Workforce development in tropical northern Australia: Bring skills in or develop from within?

Leigh-ann Onnis[1] (iD)**, Lisa Mannering[2], and Jane Oorschot[3]**

Abstract

In tropical northern Australia the intersection of workforce shortages, high turnover and geographic location impact workforce sustainability. Inevitably, business leaders find themselves considering how to build workforces within the constraints experienced in tropical regional areas. When it comes to workforce development, the enduring question is about talent acquisition and capability. This study focused on tropical northern Queensland, a region in northern Australia ripe for economic growth, yet impacted by workforce shortages. A rapid review of the literature identified and synthesised publications about workforce development in the region to identify the key workforce development strategies utilised. The literature review identified four overarching themes that characterise workforce development strategies in northern Queensland: individual capability, industry strategies, organisational strategies, and regionalisation. The study concludes that given the changing demographic, technological and societal landscape in the region, a multi-tiered approach is needed. The findings suggest that a workforce development ecosystem could create a path towards workforce sustainability for regional areas negating the internal versus external recruitment, retention and skills development dilemma. Workforce development ecosystems could support ongoing workforce sustainability for business development in the regions with characteristics similar to those of tropical northern Australia.

Keywords

Workforce development, workforce sustainability, regionalisation, ecosystem, literature review

Introduction

The tropics is a region of many paradoxes. There is great natural beauty, world heritage landscapes and a climate susceptible to extreme temperatures and devastating weather events (Stephens et al., 2015). With 42% of the world's population living in the tropics it is a region of economic opportunity, yet home to some of the most disadvantaged populations on the planet (State of the Tropics, 2022).

There is increased attention on economic development; however, regional areas within the tropics, are experiencing growth opportunities at the same time as workforce shortages, and societal, environmental and technological change (State of the Tropics, 2022; World Health Organisation (WHO), 2023). For example, Infrastructure Australia (2025) report an increase in investment in major infrastructure in Australia; however, workforce shortages and stagnating productivity in the construction industry impact the delivery of major projects (Infrastructure Australia, 2025). In fact, Infrastructure Australia (2025: 7) report that construction industry workforce 'shortages are projected to surge and could reach 300,000 workers by 2027' and 'regional areas will be hardest hit, with shortages

forecast to quadruple between 2025 and 2027'. The health industry faces similar challenges, with the WHO (2023) reporting that despite efforts to increase health workforce participation globally, there will be a global shortage of 10 million health workers by 2030. In regional areas, significantly high turnover and vacancy rates further exacerbate national and global workforce shortages (Onnis and Hunter, 2025; Veginadu et al., 2024). For example, Veginadu et al. (2024) reported annual turnover rates of 151% (clinic-level) and 81% (organisational level) for regional and remote health services. In contrast, the Australian HR Institute (AHRI) reports an average 12-month turnover rate of 14% (AHRI, 2024), highlighting the significance of the workforce challenges in regional areas. In northern

[1]CQUniversity, Australia
[2]Langtree Legal, Australia
[3]The Cairns Institute, James Cook University, Australia

Corresponding author:
Leigh-ann Onnis, Jawun Research Institute, CQUniversity, Cairns Square, cnr Abbott and Shields St, Cairns, Qld 4870, Australia.
Email: l.onnis@cqu.edu.au

Queensland, workforce challenges have been reported across the aviation, maritime, construction, healthcare and education industries (Department of Education, n.d.; Jobs Queensland, 2023; Regional Development Australia (RDA), 2025).

In times of workforce shortages, there is opportunity for innovation and a need for practical interventions (Baier et al., 2025). Therefore, employers responding to the changing environment find themselves both leading through innovation and responding to social, technological and environmental change (Ahuchogu et al., 2024). That said, many employers are still focusing on employing for current skill needs. This shortsightedness is exacerbated by emerging technologies which increase 'skill-based recruitment' utilising software 'where candidates are ranked according to the number of skills, skill's competence level and skill's experience' (Wings et al., 2021: 163). The increasing use of generative technologies (e.g. AI) in recruitment processes, especially screening, and using AI to match skills funnels applicants through technology-driven recruitment processes, which are cost-effective and efficient so likely to continue (Black and van Esch, 2020).

Given the widespread skills shortages across various industries (Babacan and McHugh, 2020; Jobs Queensland, 2023; RDA, 2025; WHO, 2023) it seems unlikely that traditional recruitment practices alone will meet future regional skills needs, particularly, if the system is limited by available skills and the willingness of workers to relocate and remain in regional areas (Carson et al., 2022). This is especially relevant for regional northern Queensland where workforce shortages are common, and the difficulty in recruiting people with highly valued skillsets is a well-known issue (Babacan and McHugh, 2020; Jobs Queensland, 2023; RDA, 2025).

A recent study found that human resources (HR) practitioners working in northern Queensland have broadened their outlook and are using innovative approaches to recruit candidates to regional areas (Gillespie et al., 2022; Onnis, 2023; Onnis et al., 2026). Looking beyond skills, some employers are considering whether candidates are the right fit for the organisation and the tropical northern Australian working environment (Onnis, 2017; Onnis et al., 2026). Studies show that some industries in northern Australia are aware that workers with ties to place are more likely to stay and create career pathways to retain workers in the region (Gillespie et al., 2022; Onnis and Hunter, 2025).

Regional development is typically accompanied by population growth which can put pressure on existing resources (e.g. housing, infrastructure), therefore, innovative workforce solutions are vital. The strategy dilemma commonly encountered is whether to recruit in the skills that organisations need, or to develop from within. Previous literature reviews focus on workforce shortages, and the challenges of recruitment and retention but few studies provide insights into effective strategies (Dolea et al., 2010; Onnis and Hunter, 2025; Onnis and Pryce, 2016). Furthermore, the literature that does describe innovative solutions is lacking evaluation of the impact of the strategies and is largely focused on a single industry or a case study (Onnis and Hunter, 2025). While these studies are important, a synthesis of the findings at a regional level can better inform business leaders, academics and industry bodies about the workforce development strategies being implemented in a particular region. Given the scarcity of published studies, this study seeks to synthesise what is known about workforce development strategies in northern Queensland, to better understand strategy approaches that can improve workforce sustainability and support regional economic development. Previous research has explored the influence of connection to place to workforce outcomes such as recruitment, retention and workforce sustainability (Onnis et al., 2026); hence the focus on 'region' is purposeful and posited as providing insights for other regions located in the tropics with similar workforce, social and environmental challenges.

Background

Context

Queensland is a resource rich state comprising a large land mass with the population living mainly in the south-east corner. The north is popular for its tropical climate and laid-back lifestyle. In this study, northern Queensland comprises a geographical area from Townsville (known locally as North Queensland) extending up the east coast to Cairns and the Torres Strait Islands (known locally as Far North Queensland (FNQ)). 'Northern Australia also has strategic and economic importance to Australia' (Stephens et al., 2015: 4) with northern Queensland positioned near Asian economic trading partners, significant facilities, such as mines and ports for exports (e.g. cattle, sugar), and large military bases. While northern Queensland is known for tourism, resources and sugarcane farming, the primary industry for employment is Healthcare and Social Assistance (Queensland Government Statistician's Office (QGSO) 2024).

When describing talent and skills requirements in the tropics, a key consideration is the region's demographics. Focusing on FNQ, the Cairns Region Workforce Development Plan from Jobs Queensland provides a population snapshot, predicting population growth from around 178,104 in 2024, to 272,557 people by 2026 (a 53% increase) (Jobs Queensland, 2023). The median age is 43.2 years, and the population is aging. It is predicted that by 2031, people aged 65 and older will comprise almost a quarter (21.5%) of the FNQ population (Jobs Queensland, 2023). Approximately 17.2% of the FNQ population identify as being Aboriginal and/or Torres Strait Islander peoples (Cairns Regional Council, n.d.). Therefore, population growth, together with an aging population, adds a level of complexity to workforce development in Far North Queensland.

Townsville (North Queensland) has a population of approximately 201,433 people, which is estimated to increase to 264,899 by 2046 (Australian Bureau of Statistics (ABS) n.d.; QGSO, 2024). The median age is

36 years, and approximately 8.4% identify as being Aboriginal and/or Torres Strait Islander peoples (ABS, n.d.). In terms of key industries in northern Queensland, an aging population is driving demand for healthcare, with healthcare and social assistance being the largest employer in the region employing 20.7% of the working population in the Cairns region (Jobs Queensland, 2023), and 22.3% in the Townsville region (Jobs and Skills Australia, n.d.).

