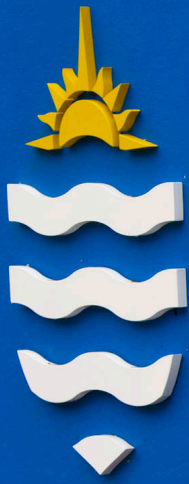




REPORT

JAMES COOK UNIVERSITY  
ECONOMIC AND HUMAN  
CAPITAL IMPACT

28 February 2018



# JAMES COOK UNIVERSITY

## AUSTRALIA

### Cairns Campus

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### Acknowledgements

WRI would like to acknowledge the assistance of Rede Consult, Cultivate Solutions and JCU staff with this report.

Photo source: James Cook University, 2013

SUMMARY OF RESULTS

**ECONOMIC IMPACT**



FTE Employment



Household Income



Economic Impact

	FTE Employment	Household Income	Economic Impact
TOWNSVILLE LGA	4,200	\$371m	\$622m
CAIRNS LGA	1,332	\$119m	\$183m
QUEENSLAND	5,450	\$512m	\$827m

**LIFETIME HUMAN CAPITAL**



Undergraduate



Postgraduate



Total

	Undergraduate	Postgraduate	Total
PRIVATE VALUE	\$774m	\$172m	\$946m
PUBLIC VALUE	\$654m	\$145m	\$799m
TOTAL VALUE	\$1.428bn	\$318m	\$1.746bn

**ANNUAL HUMAN CAPITAL**



Undergraduate



Postgraduate



Total

	Undergraduate	Postgraduate	Total
PRIVATE VALUE	\$41m	\$15m	\$55m
PUBLIC VALUE	\$34m	\$12m	\$47m
TOTAL VALUE	\$75m	\$27m	\$102m

nb: tables may not add due to rounding

## EXECUTIVE SUMMARY

James Cook University (JCU) makes a vital contribution to the regional economy of Northern Queensland. These impacts are experienced through the direct and flow-on impacts of the organisation's income, expenditure, staff and the local expenditures of the many people the organisation brings to its regional campuses in Cairns and Townsville. The University employs over 2,000 full time equivalent (FTE) staff and produced over 2,600 graduates in 2016.

JCU also produces a large impact on the human capital of its students, whereby these students go on to utilise their tertiary education to build, create, develop, provides services and care for people. These human capital impacts also have strong economic impacts on the Queensland economy.

The Western Research Institute (WRI) was commissioned by JCU to undertake an assessment of the effects of the University in terms of:

- The economic impact of its operations in 2016 on the economies of Cairns and Townsville Local Government Areas (LGAs) as well as on the economy of the state of Queensland.
- The generation of human capital through the University's graduates in 2016.

### JCU Economic Impact

The economic effects of JCU on the economies of the Cairns and Townsville LGAs and the state of Queensland were measured in terms of full-time equivalent employment, household income and value added within each of the regions. It should be noted that the term 'economic impact' has been used in place of the term 'value added' in graphs and visual elements of this report. The impacts were based on the analysis of data for 2016 regarding:

- James Cook University's operations – JCU provided WRI with detailed information about the University's operating expenditure and income, including staff wages and the number of FTE employees.
- Capital expenditure – JCU provided information on capital expenditure for each LGA and elsewhere in QLD.
- Student expenditure – Expenditure made by JCU students living at the Cairns and Townsville campuses.
- Graduation expenditure – Expenditure made by non-local guests of graduates attending ceremonies at each campus.

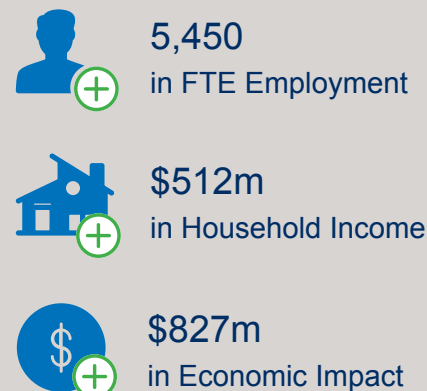
Key industry sectors with the greatest employment impacts, from JCU related expenditure, included:

- Retail trade
- Education & training
- Health care & social assistance
- Construction
- Professional, scientific & technical services

### Summary of JCU Economic Impact

	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Townsville	4,200	371.2	622.3
Cairns	1,332	119.1	183.3
Queensland	5,450	512.5	827.2

JCU's economic impact at the Queensland state level has been estimated as:



### JCU Human Capital

The Oxford English Dictionary defines ‘Human Capital’ as “the skills the labour force possesses and is regarded as a resource or asset”. As more knowledgeable and skilful workers join the work force, the overall productive capacity of labour is enhanced.<sup>1</sup> Human capital is widely accepted as a key driver of productivity growth in economies.<sup>2</sup>

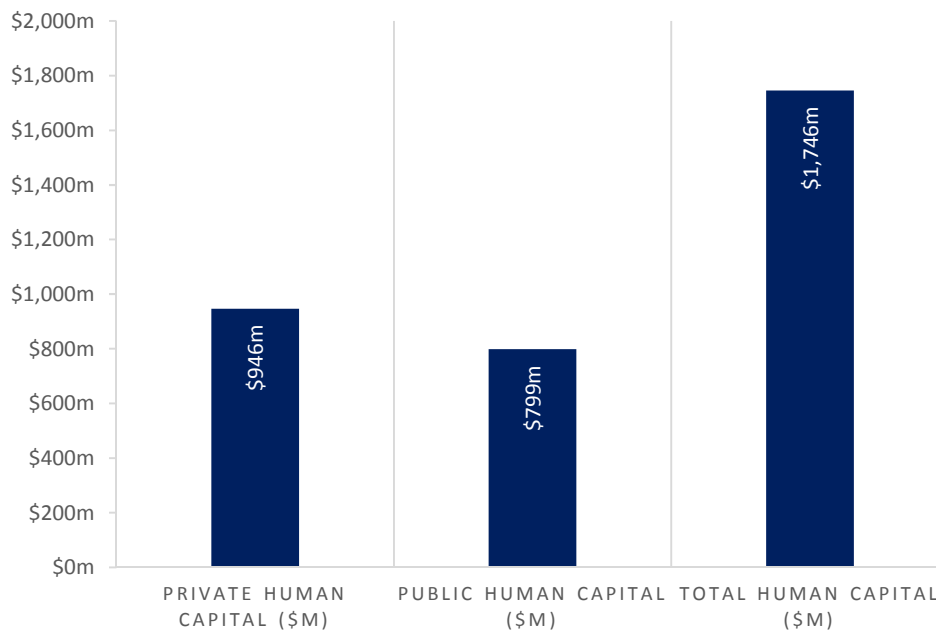
Universities are crucial in developing human capital, especially in regional areas. The presence of graduates in a region demonstrably contributes higher wages and lower unemployment rates, and provides an educated workforce. Ultimately, this contribution to human capital is an important catalyst for growth, economic activity and wellbeing in regional areas.

The lifetime value of human capital for JCU’s 2016 graduates has been calculated in terms of private value (employee captured) and public value (employer captured).<sup>3</sup> The combined total public and private value of graduates that completed studies at JCU in 2016 is approximately \$1.746 billion over their working life.

**\$1.746 billion**

The estimated total lifetime human capital value of all JCU’s 2016 graduates.

Total Lifetime Human Capital of JCU’s 2016 Graduates



The private human capital value of JCU’s 2016 graduates is estimated at \$946 million over their working life. This consists of:

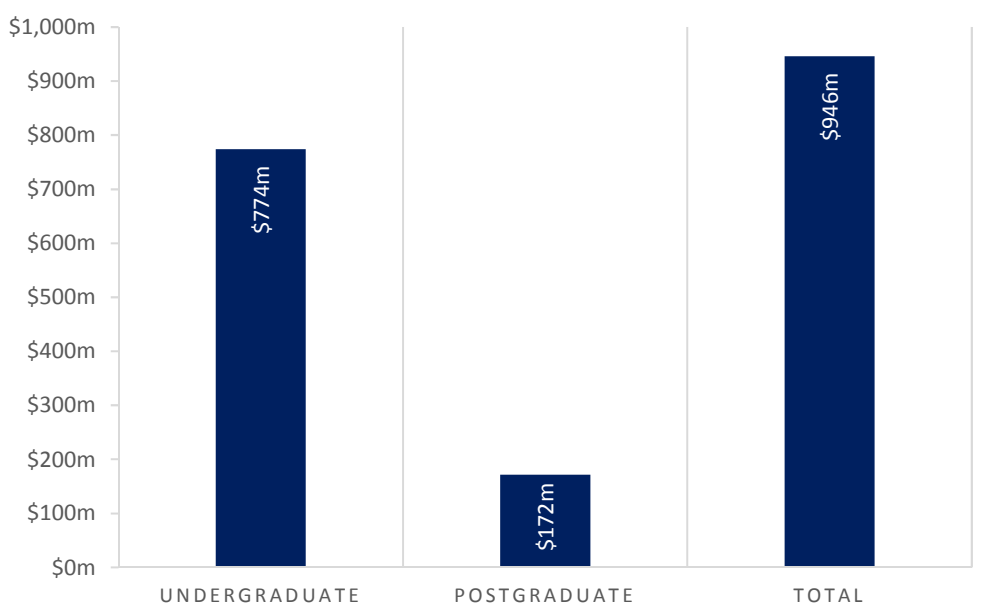
- \$774 million in Undergraduate completions over and above that realised for people without university qualifications; and
- \$172 million in Postgraduate completions over and above that realised for people with an Undergraduate degree.

1 Australian Bureau of Statistics, Catalogue No. 1370.0 - Measures of Australia’s Progress, 2010. Accessed 30 November 2017

2 Australian Bureau of Statistics, Catalogue No. 1370.0 - Measures of Australia’s Progress, 2010. Accessed 30 November 2017

3 In order to undertake this analysis it is assumed that: a JCU graduate is a person who completed studies at JCU in 2016; working life is 26 years to 65 years for Undergraduates and 36 to 65 years for Postgraduates; the discount rate applied to the calculations of present value is 4.5 percent in line with James Cook University’s current return on investments; graduates are fully employed throughout their careers; and that JCU graduates in 2016 work in QLD for their entire working life.

## Private Human Capital of JCU's 2016 Graduates – Level of Education



The public value of a university qualification is represented by the value that graduates generate for their respective employers. The calculation of the public value of human capital utilised in this report approximates an increase to Gross Operating Surplus (GOS), as reported in ABS national accounts (Gross Value Added minus compensation of employees, minus taxes on production, minus imports). The total public value of JCU's 2016 graduates over their working life was calculated to be approximately \$799 million.

**\$799 million**  
 Total Public Value of  
 JCU's 2016 Graduate  
 Human Capital.

## Annual Contribution to Human Capital

In addition to the lifetime human capital value of JCU graduates, WRI also calculated the annual private and public value of JCU graduates. This figure highlights that JCU's contribution to the production of human capital has ongoing impacts for its local economy. The ongoing graduation of students from JCU creates a pipeline of human capital supporting the region, its economic development and sustainability into the future.

The annualised results are indicative of the potential productivity of JCU graduates in a single year. These values have not been discounted and do not reflect the present value of a graduate's lifetime earnings

## Total Annual Value of Human Capital

The total annual value of JCU graduates who completed studies in 2016 is \$101.9 million. This total amount is comprised of the private annual value of human capital and the public annual value of human capital.<sup>4</sup>

4 Further details on the methodology for calculating the annual human capital results are included in the methodology section.

## Annual Private Value of Human Capital

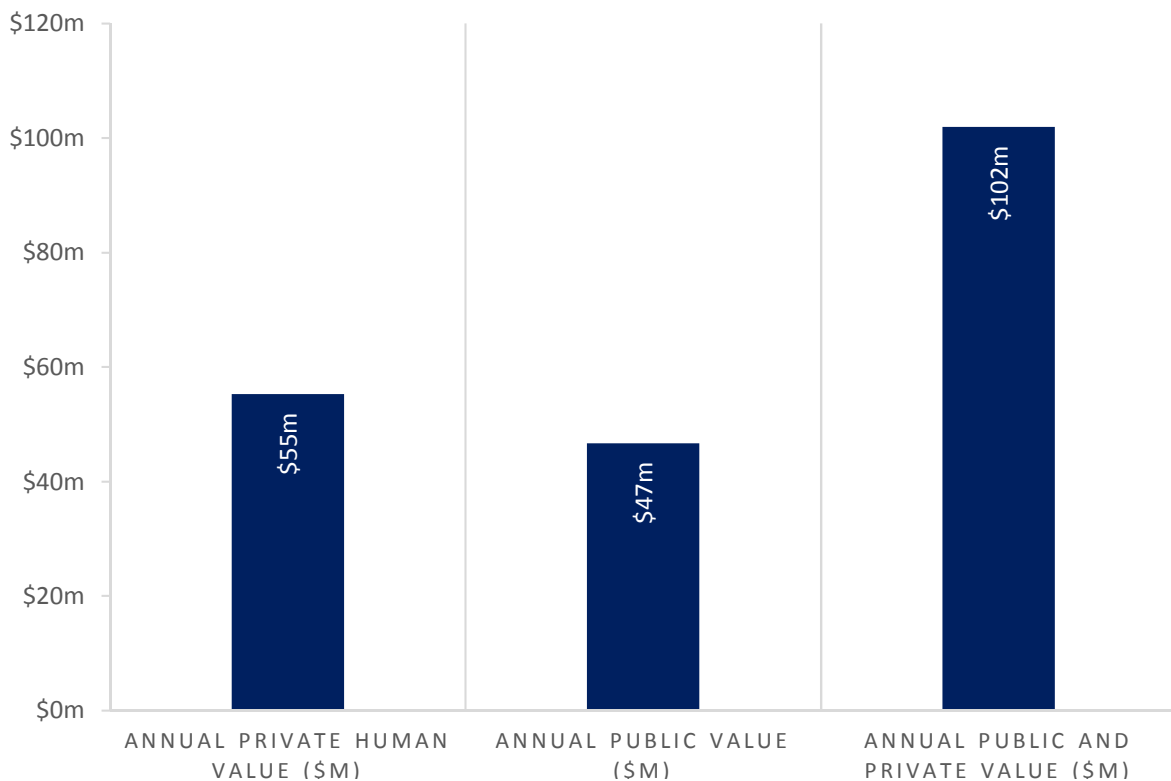
The income that a student earns after graduating from university represents the private value of holding a university qualification. The total annual private value of JCU graduates in 2016 is approximately \$55.2 million. This consists of:

- \$40.5 million in Undergraduate completions over and above that realised for people without university qualifications; and
- \$14.7 million in Postgraduate completions over and above that realised for people with an Undergraduate degree.

