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Placing skills in context: Labour market insights into Wollongong, Australia

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Data Analysis Report

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Background and summary

This data report analyses the labour market of Wollongong, a city on Australia’s southeast coast. Data presented was collected for a research project funded by the Australian Research Council (ARC) titled “*Economic Geographies of Transition: Beyond Automotive Production*” (DE180100492). The project aimed to document structural change in the downstream auto industry, examining the effects of technological change on car servicing businesses (auto shops). Wollongong was a case study city for the research because of the population’s auto-dependency (for private transport and commuting to work) and high proportion of auto-related aftermarket businesses (e.g. dealerships, service shops, smash repairers, parts suppliers, road freight companies). Several academic publications are linked to the ARC project (e.g. Warren 2019; Warren and Gibson 2021; Warren and Gibson, in press).

Data presented in this report focuses on the Wollongong local government area (LGA), and where relevant, comparisons are drawn to New South Wales (NSW) to provide additional context. The data underscores the geographical specificities of labour markets as place shapes the formation, application, evolution, and recognition of skills (Peck 1992; McDowell 2011). In particular, we provide insights into the gendered dimensions of work and employment in Wollongong. Throughout the twentieth century, coal mining, metal manufacturing (copper, steel), and maritime-related industries played a lead role in the regional economy. Male workers dominated jobs in these industries with high levels of unionisation. More recently, Wollongong has developed a service-led economy with new employment in the education, health and aged care sectors. Jobs in these industries have a higher proportion of female workers. For a range of measures, data shows that in Wollongong, significant gender differences remain in education, employment by industry, occupations, and income levels.

Wollongong: Key insights (2021)

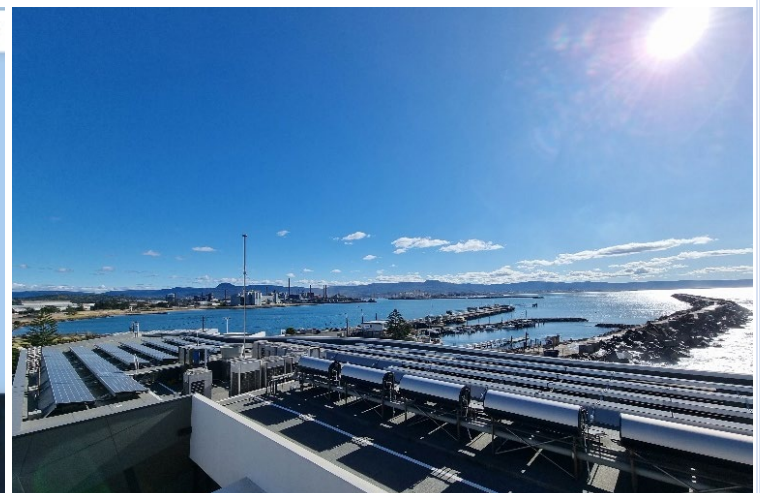
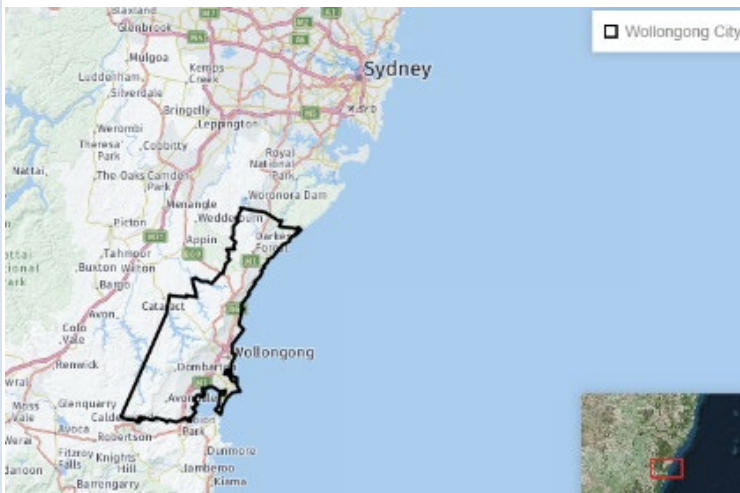
Population ➤ 214,564 11.5% increase since 2011 (ABS 2021)	Gross Regional Product ➤ \$12.7B 10.1% increase since 2011 (NIER 2021)	Median Household income ➤ \$1,682/wk 52.8% increase since 2011 (ABS 2021)
Median mortgage repayments ➤ \$501/wk 29.8% of median income (ABS 2021)	Local businesses ➤ 14,141 20.1% in construction industry (ABS 2021)	Local jobs/employed persons ➤ 88% 4.8% unemployment rate (NIER 2021)

Research focus

The main research question that informed the data analysis was: ‘*how do workers in different skilled occupations within the same industry experience technological change*’? Automotive maintenance and repair (M&R) is a suitable industry to study the relationship between work, skills and technological change because cars are one of the world’s most advanced consumer products (Vinsel 2019). Modern vehicles contain roughly 31,000 individual parts, 25-30 computers, 100+ sensors, and 300+ electronic control units. Globally, cars are also the key mode of personal transport for accessing life opportunities (Warren and Gibson 2021).

The city of Wollongong makes an ideal case study location for examining auto M&R with 74.9% of workers commuting to their place of employment using private cars. This proportion is notably higher than the NSW figure of 61.9%. Wollongong also has above-average levels of employment in auto M&R, car retailing, and road-related transport (see below).

For the broader project, one critical finding of the research has been that despite emerging auto-related technologies impacting the work of service technicians (98% of whom are men who fix cars) and customer service staff (75% of whom are women who care for customers), the range of skills critical to these occupations is inequitably recognised and valued. The differences in auto shops reflect broader divisions and differences within local labour markets (Weller 2012). Hence, while the data outlined below is not specific to auto shops, we examine broader, relevant aspects of the local labour market, including ongoing gender-based differences.



Place-based analyses of skills

Skills are complex phenomena to define and analyse. More than three decades ago, Attewell (1990) identified four main approaches in the social sciences to the study of skills: *positivist* (categorising and measuring skills), *ethnomethodological* (emphasising the complex, multidimensionality of skills),

constructionist (skills as politically mediated) and *Marxist* (skills as central to class struggle between labour and capital). Skills are popularly defined as the “direct or observable application of knowledge as a consequence of education and practical experience” (Mamabolo and Myres (2020: 39). The widespread influence of emerging technologies on work and employment has spurred renewed interest in skills questions, especially their relationship to the performance of firms, cities and regions (Glaeser et al. 2014; Sunley et al. 2020; Corradini et al. 2022; Fusillo et al. 2022). These recent studies often combine human capital theory with proxies to map and measure skills, especially their supply, demand, distribution, and evolution (e.g. Barzotto and de Propris 2019; Wigger 2022). Common proxies used to measure skills include educational attainment, qualifications, occupation, and income levels. Here, we use similar proxies to the skills literature to capture insights into employment, income and gender differences across Wollongong’s labour market. However, we recognise limitations in using human capital theory and relying on proxies to measure skills. Three shortcomings are relevant to our research.

First, measuring skills via proxies cannot shed light on the lived experiences of doing work and struggles that occur over the recognition and reward for skills (Hampson and Junor 2015). **Second**, reliance on human capital theory is problematic as skills become equated to a resource exchanged in a more-or-less transactional relationship between labour and capital (Warren and Gibson 2021). In capitalist labour markets, however, skill is not “simply a resource... rewarded in accordance with human capital theory” (Peck 1992: 336). Skills are struggled over. **Third**, measurements of skill must remember that educational qualifications or vocational training do not provide a comprehensive account of skills within employer organisations, workplaces or communities (Corradini et al. 2022). Approaches to skills must not divorce them from the social and political contexts of work (including unpaid work), including the actual tasks people do to earn an income and sustain everyday life (Cockburn 2009; Ingold 2018).