Regionalisation

Regionalisation is a form of categorising areas based on land borders, cultural similarities or economic rationalisation. In this study, regionalisation describes a geographical area, where the inhabitants experience employment, education, social, economic and political challenges that are more similar within the region than they are outside of the region. For example, northern Australia is described as 'a land of unique ecosystems, ancient and ongoing cultures and cultural knowledge systems, significant resources, and a sparsely distributed but uniquely talented population' (Chambers et al., 2018: 616). As a result, northern Queensland, has both distinct features that separate it from other tropical regions, as well as characteristics in common with other regions in the tropics.

Regionalisation contributes to both 'growing the workforce for the region as a whole, and addressing issues of maldistribution within the regions, particularly urban-rural maldistribution' (Carson et al., 2022: 100). Despite commonalities in the region, there is some nuance between regional cities, rural towns and remote communities. In their study, Carson et al. (2022: 101) found a growing body of evidence suggesting migration relationships 'between 'northern' cities and rural and remote 'hinterlands' across the high-income world, including in Australia'. The hypothesis is that a city is more attractive than rural or remote areas, and therefore, in a staged approach cities can be used as hubs and to attract workers to a region. Once there is increased workforce capability in the regional city, there is opportunity to entice workers out to rural and remote areas.

Ageing demographics and older workers

Ageing populations impact workforce shortages and older worker workforce participation globally. Research from the United Nations (2024: x) shows that 'by 2080, people aged 65 or older will outnumber children under 18'. In Australia, the population is ageing rapidly at the same time there is more demand for older workers (Farr-Wharton et al., 2023). In fact, participation rates for workers aged 65 and over has more than doubled in the last 20 years in Australia (Australian Institute of Health & Welfare, 2021; Farr-Wharton et al., 2023).

The 2025 Older and Younger Workers report, produced by AHRI in partnership with the Australian Human Rights Commission (AHRC) (2025: 4), shows that Australia-wide, about 80% of HR practitioners are open to hiring people aged between 25 and 49 years, while 18% were not open to hiring people aged 65 and over 'at all' (AHRI and AHRC, 2025: 5). In some areas of northern Queensland (e.g. Cairns where the median age of the population is 43.2 years), organisations need to consider what this means for talent management, given that 45 years is often the starting age for being classified as an older worker (Farr-Wharton et al., 2023; Jobs Queensland, 2023). Coupled with the perspectives from the Older and Younger Workers report, it may be that developing from within the region means different expectations, different experiences and different opportunities for workforces in the tropics. With an older demographic in the northern Australia, employers bringing skills in will need to continue to consider what attracts younger workers to the tropics.

Migration

The Regional Movers Index shows that the influx of people from capital cities to Australia's regions has remained elevated each quarter compared to the pre-COVID-19 pandemic figures (Regional Australia Institute, n.d.). The March 2025 quarter showed regional migration increased by 10.5%, and the figures remain about 20.5% higher than the pre-COVID-19 quarterly migration (Regional Australia Institute, n.d.). Additionally, a study conducted by the Regional Australia Institute (2025) found that 57% of millennials and 40% of Gen Z surveyed would consider a move to the regions (Regional Australia Institute, 2025). This is promising for regional workforce development.

In addition, government programs are supporting organisations in northern Queensland to bring workers into the region. For example, the FNQ Designated Area Migration Agreement (DAMA) Scheme has a skilled migration program tailored to the needs of FNQ. The DAMA for FNQ provides opportunities for skilled migration pathways different to standard migration to better meet the workforce needs of the region. Similarly, the PALM Scheme allows eligible Australian businesses to hire workers from nine Pacific Islands and Timor-Leste when not enough local workers available. Hence, the tropical environment and proximity to countries with congruent needs for employment pathways provides an opportunity to bring skills into the region. Both schemes also provide for a full range of skill levels, helping tropical northern Queensland to meet different workforce needs.

Workforce development

Workforce development is a process of planning, training, and retraining a workforce to meet the organisation's needs. It encompasses technical proficiency, adaptability, interdisciplinary competencies, culture, planning, leadership, and continuous learning to address future focused challenges

and identified skills gaps (Ahuchogu et al., 2024; Yeager et al., 2023). Workforce development requires the assessment of current and future workforce needs, identifying and managing workforce challenges which encompasses strengthening education initiatives, and training and development strategies (Endalamaw et al., 2024). In this study we use Roche's (2002: 9) conceptualisation of workforce development:

> Workforce development has a systems focus. Unlike more traditional approaches, it is broad and comprehensive, and incorporates far more than just education and training of individual frontline workers. [Workforce development works] at different levels, targeting individual, organisational and structural factors.

Historical, and to some extent current, workforce development strategies for northern Australia rely on implementing models developed in southern Australia and other regions which are largely based on assumptions of unlimited resources. However, in a world of finite and diminishing resources (e.g. rural and remote tropical northern Queensland) these assumptions are likely to be invalid (Chambers et al., 2018: 616). Hence, the aim is to synthesise what is known about workforce development to identify the key issues and strategies used to improve workforce sustainability in tropical northern Queensland.

Methods

A rapid review of the literature was conducted to identify documents about workforce development in tropical northern Queensland published in the past 10 years. Rapid reviews are used to assess 'what is already known about a policy or practice issue, by using systematic review methods to search and critically appraise existing research' (Grant and Booth, 2009: 95). Typically, rapid reviews are conducted when a review is required to provide an evidence-based summary on a specific topic where there are resource constraints and a time limited need for the findings. They are typically intended for practitioners, managers, policy and decision makers (Garritty et al., 2025; Grant and Booth, 2009; Moons et al., 2021). Of relevance to this study, rapid reviews can 'efficiently identify evidence gaps and areas where evidence is scarce or lacking, guiding future research priorities' (Garritty et al., 2025: 56). Hence, rapid reviews are a 'method to provide summaries of the literature in a timely and resource-efficient manner by using methods to accelerate or streamline traditional systematic review processes' (Moons et al., 2021: 516).

Though this was a rapid review, a transparent methodical approach is taken to the identification, selection and analysis of the literature following the Cochrane rapid review methods recommendations (Grant and Booth, 2009; Moons et al., 2021). For example, involving key stakeholders, inclusion criteria, date restriction, limit language to English, limit database searching, limit grey literature search and supplemental searching (Grant and Booth, 2009; Moons et al., 2021). The synthesis of the literature in a rapid review is typically narrative (Garritty et al., 2025; Grant and Booth, 2009).

The study investigates the research question: Which workforce development strategies are being used in northern Queensland to support regional development?

Scholarly literature

A search was conducted on the SCOPUS and ProQuest Business databases using the search terms, 'workforce development' AND 'north Queensland' OR 'northern Queensland' OR 'northern Australia'.
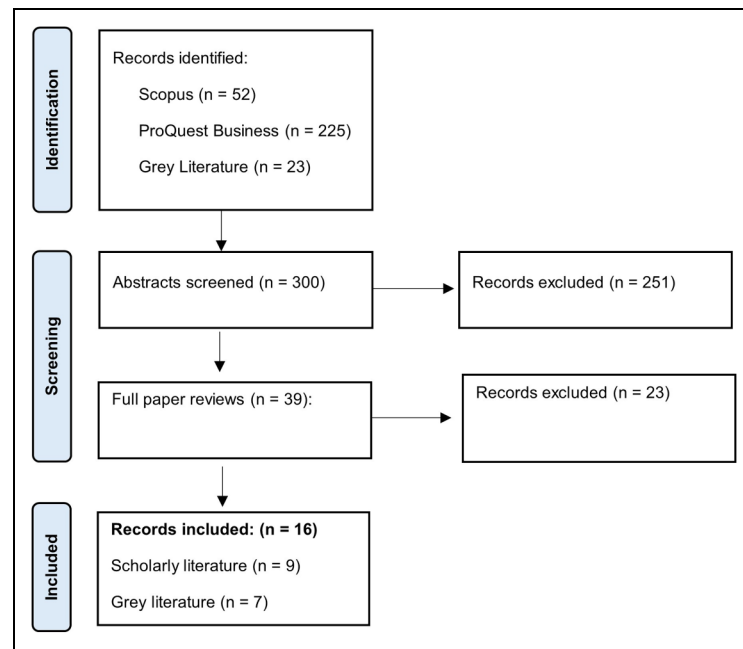
The following inclusion criteria were used to screen the literature:

- Published in English
- Published between 2015–2025
- Workforce development focused (not limited to workforce development but must include training, education or skills for workers)
- Includes northern Queensland sample (not limited to Queensland studies, but must include northern Queensland)

The search of the SCOPUS database returned 52 matches, and ProQuest Business returned 225 matches. The Abstracts of 277 documents were screened from which 24 met the criteria for full paper review. Documents were excluded if they were not focused on workforce development, did not include a northern Queensland sample or were outside the date range. From the full paper reviews, a further 15 were excluded because on a closer read, the paper was not scholarly, it was not workforce development focused, or did not include a northern Queensland sample. The remaining nine scholarly documents were included in this review (Figure 1). Next, the references were screened to identify additional documents for inclusion. No additional documents were identified. Most of the scholarly studies (7 out of 9) were from the health industry. Given that this study was interested in regional development, a review of the grey literature was conducted as well to identify workforce development activities from other industries, and across industries, to provide a more comprehensive understanding about workforce development in regional northern Australia.