## Annual Public Value of Human Capital

The public value of a university qualification is represented by the value the graduate generates for their respective employers. The estimated total annual public value of JCU graduates in 2016 is approximately \$46.6 million.

## Private and Public Annual Human Capital – 2016 Graduates



## INTRODUCTION

James Cook University (JCU) makes a vital contribution to the regional economy of Northern Queensland. These impacts are experienced through the direct and flow-on impacts of the organisation's income, expenditure, staff and the local expenditures of the many people the organisation brings to its regional campuses in Cairns and Townsville. The University employs over 2,000 full time equivalent (FTE) staff and produced over 2,600 graduates in 2016.

JCU also produces a large impact on human capital through its graduates, whereby these graduates go on to utilise their tertiary education to build, create, develop, provide services and care for people. These human capital impacts also have strong economic impacts on the Queensland economy.

The Western Research Institute (WRI) was commissioned by JCU to undertake an assessment of the effects of the University in terms of:

- The economic impact of its operations in 2016 on the economies of Cairns and Townsville Local Government Areas (LGAs) as well as on the economy of the state of Queensland.
- The generation of human capital through the University's graduates in 2016.







## ECONOMIC IMPACTS

The economic impact of JCU was calculated for 2016, based on the analysis of a number of different aspects of JCU's operations and expenditures. This included:

- James Cook University's operations – JCU provided WRI with detailed information about the University's operating expenditure and income, including staff wages and the number of FTE employees.
- Capital expenditure – JCU provided information on capital expenditure for each LGA and elsewhere in Queensland.
- Student expenditure – Expenditure made by JCU students living at the Cairns and Townsville campuses.
- Graduation expenditure – Expenditure made by non-local guests of graduates attending ceremonies at each campus.

Economic impacts were calculated on the basis of three regions:

- Townsville Local Government Area,
- Cairns Local Government Area, and
- Queensland State.

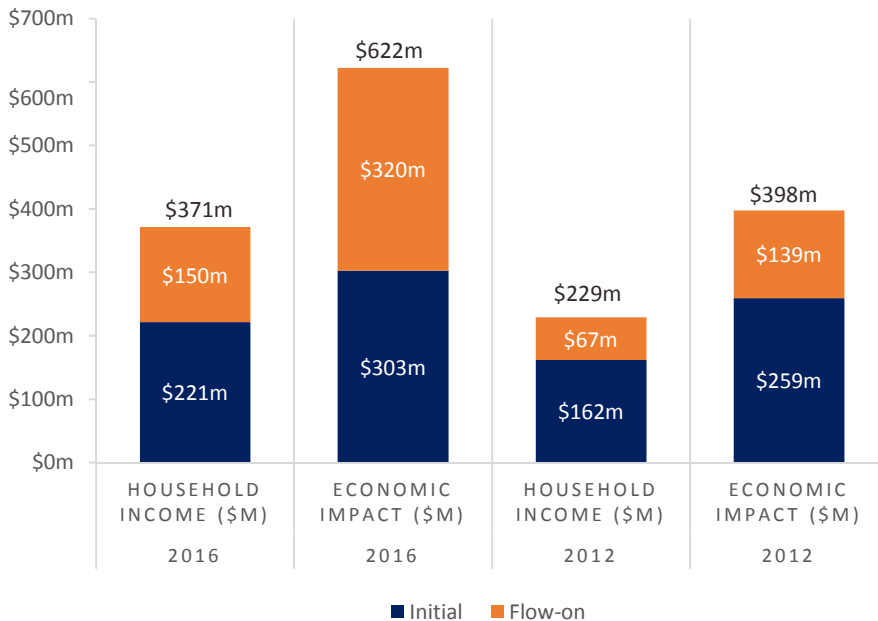
The direct economic effects of JCU and the flow-on effects on upstream industries were measured in terms of:

- FTE employment - a measure of the workload of an employed person in a given location that makes workloads comparable across different types of employment (part-time and full-time including both permanent and casual employees). An FTE is the hours worked by one employee on a full-time basis.
- Household income – which measures the benefit received by regional households from economic activity. It typically refers to compensation of employees but can also include income in return for productive activity such as the gross mixed income of unincorporated enterprises, gross operating surplus on dwellings owned by the person, and property income receivable and transfers receivable such as social assistance benefits and non-life insurance claims.
- Value-added – equal to gross output minus intermediate inputs. Value added is equivalent to the contribution to gross regional product (GRP - the local equivalent of gross domestic product). That is, value added is the difference between production (excluding the compensation of employees, gross operating surplus, taxes and imports) and the value of sales turnover. It should be noted that the term 'economic impact' has been used in place of the term 'value added' in graphs and visual elements of this report.

Of note, the 2016 economic impact modelling results include a change to the methodology utilised in the calculation of the 2011 and 2012 results. Previous economic impact analysis used the Simulating Impacts on Regional Economies (SIRE) model, which is a superior model for estimating the impacts of new activity within an economy. The decision was made to utilise standard input-output modelling methods in the 2016 analysis, rather than SIRE, as the standard method better reflects the impacts of an organisation that already exists in a given economy. The impact analysis does, however, incorporate empirically-derived marginal rather than average household income coefficients to remove the linearity associated with traditional input-output modelling.

The methodology used in the 2016 analysis has resulted in an increased estimate of the flow-on impacts from expenditure and employment. These larger flow-on impacts can be seen in the comparison of 2012 and 2016 results.

## TOWNSVILLE ECONOMIC IMPACT



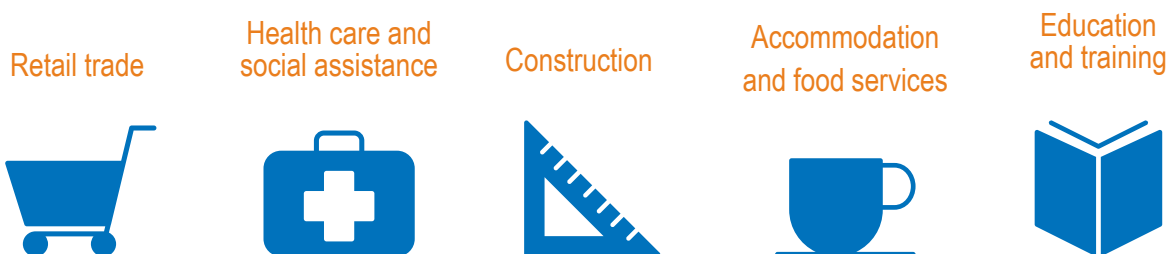
JCU's economic impact at the Townsville LGA level has been estimated as:

- 4,200** in FTE Employment
- \$371m** in Household Income
- \$622m** in Economic Impact

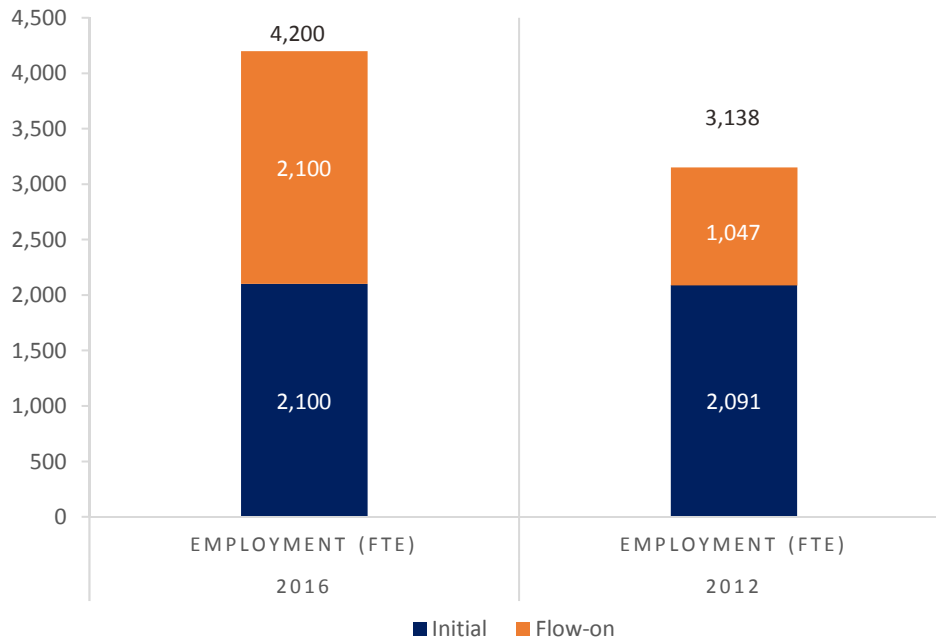
Overall, the 2016 results show strong growth in JCU's Value Added and Household Income impact, growing 56 and 62 percent, respectively. JCU continues to account for a large proportion of economic activity in the Townsville LGA, creating approximately 5.5 – 6.5 percent of economic activity across measures of Value Added, Household Income and FTE Employment. JCU now makes up a larger proportion of the Townsville economy compared with 2012 results. Indeed, JCU's Value Added contribution to the Townsville LGA economy has grown by 27 percent between 2012 and 2016 and now contributes 5.6 percent of the region's Value Added.

### Industry Employment Impacts

Key industry sectors with the greatest employment impacts, from JCU related expenditure, included:



Comparison of JCU Townsville FTE Employment 2012 – 2016



JCU contribution to initial employment in 2016 is steady compared with 2012 results, although total employment has increased by approximately 34 percent due to higher flow-on employment impacts. Initial employment is made up of JCU employees and people directly employed as a result of JCU capital expenditures, student and graduation expenditures. JCU’s Townsville initial employment mix has changed with 13 percent fewer JCU employees, but greater employment impacts through higher capital expenditure and student expenditure.

JCU economic impact results for the various modelled expenditure types have been provided below in table format.

Total JCU Economic Impact

Total JCU Economic Impact (as shown in the graphs above), including the above operational capital, student and graduation expenditure was found to have the following impacts on the Townsville economy:

Townsville	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	2,100	221.5	302.7
Flow-on	2,100	149.7	319.6
<b>Total</b>	<b>4,200</b>	<b>371.2</b>	<b>622.3</b>
<b>% of region</b>	<b>5.59%</b>	<b>6.52%</b>	<b>5.63%</b>

## JCU Operations

JCU Operations, including income, operational expenditure and staffing were found to have the following impacts on the Townsville economy:

Townsville	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	1,503	185.6	231.8
Flow-on	1,277	88.5	192.5
<b>Total</b>	<b>2,780</b>	<b>274.0</b>	<b>424.3</b>
<b>% of region</b>	<b>3.70%</b>	<b>4.81%</b>	<b>3.84%</b>

## JCU Capital Expenditure

JCU Capital Expenditure, principally made on buildings and infrastructure, were found to have the following impacts on the Townsville economy:

Townsville	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	212	15.1	24.2
Flow-on	432	32.3	65.8
<b>Total</b>	<b>644</b>	<b>47.4</b>	<b>90.0</b>
<b>% of region</b>	<b>0.86%</b>	<b>0.83%</b>	<b>0.81%</b>

## JCU Student Expenditure

JCU Student Expenditure, for students who moved to Townsville for the purpose of study or remained in Townsville to study rather than moving to another university location, was found to have the following impacts on the Townsville economy:

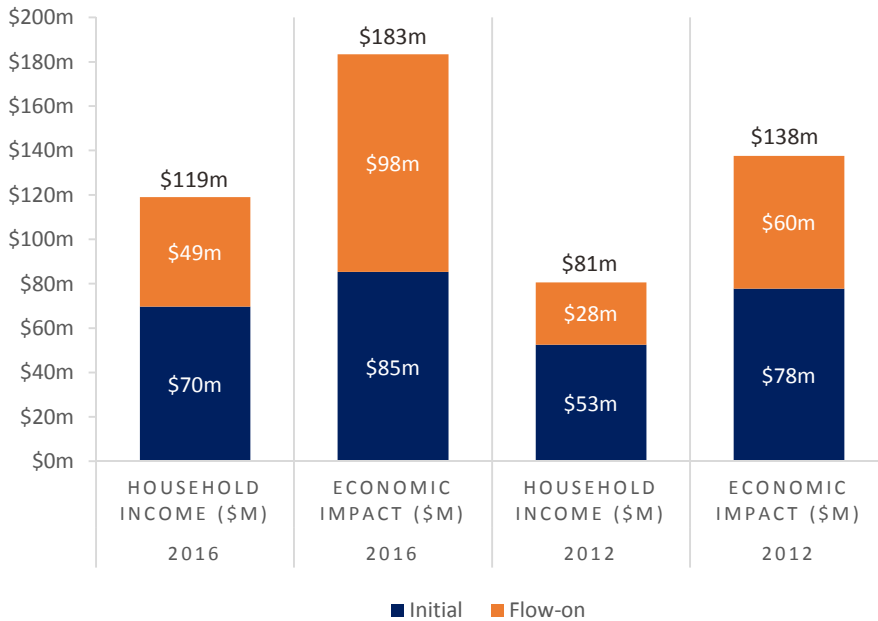
Townsville	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	382	20.7	46.4
Flow-on	388	28.7	60.8
<b>Total</b>	<b>770</b>	<b>49.4</b>	<b>107.1</b>
<b>% of region</b>	<b>1.02%</b>	<b>0.87%</b>	<b>0.97%</b>