Following feminist interventions (Richardson 2018; Mills 2019), we emphasise the processual nature of skills and their role in differentiating labour. Skills are more than internalised attributes for employers to buy and use to create value. They are context and information-rich capacities formed in an ongoing process of “learning in place” (Iskander et al. 2013). In addition to their processual qualities skills are a principal mechanism by which inequities are (re)produced and legitimated. While acknowledging problems with human capital theory, measuring skills is vital for effective economic development, service provision, and policymaking. Quantitative methods can identify spatial mismatches between the supply and demand for skills and help to leverage funding for institutions that support access to employment and other critical life opportunities. We now provide a series of datasets exploring Wollongong’s labour market.

Table 1: Highest non-school qualification: level of education by sex for Wollongong (locally employed persons) and NSW. (Source: Author analysis of ABS Census Data 2016)

Female workers

Qualification level	No. of employed persons	Wollongong %	NSW %	% difference Wollongong to NSW ¹	The difference in anticipated qualifications ²
Bachelor degree or higher	12,010	29.9	36.5	-19.9	-2,654
Advanced diploma/diploma	5,556	13.8	13.0	6.0	333
Certificate I and II	773	1.9	1.6	17.1	130
Certificate III and IV	6,590	16.4	12.4	27.8	1,608
Certificate level not defined	1,391	3.5	2.9	18.8	226
No qualification	12,671	31.5	30.5	3.2	418
Not stated	1,184	2.9	3.1	-6.7	61
Total females	40,175	100	100	-	-

Male workers

Qualification level	No. of employed persons	Wollongong %	NSW %	% difference Wollongong to NSW ¹	The difference in anticipated qualifications ²
Bachelor degree or higher	9,026	23.1	29.1	-23.0	-2,337
Advanced diploma/diploma	3,877	9.9	9.4	5.2	206
Certificate I and II	354	0.9	0.8	11.8	42
Certificate III and IV	12,070	30.9	24.4	23.5	2,542
Certificate level not defined	673	1.7	1.7	0	0
No qualification	12,077	30.9	31.7	-2.6	-301
Not stated	971	2.5	2.8	-11.3	-122
Total males	39,048	100	100	-	-

1: The relative difference in qualification levels between Wollongong and NSW workers (rounded to 1 d.p)

2: The difference in anticipated local persons with a given level of qualification based on NSW (rounded to whole no.)

Explanatory notes (table 1)

In Wollongong, a lower proportion of male (-23%) and female (-19.9%) workers hold a Bachelor's degree or higher compared with the state of NSW. If the level of tertiary qualifications among Wollongong's working population matched NSW, there would be an additional **4,991** employed persons in the city with a Bachelor's degree or higher.

Contrasting tertiary-level qualifications, a significantly higher proportion of Wollongong's working population have vocational qualifications. For male workers, 9.9% have advanced diplomas, a modest 5.2% *above* the NSW average. More significantly, 33.5% of male workers have a certificate-level qualification from a vocational training institution (e.g. a Technical and Further Education (TAFE) campus). The total proportion of vocationally trained male workers in Wollongong is 21.9% *above* the NSW average. In absolute terms, Wollongong has **2,584** more male workers with vocational qualifications (certificates of some kind) than anticipated if the city mirrored the state.

For the female workforce, the story is broadly similar. The proportion of female workers with Advanced Diplomas is 13.8% compared to 13.0% for NSW. This equates to an additional **333** women holding an Advanced Diploma in Wollongong compared to the state figure. In Wollongong, 21.8% of female workers also have a vocational qualification such as a Certificate from TAFE. This proportion of vocationally trained women workers is 25.3% *above* the NSW figure, equating to an additional **1,964** women with vocational training and qualifications in Wollongong. There is also a slightly higher proportion of female workers in the city with no formal qualifications (31.5%), compared to the NSW average (30.5%).



Table 2a: Occupational profile of female workers in Wollongong compared to NSW. (Source: Author analysis of ABS 2016; 2021)

Female workers

Occupation	No. of female workers	Wollongong %	NSW %	Difference Wollongong vs NSW %	Difference in anticipated workers
Managers (e.g. business, retail, hospitality, education, healthcare, executives)	3,510	8.3	10.6	-24.3	-976
Professionals (e.g. legal, ICT, medial & health, education, engineering, HR, Business, Media & Arts)	11,633	27.5	27.2	1.1	122
Technicians and Trades Workers (e.g. TCF, Electronics, Construction, Auto-related trades)	1,860	4.4	4.2	4.7	83
Community and Personal Service Workers (e.g. PAs, Carers, Aides, Hospitality workers)	7,465	17.6	15.1	15.3	1,075
Clerical and Administrative Workers (e.g. receptionists, office Admin., bookkeepers)	9,385	22.2	22.0	0.9	75
Sales Workers (e.g. Sales support, Sales Reps., Real Estate Agents, Salespeople)	5,118	12.1	11.7	3.4	167
Machinery Operators And Drivers (e.g. Truck & rail drivers, machine operators, plant operators)	291	0.7	1.3	-60.0	-259
Labourers (e.g. Freight handlers, farm workers, construction and mining, cleaners, food processing)	2,485	5.9	6.3	-6.6	-181
Inadequately described or not stated	572	1.4	1.6	-13.3	-105
Total female workers	42,319	100.0	100.0	-	-

Table 2b: Occupational profile of male workers in Wollongong compared to NSW. (Source: Author analysis of ABS 2016; 2021)

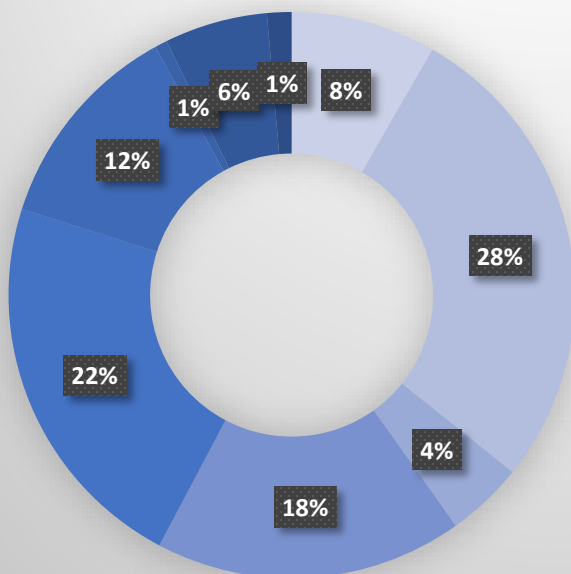
Male workers

Occupation	No. of male workers	Wollongong %	NSW %	Difference Wollongong vs NSW %	Difference in anticipated workers
Managers (e.g. business, retail, hospitality, education, healthcare, executives)	4,795	12.3	16.1	-26.8	-1,492
Professionals (e.g. legal, ICT, medial & health, education, engineering, HR, Business, Media & Arts)	7,542	19.3	20.4	-5.5	-424
Technicians and Trades Workers (e.g. TCF, Electronics, Construction, Auto-related trades)	9,113	23.3	20.4	13.3	1,147
Community and Personal Service Workers (e.g. PAs, Carers, Aides, Hospitality workers)	2,662	6.8	6.1	10.9	280
Clerical and Administrative Workers (e.g. receptionists, office Admin., bookkeepers)	2,234	5.7	6.4	-11.6	-265
Sales Workers (e.g. Sales support, Sales Reps., Real Estate Agents, Salespeople)	2,433	6.2	7.0	-12.1	-301
Machinery Operators And Drivers (e.g. Truck & rail drivers, machine operators, plant operators)	5,010	12.8	10.5	19.7	910
Labourers (e.g. Freight handlers, farm workers, construction and mining, cleaners, food processing)	4,536	11.6	11.1	4.4	201
Inadequately described or not stated	726	1.9	2.1	-10	94
Total male workers	39,051	100.0	100.0	-	-

Chart 1: Occupational profiles of male and female workers in Wollongong compared to NSW.

