

Agrifood systems knowledge exchange through Australia-Pacific circular migration schemes

Federico Davila¹  | Olivia Dun²  | Carol Farbotko³  |
Brent Jacobs¹  | Natascha Klocker²  | Ema Vueti⁴ |
Lavinia Kaumaitotoya⁵ | Angela Birch⁶ | Peter Kaoh⁷ |
Tikai Pitakia⁸ | Sinaitakala Tu'itahi⁹

¹Institute for Sustainable Futures, University of Technology Sydney, Broadway, New South Wales, Australia

²Australian Centre for Culture, Environment, Society and Space (ACCESS), University of Wollongong, Wollongong, Australia

³Centre for Social and Cultural Research, Griffith University, Nathan, Queensland, Australia

⁴Pacific Islands Council of Queensland, Brisbane, Queensland, Australia

⁵Independent Researcher, Suva, Fiji

⁶Pacific Island Farmer Organisations Network, Nadi, Fiji

⁷Farm Support Association, Port Vila, Vanuatu

⁸Kastom Gaden Association, Honiara, Solomon Islands

⁹Growers Federation of Tonga, Nuku'alofa, Tonga

Correspondence

Federico Davila, Institute for Sustainable Futures, University of Technology Sydney, Bldg 10 Level 10, 235 Jones St, Broadway, NSW 2007, Australia.

Email: Federico.Davila@uts.edu.au

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Abstract

Pacific Island workers contribute significantly to Australia's agriculture and food security through the Seasonal Worker Programme (SWP). Previous studies show the economic benefits of the SWP to both Australian agro-industries and Pacific workers. However, there are limited studies about the agricultural knowledge exchange that occurs via the circular migration enabled by the SWP, and the experiences of workers and employers as agricultural knowledge holders. With the SWP merged into the Pacific Australia Labour Mobility Scheme, there is an opportunity to help define

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how circular migration is both an economic and agricultural development policy. In this paper, we present findings from interviews with 63 workers (from Solomon Islands, Tonga, and Vanuatu) about agricultural knowledge and skills acquired and exchanged via SWP participation. We provide a discussion of opportunities for knowledge exchange in international labour mobility, and areas of future research in circular migration.

KEYWORDS

agriculture, circular migration, food systems, labour mobility, Pacific

1 | INTRODUCTION

Agriculture in Pacific Island Countries (PICs) is tremendously diverse, both between and within countries. Melanesian countries – Papua New Guinea (PNG), Fiji, Vanuatu, and Solomon Islands – have historically been relatively productive given their rich soils, abundant rainfall, and large diversity of traditional horticultural products. Contrastingly, the Polynesian countries of Samoa and Tonga, while reliant on agriculture for livelihoods, have increased their total food imports to supplement a growing population over the last few decades. Micronesian states and atoll countries have more challenging agricultural environments due to sandy soils and poor quality freshwater (Halavatau, 2018). If PNG (the PIC with the largest agricultural sector) is excluded, per capita production of crops and other starchy vegetables has been declining in the PICs region for 50 years, most drastically in Polynesia (Andrew et al., 2022). Shifting dietary patterns towards imported processed foods, coupled with insufficient nutritious food consumption, has contributed to major non-communicable disease risk in the region (Charlton et al., 2016). Alongside this food systems context, PICs are among the world's most vulnerable to the effects of climate change, facing increasing variability in rainfall, extreme weather events, and associated flooding and impacts on populations. The COVID-19 pandemic has further impacted PICs' economies and food security. During the first two years of the COVID-19 pandemic communities relied on savings and reciprocal relations, and since international borders reopened economic recovery has remained slow (Davila et al., 2021; Ferguson et al., 2022), pointing towards a need for diverse revenue streams to support livelihoods.

International labour mobility provides one avenue for supporting incomes and food security in PICs. International labour mobility includes the movements of citizens from one country to another for employment or supply of services (UNECE, 2018), with those moving commonly referred to as migrant workers. The development benefits of international labour mobility are well-recognised, with migrant workers globally contributing remittances and skills to their countries of origin and contributing to economic growth in destination countries (Hugo, 2012). Circular migration – a process whereby temporary migrants travel repeatedly between their home country and receiving country – is a common feature of international labour mobility.