## JCU Graduation Expenditure

JCU Graduation Expenditure, made by students, friends and family attending JCU student graduations, was found to have the following impacts on the Townsville economy:

Townsville	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	4	0.17	0.29
Flow-on	3	0.22	0.46
<b>Total</b>	<b>7</b>	<b>0.38</b>	<b>0.75</b>
<b>% of region</b>	<b>0.01%</b>	<b>0.01%</b>	<b>0.01%</b>

## CAIRNS ECONOMIC IMPACT



JCU's economic impact at the Cairns LGA level has been estimated as:

**1,332** in FTE Employment

**\$119m** in Household Income

**\$183m** in Economic Impact

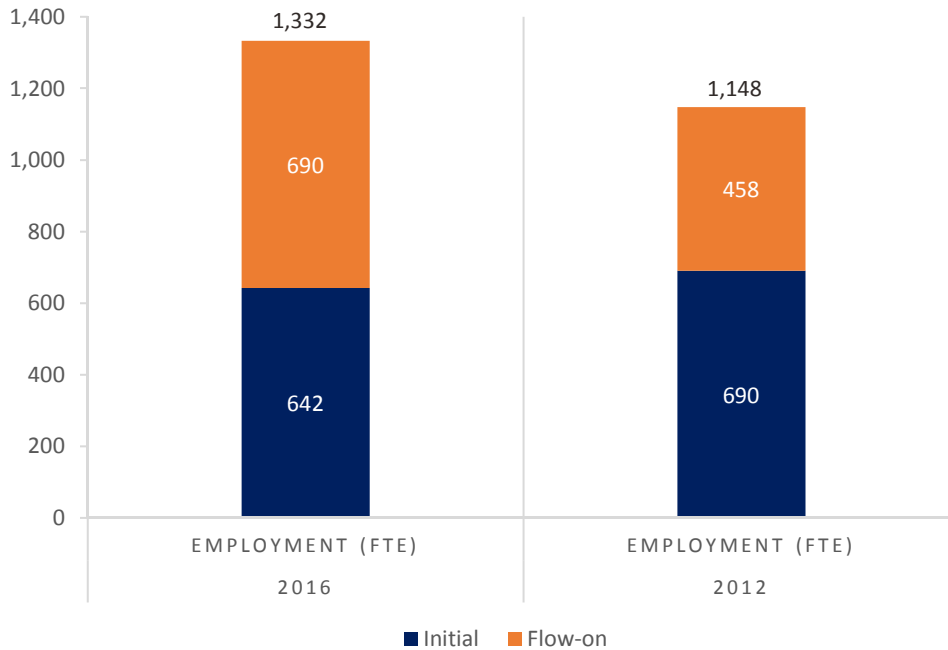
Overall, the 2016 results show good growth in JCU's Value Added and Household Income impact, growing 33 and 48 percent, respectively. JCU continues to account for a relatively large proportion of economic activity in the Cairns LGA, creating approximately 2 – 2.5 percent of economic activity across measures of Value Added, Household Income and FTE Employment. Indeed, JCU's Value Added contribution to the Cairns LGA economy has grown by 18 percent between 2012 and 2016 and now contributes 2.1 percent of the region's Value Added.

### Industry Employment Impacts

Key industry sectors with the greatest employment impacts, from JCU related expenditure, included:



## Comparison of JCU Cairns FTE Employment 2012 – 2016



JCU contribution to initial employment in 2016 is down slightly compared with 2012 results, although total employment has increased due to higher flow-on employment impacts. Initial employment is made up of JCU employees and people directly employed as a result of JCU capital expenditures, student and graduation expenditures. The drop in initial employment is comprised of a 5 percent decrease in JCU employees in the region and a significant drop in capital expenditure.

JCU economic impact results for the various modelled expenditure types have been provided below in table format.

### Total JCU Economic Impact

Total JCU Economic Impact (as shown in the graphs above), including the above operational capital, student and graduation expenditure was found to have the following impacts on the Cairns economy:

Cairns	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	642	69.7	85.3
Flow-on	690	49.4	98.0
<b>Total</b>	<b>1,332</b>	<b>119.1</b>	<b>183.3</b>
<b>% of region</b>	<b>2.17%</b>	<b>2.61%</b>	<b>2.07%</b>



### JCU Operations

JCU Operations, including income, operational expenditure and staffing were found to have the following impacts on the Cairns economy:

Cairns	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	477	60.6	65.5
Flow-on	523	37.2	72.5
<b>Total</b>	<b>1,000</b>	<b>97.8</b>	<b>138.0</b>
<b>% of region</b>	<b>1.63%</b>	<b>2.14%</b>	<b>1.56%</b>

### JCU Capital Expenditure

JCU Capital Expenditure, principally made on buildings and infrastructure, were found to have the following impacts on the Cairns economy:

Cairns	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	31	1.6	2.6
Flow-on	28	2.0	4.2
<b>Total</b>	<b>58</b>	<b>3.6</b>	<b>6.8</b>
<b>% of region</b>	<b>0.10%</b>	<b>0.08%</b>	<b>0.08%</b>

### JCU Student Expenditure

JCU Student Expenditure, for students who moved to Cairns for the purpose of study or remained in Cairns to study rather than moving to another university location, was found to have the following impacts on the Cairns economy:

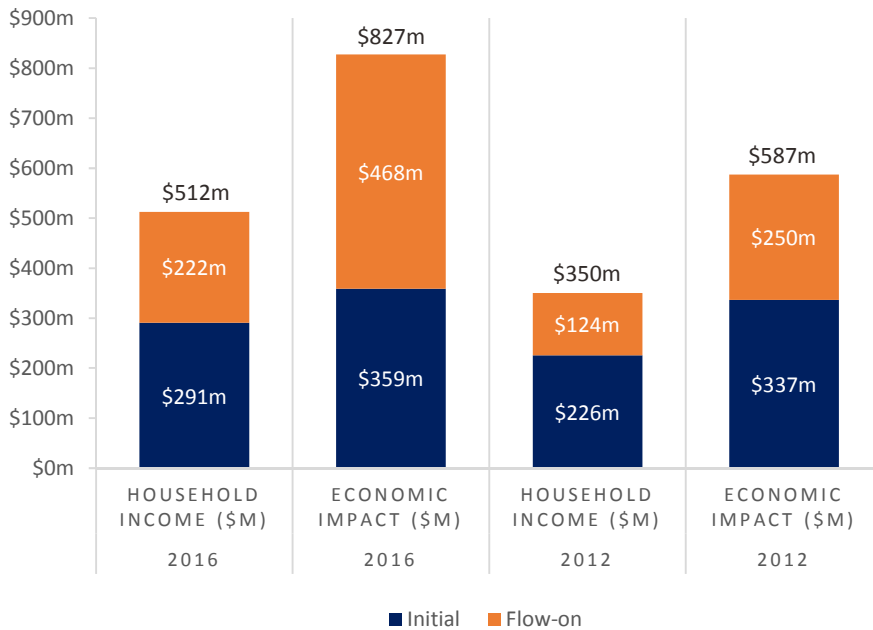
Cairns	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	134	7.5	17.1
Flow-on	138	10.1	21.2
<b>Total</b>	<b>273</b>	<b>17.6</b>	<b>38.3</b>
<b>% of region</b>	<b>0.44%</b>	<b>0.38%</b>	<b>0.43%</b>

### JCU Graduation Expenditure

JCU Graduation Expenditure, made by students, friends and family attending JCU student graduations, was found to have the following impacts on the Cairns economy:


Cairns	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	1	0.03	0.06
Flow-on	1	0.04	0.08
<b>Total</b>	<b>1</b>	<b>0.07</b>	<b>0.14</b>
<b>% of region</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>


## QUEENSLAND ECONOMIC IMPACT



JCU's economic impact at the Queensland state level has been estimated as:

 **5,450**  
in FTE Employment

 **\$512m**  
in Household Income

 **\$827m**  
in Economic Impact

Comparison of 2012 and 2016 JCU economic impact results show significant growth. JCU's Queensland household income and value-added impact has increased by 46 and 41 percent, respectively.

### Industry Employment Impacts

Key industry sectors with the greatest employment impacts, from JCU related expenditure, included:

Retail trade



Education and training



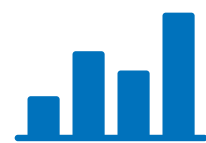
Construction



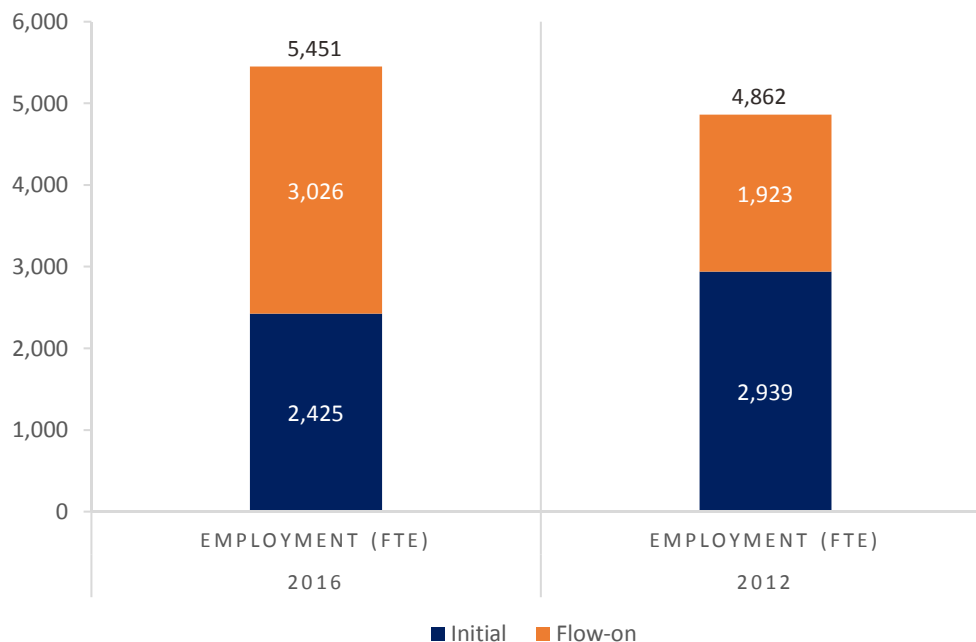
Health care and social assistance



Professional, scientific and technical services



## Comparison of JCU Queensland FTE Employment 2012 – 2016



A comparison of employment results, however, highlights that 2016 initial employment is lower than in 2012. Initial employment is made up of JCU employees and people directly employed as a result of JCU capital expenditures, student and graduation expenditures. There are two principal reasons for this decline:

- Firstly, JCU’s employment count has decreased 14 percent between 2012 and 2016.
- Secondly, this result reflects a change in methodology from the previous study and relates to the calculation of student expenditure impacts on employment, value added and household income. The 2016 methodology change was made to more accurately reflect the net impact of Queensland residents moving from one Queensland locale to a JCU campus for study.

Whereas the previous methodology summed the impact of student expenditure at the Cairns and Townsville LGA level to form the figure for the state level, the new methodology reflects the fact that many JCU students in Cairns and Townsville come from other Queensland regions. Thus, their Cairns and Townsville expenditures are of no net benefit to the Queensland economy and have not been counted as such.

JCU economic impact results for the various modelled expenditure types have been provided below in table format.

