RIDING THE NEXT WAVE OF AUTOMATION IN RURAL AUSTRALIA

SAFEGUARDING AGRICULTURE AND RURAL LABOUR MARKETS THROUGH MIGRATION AND SKILLS DEVELOPMENT

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The increasing automation of occupational tasks across the economy means the nature of work today is very different to what it was a century ago. The ability to manage these technological and labour force changes remains a challenge for workers and policymakers alike.

A key focal point of this paper is the impact of such changes on workers in the Agriculture, Forestry and Fishing (AFF) industry and, in turn, rural communities where AFF dominates the local labour market. Not only has the work undertaken by AFF workers altered as a result of increasing automation but, overall, the proportion of people employed in AFF nationally has decreased.

Although, certain subindustries such as horticulture, have the opposite problem. It is not that there are not enough jobs for people to fill, but that there are not enough local people filling them. There is a mismatch between workers and place. Consequently, migrant labour is needed to help sustain fruit and vegetable farming throughout the year and across the country.

However, even with migrant workers, the demand for labour in horticulture-intensive regions remains high, and is only expected to increase in the future as the entire domestic agricultural workforce continues to age. Moreover, the job mix in rural areas more broadly is changing rapidly, from a predominance of low skill agricultural work to a mix of low and high skilled agriculture and service sector jobs.

To help cultivate a workforce for the next generation, dual emphasis on migrant labour and skills development/acknowledgement is required. Emphasising these two issues in tandem will better enable rural communities to address current labour challenges and remain adaptable to future change.

The skills mix offered by migrant workers across the occupation spectrum is one particular area in need of renewed focus. It is not just temporary, entry level positions that need filling, but ongoing, senior positions, too.

Likewise, rural areas need better promotion of skills development at the local level, not least to boost the attractiveness and viability of farming careers for rural youth. Researchers at the National Centre for Vocational Education and Research estimate there will be a rise in the number of job vacancies for farmer and farm manager positions over the next few years (up to 123,000 openings between 2016 and 2024), due to both the expansion and the replacement of retired older workers. To help fill these vacancies, young people need to be encouraged to aspire to senior farming roles, and the increasing level of professionalism that such roles are assuming.

Because employment outlooks vary from place to place for a host of reasons, remaining adaptable to any future workforce challenges is what will safeguard communities in the long run.

In rural areas where increases in the efficiency of agricultural production are expected to come at the expense of jobs, such as certain aspects of livestock production, there needs to be broader expansion of the local skills base. This will help match the general shift from lower-skilled, more manual and more routine farm jobs to higher-skilled, less manual and less routine farm jobs.
Ongoing investment in human capital through skills development right across rural communities is crucial. This may be through formal or informal learning done ‘on the job’, at home, or in a dedicated educational setting. Investment in skills development will help ensure that rural employers are able to fill both high and low-skill jobs locally, and that people in rural communities are adaptable to the changing nature of work – whatever their industry – so they can remain competitive for employment in the broader economy.

Keeping up to date with the latest work processes and technologies will also help support rural enterprises to tap into new national and international markets and move into niche areas of business. This, in turn, can foster new employment opportunities locally.

RECOMMENDATIONS TO SAFEGUARD AGRICULTURE AND RURAL LABOUR MARKETS

Digital technologies are continuing to change the nature of work across all industries. Proactive strategies are required to ensure rural communities benefit directly (from the diffusion of burden-easing automated technologies across rural enterprises) and indirectly (from skills development in digital technologies and beyond). Five areas of action will be critical:

1. Monitor the impact of automation in rural areas to identify how different employment and occupation prospects depend on the prevalence of different subindustries. For example, within AFF, employment in fruit and tree nut growing is expected to increase by 2022 whereas employment in sheep and beef cattle farming is expected to decline (because of enhanced production efficiency). Responses to these specific prospects and challenges need to be place-based and not based simply on sector-wide policies.

2. Embrace the critical role of migrant workers in addressing rural labour shortages, especially in horticulture-reliant Heartland regions, and increase temporary and permanent migration using locally-led strategies.

3. Ensure that Australia’s visa system reflects the presence and need for high and low-skilled workers and local labour shortages.

4. Provide greater recognition of AFF-related skills and qualifications to: (a) encourage and facilitate more international migrants to pursue AFF careers in rural Australia; and (b) enhance the perceived value and professionalism of AFF careers for Australia’s rural youth.

5. Address current and future labour challenges through international migration and ongoing endogenous skills development via clearly-defined training pathways (whether through on-the-job ‘badge’ style skills recognition, free online courseware, or a more traditional TAFE-university context) to: (a) ensure local adaptability for future employment across all industries; and (b) encourage rural businesses to tap into niche markets, locally and internationally.
Regional Australia is central to the Australian economy, employing approximately one third (31 percent) of all of Australia’s workers. This distribution is similar across most industries, with one clear exception being agriculture, forestry and fishing (AFF), where regional areas make up approximately 81 percent of workers. Certainly, the connection between agriculture and regional Australia, or in AFF’s case, rural Australia, is strong. The people of rural Australia ‘bear disproportionate stewardship responsibilities for landscapes fundamental to food production.’