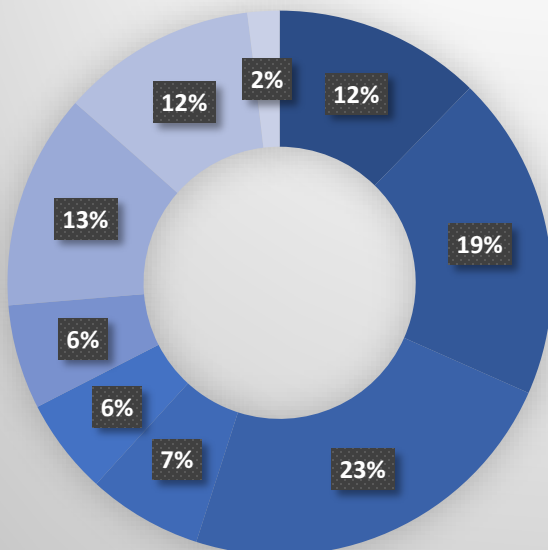
(Source: Author analysis of ABS 2016; 2021)

Female worker occupations Wollongong



- Managers (e.g. business, retail, hospitality, education, healthcare, executives)
- Professionals (e.g. legal, ICT, medial & health, education, engineering, HR, Business, Media & Arts)
- Technicians and Trades Workers (e.g. TCF, Electronics, Construction, Auto-related trades)
- Community and Personal Service Workers (e.g. PAs, Carers, Aides, Hospitality workers)
- Clerical and Administrative Workers (e.g. receptionists, office Admin., bookkeepers)
- Sales Workers (e.g. Sales support, Sales Reps., Real Estate Agents, Salespeople)
- Machinery Operators And Drivers (e.g. Truck & rail drivers, machine operators, plant operators)
- Labourers (e.g. Freight handlers, farm workers, construction and mining, cleaners, food processing)
- Inadequately described or not stated

Male worker occupations Wollongong



- Managers (e.g. business, retail, hospitality, education, healthcare, executives)
- Professionals (e.g. legal, ICT, medial & health, education, engineering, HR, Business, Media & Arts)
- Technicians and Trades Workers (e.g. TCF, Electronics, Construction, Auto-related trades)
- Community and Personal Service Workers (e.g. PAs, Carers, Aides, Hospitality workers)
- Clerical and Administrative Workers (e.g. receptionists, office Admin., bookkeepers)
- Sales Workers (e.g. Sales support, Sales Reps., Real Estate Agents, Salespeople)
- Machinery Operators And Drivers (e.g. Truck & rail drivers, machine operators, plant operators)
- Labourers (e.g. Freight handlers, farm workers, construction and mining, cleaners, food processing)
- Inadequately described or not stated

Explanatory notes (table 2a, table 2b, chart 1)

For male workers in Wollongong, the tables underscore two critical aspects of the city's labour market. First is the ongoing influence of traditional industry anchored by the Steelworks, seaport at Port Kembla, coal mining, road freight, and construction-related activity. Second is the effect of sustained growth in professional occupations such as education and healthcare.

There has been increased local employment in professional-based occupations for men and women alike. This includes categories such as engineering professionals (n= 930), medical and nursing practitioners (n=802), tertiary and secondary educators (n=1,377), trades including electricians, (n= 1,057) and carpenters, (n=988, 8.3% above state figure), and mechanical engineering trades, (n=1,060). *Automotive mechanic trades*, for example, employ 709 people locally, 12.5% higher than for NSW.

In Wollongong there is a higher than average proportion of male workers with technical and trade qualifications, including those directly linked to transport technologies, auto servicing, and M&R.

For women workers in Wollongong, there are significant numbers of employed persons across professional occupations (n=11,633), with 44% of these jobs being midwives and teachers. This is followed by workers in clerical and administrative functions (n= 9,385) and community/personal services (n= 7,465). These three occupations account for 67.3% of women workers in the city. Figures in all three of these occupational categories are higher than the NSW averages.

In the auto shops' we studied, women workers' roles were not categorised under a single type of occupation, but included different categories such as 'miscellaneous clerical and administrative workers' (n=767); 'receptionists' (n= 1,236), 'general clerks' (n= 1,708), 'secretaries' (n= 795), 'office managers' (n= 935), and 'contract/program administrators' (n=378).

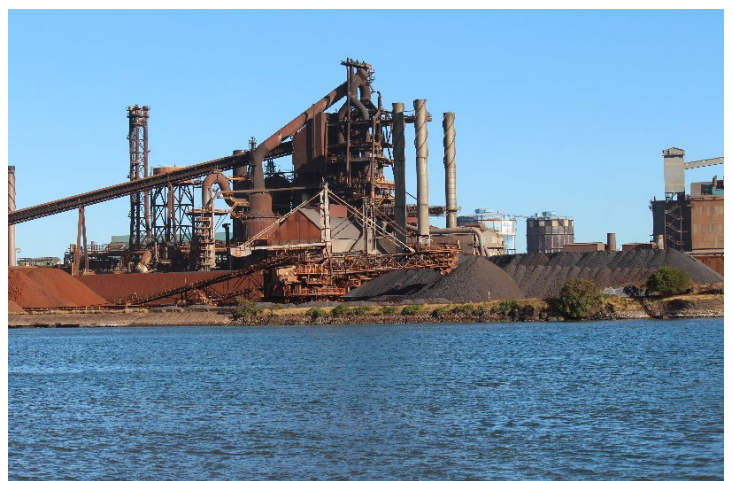


Table 3: Hours worked in paid employment, Wollongong and NSW. (Source: Author analysis of ABS 2016; 2021)

Gender	Wollongong % employed FT ¹	NSW % employed FT	% difference W'gong/NSW	Wollongong % employed PT ²	NSW % employed PT	% difference W'gong/NSW
Men	72.8	74.7	-2.6	22.3	20.8	7.0
Women	43.0	50.2	-15.5	51.2	44.1	14.9

1: Full-time (FT) work is 35 hours+ p/wk, regardless of whether the worker is a permanent, casual or contracted

2: Part-time (PT) work is 34 hours or less p/wk, regardless of whether the worker is permanent, casual or contracted.

Explanatory notes (table 3)

In Wollongong, the proportion of men and women doing full-time paid work is below figures for NSW. The difference is a modest 2.6% for male workers and a more significant 15.5% for female employees.

By contrast, Wollongong has a higher proportion of its male and female workforce doing part-time hours each week. For men, the balance of part-time workers is 7.0% higher than the NSW average. For women, the proportion of part-time workers is 14.9% above the NSW rate, or 50.2% to 44.1%.

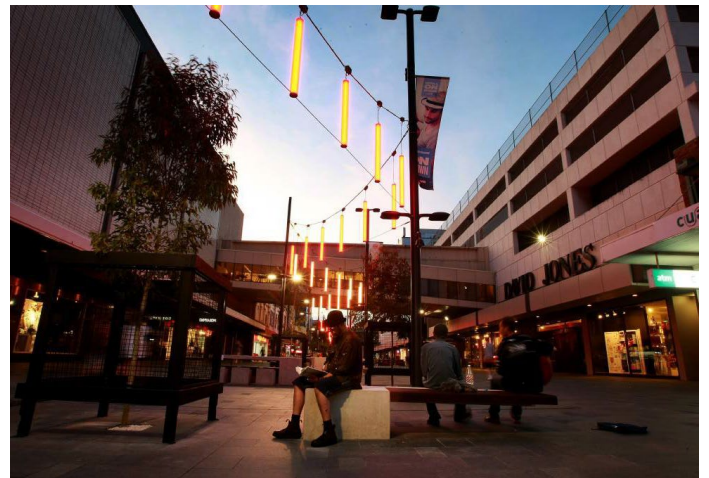


Table 4: Worker productivity calculated as industry value-added/employed persons,**Wollongong vs NSW (constant prices).** (Source: Author analysis of ABS 2021 & NIEIR 2021 data)