### Total JCU Economic Impact

Total JCU Economic Impact (as shown in the graphs above), including the above operational capital, student and graduation expenditure was found to have the following impacts on the Queensland economy:

Queensland	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	2,425	290.9	358.9
Flow-on	3,026	221.6	468.3
<b>Total</b>	<b>5,450</b>	<b>512.5</b>	<b>827.2</b>
<b>% of region</b>	<b>0.27%</b>	<b>0.34%</b>	<b>0.27%</b>

## JCU Operations

JCU Operations, including income, operational expenditure and staffing were found to have the following impacts on the Queensland economy:

Queensland	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	2,039	265.0	315.9
Flow-on	2,391	173.6	366.3
<b>Total</b>	<b>4,430</b>	<b>438.6</b>	<b>682.2</b>
<b>% of region</b>	<b>0.22%</b>	<b>0.29%</b>	<b>0.22%</b>

## JCU Capital Expenditure

JCU Capital Expenditure, principally made on buildings and infrastructure, were found to have the following impacts on the Queensland economy:

Queensland	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	264	19.0	28.5
Flow-on	506	38.3	80.6
<b>Total</b>	<b>769</b>	<b>57.3</b>	<b>109.1</b>
<b>% of region</b>	<b>0.04%</b>	<b>0.04%</b>	<b>0.04%</b>

## JCU Student Expenditure

JCU Student Expenditure, for students who moved to Cairns or Townsville from outside Queensland for the purpose of study, was found to have the following impacts on the Queensland economy:

Queensland	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	120	6.8	14.4
Flow-on	127	9.6	21.1
<b>Total</b>	<b>247</b>	<b>16.4</b>	<b>35.5</b>
<b>% of region</b>	<b>0.01%</b>	<b>0.01%</b>	<b>0.01%</b>

## JCU Graduation Expenditure

JCU Graduation Expenditure, made by students, friends and family attending JCU student graduations, was found to have the following impacts on the Queensland economy:

Queensland	Employment (FTE)	Household Income (\$m)	Economic Impact (\$m)
Initial	2	0.10	0.16
Flow-on	2	0.13	0.29
<b>Total</b>	<b>4</b>	<b>0.24</b>	<b>0.46</b>
<b>% of region</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>





## HUMAN CAPITAL

The Oxford English Dictionary defines ‘Human Capital’ as “the skills the labour force possesses and is regarded as a resource or asset”. As more knowledgeable and skilful workers join the work force, the overall productive capacity of labour is enhanced.<sup>5</sup> Human capital is widely accepted as a key driver of productivity growth in economies.<sup>6</sup>

Universities are crucial in developing human capital. The presence of graduates in a region demonstrably contributes higher wages and lower unemployment rates, and provides an educated workforce. Ultimately, this contribution to human capital is an important catalyst for growth, economic activity and wellbeing in regional areas.

Whilst precise methods of measuring human capital are complex, evolving and widely debated, WRI contends that broad estimates of a university’s contribution to human capital can be developed from an analysis of Census data relating to qualifications, age and income.

Human capital is comprised of two components, the private value and the public value. Excluding intangible social benefits such as cultural, health and other community benefits, human capital can be examined in terms of the increased productivity and income gains captured by employees (private value) and the Gross Operating Surplus (GOS) of this activity accruing to employers (public value).<sup>7</sup>

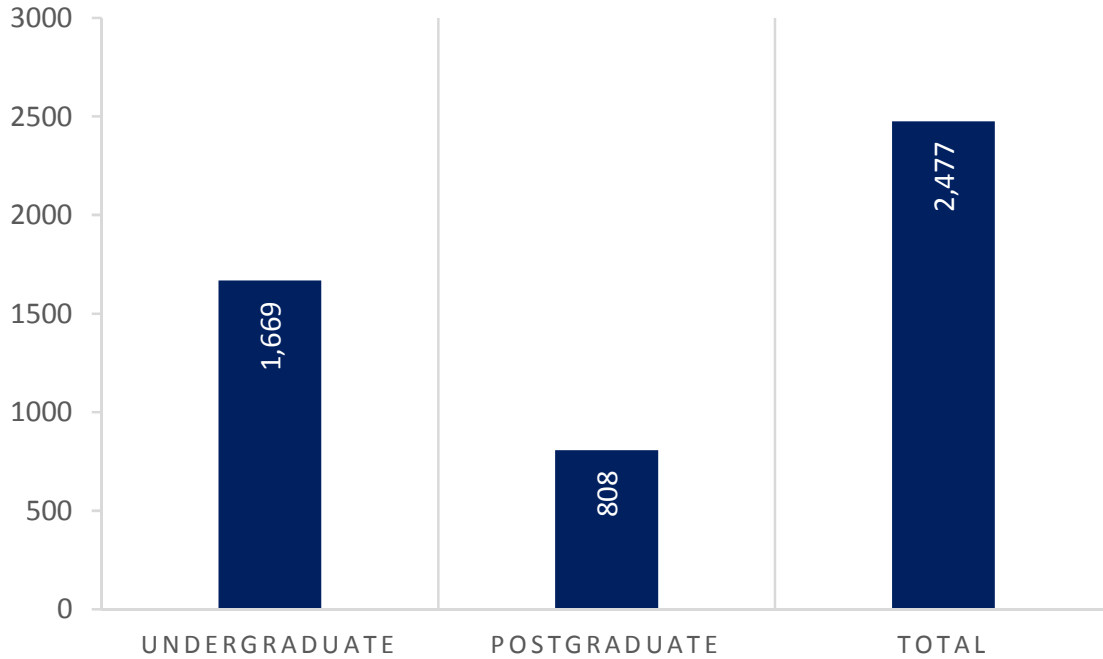
5 Australian Bureau of Statistics, Catalogue No. 1370.0 - Measures of Australia’s Progress, 2010. Accessed 30 November 2017

6 Australian Bureau of Statistics, Catalogue No. 1370.0 - Measures of Australia’s Progress, 2010. Accessed 30 November 2017

7 A full explanation of GOS is available in the methodology section of this report.

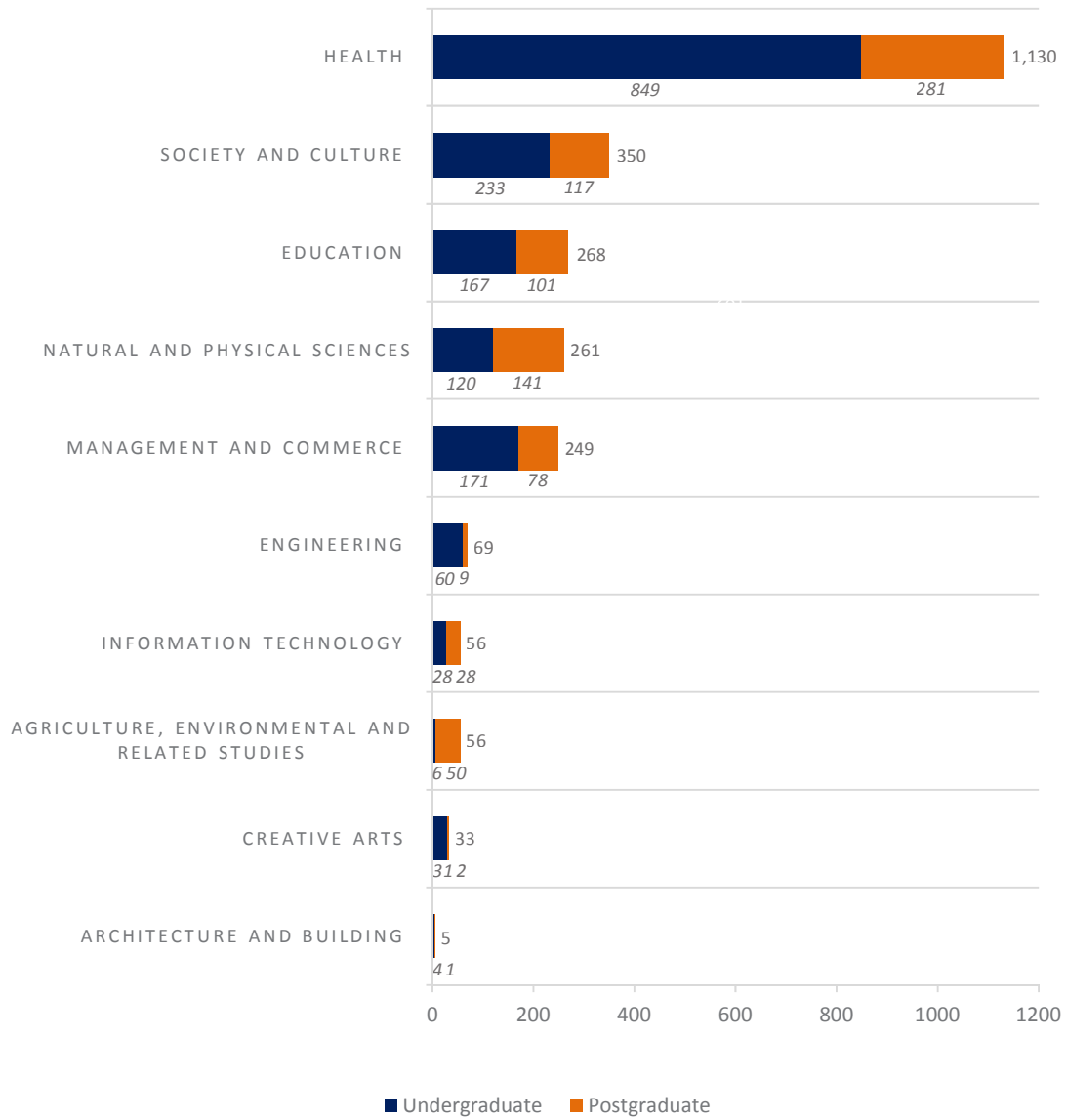
It should be noted that the value of human capital attributed to JCU in 2016 is comprised of the number of JCU graduates, their relevant field of education, average age and expected earnings.<sup>8</sup> In 2016, JCU produced 2,477 graduates, comprised of 1,669 Undergraduate completions and 808 Postgraduate completions. This is approximately ten percent lower than the number of JCU graduates in 2011 (2,749).

## 2016 JCU Graduate Breakdown



<sup>8</sup> In order to undertake this analysis, it is assumed that: a JCU graduate is a person who completed studies at JCU in 2016; working life is 26 years to 65 years for Undergraduates and 36 to 65 years for Postgraduates; the discount rate applied to the calculations of present value is 4.5 percent in line with James Cook University's current return on investments; graduates are fully employed throughout their careers; and that JCU graduates in 2016 work in QLD for their entire working life.

## 2016 JCU Graduate Breakdown by Broad Field of Education





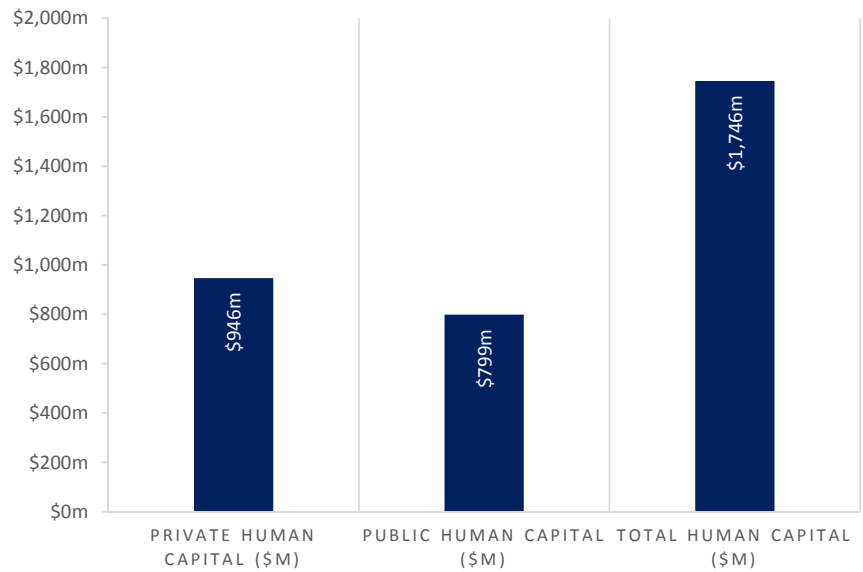
## \$1.746 billion

The estimated total public and private human capital value of all graduates that completed studies at JCU in 2016.

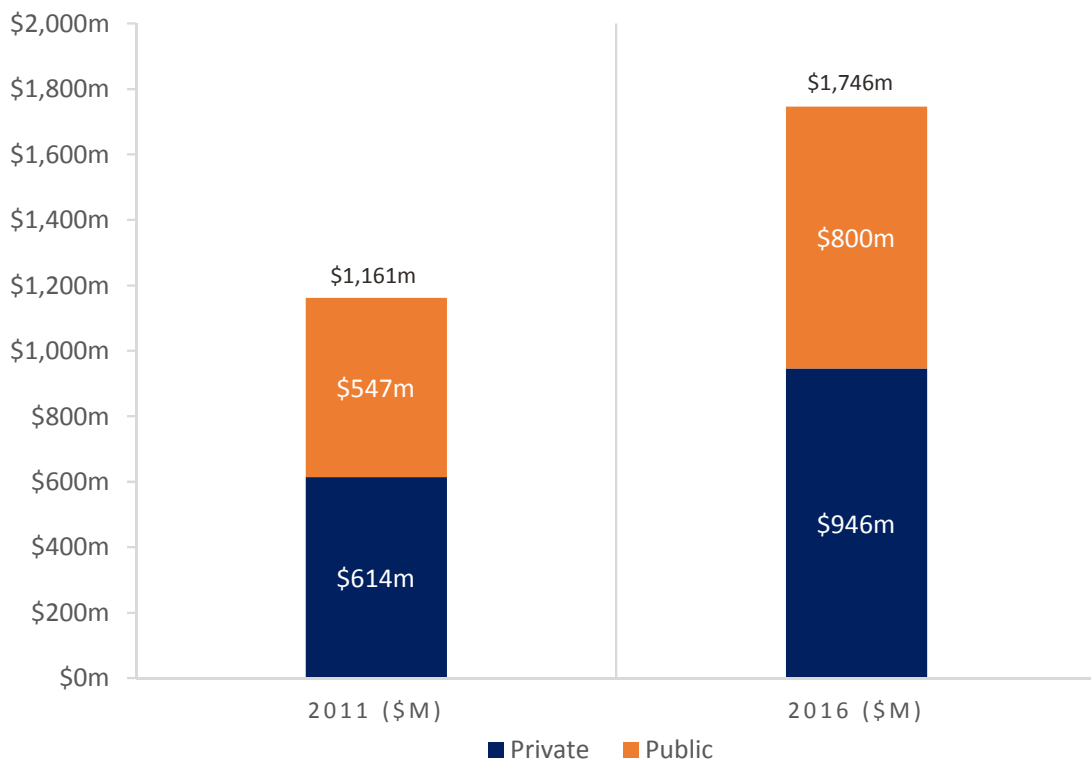
### Total Value of Human Capital

The total public and private human capital value of all graduates that completed studies at JCU in 2016 is estimated at \$1.746 billion. Overall human capital for 2016 is comprised of \$946 million in private human capital and \$799 million in public human capital – greater detail is provided on these terms below.