An ongoing challenge for Australia’s rural workforce, as with the rural workforce of other developed countries, is the changing nature of AFF employment. As a whole, AFF employment has decreased over the last five years, and is expected to continue to decrease in the five years to come. Part of this decrease is due to the mechanisation of labour.

The industrialisation of all facets of the economy has meant the nature of work has substantially changed over the last two hundred years. The agricultural sector is no different. However, the sparse nature of Australia’s population distribution in rural areas does present some relatively unique issues in the way technology impacts on agricultural work practices.

Particularly in horticulture-intensive areas, where much of the manual labour required at harvest time has yet to be replaced by machines and where projected employment growth tends to buck the negative trend, there is often not the local labour required to meet harvest demands. Consequently, seasonal migrant labour is needed to sustain fruit and vegetable farming throughout the year and across the country.

The opportunities presented for migrant workers to enable growth in Australia’s agriculture sector – both in terms of temporary entry-level roles and permanent senior roles – cannot be underestimated. The same can be said of the skills these migrant workers bring, especially the workers that come from overseas and take on ongoing roles in rural communities. Greater recognition of migrant skills, and the skills base of the rural workforce more broadly, will also better equip rural communities in terms of economic development. By broadening the capacity of workers, and the types of workers taken on, rural communities will be better able to tackle changes to employment as Australia’s economy continues to evolve.

The purpose of this paper is to generate discussion around the importance of maintaining a dual emphasis on local and migrant skills development and recognition to meet present and future labour force challenges. This dual emphasis is necessary for the long-term sustainability of rural careers in the face of digital and economic transformation, and agricultural careers in particular, both in terms of labour supply (managing seasonal and ongoing workforce shortages) and demand (enhancing the attractiveness of seasonal and ongoing jobs).

The first part of the paper looks at the prominence and transformation of agriculture in rural Australia and how digital technologies have continued to alter agricultural production and thus the agricultural workforce. Discussion then turns to the issue of automation across the economy, and its projected impact on the AFF industry, and how, because of an ageing AFF workforce, demand for labour (skilled and
unskilled) is likely to remain high in some sectors, particularly horticulture. This leads to the next part of the paper which addresses future employment prospects of the AFF industry and the national shift in work towards the higher skilled, service-based occupations. The paper then culminates in a discussion that links employment challenges with the need for broader skills development and recognition across multiple levels, among migrants and rural youth, to ensure that rural communities remain adaptable to current and future workforce challenges whatever their particular industry makeup.

Note that the term ‘regional Australia’ is used here to encompass all of the towns, small cities and areas that lie beyond the major capital cities (Sydney, Melbourne, Brisbane, Perth, Adelaide and Canberra). Rural Australia comprises the ‘Heartland regions’: smaller regional areas that are isolated from major metropolitan and regional cities (and thus more remote) and which are shaped by local ingenuity.5

THE PROMINENCE AND TRANSFORMATION OF AGRICULTURE IN RURAL AUSTRALIA

In rapidly modernising societies, our capacity for creativity and innovation is often measured by our ability to keep abreast of technological change. For rural and regional Australia, however, the lure of new technology has always been tinged with a sense of apprehension and regret. The town or region that fails to innovate fails to grow. But in tethering itself ever more tightly to the world, the bush is also in danger of surrendering its independence, and finally even its existence, to metropolitan or global forces. For over a hundred years, rural and regional Australia has wrestled with the fatal attraction of technology, the smiling friend that often turned out to be a treacherous enemy.6

There are promises and pitfalls to any change, technological or otherwise. Similarly, there are alternative perspectives of the impact of technological disruption for people living in rural Australia. It is important to address precisely what recent changes in employment and technology mean for people working in the agriculture, forestry and fishing industry, as well as what such changes are likely to mean for Australia’s rural communities more generally. Inevitably, this becomes a discussion of changing skill and labour demands; how rural Australia is able to meet these demands, and what needs to be done to ensure that ‘country life’ continues to live on.

According to political scientist Don Aitkin, one of the chief tenets of ‘countrymindedness’ is that ‘farming and grazing, and rural pursuits generally, are virtuous, ennobling and co-operative; they bring out the best in people.’7 Indeed, historically, agriculture has been at the very heart of what it means to live and work in rural Australia. How changes to the nature of work impact on the agricultural labour force thereby has huge implications for the future of Australia’s rural communities.

With industrialisation, human labour has been increasingly replaced by mechanical power as a way to increase productivity and meet the needs of growing populations.8 Despite this continued population increase, and the amount of food required to sustain it, technological changes to agricultural production saw agriculture’s share of Australian employment reduce significantly by the end of the 20th Century. At the time of the 1901 Population Census, approximately 23.4 percent of the total population (30 percent of males and 10 percent of females) were engaged in agricultural and pastoral work.9 By
May 2017, just 2.5 percent of Australia’s workforce was employed in the AFF industry.10 The majority of these workers could be found in regional Australia, with 2011 Census data showing AFF making up 6.4 percent of all regional employment and 17.4 percent of employment in ‘Heartland regions’ — taken here as a proxy for ‘rural’ places.11

So, what are the impacts of technological and workforce change on our rural farmers?