Grey literature

The review of the grey literature was structured and analytical in its approach. A Google search was conducted using a search string comparable to the scholarly literature search

Figure 1. PRISMA statement for the literature review.

('workforce development' AND 'north Queensland' OR 'northern Queensland' OR 'northern Australia') to identify grey literature for inclusion in the study. The same inclusion criteria were used to ensure the grey literature published from 2015, in English and included a focus on northern Queensland. In addition, the references from the scholarly literature were reviewed to identify grey literature suitable for review. The grey literature was included in the study to ensure that workforce development strategies from government and industry reports, and strategic plans that may not be contained in scholarly articles were included in the literature review. A total of 23 documents were identified. The documents were reviewed and sixteen excluded for not being workforce development focused or not including a northern Queensland sample. Seven documents were selected for this study (Figure 1).

The scholarly database search and the grey literature searches were conducted in June-July 2025.

Quality checks

Rapid reviews do not always include a quality assessment (Grant and Booth, 2009); however, for this study the inclusion of only peer-reviewed scholarly literature was an assessment of quality. The grey literature was not assessed for quality using an academic system of analysis which is consistent with the rapid review method (Grant and Booth, 2009). However, the author of the grey literature was used to determine the level of quality for inclusion in the study with the included studies authored by government agencies, industry bodies or credible professional networks.

Data analysis

A thematic analysis was conducted using NVIVO software (Release 1.7.1). Inductive coding was used to identify the overarching categories for the workforce development strategies contained in the literature (Clarke and Braun, 2017). Then, using the three categories (individual, organisational and regional), a subsequent thematic analysis was used for second-level coding of the strategies and initiatives to each category. After discussion with the co-authors, the content for the category *organisation*, was re-coded as *organisation* and *industry* to capture strategies focusing at the industry-level rather than being constrained to the organisation-level (e.g. agricultural industry vs. individual farm). The data were then synthesised and presented in summary tables.

Results

Characteristics of the literature

Tables 1 and 2 provide a summary of the key characteristics of the 16 documents reviewed for this study. The study comprises documents from seven unique industries (Figure 2). Most of the scholarly articles are from the health industry (78%), and most of the grey literature is published by the government – Queensland Government (71%) and government agencies (29%).

Workforce development strategies

The inclusion of the grey literature is valuable as it provided a more comprehensive range of strategies for workforce

Table 1. Summary of workforce development strategies in the selected scholarly literature.

Author (date)	Aim	Industry	Location	Method	Findings	Workforce development strategies	Age-specific strategies	Indigenous employment strategies	Strategy level*			
									I	O	Ind	R
Babacan and McHugh (2020)	A critical analysis of consultations with key stakeholders	Agriculture	Northern Australia	Review	Business as usual is not sustainable. Supply chains in northern Australia need attention otherwise northern Australia left behind in a competitive global market	• Address skills shortages in digital technologies and management • Collaboration between education providers and industry is needed to effectively align training with industry needs.	×	×	✓	✓	✓	×
Carson et al. (2022)	Investigate if training in cities improves migration to regional areas	Health	Northern Australia	Quantitative analysis of Census data 1986–2016 to model migration patterns	There was limited evidence of change in migration patterns from key metropolitan source markets to northern cities.	• Regional training hubs address workforce maldistribution and contribute to workforce growth • Migration patterns suggest limited capacity to 'grow your own'.	×	×	×	×	×	✓
Sen Gupta et al. (2018)	Trace the development of medical education	Health	Northern Australia	Review	Maintaining the quality and integrity of the training is challenging as numbers increase. Communities should benefit as it matures to address local workforce needs.	• 'Symbiotic medical education' where everyone benefits • Students on placements are role models and advocates • Communities and patients value their role in training the future workforce	×	×	✓	×	×	✓
Kanakis et al. (2020)	Explore impacts of expanding GP program to rural and remote areas	Health	Northern Queensland	Qualitative interview-based study (n = 40)	Training GPs in underserved and remote communities was perceived positively.	• Training GP registrars in remote communities, aligns training with service needs in community (symbiotic relationships) • Rural Pathway Medicine perceived as a viable option for rural communities	×	×	✓	×	✓	✓
McFarlane et al. (2018)	Explore access to skill development	Health	Northern Queensland	Qualitative interview-based study (n = 9)	Strategies formalised through organisational systems, can improve the likelihood that a skilled workforce is sustained.	• Workers use creative ways to access in-kind or low-cost training • Workforce plans and organisational systems can formalise strategies	×	×	✓	✓	×	×
Onnis (2019)	Examine impact of management on workforce sustainability	Health	Northern Australia	Qualitative interview-based study (n = 24)	Workforce sustainability is improved where there is access to resources and professional development	• Sustainable workforces require access to professional development. • Reduced access to education and training impacts skills development for managers, which in turn impacts workforce sustainability	×	×	✓	✓	×	×

(continued)

Table 1. Continued.

Author (date)	Aim	Industry	Location	Method	Findings	Workforce development strategies	Age-specific strategies	Indigenous employment strategies	Strategy level* I	O	Ind	R
Orda et al. (2017)	Evaluate a training pathway	Health	Northwest Queensland	Review of outcomes from the program	Suitable governance is needed to develop and sustain the program.	• Localised leadership, seeking synergies with all service providers to facilitate suitable training is needed to improve workforce capabilities	x	x	x	✓	x	✓
Sangha et al. (2022)	To investigate northern Australia's horticulture sector, to inform future policies.	Horticulture	Northern Australia	Mixed methods study comprising literature review, focus groups, and an online survey	The study identified key local issues related to crop production, workforce and marketing impacting economic viability and expansion in the region	• Absence of workers with required skills in technologies such as robotics, and database management • Depends on skill transfer between family members • Willing to support training to build workforce their knowledge and skills in horticulture	x	x	✓	x	✓	x
Woolley and Ray (2019)	Identify factors that predict completion of internships in northern Australia	Health	Northern Queensland	A cross-sectional survey of final year JCU medical students (2016 and 2017).	Regionally based medical training can increase rural practice for early career doctors but specialty training pathways are needed to support retention in the longer term.	• Regionally based medical schools promote early-career rural practice • Regionally based medical schools require locally available specialty post-graduate training pathways to support the workforce in the longer term • The model requires internships for medical students in the northern region	x	Preferential applicant selection	✓	x	x	✓

*I = Individual-level, O = Organisational-level, Ind = Industry-level, R = Regional-level.