### Total Lifetime Human Capital, JCU's 2016 Graduates



### Human Capital Comparison 2011 - 2016



JCU's 2016 human capital of \$1.746 billion is an approximate 51 percent increase on JCU's estimated graduate human capital in 2011, of \$1.16 billion. Importantly, the methodology utilised in the 2016 human capital analysis differs from the previous human capital analysis undertaken in 2012. These methodological changes have resulted in sizable differences in the estimates of the present value of university qualifications, particularly for Postgraduate degrees.

Previous human capital calculations utilised a similar approach to the 2016 methodology, with the key difference that the 2012 methodology assumed that all JCU graduates (Undergraduate and Postgraduate) worked for 42 years (23 – 65) with that qualification. For this 2016 report, it was decided that a more appropriate methodology would be to analyse earnings of graduates from the average age of qualification (Undergraduate average age was 26, whereas Postgraduate average age was 36).

This change in methodology had a significant impact on the present value of earnings, particularly for Postgraduate earnings. This difference is mostly explained by the change in methodology relating to discounting earnings. Whereas the previous methodology started the discounting calculations at the age of 23, Postgraduate earnings for this report started the discounting process at age 36, which was the average age of Postgraduates. This meant that the larger earnings associated with individuals in more senior stages of their careers were not discounted as heavily, leading to higher present values.

Other relevant factors which have impacted on the increased private value of human capital include:

- Inflation has raised average wages in the 2011 - 2016 period.
- Changes in the real economy have impacted wages differently across industrial sectors.
- Large percentage increase in health graduates, who have a high net present value of human capital.

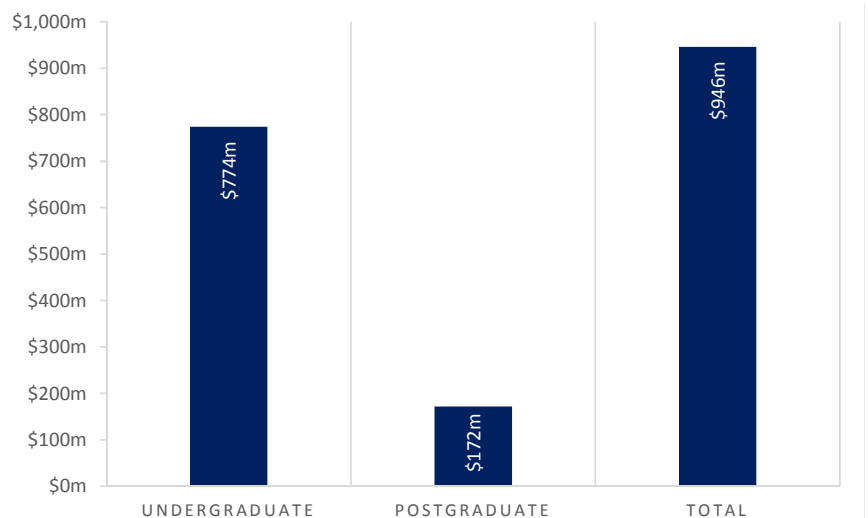
### Private Value of Human Capital, JCU's 2016 Graduates

The private value of human capital for JCU's 2016 graduates was estimated based on 2016 Census data for field of education, level of education, age and earnings. The private value of human capital has been calculated as the additional earnings JCU's 2016 graduates may expect to receive over their lifetime, owing to their tertiary education received at JCU, discounted to present day values.

**\$946 million**

The approximate lifetime private human capital value of JCU's 2016 graduates.

#### Private Value of Human Capital, JCU's 2016 Graduates by Level of Education



Utilising the average age of JCU 2016 graduates for different levels of education, increased earnings were attributed to JCU graduates according to their field and level of education. For example, a student graduating with a Postgraduate degree in engineering can be expected to have increased earnings from their age of graduation (36 years old was the average age of Postgraduates completing their studies at JCU in 2016) up to the age of 65, when they may be expected to retire. These earnings were discounted to their present value to arrive at the private value of human capital owing to each degree type and field of education, minus the average earnings of a person with no degree or a lower level degree.

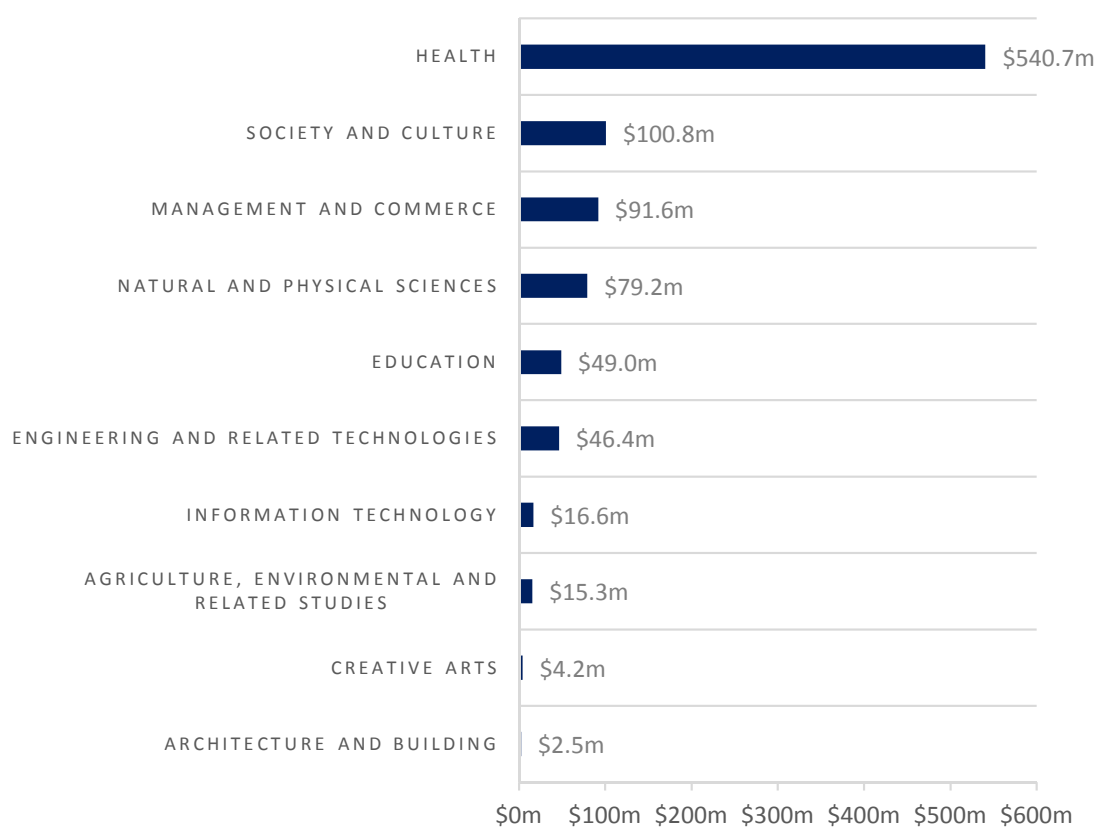
The human capital analysis undertaken for this report indicates that the lifetime private human capital value of JCU's 2016 graduates is approximately \$946 million, which is approximately 54 percent higher than the 2011 private human capital result of \$614 million. The 2016 private human capital result consists of:

- \$774 million in Undergraduate degree earnings over and above individuals without university qualifications.
- \$172 million in additional Postgraduate degree earnings over and above individuals with an Undergraduate degree.

When considered by field of education, Health, Society and Culture and Management and Commerce were the fields with the highest private human capital for the JCU graduates of 2016.

## ECONOMIC & HUMAN CAPITAL IMPACT

### Total Private Value of Human Capital, JCU's 2016 graduates by Field of Education



The tables below provide in-depth information on JCU 2016 graduate human capital, by level and field of education for the:

- number of JCU graduates,
- private value of each graduate, and
- the total present value of all 2016 JCU graduates.

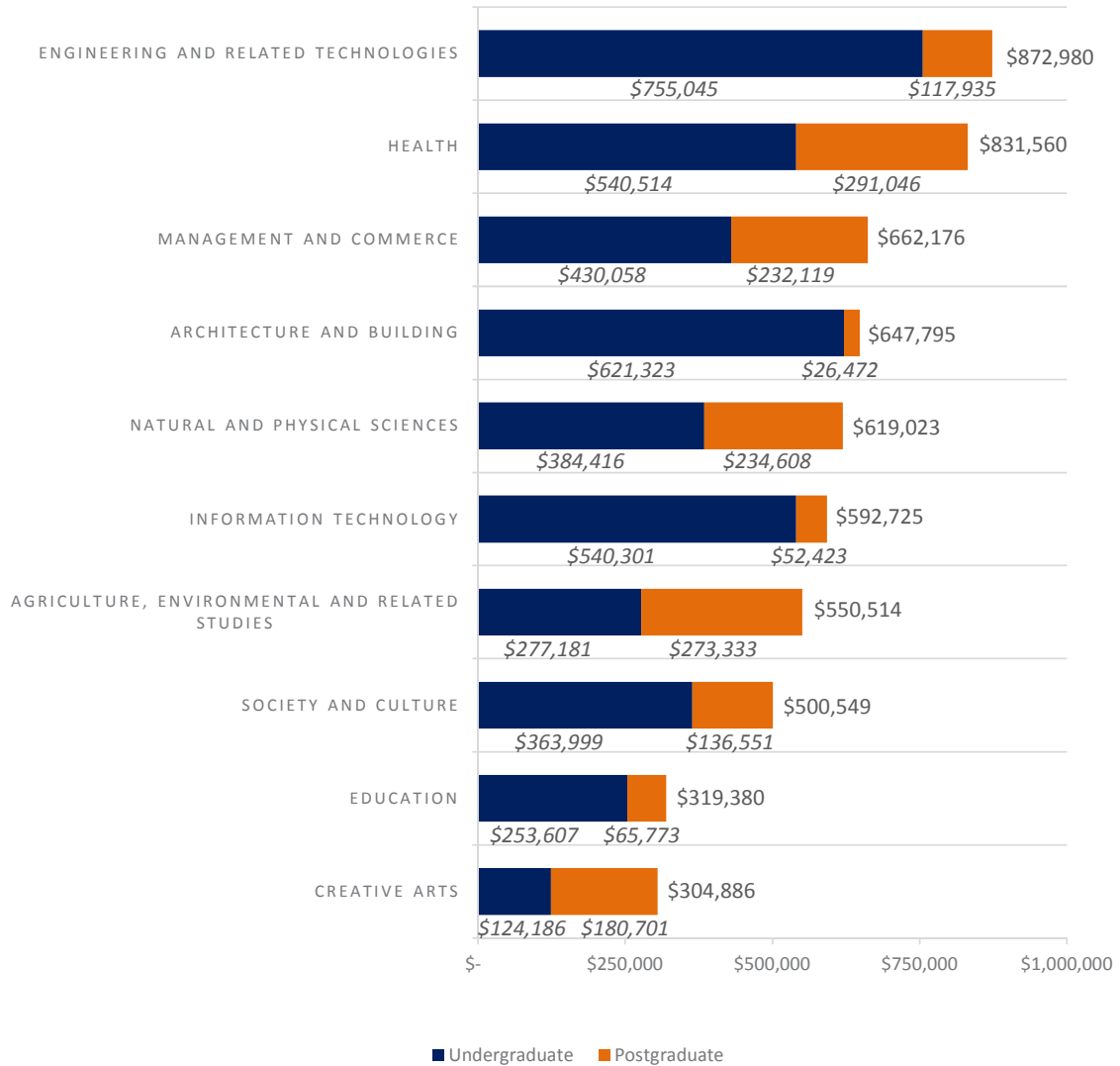
Undergraduate	JCU Completions	Private Value per Completion	Present Value
Health	849	\$ 540,514	\$ 458,896,302
Society and Culture	233	\$ 363,999	\$ 84,811,708
Management and Commerce	171	\$ 430,058	\$ 73,539,844
Natural and Physical Sciences	120	\$ 384,416	\$ 46,129,862
Engineering and Related Technologies	60	\$ 755,045	\$ 45,302,710
Education	167	\$ 253,607	\$ 42,352,447
Information Technology	28	\$ 540,301	\$ 15,128,439
Creative Arts	31	\$ 124,186	\$ 3,849,753
Architecture and Building	4	\$ 621,323	\$ 2,485,292
Agriculture, Environmental and Related Studies	6	\$ 277,181	\$ 1,663,086
<b>Total</b>	<b>1,669</b>	<b>Total</b>	<b>\$ 774,159,442</b>

Postgraduate	JCU Completions	Private Value per Completion	Present Value
Health	281	\$291,046	\$81,784,063
Natural and Physical Sciences	141	\$234,608	\$33,079,721
Management and Commerce	78	\$232,119	\$18,105,253
Society and Culture	117	\$136,551	\$15,976,436
Agriculture, Environmental and Related Studies	50	\$273,333	\$13,666,636
Education	101	\$65,773	\$6,643,069
Information Technology	28	\$52,423	\$1,467,853
Engineering and Related Technologies	9	\$117,935	\$1,061,413
Creative Arts	2	\$180,701	\$361,402
Architecture and Building	1	\$26,472	\$26,472
<b>Total</b>	<b>808</b>	<b>Total</b>	<b>\$172,172,318</b>

Total	JCU Completions	Present Value
Health	1,130	\$540,680,365
Society and Culture	350	\$100,788,144
Management and Commerce	249	\$91,645,097
Natural and Physical Sciences	261	\$79,209,582
Education	268	\$48,995,516
Engineering and Related Technologies	69	\$46,364,123
Information Technology	56	\$16,596,292
Agriculture, Environmental and Related Studies	56	\$15,329,722
Creative Arts	33	\$4,211,154
Architecture and Building	5	\$2,511,764
<b>Total</b>	<b>2,477</b>	<b>\$946,331,760</b>

# ECONOMIC & HUMAN CAPITAL IMPACT

## Present Value of JCU Completions 2016



**\$799 million**

Total Public Value of JCU  
2016 Graduate Human  
Capital.