The new Pacific Australia Labour Mobility (PALM) scheme has now replaced the Australian Government's two major international labour mobility programs targeted at Pacific Island workers, the Seasonal Worker Programme (SWP) and the Pacific Labour Scheme (PLS). These

programs have primarily involved Pacific Island migrant workers filling seasonal labour shortages in Australia's agricultural sector, with participants commonly referred to as seasonal workers. While PALM is a new institutional mechanism, at its core, the focus of the new scheme remains on recruiting Pacific Island workers to fill labour gaps in rural and regional Australia, often in agriculture. Under PALM, workers can stay in Australia, as seasonal workers, for short term periods of up to nine months at a time and can move between employers (which was not readily enabled under the SWP and PLS). Visas issued under PALM will be valid for up to four years with a multiple entry condition enabling workers to travel to Australia repeatedly to complete up to nine months seasonal work each time (DFAT, 2021b), a form of circular migration. Many Pacific Island seasonal workers (under the SWP and PLS) have worked on Australian farms or in Australian agribusinesses to meet labour needs in Australian rural areas. Seasonal workers' connections to agriculture in PICs and Australia, provide an opportunity to explore the links between international labour mobility and agricultural development.

There have been previous studies into the economic and social benefits of Australia's longer running, international labour mobility program, the SWP (World Bank, 2017, 2018). Yet only limited studies have looked beyond an economic framing of labour to explore how SWP workers' skills and capabilities contribute to Australia's broader agricultural output (Connell & Petrou, 2019). There has also been very limited investigation into whether, and how, SWP employers offer opportunities for workers to learn about Australia's agricultural production systems (Connell & Petrou, 2019).

Our study, therefore, investigated the connections between circular migration and agricultural skills and knowledge exchange between Australia and PICs, enabled via the SWP. The study sought to understand how migration can be a driver of development in the Pacific, and, specifically, the opportunities migration offers to agricultural development. Our research investigated the types of agricultural skills and knowledge Pacific Island seasonal workers have gained and applied through their SWP participation. Through interviews conducted with seasonal workers in Australia, Vanuatu, Solomon Islands, and Tonga, we present an initial qualitative analysis of agricultural knowledge exchange to complement existing economic and governance analyses of Pacific-Australia labour mobility. Our analysis contributes to filling the largely unexplored policy gap that exists at the nexus of agriculture, food security, and labour mobility as well as providing a current dataset for informing development opportunities in PALM.

The full study was conducted during the first seven months of 2021, while the SWP was Australia's main Pacific-focused labour mobility scheme. While the SWP ceased to exist in April 2022, our study's framing of the agriculture-circular migration nexus is transferable to evolving international labour mobility programs in the region. In the next section, we provide an overview of the circular migration-agriculture nexus and the SWP. We then present our fieldwork and data collection process before focusing on three major sets of findings: seasonal workers' agricultural skills gained and applied through circular migration, barriers to skills and knowledge transfer, and the types of skills seasonal workers expressed a desire to learn and to implement in their Pacific Island agricultural contexts.

2 | THE AUSTRALIA-PACIFIC AGRICULTURE AND CIRCULAR MIGRATION NEXUS

A range of research shows the multiple contributions of international migration to migrants' countries of origin. Research by the Organisation for Economic Co-operation and Development, International Labour Organization, and the World Bank indicates that individual migrants who

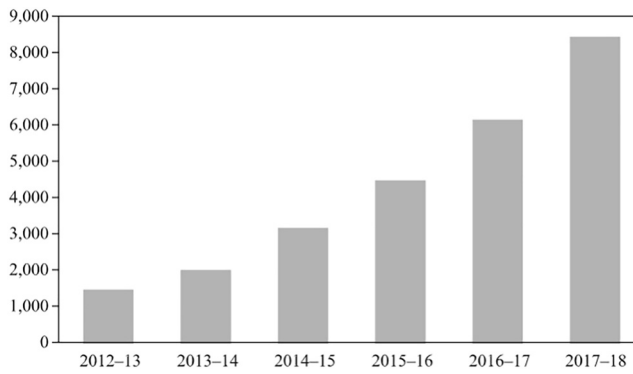


FIGURE 1 Number of Seasonal Worker Programme (SWP) visas issued each year. Source: Gibson and Bailey (2021), using Australian Government Department of Education Skills and Employment data.

return to their origin countries can increase their spending on education for children and reduce the need for child labour (ILO et al., 2015). Return migrants can also help facilitate trade and investment flows between their origin and destination countries and create new demand for goods and services. While potential ‘brain drain’ can affect migrants’ origin countries, both countries can benefit if the circulation of skills is facilitated by cooperation between origin and destination countries, (ILO et al., 2015). Despite these benefits, significant work in research, policy, and evaluation of circular migration programs is still needed to understand the flow-on effects to multiple economic sectors (Connell, 2015).

Australia’s position as a large-scale food producer and net-food exporter is dependent on the labour provided by foreign workers and immigrants (Collins et al., 2016). The Australian horticultural sector requires farm labour every harvest season, an issue amplified by international border closures associated with COVID-19 (EY, 2020). At the same time, for Australia, Pacific labour mobility remains a major component of the Australian Government’s ‘Pacific Step-up’ initiative (DFAT, 2021a). During the first six months of 2021, when this study was conducted, Australia’s SWP had been operating for close to a decade, and the PLS for three years. Participant numbers in these Pacific labour mobility programs have continually increased (Figure 1) and are projected to grow further (Lawton, 2019) under the PALM scheme. In 2012–13, Australia had less than 2000 Pacific participants in the SWP, with the number growing to over 12,000 in 2018–19 (Lawton, 2019). Tonga, Vanuatu, and Timor-Leste have the highest rates of participation (Figure 2), and since 2016 the number of Solomon Islands workers has doubled annually (DFAT, 2018).