Industry of Employment	Wollongong (\$) 2020/21	NSW (\$) 2020/21	Wollongong (\$) 2011/12	NSW (\$) 2011/12	Change in W'Gong (\$) 2011/12 – 2020/21
Agriculture, Forestry and Fishing (combined)	79,198	126,010	101,953	151,739	-22,755
Agriculture	67,755	122,577	88,652	155,685	-20,896
Aquaculture	0	59,573	0	69,675	-
Forestry and Logging	0	211,841	0	144,645	-
Fishing, Hunting and Trapping	102,403	108,812	122,268	113,755	-19,865
Agriculture, Forestry and Fishing Support Services	148,711	152,167	109,465	142,928	+39,246
Mining (combined)	488,815	313,756	417,411	311,824	+71,404
Coal Mining	514,825	426,377	454,103	429,134	+60,722
Oil and Gas Extraction	3,256,707	3,219,343	822,246	808,491	+2,434,461
Metal Ore Mining	114,841	107,080	294,943	221,264	-180,102
Non-Metallic Mineral Mining and Quarrying	107,771	161,013	49,253	45,571	+58,519
Exploration and Other Mining Support Services	187,583	157,960	89,603	86,672	+97,980
Manufacturing (combined)	90,508	126,338	79,235	128,630	+11,273
Food Product Manufacturing	86,465	108,677	84,429	107,818	+2,035
Beverage and Tobacco Product Manufacturing	122,518	137,514	144,539	162,972	-22,021
Textile, Leather, Clothing and Footwear Manufacturing	65,713	82,162	44,786	56,886	+20,926
Wood Product Manufacturing	67,497	74,280	64,773	68,590	+2,724
Pulp, Paper and Converted Paper Product Manufacturing	165,349	194,101	98,580	106,762	+66,769
Printing (including the Reproduction of Recorded Media)	84,677	89,994	82,199	81,332	+2,478
Petroleum and Coal Product Manufacturing	348,302	520,588	1,188,923	1,013,454	-840,622
Basic Chemical and Chemical Product Manufacturing	192,712	172,627	183,791	167,654	+8,921
Polymer Product and Rubber Product Manufacturing	162,120	163,587	108,861	100,408	+53,260
Non-Metallic Mineral Product Manufacturing	179,929	175,110	116,499	111,996	+63,430
Primary Metal and Metal Product Manufacturing	56,670	45,541	41,911	34,645	+14,760
Fabricated Metal Product Manufacturing	137,177	136,007	119,346	117,932	+17,831

Transport Equipment Manufacturing	278,094	263,906	344,893	363,953	-66,799
Machinery and Equipment Manufacturing	126,731	135,967	131,548	127,377	-4,817
Furniture and Other Manufacturing	42,045	52,265	44,400	52,406	-2,355
Electricity, Gas, Water and Waste Services (combined)	286,816	289,385	297,033	339,409	-10,217
Electricity Supply	342,263	375,403	395,409	416,788	-53,145
Gas Supply	936,899	234,737	198,337	179,086	+738,562
Water Supply, Sewerage and Drainage Services	340,770	360,812	331,524	334,384	+9,247
Waste Collection, Treatment and Disposal Services	83,277	97,437	215,725	202,329	-132,448
Construction (combined)	120,748	123,340	117,645	122,804	+3,103
Building Construction	119,867	96,244	116,690	104,683	+3,177
Heavy and Civil Engineering Construction	257,006	247,032	430,540	447,897	-173,534
Construction Services	101,601	119,958	84,298	97,019	+17,303
Wholesale Trade (combined)	183,349	203,110	129,997	146,623	+53,352
Basic Material Wholesaling	226,883	223,341	132,596	124,053	+94,287
Machinery and Equipment Wholesaling	157,230	176,979	146,798	163,653	+10,432
Motor Vehicle and Motor Vehicle Parts Wholesaling	178,950	204,613	114,390	125,711	+64,560
Grocery, Liquor and Tobacco Product Wholesaling	163,288	198,278	104,552	120,340	+58,736
Other Goods Wholesaling	177,706	228,302	143,545	168,493	+34,161
Commission-Based Wholesaling	96,679	172,929	59,406	95,012	+37,273
Retail Trade (combined)	64,004	73,070	56,768	63,275	+7,236
Motor Vehicle and Motor Vehicle Parts Retailing	99,325	110,877	93,944	101,697	+5,381
Fuel Retailing	82,469	89,173	98,328	94,609	-15,859
Food Retailing	52,200	60,098	48,565	52,521	+3,635
Other Store-Based Retailing	63,346	73,662	55,059	63,004	+8,286
Non-Store Retailing and Retail Commission-Based Buying	72,512	73,456	34,088	45,283	+38,423
Accommodation and Food Services (combined)	40,798	51,541	44,909	54,497	-4,110
Accommodation	49,675	66,673	55,481	64,089	-5,806
Food and Beverage Services	39,910	49,224	43,456	52,548	-3,546
Transport, Postal and Warehousing (combined)	142,206	133,802	158,543	158,171	-16,337
Road Transport	97,660	91,486	106,238	102,083	-8,578
Rail Transport	160,701	166,701	156,889	158,201	+3,813
Water Transport	606,445	479,575	395,093	326,502	+211,351
Air and Space Transport	57,924	56,501	169,358	157,618	-111,434
Other Transport	284,238	197,205	213,549	155,244	+70,689

Postal and Courier Pick-up and Delivery Services	90,573	92,051	91,174	101,189	-601
Transport Support Services	283,506	232,667	326,521	273,849	-43,015
Warehousing and Storage Services	266,080	257,800	358,025	353,136	-91,944
Information Media and Telecommunications (combined)	158,028	215,369	134,784	155,220	+23,244
Publishing (except Internet and Music Publishing)	109,195	115,356	145,672	147,200	-36,477
Motion Picture and Sound Recording Activities	76,809	114,526	45,728	77,942	+31,081
Broadcasting (except Internet)	211,769	280,783	150,985	191,582	+60,784
Internet Publishing and Broadcasting	309,574	371,691	115,458	132,381	+194,116
Telecommunications Services	171,867	193,561	154,911	182,241	+16,956
Internet Service Providers, Web Search Portals and Data Processing Services	368,547	543,703	98,852	148,290	+269,695
Library and Other Information Services	66,852	90,442	94,586	94,524	-27,733
Financial and Insurance Services (combined)	204,730	321,100	196,034	311,444	+8,696
Finance	405,719	511,322	377,633	484,022	+28,087
Insurance and Superannuation Funds	86,531	116,938	80,361	100,298	+6,171
Auxiliary Finance and Insurance Services	136,205	195,353	141,070	178,962	-4,865
Rental, Hiring and Real Estate Services (combined)	303,829	350,307	214,008	261,611	+89,822
Rental and Hiring Services (except Real Estate)	44,242	48,072	38,724	38,544	+5,519
Property Operators and Real Estate Services	358,793	414,167	280,962	328,295	+77,830
Professional, Scientific and Technical Services (combined)	133,073	135,764	116,973	132,185	+16,100
Professional, Scientific and Technical Services (Except Computer System Design and Related Services)	138,839	135,205	113,551	128,111	+25,288
Computer System Design and Related Services	113,012	137,230	130,753	146,383	-17,741
Administrative and Support Services (combined)	127,127	168,805	130,194	163,204	-3,067
Administrative Services	221,973	288,562	209,156	253,077	+12,817
Building Cleaning, Pest Control, Other Services	47,777	55,786	56,840	59,474	-9,063
Public Administration and Safety (combined)	96,720	118,640	91,956	112,876	+4,764
Public Administration	66,574	77,055	63,284	68,281	+3,290
Defence	232,053	261,921	225,900	226,139	+6,153
Public Order, Safety and Regulatory Services	181,938	183,807	164,418	167,870	+17,520
Education and Training (combined)	85,305	86,450	105,485	95,071	-20,179
Preschool and School Education	81,610	81,632	78,657	78,378	+2,953
Tertiary Education	134,334	146,071	154,052	169,689	-19,719