### Public Value of JCU Graduate Human Capital

In addition to the increase in private human capital (discussed above), university education creates human capital with a public value. University education provides workers with the skills to generate increased value in the organisations for which they work. The value generated in an organisation by university graduates can be witnessed through the increased operating surpluses (a measure that is closely related to profits) an organisation makes and can be referred to as the public value of human capital.

Undergraduate degree holders, on average, earn higher wages than non-degree holders, and Postgraduate degree holders, on average, earn higher wages than Undergraduate degree holders. The wage premiums accruing to graduates reflect differences in productivity. This difference in productivity also results in increased operating surpluses for organisations employing graduates. The value of this extra productivity can be measured by assuming that the benefits are distributed between the employee (graduate) and the employer in the same ratio as wages (compensation of employment) to Gross Operating Surplus (GOS)<sup>9</sup> in any given economy.

This measure is consistent with the human capital calculations utilised in the 2013 JCU Economic Impact and Human Capital Report and is thought to be a good approximation of the value that human capital derives for a business. On this basis, it does not include taxes or imports payable. It should be noted that taxes may be viewed as having social benefit, which has not been addressed in this report.

Based on ABS National Accounts data, a ratio can be established between wages and GOS in Queensland. In 2016, the ratio of wages to GOS was 0.54. Utilising this ratio and the above data on the present value of JCU graduate earnings, the public value of JCU graduate human capital can be assessed. Based on these assumptions, WRI calculated the total public value of JCU's graduates in 2016 over their working life to be approximately \$799.7 million. This equates to an approximate 46 percent growth in the public value of JCU graduate human capital from the 2011 result of \$546.9 million.

Information on the methodology used to calculate the public value of human capital can be viewed in the methodology section of this report.

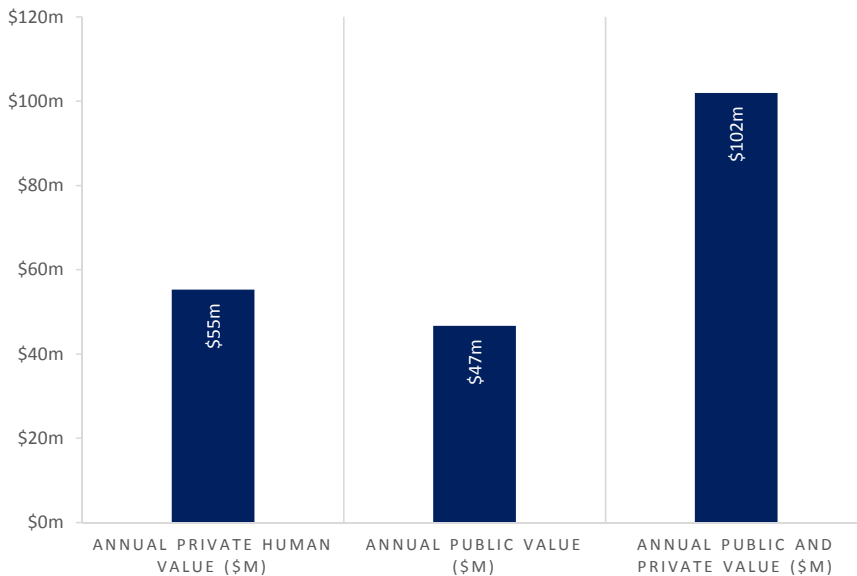
### Annual Contribution to Human Capital

In addition to the lifetime human capital value of JCU graduates, WRI also calculated the annual private and public value of JCU graduates. The annualised results are indicative of the potential productivity of JCU's 2016 graduates in a single year. It should be noted that these values have not been discounted, and do not reflect the present value of future graduate earnings. Cross-sectional data from the 2011 Census was used to estimate the annualised private and public value of JCU graduates in 2016.

<sup>9</sup> GOS is a measure utilised in ABS national accounts defined as gross value added minus compensation of employees, minus taxes on production and imports payable plus subsidies receivable. Australian Bureau of Statistics, Release No. 5216.0 - Australian National Accounts: Concepts, Sources and Methods, 2000. Accessed 21February 2018

## Total Annual Value of Human Capital

The annual private and public value of JCU graduates who completed studies in 2016 is \$101.9 million. This total amount is comprised of the private annual value of human capital and the public annual value of human capital.



**\$101.9 million**

The annual private and public value of JCU graduates who completed studies in 2016.

## Annual Private Value of Human Capital

The income that a student earns after graduating from university represents the private value of holding a university qualification. The total annual private value of JCU graduates in 2016 is approximately \$55.2million. This consists of:

- \$40.5 million in Undergraduate completions over and above that realised for people without university qualifications; and
- \$14.7 million in Postgraduate completions over and above that realised for people with an Undergraduate degree.

## Annual Public Value of Human Capital

The public value of a University qualification is represented by the value the graduate generates for their respective employers. The estimated total annual public value of JCU graduates in 2016 is approximately \$46.6 million.



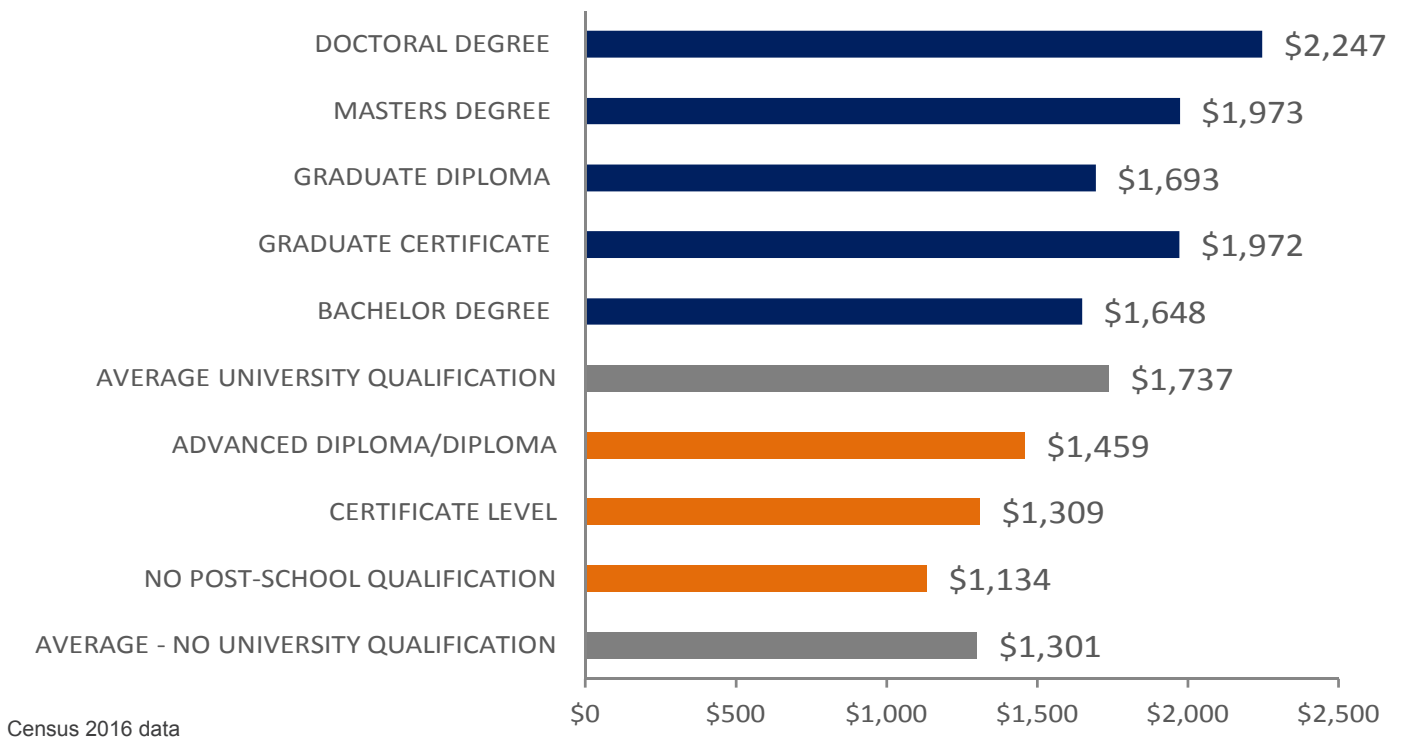
## Average Weekly Income by Level of Education

Further analysis was undertaken to illustrate the underlying issues at work in the above human capital analysis. Census 2016 data for average incomes by level of education were examined across Queensland and the Cairns and Townsville Local Government Areas (LGAs). The graphs below depict the average incomes of various university qualification levels with other or no post school qualifications.

These graphs illustrate the impact of education on average earning capacity. Interestingly, this data highlights that Townsville has higher average wages for most education levels when compared to Queensland state and Cairns LGA averages. A further interesting insight is that Graduate Certificate holders, on average, earn higher incomes than individuals with a Bachelor degree, Graduate Diploma or Masters degree.

Combined, these graphs illustrate why JCU graduates will bolster their careers and earning power through the development of their human capital

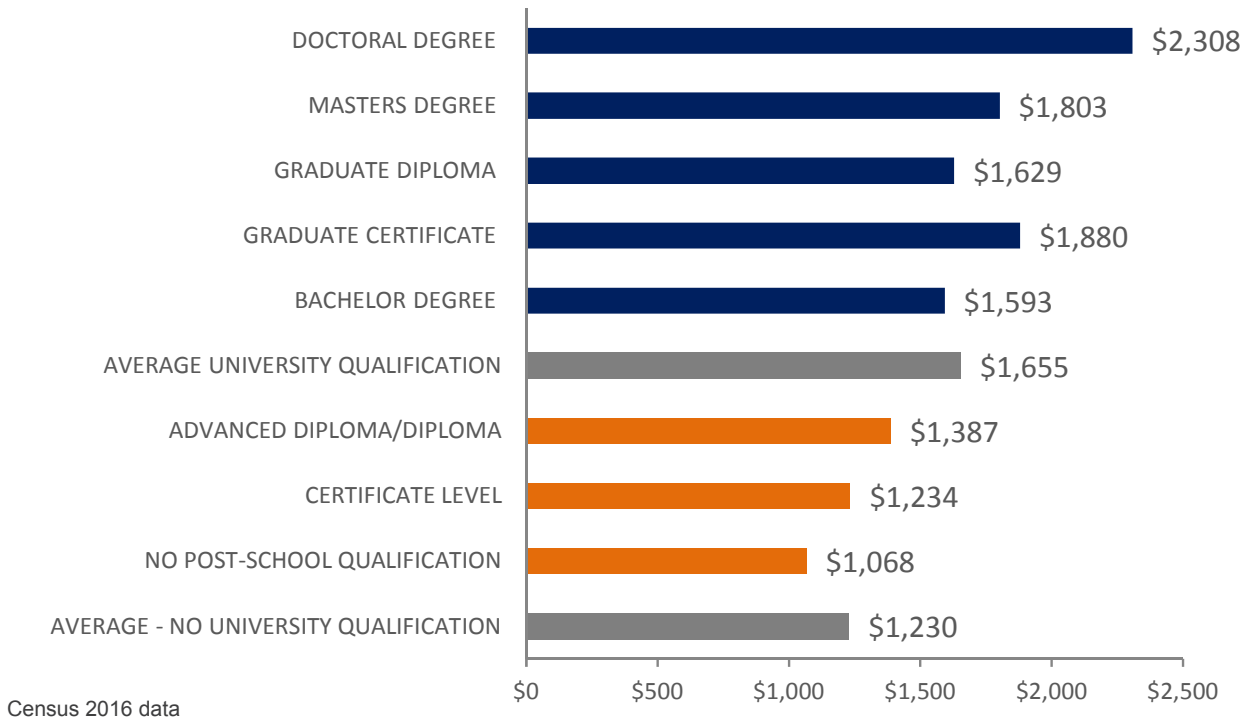
## Townsville – Average weekly income by qualification level



Key points are as follows:

- On average, a person with a university qualification can earn \$437 more in gross weekly income than those with no university qualification.
- Those with a Bachelor degree can earn, on average, \$348 more.
- Those with a Graduate Certificate can earn, on average, \$671 more.
- Those with a Graduate Diploma can earn, on average, \$393 more.
- Those with a Masters degree can earn, on average, \$672 more.
- Those with a Doctoral degree can earn, on average, \$946 more.