Table 2. Summary of workforce development strategies in the selected grey literature.

| Author (date)	Title	Industry	Location	Workforce development strategies	Age-specific strategies	Indigenous employment strategies	Strategy level* I	O	Ind	R
Department of Education (n.d.)	Queensland Teaching Workforce Strategy 2024–2027	Education	Queensland	• Turn to Teaching Internship (TTT) Program – paid internship to undertake full-time study (2 years). ($20,000 scholarship payment, access to support, part-time study (50% teaching load). Upon completion of program receive an employment offer • Trade to Teach Internship places • Remote Area Teacher Education Program (RATEP) – Community Based Teacher Education supports completion of community-based teacher education • Study and Research Assistance Scheme • 'Grow Your Own workforce' NQ and FNQ pilot approaches focus on local jobs for local people, helping build vibrant and sustainable local economies, easing housing shortages and slowing migration to Southeast Queensland.	×	• Indigenous staff capability development • First nations engagement strategy	✓	✓	✓	✓
Queensland Government (2024)	Jobs Queensland Annual Report 2023–2024	Various	Queensland	• Grow your own regional workforce program – $4.5 M to support up to 20 locally led workforce development projects over a 3-year period to 30 June 2025 • Involvement with the development of Health and community sector workforce development project; and Hydrogen Industry Workforce Development Roadmap 2022–2032	×	×	×	×	✓	✓

(continued)

Table 2. Continued.

| Author (date)	Title	Industry	Location	Workforce development strategies	Age-specific strategies	Indigenous employment strategies	Strategy level*			
							I	O	Ind	R
Department of Trade, Employment and Training (DTET) (n.d.)	Queensland's Clean Energy Workforce Map	Energy	Queensland	• Collaborate with local stakeholders to align regional skills and workforce development under the guidance of regional Jobs Committees to meet local employer needs. An additional $5 million over 3 years for clean energy industry training solutions for VET sector	• Mature-age job seekers	• Indigenous Workforce and Skills Development Grants.	✓	×	✓	✓
Regional Development Australia (2025)	North Queensland Workforce Environmental Scan 2025–2029	Various	North Queensland	• Growing Our Own Regional training	• Retraining and upskilling mature workers • Remove barriers to workforce participation	• Remove barriers to workforce participation • Apprenticeships	×	×	×	✓
Gordon (n.d.)	First Nations Health Workforce Development Framework	Health	North-western Queensland	• Strategies for strengthening cultural safety and more ambitious workforce development outcomes • Evidence informed workforce development strategies are needed • It is unlikely the gains will be made in the absence of a strategy commitment that leverages from the cultural authority of partners, and investment to advance workforce development outcomes	×	• First nations leadership • Strengthening cultural safety • Competency development • Pathways for career development • Evidence informed workforce development	×	✓	×	×
Jobs Queensland (2023)	Cairns Region Workforce Development Plan	Aviation, Maritime and Marine industries	Queensland	• Promoting the benefits of apprenticeships • Promote benefits of future-focused planning to meet future skills needs • Promote career pathways and progression within the industry	• Career transitions • Re-entry into the workforce • Job-share with younger workers	• Building cultural capability • Creating culturally safe workplaces • Improving workforce diversity	✓	×	✓	✓

(continued)

Table 2. Continued.

Author (date)	Title	Industry	Location	Workforce development strategies	Age-specific strategies	Indigenous employment strategies	Strategy level*			
							I	O	Ind	R
				• Support cross-sector skilling and work opportunities between the aviation, and maritime and marine industries to retain workers locally	• Improving workforce diversity					
Queensland Government (2024)	Queensland Workforce Strategy 2022–2032 (Progress Update)	Various	Queensland	• Partnering with local industry for the 'Grow Your Own' regional workforce program • Workforce Hub in Cairns supporting migrants, refugees, and international students into local jobs through pre-apprenticeships • Innovative industry partnerships with local schools – students explore different career opportunities • Industry-led School to Work transition projects to improve post-school outcomes for local students	×	• Indigenous Workforce Skills Development Grants • Paving the Way – the First Nations Training Strategy • First Nations Cultural Capability Resource	✓	×	✓	✓

*I = Individual-level, O = Organisational-level, Ind = Industry-level, R = Regional-level.
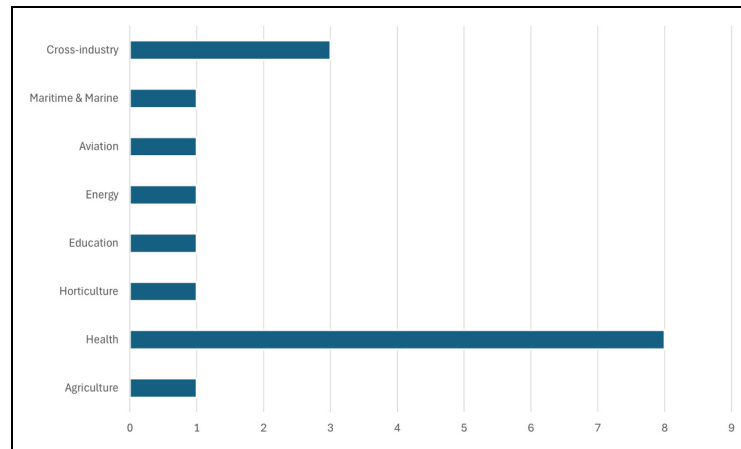
Figure 2. Industries included in the selected documents.
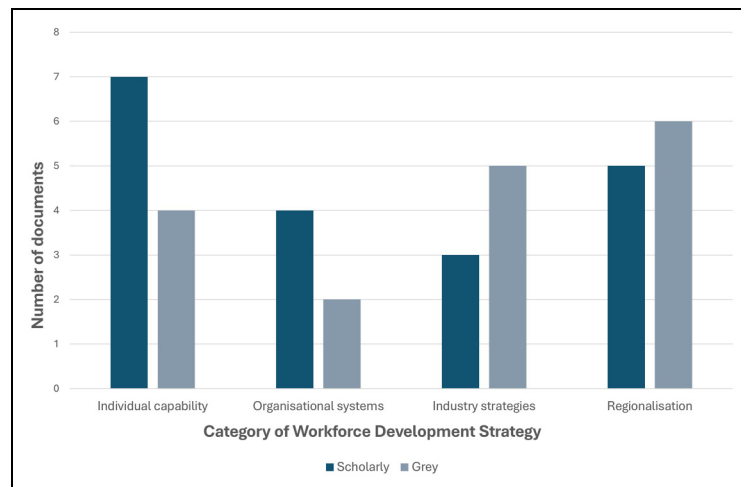
Figure 3. Categories of workforce development strategy by literature type.

development in northern Queensland. In terms of document type, the grey literature includes – two workforce strategy documents, a workforce plan, a workforce roadmap, a workforce framework, an annual report and an environment scan (Table 2). Where environmental scans were conducted in tropical northern Queensland the findings highlight the current and forecasted workforce challenges, and strategies for the anticipated challenges. Although there are a range of strategies listed, few report the benefits of implemented strategies. Where they do report progress, most report uptake rather than impact (e.g. 'Over 3100 people supported by the First Nations Training Strategy' (Queensland Government, 2024: 4), and '200 new Turn to Teaching Internship placements' (Department of Education, n.d.: 4)). There is no indication of short- or long-term benefits.

The analysis of the literature identified four overarching themes describing the categories of workforce development strategies utilised in northern Queensland: individual capacity

and skill development, organisational-level strategies to improve business performance, industry-level strategies to meeting changing industry needs, and regionalisation to build workforce capabilities in the region (Figure 3). Each of these themes is described in more detail in this section starting with individual capability.

Theme: Individual capabilities. There are seven scholarly documents and four grey literature documents that included individual-level capabilities and skills development (Tables 1 and 2). There is one scholarly article and six grey literature documents that contain an individual level strategy for Indigenous workforce development (Department of Education, n.d.; Gordon, n.d.; Department of Trade, Employment and Training (DTET) n.d.; Jobs Queensland, 2023; Queensland Government, 2024; RDA, 2025; Woolley and Ray, 2019). The Indigenous workforce development strategies include: a preferential selection

strategy for Indigenous applicants in a rural medical school program, apprenticeships, cultural safety and capability training. In terms of age-related strategies, there are no scholarly articles with age-related strategies and three in the grey literature. The age-related strategies include: re-training and upskilling for mature aged workers, increase workforce flexibility and removal of barriers for older worker workforce participation.

Individual-level strategies are being implemented in a range of industries, including: education, energy, aviation, maritime and marine industries. Several scholarly studies identify the challenges that individuals experience in managing their careers, especially the barriers to accessing professional development (McFarlane et al., 2018). In contrast the grey literature contains information about programs aiming for individual-level change (e.g. incentives to retrain, scholarships and subsidies), industry and community initiatives (e.g. pathways from education-to-employment). For example, the future teachers program is a structured school-based pathway 'for students to commence university study at the same time as undertaking their senior secondary studies' (Department of Education, n.d.). The disparity in narrative in the literature types is apparent with the grey literature describing an environment of development opportunity that is not as evident in the scholarly literature.

Some scholarly studies report challenges with accessing professional networks, peer support and mentorship (McFarlane et al., 2018; Onnis, 2019; Orda et al., 2017). The key barrier to professional development in the literature is access which has the dual constraints of distance and cost. Orda et al. (2017: 117) report that a major obstacle in attracting health professionals is a lack 'of appropriate (vocational) postgraduate training', and Onnis (2019) reports that clinicians transitioning into management roles in rural and remote northern Australia lack access to contextualised management development training. In contrast, others 'viewed remote regions as opportunities to gain experience and fast-track their career' (Onnis, 2019).