**PERCEPTIONS OF TECHNOLOGY’S IMPACT ON AGRICULTURAL PRODUCTION**

In the first part of the 20th Century, change in agricultural production was considered a largely positive development for the rural workforce. Improvement through technological advancement was central to this way of thinking. The opinion was that ‘modern technology and labour-saving devices would ease the back-breaking and monotonous labour of the farmer and his wife, while modern transport and communications would reduce the “social sterility” of rural existence’.12

More recent praises of changes for rural workers emphasise automation from digital technologies as a way to increase farming yields and profits, as well as food and nutritional security. Moreover, in cases where farm labourers are hard to come by, digital technologies are positioned as a way to help fill labour gaps in rural areas. Essentially, those who view digital innovations as helping the farmers of today believe that new technologies ‘can speed [up] the way farmers in rural areas…get, exchange and manipulate information’.13 As well as enhancing production, digital technologies also have the potential to alter the nature of the relationship between rural workers and the marketplace.

Importantly, this positive view of change to the rural workforce, especially the parts involved in agricultural production, is not universal. Those less optimistic about the role of digital technologies in particular see automation as: (1) being more likely to be taken up by corporate agribusinesses than small scale farmers; (2) a threat to the need for manual labour in the agricultural workforce; and (3) a sign that labour needs in rural areas are shifting from manual/low skilled work to more conceptual/high-skilled work, and that those in the former category will be superseded by the latter.

Certainly, the rural workforce is changing, and agricultural practices of today are a far cry from pre-industrial times. Even 20 years ago, as then Deputy Prime Minister John Anderson noted: ‘[gone are] the eras of manual shearing handpieces, the sickle and scythe, bagged wheat, and horse-drawn ploughs.’14 Changes in farming technologies have changed the way farming happens, and ‘every time... farming technologies [have] changed, jobs were lost, and every time jobs were lost, country town populations [have fallen] away.’15

With the advent of new digital technologies, there has been a growing fear that some rural jobs may soon be wiped out altogether. Twenty years ago, there was warning that ‘a new generation of sophisticated computer-driven robots may soon replace many of the remaining tasks on the land, potentially transforming the modern farm into an automated outdoor factory.’16 In other words, ‘hundreds of millions of farmers across the globe face the prospect of permanent elimination from the economic process.’17
The more pessimistic interpretation of the ‘technological take-down’ of the agricultural labour force fits with the opinion that the technology advancements made today will drastically alter the types of jobs available for the generations of tomorrow. In other words, because of technological change, some agricultural jobs may not even exist in a couple of decades.

A more conservative view is not of job loss, but of job change. Work by Frey and Osborne has underpinned widespread claims that automation will mean the job market in 10 to 20 years’ time will be very different to what we see now – not just for agriculture, but for all industries. While others, such as the McKinsey Global Institute, dispute the speed and extent to which automation will occur, there is general agreement that some kind of job change is inevitable. New skills will be needed for the work generated by new technologies. Meanwhile, the skill level across most existing jobs will likely rise, and digital skills will become increasingly important. The challenge for rural Australia will centre on how communities adapt to these technological changes.

Research from the Regional Australia Institute (forthcoming) into the vulnerability of occupations to change as a result of automation has found that 27 percent of all occupations in metropolitan areas can be deemed highly vulnerable to change as the result of automation. Across regional Australia, the average proportion of occupations highly vulnerable to automation is also around 27 percent. With an additional 37 percent of jobs in regional Australia at moderate risk of automation, compared with 27 percent moderately at risk in metropolitan areas, the overall risk posed by automation appears greater in regional areas.

Some individual places are more susceptible to disruption than others, though. In rural Australia (what RAI defines broadly as ‘Heartland regions’), places like Kent and Upper Gascoyne (WA) have a smaller proportion of all jobs highly vulnerable to automation (12 percent and 11 percent respectively) compared to places like Tammin and Murchison (WA) which have 27 percent and 22 percent of jobs at high risk of automation respectively (see Table 1). Importantly, the differences in vulnerability to automation are not necessarily due to the industry that the majority of people work in. For instance, all of these local government areas (LGAs) have large proportions of their workforce employed in the AFF industry (Kent has 74 percent, Upper Gascoyne has 68 percent, Tammin has 66 percent and Murchison has 67 percent).

While different LGAs record different automation scores based on their specific occupation mix, it is clear that, on the whole, the rural impacts of automation are not ‘apocalyptic’; impacts vary. The key difference is in the specific occupation mix within each industry of employment. The occupations most vulnerable to change as a consequence of automation are machinery operators and drivers, labourers, and clerical and administrative workers (see Figure 1). The least vulnerable are managers and professionals. Essentially, occupations that revolve around low-skilled, routine manual labour are regarded as being far more susceptible to change as the result of automation than occupations that are non-routine and require a high level of skill, personal contact and care.

Rural places that will be challenged in years to come are the ones that have a relatively large proportion of people employed in the agriculture, forestry and fishing industry and a relatively large
proportion of jobs at ‘high risk’ of being impacted by automation. Kent and Cranbrook (WA) are two such places. In Kent, the AFF industry accounts 74 percent of all known employment. While the overall exposure to automation across all industries in Kent is relatively mild, many of the jobs that are vulnerable are AFF jobs. As such, while Kent as a whole may not be overly vulnerable to automation, Kent AFF workers are quite exposed to the impacts of automation. Cranbrook, with 68 percent of all local jobs found in AFF, faces a similar scenario.