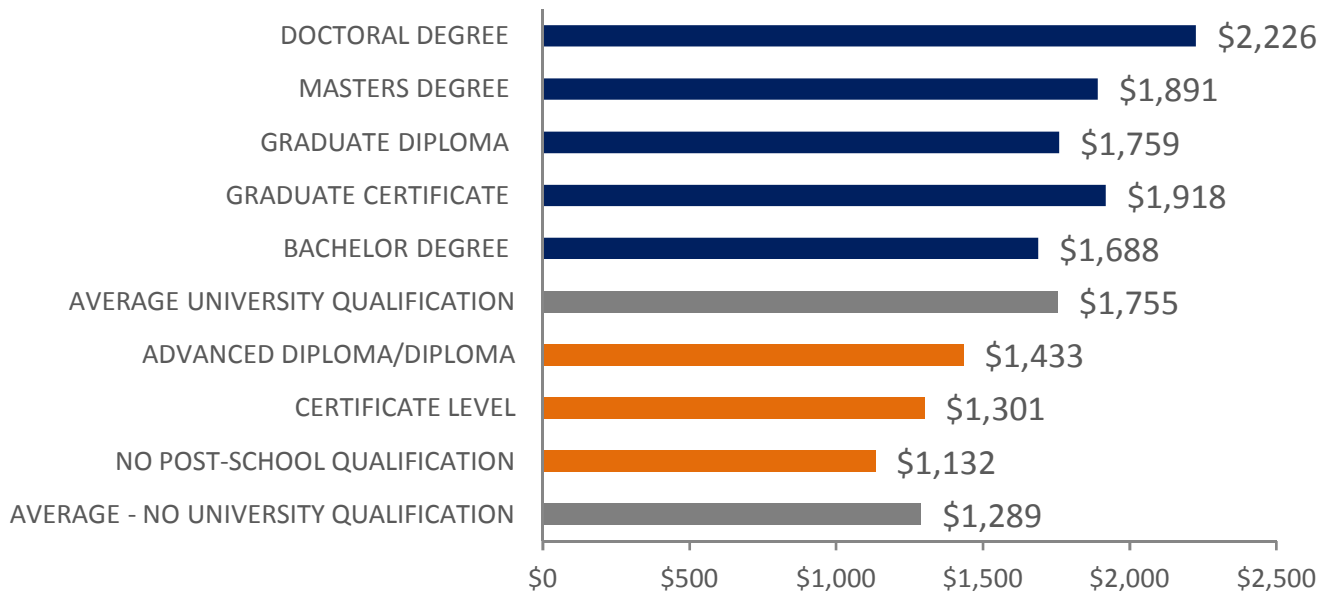
## Cairns - Average weekly income by qualification level



### Key points are as follows:

- On average, a person with a university qualification can earn \$426 more in gross weekly income than those with no university qualification.
- Those with a Bachelor degree can earn, on average, \$364 more.
- Those with a Graduate Certificate can earn, on average, \$650 more.
- Those with a Graduate Diploma can earn, on average, \$399 more.
- Those with a Masters degree can earn, on average, \$573 more.
- Those with a Doctoral degree can earn, on average, \$1079 more.

## Queensland - Average weekly income by qualification level



Census 2016 data

Key points are as follows:

- On average, a person with a university qualification can earn \$467 more in gross weekly income than those with no university qualification.
- Those with a Bachelor degree can earn, on average, \$400 more.
- Those with a Graduate Certificate can earn, on average, \$629 more.
- Those with a Graduate Diploma can earn, on average, \$471 more.
- Those with a Masters degree can earn, on average, \$602 more.
- Those with a Doctoral degree can earn, on average, \$937 more.

## Average Unemployment by Level of Education

In addition to increased earning capacity, the increase in human capital associated with tertiary education makes an individual less likely to be unemployed. Average levels of unemployment were analysed for different levels of education in Queensland and for the Cairns and Townsville LGAs to understand the impact of education on employment levels.

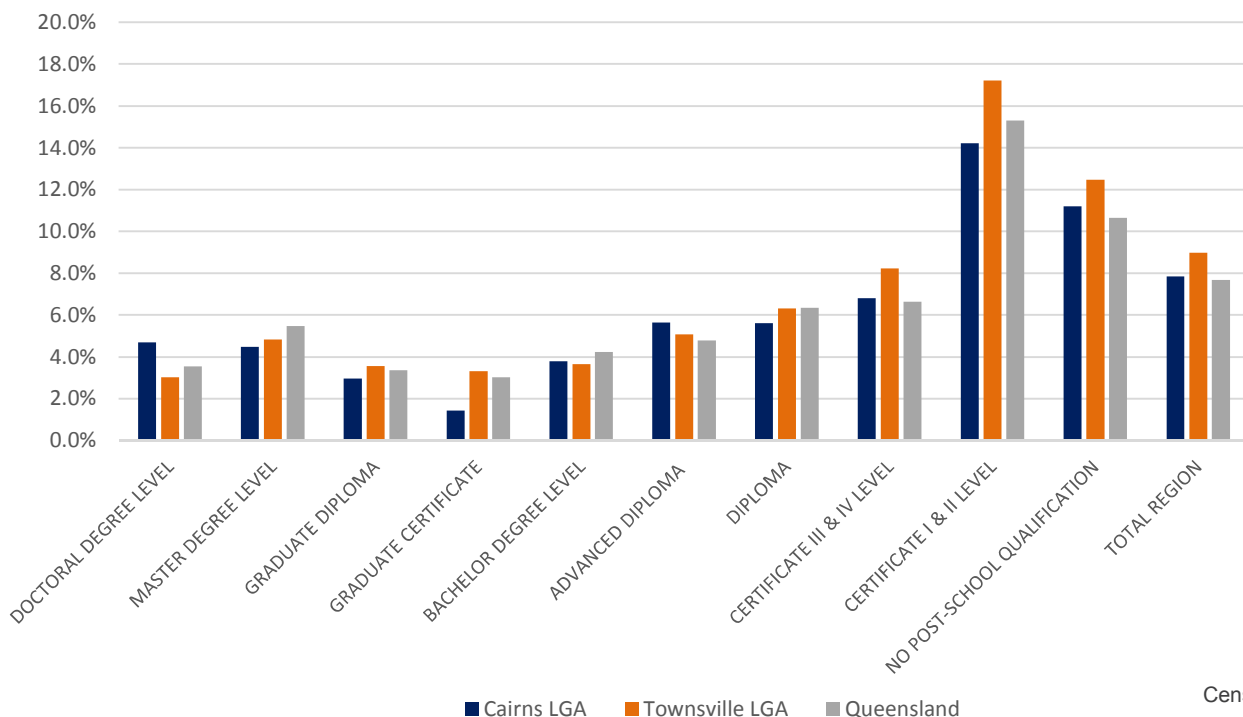
This analysis found that higher education levels impacted positively on employment rates. In all three jurisdictions, Graduate Certificate holders generally had the lowest level of unemployment, with the exception of Townsville where Doctoral Degree holders are less likely to be unemployed. Educational qualifications higher than Graduate Certificate generally had higher levels of unemployment.

## Queensland - Average Unemployment by qualification level

Qualification	Townsville LGA	Cairns LGA	Queensland
Doctoral Degree Level	3.0%	4.7%	3.6%
Master Degree Level	4.8%	4.5%	5.5%
Graduate Diploma	3.6%	3.0%	3.4%
Graduate Certificate	3.3%	1.4%	3.0%
Bachelor Degree Level	3.6%	3.8%	4.2%
Advanced Diploma	5.1%	5.6%	4.8%
Diploma	6.3%	5.6%	6.3%
Certificate III and IV Level	8.2%	6.8%	6.6%
Certificate I and II Level	17.2%	14.2%	15.3%
No post-school qualification	12.5%	11.2%	10.6%
<b>Total Region</b>	<b>9.0%</b>	<b>7.8%</b>	<b>7.7%</b>

Census 2016 data

## Unemployment by Level of Education - Graph



Census 2016 data

## METHODOLOGY

### Economic Impact Analysis

Input-output analysis was used in this study to determine the economic impact of JCU. Input-output analysis provides a detailed picture of the structure of a regional economy at a point in time and can be used to estimate the contribution or impact of a particular sector of the economy including flow-on or multiplier effects.

An input-output table was developed for the state of Queensland for 2015-16. Regional input-output tables were then constructed for the LGAs of Cairns and Townsville for 2015-16. LGA geography was used in order to remain consistent with the previous 2013 JCU Economic Impact and Human Capital Report and also as LGAs are generally a readily understood geographical standard, that often provide a geographical region representative of its host economy.

The economic impact of JCU has been estimated for 2016.

### Constructing the Tables

The input-output tables for this project were extracted from the ABS national input-output table for 2013-14 and subsequently updated to 2015-16 using the National Accounts and Labour Force Survey data for that year. The national table was adjusted to represent Queensland and subsequently Cairns and Townsville using the Generation of Regional Input-Output Tables (GRIT) technique incorporating detailed data from:

- 2016 Census,
- 2015-16 National State Accounts for Queensland (ABS Cat No 5220.0),
- Australian Demographic Statistics (ABS Cat No 3101.0), and
- Quarterly data on employment by industry sector (ABS cat. no. 6291.0.55.003).

The GRIT technique derives regional input-output tables from the national input-output table using location quotients and superior data (in this case, information regarding the operations of JCU as well as regional employment and income data) at various stages in the construction of the tables. The GRIT procedure was developed by Associate Professor Guy West and Professor Rod Jensen of the University of Queensland and is the most widely used method of constructing regional input-output tables in Australia. The GRIT method is also widely used in America and Europe.

### Data Collection

#### JCU Operations

The national input-output table includes only one sector for Technical, vocational and tertiary education and does not include a separate sector for university education. JCU provided WRI with detailed information of the University's expenditure, location of expenditure, employment and revenues. This information was used to construct a new sector row and column in the input-output table representing the operations of the University. This was then subtracted from the total education sector.

The following assumptions were made regarding the income and expenditure resulting from the operations of JCU.

### Income

JCU provided WRI with the income received by the University in 2016. Income was allocated to the region from which it was paid. Teaching and research income were allocated to each campus according to the approximate distribution of Domestic and International Equivalent Full Time Student Load, staff numbers or a combination of staff numbers and student enrolment.

### Wages and Salaries

JCU supplied information on the number of FTE employees and associated wages and salaries for 2016. The impact of FTE employment and associated gross wages and salaries was allocated to the region of the home address of each staff member.

### Other Expenditure

JCU supplied information regarding other expenditure during 2016 by industry category and the location where the purchase was made. This was allocated to individual campuses. Local expenditure was defined as that made in the immediate local area. For example, only those purchases where the expenditure was made in Cairns LGA were classed as local for the Cairns LGA table. Imports were distributed according to the proportion each campus represented of total expenditure. Purchases from the state of Queensland were classified as local for the Queensland table, with the balance being treated as imports to the region.

### Capital Expenditure

JCU provided information on capital expenditure for each LGA and elsewhere in Queensland in 2016. This was examined as a final demand impact and the results incorporated into the overall impact of each campus on its respective LGA.

### Student Expenditure

JCU provided student enrolment data for Cairns and Townsville campuses for 2016. The following process was followed in order to model student expenditure:

1. JCU provided data regarding home address on enrolment and residential address during semester for all students studying on campus, disaggregated by those studying internally and those studying by distance education. Student expenditure impact was calculated based on those students studying internally at either campus given that, by definition, distance education can theoretically be undertaken from any home address at any higher education institution, irrespective of location.
2. Data from the Department of Education and Training indicates that, in 2016, approximately 73.5 percent of students at JCU were classified as full-time. In light of this, the assumption was made that if JCU did not exist, all current non-local internal students and 73.5 percent of local students studying internally would move away from the local area in order to attend university. JCU's predominance as a provider of university education in the local area, combined with the geographical distance from other higher education providers, also supports this assumption.
3. JCU also provided information relating to the number of students undertaking block mode enrolments at each campus along with the average duration of the study period. Only those students from outside the immediate local area were included when assessing student expenditure derived from block mode enrolments and expenditure by broad category was adjusted to reflect reduced average weekly spend in some categories.
4. Information relating to student expenditure was derived from a number of sources including the 2015-16 ABS Household Expenditure Survey (ABS Cat No. 6530.0). That data provides average expenditure

per household by various categories for Queensland as a whole, average by quintile for Queensland in aggregate and average for Queensland – Capital City and Queensland – Rest of State. The average weekly expenditure for Queensland – Rest of State was adjusted to reflect the overall State distribution for the second gross household income quintile and subsequently adjusted to equate to average expenditure per person. The total annual expenditure calculated was checked for reasonableness against the Federal Government’s website for students intending to study in Australia for 2016-17.

5. It was assumed that those living in on-campus accommodation had no expenditure on household goods and services or utilities. In addition, accommodation rental payments by students living on-campus were excluded to avoid double-counting, as these payments are already included in JCU revenues. As a substantial proportion of the residential packages available at the Townsville Campus include a catering component, the expenditure on food and beverage for those living on-campus was also reduced, when compared with those living in off-campus accommodation. The overall magnitude of this reduction in expenditure by students living on-campus was compared with the data provided by JCU on income derived from campus accommodation for reasonableness.
6. Only students who lived overseas on enrolment were assumed to contribute to a net increase in expenditure on health insurance, as it is compulsory for overseas students to take up health insurance coverage for the duration of their stay.
7. The approach to analysing Cairns and Townsville student expenditure cannot be applied to the state of Queensland. For Cairns and Townsville, it is appropriate to assume that all current non-local students and a proportion of local students (both being defined as those studying internally) would move away from the local area to attend university if JCU did not exist, because there are limited other options locally. For Queensland as a whole, however, there are numerous university education options across the state and therefore, it has been assumed that a large proportion of students would be likely to stay in Queensland to study. Therefore, in order to estimate the impact of net student expenditure on Queensland it is more appropriate to include only that derived from non-local students i.e. those living in other States and Territories of Australia or overseas on enrolment.