Repeat, circular migration was a core element of the SWP. Around 60 per cent of SWP participants worked in Australia at least twice, and 70–80 per cent of those who spent a second season subsequently participated multiple times in the program (Curtain & Howes, 2020). Repeat participation in the SWP provides scope to acquire significant earnings over multiple years and the accumulation of skills amongst return workers (Klocker et al., 2020). This circular migration is also positive from the perspective of employers who benefit from not having to train new workers each year. Previous studies have shown that SWP employers prefer workers from rural areas of PICs, and look to build relationships of trust with workers from particular areas who may return for several seasons (Bailey & Rereman, 2019). However, there are equity considerations around allowing workers to return for many seasons, because others may miss out on the income-earning potential offered by SWP participation (Doan et al., 2020; Perkiss et al., 2022).

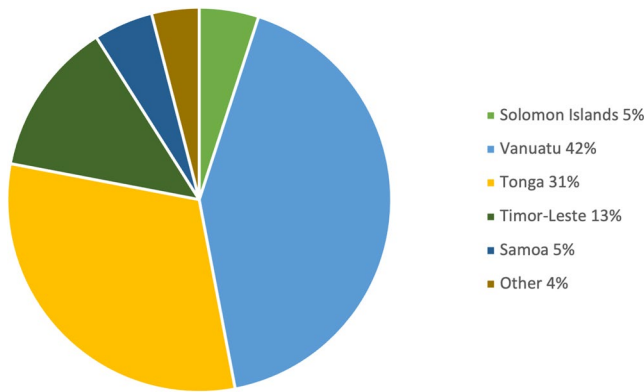


FIGURE 2 Share of participation in the Seasonal Worker Programme (SWP), 2018-19, by country. Data is approximated. Source: Lawton (2019) and Curtain and Howes (2020).

At the intersection of Pacific labour mobility, agricultural production, and food security initiatives, there is an as yet largely underexplored opportunity to understand how workers involved in circular migration, via labour mobility programs between Australia and PICs, participate in agricultural knowledge flows (Dun & Klocker, 2017). Previous studies have found that workers from the Solomon Islands and Kiribati have learnt about citrus crop varieties, grafting, netting, pruning, and fertiliser management while participating in the SWP (Dun et al., 2018; Dun et al., 2022). Other studies have found that the add-on skills training component of the SWP has enabled workers to develop skills in English language, numeracy, information technology and first aid, as well as agriculture skills in picking, packing, sorting, and pruning (World Bank, 2018). However, it can be difficult to ascertain what proportion of seasonal workers are involved in agriculture in their origin PICs.

A 2018 World Bank study identified that, prior to departure, less than 40 per cent of Pacific seasonal workers were in formal paid employment in their countries (including Timor-Leste, $n = 385$), but did not indicate the extent to which this employment was part of the agricultural sector. The study also does not mention the livelihood activities of the remaining 60 per cent of workers, but given cultural connections to land and the contribution of agriculture to livelihoods in PICs, it is likely that many seasonal workers retain some connection to rural areas. Agriculture is a major contributor to everyday food security in Melanesian and Polynesian societies, and contributes to 13.7 per cent of gross domestic product in Tonga (in 2015–16, as per Food and Agriculture Organization [FAO], 2019b), 29 per cent in Solomon Islands (as per 2018 Statistical Bulletin cited in FAO, 2019a) and 21 per cent in Vanuatu (in 2012, as per FAO, 2020). It must be noted that these contributions are low as much agriculture is subsistence and non-commercial, and thus not captured in economic metrics. Rural populations are dominant in these countries: 75 per cent in Vanuatu, 77 per cent in Tonga and 81 per cent in Solomon Islands, thus indicating that agriculture is relevant to these societies, even if non-commercial. While it is hard to know the origin of all seasonal workers, a study of 20 seasonal workers in Australia's Sunraysia region, 90 per cent reported being farmers in their origin PICs (Dun et al., 2018). Similarly, a separate study of 12 seasonal workers from Solomon Islands in the Sunraysia region found 75 per cent reported growing crops in Solomon Islands (Dun et al., 2022). While each of these studies is individually small, they consistently show that seasonal workers from PICs, who work on Australian farms, often maintain food growing activities in their origin countries and so may benefit from the types of policy adjustments suggested in this paper.