Conversely, some areas with relatively major overall job vulnerability, such as Tammin, are expected to see minimal automation in the local AFF workforce. Once again, these variances in vulnerability come down to variances in the skill, routineness, and labour type of the local occupation mix in these places. Essentially, in AFF-intensive Heartland regions, places with more ‘farm owners’ than ‘farm labourers’ will tend to have fewer jobs susceptible to automation.

<table>
<thead>
<tr>
<th>Clerical and administrative workers</th>
<th>Most vulnerable to automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine operators and drivers</td>
<td></td>
</tr>
<tr>
<td>Sales workers</td>
<td></td>
</tr>
<tr>
<td>Labourers</td>
<td></td>
</tr>
<tr>
<td>Technicians and trades workers</td>
<td></td>
</tr>
<tr>
<td>Community and personal service workers</td>
<td></td>
</tr>
<tr>
<td>Managers</td>
<td></td>
</tr>
<tr>
<td>Professionals</td>
<td></td>
</tr>
</tbody>
</table>

Increasing automation score

Least vulnerable to automation

Figure 1. Ranking of occupations by vulnerability to automation

### Table 1. Vulnerability of jobs to automation in the 25 most AFF-intensive Heartland regions

<table>
<thead>
<tr>
<th>2016 LGA name</th>
<th>AFF as % of all known jobs</th>
<th>% of all known jobs highly vulnerable to automation</th>
<th>Overall exposure to automation</th>
<th>% of highly vulnerable jobs that are AFF jobs</th>
<th>AFF exposure to automation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Arthur</td>
<td>74.65%</td>
<td>16.67%</td>
<td>Moderate</td>
<td>10.53%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Trayning</td>
<td>74.63%</td>
<td>12.12%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Kent</td>
<td>73.54%</td>
<td>12.10%</td>
<td>Mild</td>
<td>43.33%</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>Mount Marshall</td>
<td>69.19%</td>
<td>14.90%</td>
<td>Mild</td>
<td>10.53%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Upper Gascoyne</td>
<td>68.42%</td>
<td>10.64%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Cranbrook</td>
<td>67.79%</td>
<td>12.12%</td>
<td>Mild</td>
<td>37.29%</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>Murchison</td>
<td>66.67%</td>
<td>22.22%</td>
<td>Moderate</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Kulin</td>
<td>66.57%</td>
<td>11.52%</td>
<td>Mild</td>
<td>21.95%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Tammin</td>
<td>66.32%</td>
<td>27.10%</td>
<td>Major</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Wickepin</td>
<td>64.23%</td>
<td>18.18%</td>
<td>Moderate</td>
<td>13.79%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Karoonda East Murray</td>
<td>64.14%</td>
<td>12.03%</td>
<td>Mild</td>
<td>16.67%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Jerramungup</td>
<td>64.11%</td>
<td>15.56%</td>
<td>Moderate</td>
<td>17.24%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Dumbleyung</td>
<td>62.55%</td>
<td>11.66%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Woodanilling</td>
<td>62.42%</td>
<td>23.35%</td>
<td>Moderate</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Narembeen</td>
<td>62.34%</td>
<td>18.38%</td>
<td>Moderate</td>
<td>15.15%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Victoria Plains</td>
<td>62.24%</td>
<td>13.72%</td>
<td>Mild</td>
<td>12.90%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Lake Grace</td>
<td>59.96%</td>
<td>14.54%</td>
<td>Mild</td>
<td>16.98%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Nungarin</td>
<td>59.18%</td>
<td>14.09%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Boulia</td>
<td>58.24%</td>
<td>14.14%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Southern Mallee</td>
<td>57.91%</td>
<td>22.28%</td>
<td>Moderate</td>
<td>22.79%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Gnowangerup</td>
<td>57.30%</td>
<td>19.45%</td>
<td>Moderate</td>
<td>17.36%</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td>Koorda</td>
<td>57.25%</td>
<td>11.93%</td>
<td>Mild</td>
<td>0.00%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Elliston</td>
<td>56.04%</td>
<td>14.84%</td>
<td>Mild</td>
<td>12.31%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Etheridge</td>
<td>55.97%</td>
<td>14.55%</td>
<td>Mild</td>
<td>12.50%</td>
<td>Mild</td>
<td></td>
</tr>
<tr>
<td>Broomehill-Tambellup</td>
<td>55.53%</td>
<td>14.33%</td>
<td>Mild</td>
<td>24.00%</td>
<td>Moderate</td>
<td></td>
</tr>
</tbody>
</table>


Notes: * ‘Known jobs’ refers to 2016 Census records with stated occupation and industry of employment, to which automation scores can be attributed according to ANZSCO classifications.
# ‘Mild’ =<15%; ‘Moderate’ = 15-25%; ‘Major’ =>25%
Importantly, vulnerability to automation is about change as the result of automated technologies. It does not necessarily mean job loss, nor does it extend to all AFF subsectors.