Adult, Community and Other Education	27,694	30,790	33,633	37,270	-5,939
Health Care and Social Assistance (combined)	78,491	82,486	71,371	74,910	+7,120
Hospitals	97,354	108,766	85,911	91,122	+11,444
Medical and Other Health Care Services	51,682	58,564	54,279	60,009	-2,597
Residential Care Services	98,935	102,876	86,349	87,866	+12,586
Social Assistance Services	67,271	71,958	61,827	63,675	+5,444
Arts and Recreation Services (combined)	53,715	66,204	50,700	65,273	+3,016
Heritage Activities	110,932	116,787	83,671	86,478	+27,261
Creative and Performing Arts Activities	20,139	23,896	15,010	20,324	+5,129
Sports and Recreation Activities	44,716	53,344	51,848	59,557	-7,132
Gambling Activities	117,205	141,855	124,693	153,326	-7,488
Other Services (combined)	62,728	66,352	66,741	70,796	-4,012
Repair and Maintenance	77,016	78,133	71,899	72,462	+5,117
Personal and Other Services	52,015	57,942	61,910	70,703	-9,895
Private Households Employing Staff and Undifferentiated Goods	2,803	9,014	3,900	8,365	-1,097
Total worker productivity	106,574	127,679	106,660	124,601	-85

Explanatory notes (table 4)

For Wollongong, calculations of worker productivity were based on industry value add divided by the total number of workers employed in that particular industry at the end of the financial year. Data combined income information from the Australian Taxation Office (ATO), industry measures by the ABS (2021) and NIEIER (2021) modeled estimates.

In general, higher productivity figures equate to a particular industry having a higher level of output in terms of market value for goods or services. It is important to keep in mind that in many cases labour has only limited influence over fluctuations in productivity measures. This is especially true for globalised, trade exposed industries such as mining, financial services and construction. Here, price fluctuations on global markets (raw commodities, interest rates, currency changes etc.) have a much greater influence over the value of outputs and thus the final measure for worker productivity.

For Wollongong, measures of worker productivity showed noticeable variation across industries over the period of 2011/12 to 2020/21. Given upward global trends in the price for coking and thermal coal, combined with advances in production technologies (e.g. continuous mining machinery used in longwall mining that typifies extraction methods in the Illawarra region) worker productivity in mining

grew locally by \$71K. The most significant growth in worker productivity was in real estate services (\$89K). Much of this can be attributed to a property boom in coastal areas of NSW over the period. For instance, in Wollongong there was a 35% increase in median house prices between 2017 and 2021. In fact, the city became Australia's third most expensive property market (behind Sydney and Melbourne) when measuring median house prices against median incomes. The city's proximity to Sydney, coastal lifestyle and amenities, comparative affordability, and low interest rates helped to drive house price growth. In July 2022 the median house price in Wollongong reached \$1.1M. In reality, real estate agents had little sway over productivity gains in the industry.

Other industries where worker productivity increased was in Wholesale trade (\$53K), Information, Media and Telecommunications (\$23K), and Manufacturing (\$11K). In all three instances, however, increases were at or below productivity increases at the NSW state level.

In terms of declining worker productivity, three industries stood out: Agriculture, Forestry and Fishing (-\$23K), Education and Training (-\$20K), and Transport and Warehousing (-\$16K). As with the above mentioned increases in productivity, the industries that experienced declining productivity in the city of Wollongong also witnessed declines at the NSW level too.



Table 5a: Income distribution for female workers in Wollongong compared to NSW. (Source: Author analysis of ABS Census Data 2016)

5a) Female workers

Gross weekly income	Number	Wollongong %	NSW %	Difference Wollongong to NSW %
Nil income	264	0.7	0.8	-13.3
\$1 - \$149	2,024	5	4.1	19.8
\$150 - \$299	2,422	6	5.1	16.2
\$300 - \$399	2,471	6.2	5.6	10.2
\$400 - \$499	3,079	7.7	6.6	15.4
\$500 - \$649	4,725	11.8	10.2	14.5
\$650 - \$799	5,218	13	11.9	8.8
\$800 - \$999	5,181	12.9	12.6	2.4
\$1,000 - \$1,249	4,855	12.1	12.4	-2.4
\$1,250 - \$1,499	3,115	7.8	8.5	-8.6
\$1,500 - \$1,749	2,409	6	7	-15.4
\$1,750 - \$1,999	1,615	4	4.8	-18.2
\$2,000 - \$2,999	1,640	4.1	6.1	-39.2
\$3,000 or more	549	1.4	3	-72.7
Not stated	598	1.5	1.5	-
Total	40,165	100	100	-



Table 5b: Income distribution for male workers in Wollongong compared to NSW. (Source: Author analysis of ABS Census Data 2016)

5b) Male workers

Gross weekly income	Number	Wollongong %	NSW %	Difference Wollongong to NSW %
Nil income	214	0.5	0.7	-33.3
\$1 - \$149	1,241	3.2	2.3	32.7
\$150 - \$299	1,217	3.1	2.6	17.5
\$300 - \$399	1,333	3.4	3.2	6.1
\$400 - \$499	1,624	4.2	4	4.9
\$500 - \$649	2,341	6	6.2	-3.3
\$650 - \$799	3,060	7.8	8.8	-12.0
\$800 - \$999	4,308	11	12	-8.7
\$1,000 - \$1,249	5,159	13.2	13.5	-2.2
\$1,250 - \$1,499	3,935	10.1	9.9	2.0
\$1,500 - \$1,749	3,805	9.7	8.8	9.7
\$1,750 - \$1,999	3,194	8.2	6.7	20.1
\$2,000 - \$2,999	4,977	12.7	11.4	10.8
\$3,000 or more	2,067	5.3	8.2	-43.0
Not stated	569	1.5	1.6	-6.5
Total	39,044	100	100	-



Explanatory notes (table 5a, table 5b)

Individual income levels in the city are an indicator of socio-economic, skilled and occupational status. Combined with other data such as qualifications and occupations, individual income levels provide a snapshot of people's economic opportunities within a place. Income levels are shaped by a range of factors, including age and experience, qualifications, credentials, employer size, employment type (FT, PT, casual), conditions (direct employee vs. subcontractor), coverage of a worker under an Industry Awards, collective (unionised) and individual bargaining power (Warren 2019).

In 2016, of the 79,209 total employed persons in Wollongong, 50.7% were women, 49.3% were men. Compared to NSW, there is a higher proportion of women workers in Wollongong whose incomes are in the lower distribution brackets with a lower proportion earning higher incomes relative to NSW. For men, there is a lower proportion of workers occupying the lower income brackets compared to NSW figures. There is a greater proportion of male workers earning higher incomes in Wollongong compared to NSW figures, particularly in the higher incomes brackets between \$1,500 and \$2,999 per week.