Organisational systems. There are four scholarly documents and two grey literature documents that contain orgnisational-level capability and skills development strategies (Tables 1 and 2). The grey literature does not contain many organisation-level strategies; however, strategies such as 'Grow Your Own workforce', and creating internal career pathways for local workers are two long-term strategies for workforce development (Department of Education, n.d.). There are no scholarly articles with specific organisation-level strategies for Indigenous workforce development. Four grey literature documents contain organisation-level strategies specifically targeting Indigenous workforce development, and capacity building (Department of Education, n.d.; Queensland Government, 2024; RDA, 2025). The Indigenous workforce development strategies include:

Indigenous workforce skills development grants; creating culturally safe workplaces and improving workforce diversity. In terms of age-related strategies one grey literature document contained organisation-level strategies for young or aging workforces (Gordon, n.d.) there are no scholarly articles with age-related organisation-level strategies. The age-related strategies include: flexible work arrangements, job-sharing with younger workers, and promoting workforce diversity.

Organisation-level strategies include traditional employee recruitment as well as labour hire strategies. For example, in regional areas the agriculture industry relies on labour hire, and seasonal labour; however, there are immense challenges in securing the skilled workforce needed for a sustainable future (Sangha et al., 2022). Babacan and McHugh (2020: 257) propose:

> Developing strong career pathways, coordination of industries for strong labour market growth, building employer capacity to attract and retain and addressing liveability as part of supply chain infrastructure are critical considerations.

The review found that organisational strategies focus on 'upskilling and retraining the current and future workforce as a priority for Northern Australia to keep pace with future changes' (Babacan and McHugh, 2020: 257). Initiatives include, 'international migration, working visas and tapping into non-traditional workforce sources, such as women and students' (Babacan and McHugh, 2020: 257). Of note, an emerging challenge for family-run farms who 'have demonstrated efficiency in managing their farms, knowledge, and skill transfer among their own family members across the north' arises from fewer young people choosing farming as a career forcing families to look externally to continue the farming business (Sangha et al., 2022: 10).

Industry strategies. There were three scholarly documents and five grey literature documents that contain industry-level capability and skills development strategies (see Tables 1 and 2). Industry level strategies include: rural pathways for medical students, career paths, access to training in emerging industry skill requirements (Babacan and McHugh, 2020; DTET, n.d.; Jobs Queensland, 2023; Kanakis et al., 2020; Queensland Government, 2024; Sangha et al., 2022). For example, Babacan and McHugh (2020: 255) argue that 'education providers have a critical role to play in supporting the workforce development needs of both agricultural development and supply chains sector in Northern Australia' calling for 'better engagement between education providers and industry and agility on behalf of educational institutions to respond to industry needs'. Meanwhile, Sangha et al. (2022: 11) report that a 'growing demand for a skilled workforce in the sector offers another opportunity to train young Australians in VET and agriculture-related courses in universities to meet the industry needs and enhance the application of technology in farming systems'.

There are no scholarly articles with specific industry-level strategies for Indigenous workforce development. Three grey literature documents contain industry-level strategies specifically targeting Indigenous workforce development and capacity building (DTET, n.d.; Queensland Government, 2024; RDA, 2025). The Indigenous workforce development strategies include: industry training programs, and apprenticeships. In terms of age-related strategies one grey literature document contains industry-level strategies for young or aging workforces (Jobs Queensland, 2023). There are no scholarly articles with industry-level age-related strategies. The age-related industry-level strategies include: supporting career transitions and removing barriers for re-entry into the workforce.

Both Babacan and McHugh (2020) and Sangha et al. (2022) report that technological advances are reshaping skill requirements in the agricultural industry with employers requiring a workforce with 'skills in new technological innovations' (e.g. robotics, machine learning, cyber security, digital customer communication). 'In addition to the digital technologies skills, the industry survey has also identified the need for "soft skills" such as leadership, management, teamwork, problem solving, critical thinking, communication' (Babacan and McHugh, 2020: 256). Queensland Government (2024) and DTET (n.d.) report emerging industry needs (e.g. technological advances) that require an industry-level approach for workforce development.

Regionalisation. There are four scholarly articles and six grey literature documents with regional workforce development strategies. There are no scholarly articles with specific regional strategies for Indigenous workforce development. Two grey literature documents contained regional-level strategies specifically targeting Indigenous workforce development and capacity building (Queensland Government, Jobs Queensland, 2023; Queensland Government, 2024). The Indigenous workforce development strategies include: local career pathways, consortiums with governments, education providers and industry partners. In terms of age-related strategies, no scholarly or grey literature documents contain regional strategies for young or aging workforces.

The regionalisation approach focuses on regional (internal) workforce development (Carson et al., 2022). The scholarly literature contains examples of this strategy in the health industry (Carson et al., 2022; Kanakis et al., 2020; Orda et al., 2017; Woolley and Ray, 2019). The establishment of the medical school at James Cook University with the intention of immersing medical students in the northern Australia environment increased the number of doctors in the region (Carson et al., 2022). While international migration is a primary driver of health workforce growth, it is noted that workforce growth is a result, in part, of the regionalisation process which enables 'people to grow up, be educated and trained, and then find work in the same region' (Carson et al., 2022: 101). While research has not established whether regionalisation is responsible for workforce gains, Carson et al. (2022: 101) report that 'it is clear that the home-grown health workforce has been insufficient to meet demand, especially in periods of rapid increase in demand'. Though promising, Carson et al. (2022: 105) conclude that the regionalisation model 'will have reduced impacts on the volume of supply to the regional north because of limited capacity to "grow your own" and the differences in living and working conditions between northern cities and the regional north [rural/remote]'.

While the regional training hubs show progress and some success in developing career opportunities within the region (Carson et al., 2022), there are still factors that limit the success of this model. One health service in northern Queensland found that 'increasing supply did not translate into an increase in medical workforce' in the remote regional town (Orda et al., 2017: 117). While the principle for establishing regionally based medical training has been proven as a successful model for improving workforce capability for northern Australia, there is limited capacity for expansion because 'the establishment of any new regionally based medical school would concurrently require sufficient numbers of locally available intern places to promote rural practice in the short term and likely specialty training pathways to promote rural practice in the long term' (Orda et al., 2017: 130). Hence, while regionalisation may not be the panacea, it supports regional development.

In summary, the review of the literature identified four overarching themes that characterise workforce development in northern Queensland, revealing a range of workforce development strategies and initiatives, few of which report their impact. One exception was regional training hubs where medical students were trained in regional northern Australia, an initiative that created a career pathway for local populations and improved the retention of medical graduates in the region (Carson et al., 2022).

Discussion

This study, framed within the dichotomy of recruiting skills into the region or developing from within, set out to identify workforce development strategies used in northern Queensland. The findings lend themselves to a multi-faceted approach like that of a workforce development ecosystem. The literature reveals four categories of strategy as well as a need to look at the complexity of regional life, particularly given the technological advancements, emerging industries, population characteristics, and political, societal and demographic shifts in the tropics.

The findings from this literature review suggest that the demographic and societal shifts emerging as cross-cutting factors in industry narratives (e.g. aging workforces, workforce development for Indigenous peoples) are not yet emerging in the scholarly literature. With technology at the heart of current workforce disruption, workforce development for emerging skills needs and innovation solutions

for anticipated future economic development requires a strategic long-term focus on workforce development (Aluko and Burgess, 2025). Challenges in achieving transformational change in multifaceted systems will require multifaceted interventions with interacting components (Leake et al., 2020). An ecosystem approach is proposed as a practical solution to the management of the complex challenges. According to Tsujimoto et al. (2018: 49), 'In the field of management of technology and innovation, the eco-system concept is of increasing significance'.

Workforce development ecosystems

An ecosystem differs from a process which is the common approach to workforce development (Endalamaw et al., 2024; Roche, 2002). A process is defined, repeatable with measurable outcomes and regular paths to uniform outcomes. It is 'routine, fixed, static, and usually has a primary goal and a measurable output' (O'Leary et al., 2023: 2). Processes are linear and address problems to be solved. In contrast, an ecosystem is,

> A naturally occurring set of related activities. It may have multiple participants with different goals, varied relationships, feedback loops, and constant evolution. An ecosystem has no start or finish. Ecosystems are shaped, not managed (O'Leary et al., 2023, 2).