Horticulture is one AFF subsector where the demand for human labour remains high. Indeed, fruit and vegetable farmers still rely heavily on human labour to harvest crops. Though there are some new developments in the works, the current capacity for robots to manage the complexities of harvesting fruit and vegetables (which can vary greatly in colour, shape, size and growing conditions) is limited.

As well as being labour-intensive and located in more remote areas of Australia, much of horticultural work is seasonal. Consequently, securing the workers necessary to stem labour shortages in rural areas can be tricky. This is compounded by the fact that employment can be somewhat unpredictable and staggered, ‘fragmented across time and space’. Efforts to support Australia’s fruit and vegetable farmers include endorsement of Working Holiday visas to meet harvesting needs and creation of the Harvest Trail website (www.harvesttrail.gov.au), an initiative to entice people, especially from overseas, to ‘work their way around Australia’.

Part of the reliance on migrant workers is the exodus of potential home-grown workers. In search of broader employment opportunities, many young people are leaving country towns for larger regional and metropolitan centres in pursuit of higher education or alternative careers. Working-age residents who remain behind are also lured away from horticulture to the perceived benefits of employment in other sectors. Nevertheless, the demand for outputs from Australian fruit and vegetable growers persists.

Without workers to physically pick fruit and vegetables, some crops simply cannot be harvested. Subsequently, food and economic opportunity – for farmers and the broader community within which they live – is wasted. According to a 2008 analysis by the National Farmer’s Federation, farms have been left with an average of $100,000 of unpicked fruit each year because of a shortage of 22,000 fruit-picking workers.

Migrant labour presents a means to maintain productivity ‘when local workers shun farm jobs faster than labour-saving technology or imports eliminate farm jobs.’ And since fruit and vegetable growing is so climate and season-dependent, migrant workers are in demand throughout the year and across the country, moving from place to place and crop to crop. Indeed, transient horticultural workers represent ‘one of the most prominent and enduring forms of population movement in rural areas of Australia.’

Those embarking on this harvesting circuit tend to constitute one of five main groups: Permanent itinerants, retirees, Australian Working Holiday Makers (AWHMs), Working Holiday Makers from Overseas (WHMOs) and students. In other words, both Australian residents and overseas visitors traverse the country in search of temporary work in horticulture.
Interestingly, working across multiple distant locations for short periods is often considered favourable to working in a single region all year around, suggesting that mobile harvest work may be more of a lifestyle than an economic choice for some. Others, however, may travel from region to region precisely to increase their earning potential.

**FUTURE EMPLOYMENT PROSPECTS FOR THE AFF INDUSTRY**

Nationally, projections from the Department of Employment show that AFF is expected to decrease by 0.8 percent over the next five years through to May 2022 (see Appendix A for further details). Subindustries where employment is expected to be hardest hit are those related to livestock production (sheep, beef cattle and grain farming employment declining by 16.6 percent, other livestock farming employment declining by 11.6 percent).

AFF subindustries where employment is expected to increase the most are those related to fishing and hunting (between 9.2 percent and 14.8 percent employment growth) as well as fruit and tree nut growing (13.1 percent employment growth). Mushroom and vegetable growing, as well as nursery and floriculture production, are likewise expected to have employment growth over the same five year period (6.1 percent and 5.8 percent respectively). These projections suggest that, while some areas of agriculture may face declining employment in the near future, many areas of horticulture are still very much in demand of human labour, whether the labour is sourced locally or through in-migration.

In terms of employment growth in the AFF industry as a whole (where the focus is on production and farming services rather than processing), the outlook for AFF employment in the 1 digit ANZSIC level varies by state (see Appendix B). According to the Department of Employment’s five year projections for 2016-2020, across New South Wales, employment in AFF is expected to decrease. The greatest proportion of jobs lost in regional New South Wales is anticipated for Far West and Orana, Capital Region, New England and North West, Riverina and Hunter Valley. All of Western Australia is likewise expected to have employment declines in the industry.

Tasmania, the Northern Territory and the Australian Capital Territory are all projected to have AFF employment growth between 2016 and 2020. The situation in Victoria, South Australia and Queensland is more mixed. In Victoria, most regional areas are expected to have employment growth in AFF, with Bendigo, Geelong and Hume the biggest winners. The exceptions are Ballarat, North West Victoria and Shepparton, which are projected to have declines in AFF employment. In regional South Australia, the Barossa-Yorke-Mid North region is projected to have employment growth through to 2020, however South Australia’s Outback and South East regions are expected to have declines in employment.

Queensland is another state with a mixed outlook for regional areas, however with far greater extremes than Victoria and South Australia. While Cairns, Darling Downs-Maranoa, Townsville and Wide Bay are expected to lose almost one fifth of their AFF jobs in the next five years, the majority of other areas are projected to have modest AFF employment growth (0.1 percent).
The fulfilment of AFF’s future employment needs is likely to remain heavily reliant on migrant workers – be they Australian-born workers who migrate across the harvest trail, temporary overseas holiday makers or more long-term overseas workers looking to call rural Australia ‘home’. The long-term migrant workers from overseas are, and will continue to be, especially important for the agriculture sector for two reasons, particularly where farm management positions are concerned.