Table 6: Employment capacity in Wollongong, 2021. (Source: Author analysis of data provided by WCC 2022 and NIEIR 2021)

Industry	Local jobs in Wollongong	Employed residents	Ratio of jobs to residents
Agriculture, Forestry and Fishing	494	271	1.82
Agriculture	393	188	2.08
Aquaculture	0	0	0
Forestry and Logging	0	4	0
Fishing, Hunting and Trapping	55	57	0.96
Agriculture, Forestry and Fishing Support Services	46	22	2.14
Mining	1,442	2,010	0.72
Coal Mining	1,258	1,743	0.72
Oil and Gas Extraction	8	30	0.28
Metal Ore Mining	24	56	0.42
Non-Metallic Mineral Mining and Quarrying	15	23	0.65
Exploration and Other Mining Support Services	138	159	0.87
Manufacturing	7,369	7,448	0.99
Food Product Manufacturing	369	596	0.62
Beverage and Tobacco Product Manufacturing	164	251	0.65
Textile, Leather, Clothing and Footwear Manufacturing	123	143	0.86
Wood Product Manufacturing	227	262	0.87
Pulp, Paper and Converted Paper Product Manufacturing	109	56	1.95
Printing (inc. the Reproduction of Recorded Media)	116	180	0.64
Petroleum and Coal Product Manufacturing	43	127	0.34
Basic Chemical and Chemical Product Manufacturing	163	349	0.47
Polymer Product and Rubber Product Manufacturing	86	162	0.53
Non-Metallic Mineral Product Manufacturing	298	320	0.93
Primary Metal and Metal Product Manufacturing	3,878	2,757	1.41
Fabricated Metal Product Manufacturing	543	622	0.87
Transport Equipment Manufacturing	238	315	0.76
Machinery and Equipment Manufacturing	551	724	0.76
Furniture and Other Manufacturing	460	586	0.79
Electricity, Gas, Water and Waste Services	866	870	1.00
Electricity Supply	331	420	0.79
Gas Supply	59	33	1.78
Water Supply, Sewerage and Drainage Services	156	184	0.85
Waste Collection, Treatment and Disposal Services	320	232	1.37
Construction	8,509	9,248	0.92

Building Construction	2,018	2,487	0.81
Heavy and Civil Engineering Construction	811	906	0.90
Construction Services	5,680	5,855	0.97
Wholesale Trade	1,556	1,770	0.88
Basic Material Wholesaling	437	524	0.83
Machinery and Equipment Wholesaling	410	449	0.91
Motor Vehicle and Motor Vehicle Parts Wholesaling	157	181	0.87
Grocery, Liquor and Tobacco Product Wholesaling	201	124	1.62
Other Goods Wholesaling	331	467	0.71
Commission-Based Wholesaling	20	25	0.82
Retail Trade	8,434	9,360	0.90
Motor Vehicle and Motor Vehicle Parts Retailing	863	884	0.98
Fuel Retailing	191	152	1.26
Food Retailing	2,660	2,771	0.96
Other Store-Based Retailing	4,666	5,482	0.85
Non-Store Retailing and Retail Commission Buying	54	71	0.77
Accommodation and Food Services	6,488	7,376	0.88
Accommodation	590	866	0.68
Food and Beverage Services	5,897	6,510	0.91
Transport, Postal and Warehousing	4,983	5,028	0.99
Road Transport	2,668	2,246	1.19
Rail Transport	688	821	0.84
Water Transport	107	123	0.87
Air and Space Transport	8	301	0.03
Other Transport	106	67	1.58
Postal and Courier Pick-up and Delivery Services	794	800	0.99
Transport Support Services	431	554	0.78
Warehousing and Storage Services	181	115	1.57
Information Media and Telecommunications	923	1,492	0.62
Publishing (except Internet and Music Publishing)	126	243	0.52
Motion Picture and Sound Recording Activities	128	153	0.84
Broadcasting (except Internet)	187	294	0.64
Internet Publishing and Broadcasting	3	8	0.39
Telecommunications Services	280	601	0.47
Internet Service Providers, Web Search Portals and Data Processing Services	67	19	3.54
Library and Other Information Services	132	175	0.75
Financial and Insurance Services	3,547	3,711	0.96
Finance	1,189	1,103	1.08
Insurance and Superannuation Funds	1,558	1,297	1.20

Auxiliary Finance and Insurance Services	800	1,312	0.61
Rental, Hiring and Real Estate Services	1,221	1,437	0.85
Rental and Hiring Services (except Real Estate)	213	228	0.94
Property Operators and Real Estate Services	1,008	1,209	0.83
Professional, Scientific and Technical Services	5,540	8,198	0.68
Professional, Scientific and Technical Services (Except Computer System Design and Related Services)	4,303	6,398	0.67
Computer System Design and Related Services	1,237	1,801	0.69
Administrative and Support Services	2,846	2,990	0.95
Administrative Services	1,296	1,352	0.96
Building Cleaning, Pest Control, Other Support Services	1,550	1,638	0.95
Public Administration and Safety	6,122	9,202	0.67
Public Administration	4,583	6,164	0.74
Defence	141	298	0.47
Public Order, Safety and Regulatory Services	1,398	2,741	0.51
Education and Training	12,199	13,605	0.90
Preschool and School Education	5,092	6,271	0.81
Tertiary Education	4,016	3,781	1.06
Adult, Community and Other Education	3,091	3,553	0.87
Health Care and Social Assistance	15,898	16,293	0.98
Hospitals	4,815	4,246	1.13
Medical and Other Health Care Services	3,936	4,274	0.92
Residential Care Services	2,996	3,243	0.92
Social Assistance Services	4,151	4,530	0.92
Arts and Recreation Services	1,761	2,905	0.61
Heritage Activities	292	571	0.51
Creative and Performing Arts Activities	271	405	0.67
Sports and Recreation Activities	1,154	1,899	0.61
Gambling Activities	44	30	1.47
Other Services	4,327	4,459	0.97
Repair and Maintenance	1,931	1,864	1.04
Personal and Other Services	2,358	2,555	0.92
Private Households Employing Staff or Undifferentiated	39	40	0.96
Total industries	94,524	107,676	0.88

Explanatory notes (table 6)

Employment capacity is calculated as the ratio between the number of local jobs in an industry divided by the number of local residents employed (anywhere) in that same industry. A number above 1.0 means more jobs are available locally than residents employed in that industry. This generally means employers and the local labour market are unable to rely on resident workers to fill jobs and instead require appropriately skilled labour from outside the LGA.

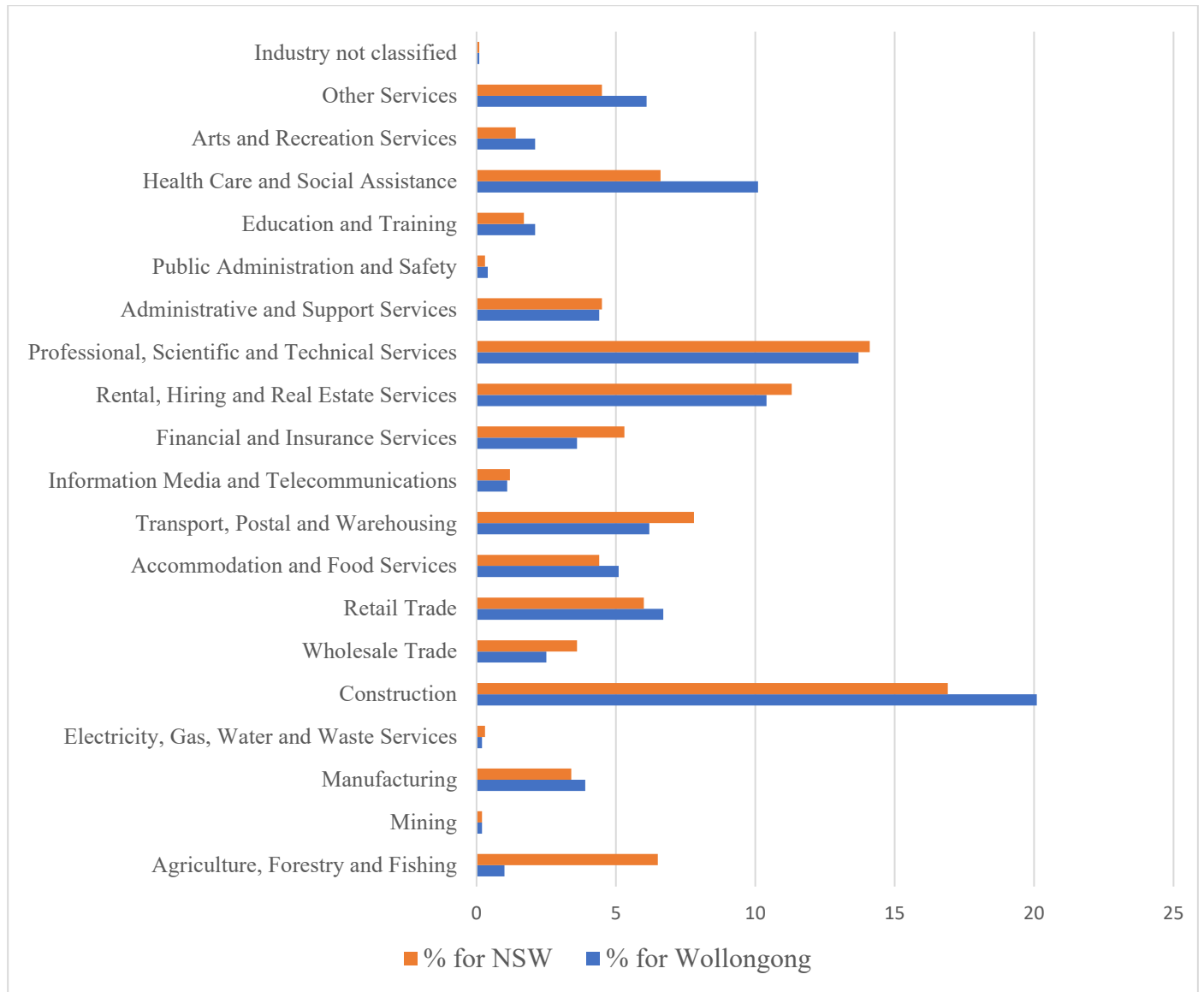
On the flipside, a number below 1.0 means more residents are employed in a particular industry than local jobs available. In other words, residents are working in an industry outside the LGA. Local employment quotients are a way to measure the capacity of a city or region to supply jobs to suitably qualified local people. The figures for Wollongong indicate that many resident workers are employed outside the city. This is unsurprising given that Wollongong is located just a 60-minute drive from Sydney, Australia's largest city.