It should be noted that the above student expenditure methodology differs from that used in the previous JCU economic impact report. A comparison of employment results between 2012 and 2016 highlights that 2016 initial employment is lower than in 2012. Initial employment is made up of JCU employees and people directly employed as a result of JCU capital expenditures, student and graduation expenditures. There are two principal reasons for this decline:

- Firstly, JCU’s employment count has decreased 14 percent between 2012 and 2016.
- Secondly, this result reflects a change in methodology from the previous study and relates to the calculation of student expenditure impacts. The 2016 methodology change was made to more accurately reflect the net impact of Queensland residents moving from one Queensland locale to a JCU campus for study.

Whereas the previous methodology summed the impact of student expenditure at the Cairns and Townsville LGA level to form the figure for the state level, the new methodology reflects the fact that many JCU students in Cairns and Townsville come from other Queensland regions. Thus, their Cairns and Townsville expenditures are of no net benefit to the Queensland economy and have not been counted as such.

Expenditure associated with graduation ceremony visitation

JCU provided information regarding the number of students attending graduation ceremonies at each campus, along with an estimate of the average number of guests per graduate (3). It was assumed that the origin of these guests was distributed in the same proportion as the students attending the graduation. The proportion of non-local graduates for each LGA was estimated based on the distribution of home address on enrolment. If a guest was deemed to be non-local, it was assumed that the guest would have an average of 1.5 nights stay in the LGA. Tourist expenditure data by LGA obtained from the Department of Resources, Energy and Tourism was then used to estimate the likely additional expenditure in the relevant LGA generated by non-local guests attending graduation ceremonies. This expenditure is likely to be underestimated as it does not include expenditure made by parents attending orientation on commencement.

## *Modelling Process*

Modelling was undertaken utilising one of two economic impact modelling methodologies, depending on the type of expenditure. These are Industry Significance and Final Demand.

### *Industry Significance*

Input-output tables are frequently used to provide estimates of the significance of a particular industry or organisation in terms of its contribution to the economy. This is done by examining the effects of the organisation shutting down and ceasing all economic activities. This method provides an estimate of the level of economic activity that can be attributed to that particular organisation, in this case JCU. The industry significance approach was used to model the operations of JCU.

### *Final Demand*

The impact of student expenditure was estimated as a final demand impact. Specifically, student expenditure was allocated to the relevant sectors to determine the impacts of this expenditure including both initial and flow-on effects. A similar approach was used for expenditure by visitors attending graduation and for capital expenditure impacts.

## *Total Impacts*

The economic impact of JCU, in total, was estimated by aggregating the industry significance of the University, the final demand impacts of student expenditure, the final demand impacts generated by family and friends from outside the local area attending graduation ceremonies and the final demand impacts of capital expenditure.

The impact of JCU on the study locations was estimated in terms of:

- Value added, which is equal to gross output minus intermediate inputs. Value added is equivalent to the contribution to gross regional product (GRP- the local equivalent of gross domestic product). That is, value added is the difference between the costs of production (excluding the compensation of employees, gross operating surplus, taxes and imports) and the value of sales turnover. It should be noted that the term 'economic impact' has been used in place of the term 'value added' in graphs and visual elements of this report.
- Household income, which measures the benefit received by regional households from economic activity. It typically refers to compensation of employees but can also include income in return for productive activity such as the gross mixed income of unincorporated enterprises, gross operating surplus on dwellings owned by persons, and property income receivable and transfers receivable such as social assistance benefits and non-life insurance claims.



- Full-time equivalent employment is a measure of the workload of an employed person in a given location that makes workloads comparable across different types of employment (part-time and full time). In this report, FTE employment is calculated as  $1.0 \times$  the number of full-time workers +  $0.5 \times$  the number of part-time workers.

The economic impact of JCU has been reported as a sum of:

- Initial impacts: defined as the value of the immediate changes in the regional economy of Cairns and Townsville as a result of increased expenditure of JCU; and
- Flow-on impacts: defined as the value of changes in the regional economy in the course of additional rounds of spending after the initial expenditure of JCU was made.

### *Assumptions*

It should be noted that this assessment of the economic impact of JCU has been undertaken utilising conservative assumptions, including the following:

- No allowance has been made for additional economic impacts derived from visits to the region by family members, particularly those of overseas students. This would be expected to impact on the accommodation and food services, transport and retail sectors in particular.
- No allowance has been made for expenditure by visiting academics which would also generate additional economic impacts.
- No allowance has been made for the contribution of the University to the social and cultural base of the regional community.

### *Human Capital Analysis*

WRI undertook a human capital analysis, whereby the future value of JCU graduate's lifetime earnings and the Gross Operating Surpluses (GOS) of their employers were estimated. Human capital for JCU graduates was estimated in terms of the private value (accruing to graduates through increased income) and public value (accruing to the future employers of these graduates through increased GOS). These two values were summed to get the total Human Capital Value of JCU graduates in 2016.

#### *Private Value of Human Capital*

The private value of human capital required a number of steps to calculate. The following steps were undertaken for Queensland and the Cairns and Townsville LGAs:

1. ABS Census data for a region's residents by age, income, level of education and field of education was examined to understand the average income of these residents at each age, by field of education. By examining these average earnings, it is posited that the future income for a given individual, with a given level and field of education, can be estimated.
2. JCU 2016 graduate data was examined to understand the average age of undergraduates (26 years) and post graduates (36 years). An assumption was made that JCU graduates would work from their average graduation age, until retirement age of 65. This gave the average working life of JCU Undergraduates (36 years) and postgraduates (26 years).
3. For the purpose of this analysis, Postgraduate included any qualification higher than a Bachelor degree (Postgraduate Certificates and Diplomas, Masters and Doctoral degrees).

4. Estimated future earnings (discussed above), by level and field of education were applied to these age brackets, with each year's average income discounted to present values (PV). The discount rate by which this figure was discounted was 4.5 percent. This rate was utilised in the previous JCU human capital analysis and was considered still relevant given the current low rate environment.
5. A similar analysis was also undertaken for all Queenslanders who did not have a tertiary qualification.
6. The private value of human capital was then calculated by finding the difference between the PV of an individual with an Undergraduate degree (in a given field of education) and someone with no degree.
7. Similarly, in order to arrive at the human capital value of a Postgraduate degree, the present value of an Undergraduate degree (by relevant field of education) was deducted off the present value of projected Postgraduate future earnings.
8. It should be noted that the deduction of 'no degree' earnings from Undergraduate earnings, and the deduction of Undergraduate earnings from Postgraduate earnings, was on the basis of like ages. For example, as JCU 2016 Postgraduates had an average working life of 36 – 65, comparative Undergraduate earnings were subtracted to arrive at a figure for the human capital of the Postgraduate degree.
9. Once the PV for Undergraduate and Postgraduate degrees (by field of education) were calculated, these figures were multiplied by the relevant number of JCU's 2016 graduates in each field and level of education.

Importantly, the above methodology differs from the previous human capital analysis undertaken in 2013 and based on 2011 data. These methodological changes have resulted in sizable differences in the estimates of the present value of university qualifications, particularly for Postgraduate degrees.

### *Public Value of Human Capital*

The calculation of the public benefit of JCU graduate human capital is based on the assumption that there is a link between the ratio of wages to Gross Operating Surplus (GOS)<sup>10</sup> in any given economy. This measure is consistent with the human capital calculations utilised in the 2013 JCU Economic Impact and Human Capital Report and is thought to be a good approximation of the value that human capital derives for a business. On this basis, it does not include taxes or imports payable. It should be noted that taxes may be viewed as having social benefit, which has not been addressed in this report.

Of further note, the GOS figure is based on the whole Queensland economy as at 2016. This GOS figure is an aggregate measure that takes into account estimates of the productivity of government and non-profit institutions. On this basis, this figure provides a reasonable basis to provide an 'average' contribution of JCU's 2016 graduates to the economy throughout their working career.

The rationale for the calculation of the public value of human capital is that if we understand the value of wages, then the approximate value of GOS can be determined. The public human capital methodology used ABS National Accounts data to establish the ratio between wages and GOS in Queensland. In 2016, the ratio of wages to GOS was 0.54.

<sup>10</sup> GOS is a measure utilised in ABS national accounts defined as gross value added minus compensation of employees, minus taxes on production and imports payable plus subsidies receivable.

The private value of human capital of \$946m was divided by 0.54 to establish the total (private and public) value of human capital (\$1.746 billion). The difference between the private and total human capital equals the public value of human capital.

### *Total Value of Human Capital*

As discussed above, the total value of human capital was calculated by dividing the private value of human capital by 0.54 (the ratio of wages to GOS, based on ABS National Accounts data). This ratio is slightly higher than that utilised in the previous JCU human capital report (0.54 compared to 0.53 in 2011).

### *Annual Human Capital Analysis*

In addition to the lifetime value of JCU graduates, WRI has also estimated the annual private and public value of students graduating from JCU in 2016. The annualised results are indicative of the potential productivity of JCU graduates in a single year. These values have not been discounted and do not reflect the present value of future graduate earnings. As with the lifetime human value calculated, the results do not take into account the intangible, non-monetary benefits of a JCU qualification including cultural, health and other community benefits.

### *Annual Private Human Capital*

WRI utilised income and education data from the 2016 Census to understand the average earnings of graduates by level and field of education over and above individuals without a degree, as at 2016. These average earnings were multiplied by the number of 2016 graduates in each field and level of education to arrive a total 'annual' human capital figure. The main difference between the lifetime human capital analysis and the 'annual' figure is that the annual value is taken from 2016 data only and relates to the average earnings of all ages, rather than earnings at each age, discounted to present values.

The process undertaken included the following steps:

- Census 2016 data on full-time employed individuals (Queensland) by age, field and level of qualification was analysed to understand the average earnings for all ages working with an Undergraduate or Postgraduate qualification in each field of education. This was calculated by dividing the total earnings of each qualification group, by the number of individuals in each group.
- The average earnings of Queenslanders without a degree qualification (Bachelor or higher) were then subtracted from the degree earnings to arrive at the average additional earnings that came with each field and level of education.
- These figures were then multiplied by the number of JCU graduate completions in 2016 for each level and field of education.

The annualised private human capital figures reported represent:

- The average annual value of an Undergraduate degree over and above that realised for people without university qualifications.
- The average annual value of a Postgraduate degree over and above that realised for people with an undergraduate degree in the field of education.

### *Annualised Public Human Capital*

Similar to the calculation of the public value of lifetime human capital, the annual value of human capital was calculated with reference to the wage/GOS ratio (0.54) established from ABS national accounts data.

### *Total Annual Human Capital*

The total annual human capital is the sum of the private and public annual human capital, also calculated with reference to the wage/GOS (0.54) established from ABS national accounts data.



## WESTERN RESEARCH INSTITUTE

WRI is a regional development research organisation located in Bathurst, New South Wales. WRI holds a wealth of knowledge on employment, business development and investment issues affecting regional Australia. It has worked with Commonwealth, State and Local Governments and industry groups on numerous investment and development programs in regional areas. WRI has strong credentials in business and commercial market consulting and applied economic modelling including input-output analysis, shift-share, agribusiness and regional socio-economic surveys and analysis.

### Ms Kathy Woolley – Chief Executive Officer

Kathy joined the WRI team in February 2018 having previously worked on a variety of boards and in a number of senior management roles across sectors including media, health, education, regional development, government, event management, research and sales. For a number of years Kathy also ran a consultancy specialising in services for not for profit entities, focusing on best practice techniques in management and governance.

With formal qualifications in change management, company directorship, economics and training, and well developed skills in human resources, information technology, finance and economic development, Kathy offers a unique skill set to assist with most business needs.

This is the second time Kathy has worked for WRI, previously fulfilling the role of Business Development Manager. A position as a research officer for a similar organisation in the Illawarra rounds off the experience in economic modelling and research.

### Mr Alistair Maclennan – Senior Research Consultant

BA Political Economy, First Class Honours (UNE)

Having served in a variety of parliamentary, public service and private sector roles, Alistair brings a wealth of research experience to WRI. Alistair has well developed skills in data analysis, economics and business, and has a wide understanding of government. In addition, Alistair also has experience in policy development in the energy sector, where he engaged with industry, government agencies and NGOs to inform policy. Alistair's experience in engaging with clients, stakeholders and the public assists WRI to fully understand its client's needs and provide tailored research. Alistair is currently furthering his skills, studying accountancy with CPA Australia.

### Ms Dale Curran – Executive Officer

BA ANU


Dale is responsible for all administrative processes at WRI including executive support, finance, management of the board of Directors and maintenance of policies. She has worked in a variety of roles at WRI, including Fieldwork Supervisor and Research Assistant, and has worked on several community and business surveys. Dale's skills and experience in data collection contribute to WRI's projects, bringing strong skills in data collection, particularly questionnaire development, data entry and telephone and face to face interviewing techniques. In addition to her administrative role, Dale has oversight of marketing, PR and communications activities, and brings a high level of skill to the design of WRI's reports.

### Associates:


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