The first reason is the ageing of Australian’s existing farmer base. The second is the reluctance of rural youth to pursue a life working ‘on the land’. Together, these issues put strain on the demand for farmers, and the capacity of farmers to attract other workers.

A recent study published by the National Centre for Vocational Education Research (NCVER) has estimated that while net employment numbers are variable in AFF, the number of job openings is expected to grow in the order of 123,000 positions through to 2024. This estimate includes some 71,800 vacancies expected as replacement workers and managers are required to fill vacancies caused either by staff turnover or retirement.

Growth in the number of overseas-born residents is important for rural areas with ageing populations that are looking for the next generation of workers to fill these vacancies. RAI analysis of 2016 Census Community Profile data shows that, in AFF-dominant Heartland regions, there is a negative correlation between labour participation and median age ($r = -0.45$, $n = 166$, $p = 0.00$). This means that the older an AFF-dominant Heartland region is, the fewer people it is likely to have working or available to work.

The rest of Australia also has the same relationship between median age and labour force participation, albeit not a strong as AFF dominant Heartland regions ($r = -0.26$, $n = 372$, $p = 0.00$). What makes AFF-dominant Heartlands further stand out from the rest of Australia is the negative correlation between unemployment and proportion of AFF workers ($r = -0.22$, $n = 166$, $p = 0.05$). In general, as the proportion of AFF workers increases in AFF-dominant Heartlands, unemployment decreases. This indicates that rural communities with a high proportion of older residents may not have spare workers to draw on, and so should look to secondary migration to help meet their labour demands. Moreover, since overseas-born AFF workers tend to be younger than Australian-born AFF workers, increasing the pool of migrant labour can help boost the AFF workforce in both the short and long-term (see Table 2).

Therefore, any increase in the number of immigrant farmers not only imbues Australian farming with new knowledge and skills from abroad, it also helps provide ‘an alternate source of new generation farmers’ and farm labourers.
Table 2. Distribution of Australia’s workers by age, industry and place of birth

<table>
<thead>
<tr>
<th></th>
<th>Aged under 30 years</th>
<th>Aged 50 years or over</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALL INDUSTRIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian-born workers</td>
<td>27%</td>
<td>41%</td>
</tr>
<tr>
<td>Overseas-born workers</td>
<td>20%</td>
<td>44%</td>
</tr>
<tr>
<td><strong>AFF INDUSTRY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian-born workers</td>
<td>16%</td>
<td>50%</td>
</tr>
<tr>
<td>Overseas-born workers</td>
<td>24%</td>
<td>38%</td>
</tr>
</tbody>
</table>

Source: 2016 Census of population and housing, customised data

Not only have children of farmers been increasingly reluctant to continue their family business, fewer young people have been undertaking agriculture and rural science studies because of perceptions that AFF lacks clear opportunities for employment and career progression.41 While there is some optimism that this negative trend may now be reversing – with student intakes into agricultural courses increasing since lows in 2012 – perceptions of AFF as a career choice still need to be enhanced for many young people.42

Until the local supply of AFF labour (skilled and unskilled) is better secured, the need for international migrant labour – both temporary and permanent – remains critical. According to research by the National Farmer’s Federation from 2008, the AFF industry was short approximately 80,000 skilled workers.43 With improved mechanisms for matching skilled migrant labour with rural employers, the chances of filling some of these positions would be greatly enhanced.

To encourage more international migrants to pursue agricultural careers and settle in rural Australia, there also has to be a greater recognition of agriculture-related qualifications (including vocational qualifications) in Australia’s skilled migration program.44 In accordance with the recommendations put forward by the South Australian Centre for Economic Studies, greater flexibility in Australia’s visa system is necessary to enable rural employers to effectively fill local labour gaps, no matter the occupation classification or skill level required.45

If visa allocation is to remain reliant on occupation lists and remuneration requirements, there must be greater recognition of region-specific labour needs and the challenges rural employers face in meeting standards imposed at the national level. Moreover, the visa bias towards skilled workers must also be revisited to ensure that current industry and occupation classifications accurately reflect the nature of work taking place in rural communities as well as the need for unskilled labour and lower level qualifications.

Acknowledging the wide-ranging skills mix in agriculture – as well as the presence and need for high and low-skill jobs – will not only make it easier for agricultural employers in rural areas to fill labour gaps. Increasing awareness of the professional pathways available may also enhance the perceived value of farming careers for Australia’s local rural youth. This, in turn, could boost the uptake of agriculture-based qualifications and training, and thus the number of local workers for rural communities to draw on to replace older farmers and farm managers as they retire. With the NCVER’s prediction of a large number of job openings for farmers and farm managers between 2016 and 2024, fostering an interest in farming among today’s youth will be critical for the AFF industry in the years to come.
LEARNING TO ‘GROW’ BOTH ON AND OFF THE FARM

As well as cultivating career interest, understanding the skills required to prepare the next generation of agricultural workers has never been more important. The same goes for understanding the ‘bigger picture’ challenges that all workers in rural communities face.