Table 7: Total registered businesses by industry in Wollongong with comparison to NSW, 2021. (Source: Author analysis of data provided by WCC 2022 and NIEIR 2021)

Industry category	No. of local businesses (2021)	% for Wollongong	% for NSW	Difference in anticipated no. of businesses: W’Gong vs NSW
Agriculture, Forestry and Fishing	144	1.0	6.5	-775
Mining	30	0.2	0.2	0
Manufacturing	546	3.9	3.4	65
Electricity, Gas, Water and Waste Services	30	0.2	0.3	12
Construction	2,840	20.1	16.9	450
Wholesale Trade	348	2.5	3.6	-161
Retail Trade	943	6.7	6.0	95
Accommodation and Food Services	720	5.1	4.4	98
Transport, Postal and Warehousing	881	6.2	7.8	-222
Information Media and Telecommunications	153	1.1	1.2	-16
Financial and Insurance Services	516	3.6	5.3	-233
Rental, Hiring and Real Estate Services	1,469	10.4	11.3	-129
Professional, Scientific and Technical Services	1,937	13.7	14.1	-57
Administrative and Support Services	619	4.4	4.5	-17
Public Administration and Safety	53	0.4	0.3	9
Education and Training	298	2.1	1.7	58
Health Care and Social Assistance	1,427	10.1	6.6	494
Arts and Recreation Services	304	2.1	1.4	106
Other Services	865	6.1	4.5	229
Industry not classified	18	0.1	0.1	4
Total business	14,141	100.0	100.0	-

Chart 2: Total registered businesses by industry in Wollongong with comparison to NSW, 2021. (Source: Author analysis of data provided by WCC 2022 and NIEIR 2021)



Explanatory notes (table 7, Chart 2)

The data on registered businesses in the Wollongong LGA showed a total of 14,141 entities. There is a high proportion of construction-related businesses in the city, equivalent to one in every five registered businesses (20.1%). The figure is 17.3% above the NSW share of registered businesses in construction, equating to an additional 450 firms over the number that would be anticipated. Similarly, there were many registered companies in the ‘Health Care and Social Assistance’ category: 10.1% or 1,427 businesses. This was 41.9% above the NSW proportion of companies registered in the same category. This business count also squared with the employment figures for healthcare, which employed 15,898

people in Wollongong during 2021. The number of healthcare workers in the city was 24% above the NSW ratio.

By contrast, Wollongong had lower numbers of businesses in ‘Agriculture, Forestry and Fishing’ (-775 businesses), ‘Wholesale Trade’ (-161), ‘Transport, Postal and Warehousing’ (-222), and ‘Financial and Insurance Services’ (-233) compared to the NSW shares for these industries. For most of these businesses contributions to employment were also below NSW levels.

However, one major exception was ‘Transport, Postal and Warehousing’. While the number of registered businesses in Wollongong’s transport industry was below the NSW rate (roughly 222 businesses), the city actually had a higher proportion of workers employed in the industry compared to NSW (an extra 257 jobs). This higher level of employment can be explained by the fact that Wollongong has a number of large trucking and freight companies that substantially contribute to industry employment. Thus, despite having fewer businesses registered in the industry overall, their combined employment contribution is significant in the city. The finding is a reminder that the overall number of companies within an industry category does not always correlate to the number of persons employed in that particular industry.



Table 8: A shift-share analysis of Wollongong based on the industry of employment, 2011-2021. (Source: Author analysis of data provided by WCC 2022 and NIEIR 2021)

Employment by Industry ABS category	2021	2011	1. Job change 11-21	2. Benchmark growth	3. Industry mix effect	4. Regional competitive effect
Agriculture, Forestry and Fishing	493	322	171	58	-54	167
Agriculture	392	229	163	41	-37	159
Aquaculture	0	0	0	0	0	0
Forestry and Logging	0	3	-3	0	-1	0
Fishing, Hunting and Trapping	54	63	-9	12	-40	20
Agriculture, Forestry and Fishing Support Services	46	25	21	5	0	17
Mining	1,442	2,077	-635	373	141	-1,149
Coal Mining	1,257	1,815	-558	326	-303	-581
Oil and Gas Extraction	8	32	-24	6	-10	-20
Metal Ore Mining	23	19	+4	3	18	-18
Non-Metallic Mineral Mining and Quarrying	14	13	+2	2	3	-4
Exploration and Other Mining Support Services	137	196	-59	35	16	-110
Manufacturing	7,369	10,121	-2,753	1,819	-2,684	-1,888
Food Product Manufacturing	368	402	-34	72	-62	-44
Beverage and Tobacco Product Manufacturing	164	56	+108	10	-16	114
Textile, Leather, Clothing and Footwear Manufacturing	123	210	-87	38	-86	-40
Wood Product Manufacturing	226	317	-91	57	-116	-32
Pulp, Paper and Converted Paper Product Manufacturing	108	25	+83	5	-7	86
Printing (including the Reproduction of Recorded Media)	115	121	-6	22	-60	32
Petroleum and Coal Product Manufacturing	42	29	+14	5	-12	20
Basic Chemical and Chemical Product Manufacturing	163	126	+36	23	-12	26
Polymer Product and Rubber Product Manufacturing	86	129	-43	23	-61	-5
Non-Metallic Mineral Product Manufacturing	297	500	-203	90	-152	-141
Primary Metal and Metal Product Manufacturing	3,878	6,282	-2,405	1129	-2,782	-752
Fabricated Metal Product Manufacturing	543	618	-75	111	-57	-130