In their meta-synthesis of the literature about HR development ecosystems, Garavan et al. (2019: 250) use complex adaptive systems (CAS) theory to explain their conceptualisation of a HRD ecosystem saying that 'it a system composed of a large number of independent single components that locally interact in an independent and nonlinear fashion' which is consistent with O'Leary et al.'s (2023) description of an ecosystem. An ecosystem moves beyond the traditional 'individual focus' to a more complex system or network of actors. These actors move in the micro-, meso- and macro- levels of the ecosystem (Garavan et al., 2019). Where a workforce development ecosystem is thriving, it is characterised by adaptation, agility, flexibility, biodiversity and connectedness (Donald, 2023; O'Leary et al., 2023).

Contextualising an ecosystem

In the workforce development ecosystem, new approaches are required to shift mindsets to what works. This need for 'adaptation applies not only apply to individuals but also to organizations, regions, and entire industries' (O'Leary et al., 2023: 3; Garavan et al., 2019). In an ecosystem, actors benefit from connections, a change for one actor in the ecosystem, impacts others in a connected environment. For example, the national Closing the Gap Agreement set out the national priorities for improving the lives of Aboriginal and Torres Strait Islander peoples. Where a workforce development ecosystem can remove 'structural barriers to employment' through 'working collaboratively with Aboriginal and Torres Strait Islander communities and building a more inclusive education system, [that will] support workforce participation' there is improved likelihood that the Closing the Gap targets can be achieved (Liddle, 2018; Productivity Commission, 2024). As such, an ecosystem strengthens the pillars that support financial security not simply though linking a person to a job, but supporting them in terms of housing, education, health and wellbeing, etc., so that employment participation continues in the long-term, and regions can realise economic development aspirations.

An ecosystem requires 'local coordination and leadership, seeking synergies with all service providers to facilitate excellent training opportunities' (Orda et al., 2017: 119). Sen Gupta et al. (2018: 499) highlight the role of vision in their 'symbiotic medical education' model, saying that where an educational institution's vision reflects the needs of the community and emphasises 'the distinctive and unique features of the region' and values community engagement (e.g. community advisory committees, advocacy) it is reciprocated through industry support in providing community placements. It is through this type of ecosystem that education providers, students, patients, and the broader community can all benefit and the region more broadly benefits from improvements in workforce sustainability (Sen Sen Gupta et al., 2018). Educational institutions will be pivotal in regional innovation systems providing access to leading edge research and meeting emerging industry and regional needs, through technological innovation (Atta-Owusu et al., 2021; Bilderback et al., 2025).

Further, the Jobs Queensland (2023) report describes the Aviation, Maritime and Marine industries as an ecosystem because they are a conglomerate of industries, not a single industry. Within this ecosystem, workforce development strategies are proposed for a range of workforce issues; however, within the ecosystem context, broader workforce outcomes were described. For example, one challenge identified was limited capacity of the core skills needed to run a SME business successfully, the strategy was for SME-focused leadership and management skills training, and the proposed outcome was stronger leadership and management capabilities for all businesses which had a broader impact in the region, particularly as those skills are transferable to other industries. Further, a workforce ecosystem that 'enables a more dynamic and inclusive view of fit and alignment by making more explicit the interconnections between organizational strategy and workforce capabilities, composition, and culture(s)' contributes to a stronger broader ecosystem (Donnelly and Hughes, 2023: 81).

Many of the grey literature documents contained in this review are published by government departments, further

highlighting the key role of governments in economic development in the region. As key actors in an ecosystem, governments, business groups and industry representative with regional interests will need to work together with community if progress is to be realised. As Stephens et al. (2015: 2) explain, there is:

> a need for an alternative account of governance in northern Australia which renders explicit the multiple agendas, world-views and resulting tensions and which moves towards a politics of engagement that seeks a more open, genuine dialogue that is inclusive of, and respectful towards, the beliefs and values of all communities residing in northern Australia.

This perspective is consistent with the finding from this study that a multi-faceted, inclusive ecosystem can facilitate the multiplicity of complex approaches by governments, industries, organisations and individuals to aid progress towards economic development that benefits all the actors within the ecosystem.

Finally, the North Queensland Workforce Environmental Scan 2025 posits that for the next 5 years efforts for northern Queensland to grow their own workforce 'will need to be complemented by bringing workers into the regions' and mitigating issues preventing migration such as 'the tight housing market by developing solutions that provide housing and community support for sustainable population growth' (RDA, 2025: 49), To support this strategy, recruitment practices focused on improving diversity across the region could create new pathways for underrepresented groups and improve workforce participation in the region (Klysing et al., 2022).

Future directions

The findings from this review suggest that a significant shift in mindset is needed for long-term workforce sustainability to support economic growth in northern Queensland. Further, the findings from the grey literature suggest industry-led initiatives could be the levers to drive change. It is not unusual for community groups and networks to initiate change. For example, in the 1970s amidst an era of political activism, a group of disability advocates poured cement to create a ramp from a curb in Berkeley, California (Blackwell, 2017). These makeshift sloping curbs, intended to make a political statement, did much more – they provided mobility to people with disabilities. While the idea was not entirely new, it paved the way for change. There was a ripple effect across so many areas, when 'the wall of exclusion came down, everybody benefited—not only people in wheelchairs. Parents pushing strollers headed straight for curb cuts. So did workers pushing heavy carts, business travellers wheeling luggage, even runners and skateboarders' (Blackwell, 2017: 28). The curb-cut effect is evidence that modification for one group, can benefit many groups, and

our society as a whole (Blackwell, 2017). An ecosystem brings the actors together to improve capability rather than focusing on barriers or limitations. Therefore, when we think about workforce development ecosystems – there are many opportunities for the curb-cut effect to come through in the tropics. Policies and workforce roadmaps for one industry can benefit other industries. For example, the workforce development plan for the Aviation, Marine and Maritime industries, also benefits the agriculture; forestry and fishing; manufacturing; retail; construction, education and training, transport and postal, warehousing; and professional, scientific and technical services industries (Jobs Queensland, 2023). Therefore, seizing opportunities through industry innovations creates a ripple effect that benefits other businesses, society and the region.

Implications for practice and research

The findings suggest that some industries are already leading the way (Jobs Queensland, 2023; RDA, 2025); hence, more cross-industry collaborations, and partnerships with all levels of government could improve the long-term sustainability of potentially effective initiatives. Further, such collaborations will ensure the workforce planning and government policies are agile to embrace emerging challenges. This could extend to regional policies that reflect the challenges presented such as remoteness, isolation and limited infrastructure. For business leaders, managers and HR professionals, practical approaches range from individual focused strategies, such as education-to-employment pathways, internal career develop pathways; to organisational strategies focused creating culturally safe, inclusive, flexible workplaces and HR policies.

The evidence-based scholarly literature contains insights for workforce sustainability that could inform HR practitioners and business leaders. Future workforces will need to be skilled in emerging technologies, have improved access to employment opportunities (especially underemployed or unemployed populations living in the region, e.g. older workers). Workers will need to be upskilled or re-skilled to mitigate the impacts of forecasted workforce shortages. Further research can investigate the 'practical implications [which] come from understanding the interconnectedness, interdependencies, and interactions among the loosely coupled actors', such as the needs of each of the actors and what 'each of the actors provide to ensure sustainability' for the ecosystem (Donald, 2023).

Finally, the rapid review of the literature identified the challenges and opportunities for regional development in tropical northern Queensland. However, one notable finding from the review was the lack of evaluation and discussion about the impact of previously implemented workforce development strategies and initiatives. The stakes are high for future generations; therefore, it is imperative that the impact of workforce initiatives is measured and evaluated

to inform future workforce development strategies that support growth in the region.

Limitations

The academic literature contained a large proportion of publications from the health industry which is acknowledged as a limitation to the findings presented in this review. However, the grey literature introduced findings from across a range of industries, therefore the authors believe that the findings cover sufficient industries to make them of interest to a broad readership. The authors acknowledge the limitation of a rapid literature review; however, given the focus of the review we believe that the findings support the argument formulated. Moons et al. (2021: 516) reported that 'direct comparison of the findings from rapid and full systematic reviews showed that the essential conclusions did not differ extensively'. Therefore, the authors stand by the decision to conduct a rapid review to identify workforce development strategies utilised in northern Australia in a time-efficient manner. Finally, it is acknowledged that there is potential bias in the data collection and analysis which was performed by one researcher; however, the first two co-authors discussed the emerging themes and considered the academic findings within industry narratives. All co-authors agree with the final themes identified from the literature review.