The impact of digital technologies on the agricultural workforce through job automation is just one issue that rural communities need to consider carefully. A long-term approach for embracing economy-wide workforce change more holistically is essential.

National projections from the Department of Employment for the five years from May 2017 to May 2022 give a broad picture for what regions can expect in the coming years.46

In terms of occupation at the 1 digit ANZSCO level, the smallest national increases in employment between 2017 and 2022 are expected for clerical and administrative workers (1.7 percent growth), and sales workers and machinery operators and drivers (each 3.6 percent growth). The greatest increases are expected to be among community and personal service workers (19.2 percent growth), professionals (12.1 percent growth) and managers (7.8 percent growth). At the 2 digit occupation level, the greatest decreases are expected for personal assistants and secretaries (14 per cent decline). The second greatest decrease is expected for farmers and farm managers, with the Department of Employment predicting an overall decrease in these types of workers (11 percent decline) despite the NCVER’s anticipated increase in farming vacancies through to 2024.1

In terms of industry, the largest national increases for employment between 2017 and 2022 are expected in healthcare and social assistance (16.1 percent growth), professional, scientific and technical services (12.5 percent growth), and education and training (12 percent growth). The largest decreases are expected in electricity, gas, water and waste services (7 percent decline), manufacturing (4.2 percent decline) and agriculture, forestry and fishing (0.8 percent decline).

Skills-wise, Skill Level 1 jobs (commensurate with university qualifications) are expected to have the greatest employment growth between 2017 and 2022 (10.7 percent). This follows the trend from the previous five years to November 2016, with 43 percent of all new jobs in Australia being created for professionals.47

While high-skill positions are hard to fill anywhere, they’re even harder to fill in rural areas.48 As such, increasing and monitoring the skills base of rural communities, and creating a culture of lifelong learning, will prove invaluable – for rural employers looking to fill high-skilled roles and rural employees looking to enhance their career prospects and earning potential.

As industry growth projections further demonstrate, the occupation and skills makeup, and adaptability of the workforce generally, will be critical for rural communities to be able to fill jobs in the years ahead.

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1 As previously noted, many farming vacancies are anticipated to replace ageing workers, so an increase in vacancies does not necessarily mean an increase in the total number of workers.
By 2020, some rural areas, such as Warrnambool and South West (Figure 2) and New England and North West (Figure 3), there is expected to be a net decrease in employment in more resource and production-based industries and an increase in employment in more service-oriented industries. The outlook for AFF employment varies from place to place, but any losses are expected to be outweighed by gains in other industries, like healthcare and social assistance, and accommodation and food services.

A key question in response to these projections is: are the local populations in rural areas ready and able to benefit from expected changes to employment, both within and beyond the AFF industry?

To be better prepared, there needs to be sufficient skilling pathways in place. These may be achieved by: (1) individual businesses incorporating dedicated training mechanisms, such as ‘digital badge’ systems of encouraging and acknowledging on-the-job skills development; (2) community-wide promotion of free online courseware (such as Massive Open Online Courses) for skills development inside or outside of the workplace; and (3) institutional facilitation of more streamlined pathways between schools, workplaces, TAFE and university, to broaden opportunities of access to more traditional, accredited education channels for everyone, be they school-leavers, migrants, career-changers or lifelong learners.

As articulated in a recent report from the National Centre for Student Equity in Higher Education (NCSEHE), there needs to be greater synergy between rural vocational education and training (VET) providers and higher education institutions. Greater flexibility in the way such education and training is delivered in rural areas is also important. Better pathways between school, training and employment in the agriculture sector will also help lessen competition between sectors (for government funds and students) and ensure that future workers gain the practical skills necessary to ‘get jobs done’, and to fill the senior vacancies left by retiring farmers and farm managers. According to NCSEHE:

Competitive tension between the two pathways would be lessened if nested courses of study, offered sequentially by different institutions and recognised by all higher educational institutions, allowed for greater transition between the VET and university sectors, as well as a higher recognised status for VET.
Figure 2. Employment projections by industry for Warrnambool and South West (Victoria)

Figure 3. Employment projections by industry for New England and North West (New South Wales)
Riding the Next Wave of Automation in Rural Australia

MEETING TECHNOLOGICAL AND DEMOGRAPHIC CHALLENGES

Rural communities need not be overwhelmed by the economic and demographic changes that will inevitably come as the current workforce continues to age. Proactive steps to extend and diversify the skill set of workers, whether locally-sourced or migrating in from elsewhere, will make rural communities more responsive to future challenges.

To mitigate against the disruptive potential of automation, all communities must start to think about digital technological impacts with a long-term mindset. There cannot only be emphasis on enhancing access to digital technologies by rural workers and businesses. There also has to be an emphasis on developing a higher skill profile to ensure rural workers and business-owners are equally able to take advantage of such technology.

Similarly, the Australian Government needs to take a long-term view of agricultural employment and better recognise the depth and breadth of skills in the agriculture workforce when implementing future changes to Australia’s visa system. Occupation and wage requirements must be flexible enough to ensure that rural parts of the country are not disadvantaged when it comes to securing migrant agricultural labour (an example of which is the Temporary Skilled Migration Income Threshold, which has not effectively compensated for differences in wage standards for areas outside of metropolitan cities).