Transport Equipment Manufacturing	238	305	-67	55	-129	7
Machinery and Equipment Manufacturing	550	781	-230	140	-220	-151
Furniture and Other Manufacturing	460	212	+248	38	39	171
Electricity, Gas, Water and Waste Services	865	1,413	-548	254	-292	-510
Electricity Supply	331	470	-140	85	-140	-85
Gas Supply	58	57	+2	10	8	-17
Water Supply, Sewerage and Drainage Services	155	155	+0	28	-12	-16
Waste Collection, Treatment and Disposal Services	319	729	-410	131	-139	-402
Construction	8,509	7,944	+565	1,428	869	-1,732
Building Construction	2,018	1,660	+358	299	696	-637
Heavy and Civil Engineering Construction	811	605	+206	109	323	-225
Construction Services	5,679	5,678	+1	1020	-284	-735
Wholesale Trade	1,556	2,026	-471	364	-592	-243
Basic Material Wholesaling	437	567	-130	102	-193	-39
Machinery and Equipment Wholesaling	410	552	-142	99	-145	-97
Motor Vehicle and Motor Vehicle Parts Wholesaling	156	164	-8	30	-36	-1
Grocery, Liquor and Tobacco Product Wholesaling	201	388	-187	70	-104	-154
Other Goods Wholesaling	330	321	+9	58	-108	59
Commission-Based Wholesaling	20	32	-12	6	-6	-12
Retail Trade	8,434	8,875	-442	1,595	-691	-1,346
Motor Vehicle and Motor Vehicle Parts Retailing	862	630	+233	113	-5	124
Fuel Retailing	191	245	-54	44	-43	-55
Food Retailing	2,659	2,734	-75	492	-403	-163
Other Store-Based Retailing	4,665	5,196	-531	934	-290	-1,175
Non-Store Retailing and Retail Commission-Based Buying	54	68	-15	12	28	-55
Accommodation and Food Services	6,487	6,749	-262	1,213	-415	-1,060
Accommodation	590	827	-238	149	-274	-113
Food and Beverage Services	5,897	5,921	-24	1065	-27	-1,062
Transport, Postal and Warehousing	4,983	4,246	+737	763	-424	398
Road Transport	2,667	1,930	+738	347	-43	433

Rail Transport	687	744	-56	134	-130	-61
Water Transport	106	66	+40	12	-10	39
Air and Space Transport	8	15	-7	3	-6	-4
Other Transport	106	159	-53	29	-15	-66
Postal and Courier Pick-up and Delivery Services	794	585	+209	105	-64	168
Transport Support Services	430	636	-206	114	-167	-153
Warehousing and Storage Services	180	108	+72	20	26	27
Information Media and Telecommunications	922	1,085	-164	195	-172	-187
Publishing (except Internet and Music Publishing)	125	299	-173	54	-143	-84
Motion Picture and Sound Recording Activities	127	94	+33	17	5	11
Broadcasting (except Internet)	187	227	-40	41	-29	-53
Internet Publishing and Broadcasting	3	4	-1	1	-1	-1
Telecommunications Services	280	337	-57	61	-42	-76
Internet Service Providers, Web Search Portals and Data Processing Services	66	55	+11	10	32	-31
Library and Other Information Services	131	66	+65	12	-10	63
Financial and Insurance Services	3,547	3,266	+281	587	-38	-268
Finance	1,189	1,167	+21	210	-95	-94
Insurance and Superannuation Funds	1,558	1,541	+16	277	178	-436
Auxiliary Finance and Insurance Services	799	556	+243	100	7	137
Rental, Hiring and Real Estate Services	1,221	1,497	-277	269	-100	-446
Rental and Hiring Services (except Real Estate)	213	436	-223	78	-165	-137
Property Operators and Real Estate Services	1,007	1,061	-54	191	34	-279
Professional, Scientific and Technical Services	5,539	4,651	888	836	1,337	-1,283
Professional, Scientific and Technical Services (Except Computer System Design and Related Services)	4,302	3,746	+556	674	665	-783
Computer System Design and Related Services	1,236	904	+332	163	617	-447

Administrative and Support Services	2847	3050	-205	548	-147	-606
Administrative Services	1,296	1,450	-154	261	-221	-194
Building Cleaning, Pest Control and Other Support Services	1,549	1,600	-51	288	114	-452
Public Administration and Safety	6,121	5,093	+1,028	916	132	-20
Public Administration	4,582	3,739	+844	672	482	-310
Defence	140	137	+4	25	-45	23
Public Order, Safety and Regulatory Services	1,397	1,217	+181	219	-74	35
Education and Training	12199	9,628	2,571	1,731	1,068	-228
Preschool and School Education	5,091	4,554	+537	819	291	-573
Tertiary Education	4,015	4,021	-5	723	-61	-667
Adult, Community and Other Education	3,091	1,053	+2,038	189	573	1,276
Health Care and Social Assistance	15,898	12,461	+3,437	2240	2,887	-1,690
Hospitals	4,815	3,638	+1,177	654	539	-16
Medical and Other Health Care Services	3,935	3,436	+499	618	984	-1102
Residential Care Services	2,996	2,285	+711	411	-104	404
Social Assistance Services	4,150	3,101	+1,050	557	1,456	-963
Arts and Recreation Services	1,761	1,169	+592	210	86	296
Heritage Activities	291	107	+184	19	-2	167
Creative and Performing Arts Activities	271	251	+20	45	-15	-10
Sports and Recreation Activities	1,154	755	+399	136	140	124
Gambling Activities	44	55	-11	10	2	-23
Other Services	4327	3,841	486	691	-285	80
Repair and Maintenance	1,930	2,006	-76	361	-272	-165
Personal and Other Services	2,357	1,806	+551	325	-36	262
Private Households Employing Staff and Undifferentiated Goods	38	29	+10	5	1	4
Total employment by industry	94,524	89,522	5,002		16,092	-11,090

Explanatory notes (table 8)

A shift-share analysis offers a place-based mechanism to interpret changes in economic and labour market variables over different periods. A shift-share can help analyse growth or decline in a given industry (or wider economy). Here we used four broad components to identify some of the driving forces behind employment change in Wollongong. The four components of change were:

- 1. Jobs change:** The difference in job counts for two different periods e.g. Wollongong jobs in mining for 2021 (1,422) – jobs for mining in 2011 (2,077) = **- 635**.
- 2. Benchmark growth:** This is industry growth or decline linked to NSW's overall economic growth rate over precisely the same period. Benchmark growth links Wollongong's performance directly to NSW based on the economic adage "*a rising tide lifts all boats*". Over the 2011 to 2021 period, the NSW growth rate was 8.34%. The growth rate for Wollongong was 5.60%. In other words, Wollongong's rate of employment growth lagged behind the overall growth rate for NSW by -39.3%.
- 3. Industry mix:** This is the growth or decline in a given industry that can be attributed to the industry's performance at the NSW level. This helps to assess the direct industry-level flow-on effects from macro-scale performance to the city scale. To arrive at the industry mix number, the NSW growth rate of the total economy is *subtracted* from the NSW growth rate for each specific industry being measured. This provides a growth percentage that can be applied to the city.
- 4. Regional competitive effect:** This measures how much change in employment by industry in Wollongong is connected to localised, place-based factors and competitive advantage (effects of endogenous factors). The regional/city competitive effect measures the job change that occurs within a location for different industries, which broader trends at the state level don't explain e.g. NSW growth.

The regional competitive effect is considered the most critical variable in a shift-share analysis because it helps capture localised factors (See EMSI 2022). If an industry has a positive number in the regional competitive effect column, it suggests characteristics local to Wollongong helped drive above trend growth. For example, increases in education jobs may be due to new schools or university campus being opened in the city. Negative numbers in the regional effect measure suggest localised factors have played a role inhibiting employment growth in that industry. For example, a manufacturing employment decline due to a factory or plant closure.

Results for Wollongong show the highest regional competitive scores were in transport-related services (+473), suggesting local characteristics supported above trend growth. On the flipside, large negative numbers were found in Manufacturing (-1,888), Construction (-1,732) and Health Care and Social Assistance (-1,690), suggesting any overall jobs growth here was due to external factors.

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