Conclusion

This study presented a salient issue for organisations operating in tropical northern Queensland – do they recruit workers in or develop from within? Organisations in the tropics know the frustration of looking for the right person with the right skills who will remain in the region for a reasonable timeframe. The global economy challenges organisations to be strategic, agile and responsive to a multitude of environmental influences and this requires skilled and engaged workers. In response, many organisations are increasingly cognisant that attracting and retaining talent can be a way to sustain a competitive advantage (Cooke et al., 2022) but may overlook the broader opportunities for workforce sustainability at the regional level. HR professionals spend considerable time outlining the strengths of the organisation, the values, culture, employee benefits, environmental and sustainability credentials, flexible working conditions, pay, allowances, and the wellbeing programs, but often promoting the employee value proposition, is not translating into successful recruitment outcomes. Largely, because it is bigger than the organisation. Employers, solely, cannot fix other economic and social issues, such as, lack of available housing, limited access to public transport, cyclones, flooding and a 6-month stinger season. These are the environmental conditions for organisations in the tropics, and the best workplace is not necessarily enough.

In this study, a range of workforce development strategies are identified at the individual, organisational, industry and regional level. If focusing too closely on the individual or the organisation, leaders may not see the real problem. Drawing from the adage that it takes a village to raise a child, we argue that it takes a region to improve workforce sustainability for that region. Organisations sending a candidate overseas would conduct cross-cultural orientation, but when people are relocated to the tropics is there any cross-cultural orientation? Within country (i.e. southern city dwellers relocating to regional tropics towns) cross-cultural orientation could be a regional curb-cut, the orientation is for the individual, but it has a ripple effect for many. By looking at place-based, community-engaged, collaborative solutions and innovative strategies, it is possible to overcome the challenges of workforce shortages in regional areas. There are some brilliant examples of this in practice, such as the 'Attract – Connect – Stay' model with community connector positions (Gillespie et al., 2022), Mallacoota's Doctor Search – an ongoing campaign to recruit doctors to the small community with collaborative community-driven ideas (Gillespie et al., 2022) and Bundaberg's Community Connector Program (Reynolds, 2025).

Imagine if the perceived downside of living and working in the tropics was in fact an advantage. Tropical regions are well placed to create workforce development ecosystems, to work together and advocate for the region. The competition for talent is not slowing down, so it is imperative to look beyond individuals and organisations to improve workforce sustainability, and the signs are that workforce development ecosystems are a key step in regional development into the future.

ORCID iD

Leigh-ann Onnis https://orcid.org/0000-0002-8496-6616

Author contributions

LO and LM conceptualised the research and developed the research design, LO conducted the literature review and identified the key themes. LO, LM and JO all contributed to the introduction, and background sections. LM contributed substantially to the discussion section. LO completed the first full draft, and all three co-authors edited and revised the manuscript prior to submission.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability statement

Data available via request to the corresponding author.

References

Ahuchogu MC, Sanyaolu TO and Adeleke AG (2024) Workforce development in the transport sector amidst environmental change: A conceptual review. *Global Journal of Research in Science and Technology* 2(01): 61–77.

Aluko KM and Burgess J (2025) Navigating workforce transformation: HRM strategies of rural and regional Australian councils in the 4IR era. *Administrative Sciences* 15(2): 52.

Atta-Owusu K, Fitjar RD and Rodríguez-Pose A (2021) What drives university-industry collaboration? Research excellence or firm collaboration strategy? *Technological Forecasting & Social Change* 173: 121084.

Australian Bureau of Statistics (ABS) ((n.d.) 2021) Townsville Census All Persons QuickStats. Available at: https://abs.gov.au/census/find-census-data/quickstats/2021/LGA37010 (accessed 19 November 2025).

Australian HR Institute (AHRI) and Australian Human Rights Commission (AHRC) (2025) Older and Younger Workers Report. Available at: https://www.ahri.com.au/wp-content/uploads/Older-Younger-Workers-Report-2025-FINAL.pdf (accessed 14 October 2025).

Australian HR Institute (AHRI) (March 2024) AHRI Quarterly Australian Work Outlook. Available at: https://www.ahri.com.au/wp-content/uploads/AHRI-WorkOutlook-Report-Q1.pdf (accessed 19 November 2025).

Australian Institute of Health and Welfare (AIHW) Older People, Older Australians (Web Report) (November 2021) Available at: https://www.aihw.gov.au/reports/older-people/older-australians/contents/demographic-profile (accessed 14 October 2025).

Babacan H and McHugh J (2020) Re-thinking agricultural supply chains in northern Australia. *Australasian Journal of Regional Studies* 26(3): 239–268.

Baier HA, Lergetporer P and Rittmannsberger T (2025) Firms' expectations about skill shortages. *Small Business Economics* 65(2): 1095–1112.

Bilderback S, Movahed M and McCarthy V (2025) The role of virtual training in implementing sustainable development goals globally. *European Journal of Training and Development* 49(5/6): 591–608.

Black JS and van Esch P (2020) AI-enabled recruiting: What is it and how should a manager use it? *Business Horizons* 63(2): 215–226.

Blackwell AG (2017) The curb-cut effect. *Stanford Social Innovation Review* 15(1): 28.

Cairns Regional Council (n.d.) Community profile. Available at: https://profile.id.com.au/cairns/ancestry?BMID=35 (accessed 13 October 2025).

Carson DB, McGrail M and Sahay A (2022) Regionalisation and general practitioner and nurse workforce development in regional northern Australia: Insights from 30 years of census migration data. *Journal of Rural Studies* 91: 98–107.

Chambers I, Russell-Smith J, Costanza R, et al. (2018) Australia's north, Australia's future: A vision and strategies for sustainable economic, ecological and social prosperity in northern Australia. *Asia and the Pacific Policy Studies* 5(3): 615–640.

Clarke V and Braun V (2017) Thematic analysis. *The Journal of Positive Psychology* 12(3): 297–298.

Cooke GB, Chowhan J, Mac Donald K, et al. (2022) Talent management: Four "buying versus making" talent development approaches. *Personnel Review* 51(9): 2181–2200.

Department of Education (n.d.) Queensland Teaching Workforce Strategy 2024–2027. Available at: https://qed.qld.gov.au/our-publications/strategiesandplans/Documents/qld-teaching-workforce-strategy.pdf (accessed 14 September 2025).

Department of Trade, Employment and Training (DTET) (n.d.) Queensland's Clean Energy Workforce Roadmap. Queensland Government. Available at: https://www.publications.qld.gov.au/ckan-publications-attachments-prod/resources/62a2ef56-8100-4171-9117-964afabd65ec/queenslands-clean-energy-workforce-roadmap.pdf?ETag=f1465fcc9ec26b9f5452a7d7cef68487 (accessed 14 September 2025).

Dolea C, Stormont L and Braichet JM (2010) Evaluated strategies to increase attraction and retention of health workers in remote and rural areas. *Bulletin of the World Health Organization* 88(5): 379–385.

Donald WE (2023) Application of career ecosystems theory and the new psychological contract to the field of project management: Toward a conceptual model. *Project Management Journal* 54(1): 7–18.

Donnelly R and Hughes E (2023) The HR ecosystem framework: Examining strategic HRM tensions in knowledge-intensive organizations with boundary-crossing professionals. *Human Resource Management* 62(1): 79–95.

Endalamaw A, Khatri RB, Erku D, et al. (2024) Barriers and strategies for primary health care workforce development: Synthesis of evidence. *BMC Primary Care* 25(1): 99.

Farr-Wharton B, Bentley T, Onnis L, et al. (2023) Older worker-orientated human resource practices, wellbeing and leave intentions: A conservation of resources approach for ageing workforces. *International Journal of Environmental Research and Public Health* 20(3): 2725.

Garavan TN, McCarthy A and Carbery R (2019) An ecosystems perspective on international human resource development: A meta-synthesis of the literature. *Human Resource Development Review* 18(2): 248–288.

Garritty C, Nussbaumer-Streit B, Hamel C, et al. (2025) Rapid reviews methods series: Assessing the appropriateness of conducting a rapid review. *BMJ Evidence-Based Medicine* 30(1): 55–60.