By enabling greater flexibility in how workers can be drawn in from overseas, agriculture-intensive regions – especially fruit and vegetable growing regions – can be better placed to attract the workers they need.

Dual emphases on skills (development and recognition) and migration (temporary and long-term) is required for rural communities to meet the demands of a changing economy and occupation mix into the future. Rural communities also need to have the right skills pathways in place to ensure that workers are able to move up from low to high skilled jobs, and from employment in production and resource industries to more service-based industries.
The rural workforce is undoubtedly changing. The increasing mechanisation of labour has altered the nature of work across all industries, including AFF. For rural areas heavily reliant on AFF, where manual farm labour has been a core part of ‘country life’, this has had a profound impact on how farming is perceived and profits are actualised.

It is inevitable that digital technologies will continue to transform the nature and type of work undertaken in many aspects of agricultural production. However, in horticulture, where many harvest-related tasks are yet to be automated, the demand for human labour is likely to remain high for the foreseeable future. Indeed, many horticulture-intensive Heartland regions currently struggle to meet production demands without migrant labour. Such labour is sourced from people travelling from overseas (temporarily or long-term), or from people traveling between towns or interstate.

As an indication of continued labour opportunities, fruit and vegetable growing are expected to experience an increase in employment in the coming years. Other agricultural subsectors with more muted employment projections, such as sheep and beef farming, have an opportunity to develop existing workforce capacity, within and across industry sectors.

To help address the needs of the AFF industry as a whole, greater recognition and development of skills is required. So is an expansion of worker skills and adaptability in rural areas generally.

Beyond AFF, employment trends clearly favour many of the service industries and occupations, at both low-medium and higher skill levels. In many regions, the number of these new jobs is expected to exceed the number of jobs lost in more traditional industries. The challenge for regions is to achieve an alignment of workers, employers and training providers that will ensure that locals have a strong chance at picking up jobs in the growing sectors.

Ongoing and clearly-defined skills pathways and international migration can help safeguard rural communities against the inevitability of job change and labour demands in the long-term. Dual emphases on skills (development and recognition) and migration (temporary and long-term) will ultimately empower rural communities to better attract and retain the next generation of workers that they need. This includes workers from both high and low-skill occupations, all of whom must be adaptable to change.

Keeping up to date with the latest skills and technologies will also help support rural enterprises to tap into new national and international markets and move into niche areas of business. This, in turn, can foster new employment opportunities locally.
Digital technologies are continuing to change the nature of work across all industries. Proactive strategies are required to ensure rural communities benefit directly (from the diffusion of burden-easing automated technologies across rural enterprises) and indirectly (from skills development in digital technologies and beyond). Five areas of action will be critical:

1. **Monitor the impact of automation in rural areas to identify how different employment and occupation prospects depend on the prevalence of different subindustries.** For example, within AFF, employment in fruit and tree nut growing is expected to increase by 2022 whereas employment in sheep and beef cattle farming is expected to decline (because of enhanced production efficiency). Responses to these specific prospects and challenges need to be place-based and not based simply on sector-wide policies.

2. **Embrace the critical role of migrant workers in addressing rural labour shortages, especially in horticulture-reliant Heartland regions, and increase temporary and permanent migration using locally-led strategies.**

3. **Ensure that Australia’s visa system reflects the presence and need for high and low-skilled workers and local labour shortages.**

4. **Provide greater recognition of AFF-related skills and qualifications to: (a) encourage and facilitate more international migrants to pursue AFF careers in rural Australia; and (b) enhance the perceived value and professionalism of AFF careers for Australia’s local rural youth.**

5. **Address current and future labour challenges through international migration and ongoing endogenous skills development via clearly-defined training pathways (whether through on-the-job ‘badge’ style skills recognition, free online courseware, or a more traditional TAFE-university context) to: (a) ensure local adaptability for future employment across all industries; and (b) encourage rural businesses to tap into niche markets, locally and internationally.**
ENDNOTES


In devising its approach, the RAI adapted the automation scores developed by Edmonds and Bradley (2015) to develop a three-tier vulnerability index comprising occupational scores for ‘low vulnerability’, ‘moderate vulnerability’ and ‘high vulnerability’, based on Frey and Osborne’s (2013) 30-70 threshold. Taking a more conservative approach than Frey and Osborne (2013) in line with Arntz, Gregory and Zierahn (2016)’s view that the Frey and Osborne method may overstate the vulnerability of jobs to automation, the calculations of vulnerability in this article are based on a 40-80 threshold. By shifting the threshold up by 10, more occupations are in the ‘safe/low risk’ category and fewer occupations are in the ‘unsafe/high risk’ category. The result is that a 0 (low vulnerability code) is assigned to jobs which have an automation score below 40, a 0.5 (medium vulnerability code) to jobs which have an automation score at or above 40 and at or below 80, a 1 (high vulnerability code) to jobs which have an automation score above 80. Publication of the detailed explanation of the RAI’s job vulnerability methodology is forthcoming.


35 Note: ANZSIC stands for Australian New Zealand Standard Industrial Classification.
36 Note: these regional employment projections are at Statistical Areas Level 4 (SA4).