Gillespie J, Cosgrave C and Malatzky C (2022) Making the case for place-based governance in rural health workforce recruitment and retention: Lessons from Canada and Australia. *Social Sciences and Humanities Open* 6(1): 100356.

Gordon S (n.d.) First Nations Health Workforce Development Framework. Available at: https://cdn.prod.website-files.com/6498e7a6f8c93e238042358e/67276764c6958c4dcec74761_First%20Nations%20Workforce%20Implementation%20Plan.pdf (accessed 14 September 2025).

Grant MJ and Booth A (2009) A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal* 26(2): 91–108.

Infrastructure Australia (November 2025) Infrastructure Market Capacity 2025 Report. Available at: https://www.infrastructureaustralia.gov.au/sites/default/files/2025-11/IA2025_Market%20Capacity%20Report.pdf (accessed 18 November 2025).

Jobs and Skills Australia (n.d.) Employment Region Dashboards and Profiles. Available at: https://www.jobsandskills.gov.au/data/employment-region-dashboards-and-profiles (accessed 14 October 2025).

Jobs Queensland (March 2023) Cairns Region Workforce Development Plan, Aviation industry, and Maritime and Marine industry. Available at: https://jobsqueensland.qld.gov.au/_resources/files/pdf/cairns-region-workforce-development-plan.pdf (accessed 14 September 2025).

Kanakis K, Young L, Reeve C, et al. (2020) How does GP training impact rural and remote underserved communities? Exploring community and professional perceptions. *BMC Health Services Research* 20(1): 12.

Klysing A, Renström EA, Gustafsson-Sendén M, et al. (2022) Gender diversity in recruitment: Influence of gender trouble on applicant attraction and evaluation. *Journal of Applied Social Psychology* 52(8): 781–802.

Leake R, De Guzman A, Golieb K, et al. (2020) Workforce development strategies: A model for preparing the workforce to support transformational systems in child welfare. *Journal of Public Child Welfare* 14(1): 19–37.

Liddle C (2018) Introduction – aboriginal and torres strait islander employment policies and repeating colonial histories. *Journal of Australian Political Economy* 82: 5–8.

McFarlane KA, Judd JA, Wapau H, et al. (2018) How primary health care staff working in rural and remote areas access skill development and expertise to support health promotion practice. *Rural and Remote Health* 18: 4413.

Moons P, Goossens E and Thompson DR (2021) Rapid reviews: The pros and cons of an accelerated review process. *European Journal of Cardiovascular Nursing* 20(5): 515–519.

O'Leary J, Datar A and Overley N (2023) Rethinking the workforce development ecosystem: Grow the economy by bridging the skills gap. Deloitte Centre for Government Insights. Available at: https://www.deloitte.com/us/en/insights/industry/government-public-sector-services/strategic-workforce-development-ecosystem.html (accessed 26 August 2025).

Onnis L (2017) Attracting future health workforces in geographically remote regions: Perspectives from current remote health professionals. *Asia Pacific Journal of Health Management* 12(2): 25–33.

Onnis L (2019) Human resource management policy choices, management practices and health workforce sustainability: Remote Australian perspectives. *Asia Pacific Journal of Human Resources* 57(1): 3–23.

Onnis L (2023) "HR is different up here": An exploratory study of HR in tropical northern Australia. In: *Proceedings of the 36th ANZAM conference: Changing management values and practices for a sustainable future*, Wellington, New Zealand, 5–7 December 2023, pp. 108–130.

Onnis L and Hunter T (2025) Improving rural and remote health workforce retention amid global workforce shortages: A scoping review of evaluated workforce interventions. *Journal Of Health Organization and Management* 39(2): 260–279.

Onnis L, Oorschot J, Mannering L, et al. (2026) Within country workforce migration: The impact of place on HRM in regional Australia. *Asia Pacific Journal of Human Resources* 64(1): e70043.

Onnis L and Pryce J (2016) Health professionals working in remote Australia: A review of the literature. *Asia Pacific Journal of Human Resources* 54(1): 32–56.

Orda U, Orda S, Sen Gupta T, et al. (2017) Building a sustainable workforce in a rural and remote health service: A comprehensive and innovative rural generalist training approach. *The Australian Journal of Rural Health* 25(2): 116–119.

Productivity Commission (2024) Closing the Gap Annual Data Compilation Report July 2024, Canberra. Available at: https://www.pc.gov.au/closing-the-gap-data/annual-data-report/closing-the-gap-annual-data-compilation-july2024.pdf (accessed 29 September 2025).

Queensland Government (August 2024) Queensland Workforce Strategy 2022-2032. Progress Update. Available at: https://www.publications.qld.gov.au/dataset/queensland-workforce-strategy-2022-2032/resource/cf65c5f0-7c65-4dd9-b760-67bbe3a5a198 (accessed 14 September 2025).

Queensland Government Statistician's Office (QGSO) (2024) Population Projections, Regions. Available at: https://www.qgso.qld.gov.au/statistics/theme/population/population-projections/regions (accessed 14 October 2025).

Regional Australia Institute (2025) Regional living, remote working: The lifestyle Australians are longing for. Available at: https://regionalaustralia.org.au/Web/Web/Media/News/2025/Regional_living_remote_working.aspx (accessed 14 October 2025).

Regional Australia Institute (n.d.) Regional Movers Index, Mar 2025 Quarter Report. Available at: https://regionalaustralia.org.au/Web/Web/Toolkits-Indexes/Regional-Movers-Index.aspx (accessed 14 October 2025).

Regional Development Australia (RDA) (2025) North Queensland workforce environmental scan 2025-2029. Available at: https://www.rdanwq.org.au/wp-content/uploads/2025/04/Environmental-Scan-FINAL_March-2025.pdf (accessed 21 November 2025).

Reynolds G (2025) How the Community Connector Program Can Transform Bundaberg. Available at: https://www.welcometobundaberg.com/2025/02/11/how-the-community-connector-program-can-transform-bundaberg/ (accessed 21 November 2025).

Roche AM (2002) *Workforce Development: Our National Dilemma*. Adelaide: National Centre for Education and Training on Addiction, Flinders University.

Sangha KK, Ahammad R, Mazahar MS, et al. (2022) An integrated assessment of the horticulture sector in northern Australia to inform future development. *Sustainability* 14: 11647.

Sen Gupta ST, Johnson P, Rasalam R, et al. (2018) Growth of the james cook university medical program: Maintaining quality, continuing the vision, developing postgraduate pathways. *Medical Teacher* 40(5): 495–500.

State of the Tropics (2022) COVID-19 in the Tropics, State of the Tropics 2022 Report. James Cook University, Townsville, Australia. Available at: https://www.jcu.edu.au/state-of-the-tropics/publications/2022-state-of-the-tropics-report (14 November 2025).

Stephens A, Oppermann E, Turnour J, et al. (2015) Identifying tensions in the development of northern Australia: Implications for governance. *Journal of Economic and Social Policy* 17(1): 1–21.

Tsujimoto M, Kajikawa Y, Tomita J, et al. (2018) A review of the ecosystem concept — towards coherent ecosystem design. *Technological Forecasting and Social Change* 136: 49–58.

United Nations (2024) World Population Prospects 2024: Summary of Results. UN DESA/POP/2024/TR/NO. 9. New York: United Nations. Available at: https://desapublications.un.org/publications/world-population-prospects-2024-summary-results (accessed 14 September 2025).

Veginadu P, Russell DJ, Zhao Y, et al. (2024) Patterns of health workforce turnover and retention in aboriginal community controlled health services in remote communities of the northern territory and western Australia, 2017–2019. *Human Resources for Health* 22(1): 58.

Wings I, Nanda R and Adebayo KJ (2021) A context-aware approach for extracting hard and soft skills. *Procedia Computer Science* 193: 163–172. (accessed 14 November 2025).

Woolley T and Ray RA (2019) Effectiveness of regional medical schools in attracting and retaining students for early-career practice in the local area: The james cook university experience. *The Australian Journal of Rural Health* 27(2): 125–131.

World Health Organisation (WHO) (2023) *World health Statistics 2023: Monitoring Health for the SDGs, Sustainable Development Goals*. Geneva: World Health Organization. Available at: https://www.who.int/publications/i/item/9789240074323 (accessed 22 November 2025).

Yeager VA, Burns AB, Lang B, et al. (2023) What are public health agencies planning for workforce development? A content analysis of workforce development plans of accredited public health departments. *Journal of Public Health Management and Practice* 29(6): 762–774.