3 | METHODS AND COUNTRY FOCUS

Solomon Islands, Tonga and Vanuatu participated in the SWP and are part of the PALM scheme. These countries are heavily dependent on agriculture for livelihoods and household food security and have different histories of engaging in international labour mobility. International migration, both long term and circular, with associated remittances, has made Tonga a strong migration-remittances economy (Brown et al., 2014). In contrast, Vanuatu and Solomon Islands have only recently engaged with Australia's labour mobility program and, as such, remittances are playing an increasingly important role in their respective economies (World Bank, 2018). We thus selected these three PICs as the focus for our study. Within Australia, Queensland was selected as the study site because it is one of the Australian states that has relatively similar agroclimatic conditions to those in PICs, potentially enhancing the relevance of agricultural knowledge exchange, and it has hosted 38 per cent of all seasonal workers under the SWP since 2012 (Curtain & Howes, 2020).

This research was designed with the guidance, advice, and expertise of Pacific Islander-led organisations experienced in working with Pacific Island farmers and migrants at its centre. A purposeful partnership with community-based organisations, the Pacific Island Council of Queensland (PICQ)¹ and Pacific Island Farmer Organisations Network (PIFON),² provided cultural expertise, language assistance and co-designed data collection processes in Australia, Solomon Islands, Tonga and Vanuatu. This helped to address Western epistemological biases embedded in our research design.

This study's research question and subject matter required our team to elicit qualitative insights from seasonal workers. Qualitative methods, namely semi-structured interviews, allowed us to explore the nuances of agricultural skills and knowledge exchange between workers and employers and the application of skills by workers upon their return to home countries.

3.1 | Participants and interviews

Our target study participants were male and female SWP workers (both in Australia and PICs) who had participated in the SWP at least once, ideally more than once, to capture the longer-term circular nature of learning and knowledge application. Participants were recruited by PICQ staff who reached out to their diaspora networks to connect the research team with workers and approved employers under the SWP. Labour mobility coordinators also connected researchers with approved employers under the SWP. Interviews with SWP workers in Queensland were organised and conducted together with PICQ staff, and proceeded only with workers whose employers were supportive of them being interviewed. Once recruited, participants were interviewed in small groups, to allow individual reflections while being part of a group of workers they trusted. Interviews in Queensland were conducted in English, together with pidgin-speaking and Tongan-speaking representatives of PICQ who provided language clarifications. Interviews in Solomon Islands, Tonga and Vanuatu were organised and led by PIFON and their membership organisations and were conducted in the local language by the Pacific Islands' research team.

¹PICQ represents the voice and views of Queensland-based Pacific Island national organisations to all levels of government and other agencies, on matters that affect their communities and individual wellbeing; and continues to work at enhancing the capacity of its members to participate fully in all aspects of Queensland society.

²PIFON is responsible for supporting and overseeing research and capacity development activities with its member farmer organisations across nine Pacific countries and territories. PIFON is a network focused on exchanging and sharing information.

TABLE 1 Overview of the number of Seasonal Worker Programme (SWP) workers interviewed.

SWP worker's country of origin	Number of SWP workers interviewed in Australia	Number of SWP workers interviewed in the Pacific Islands	Number of male SWP workers	Number of female SWP workers	Total number of SWP workers interviewed
Solomon Islands	14	16	27	3	30 (48 per cent)
Tonga	7	15	15	7	22 (35 per cent)
Vanuatu	4	7	7	4	11 (17 per cent)
Total					63 (100 per cent)

Pacific Island Farmer Organisations Network recruited participants via a list of participating workers from relevant agencies in each country, using a project information sheet. Interview guides focused on their home production systems, their experiences working as agriculturalists in Australia, and the barriers and opportunities for transferring skills learnt between Australia and PICs.

Summary information about the SWP workers for this study is shown in Table 1. Seasonal Worker Programme workers interviewed had participated in the SWP for periods ranging from one to 10 years. Two-thirds of these SWP workers had participated in the SWP only once or twice (42 respondents), seven had participated three times, five had participated four times, and the remaining SWP workers (13 per cent) had participated in the scheme for five years or more. Around three-quarters (78 per cent) of workers were male, and 22 per cent were female (for context, approximately 14 per cent of SWP participants were female between 2012–17 (World Bank, 2017)).

Seasonal workers interviewed were largely employed in the horticulture sector in Australia, primarily in mixed vegetables, root crops, and cash crops. All but two workers said they were involved in some type of food production in their home countries. Most respondents (48 per cent) said they grew food in traditional home gardens, which are common in Melanesia and Polynesia and are used to grow subsistence vegetables for families (such as leafy vegetables and bananas). An additional 30 per cent said they worked on both cash crop plantations for market crops (e.g., kava) and home gardens, while 44 per cent said they also had livestock.

Throughout the study we use the term 'home gardens' to refer to household managed small plots (between 0.2–2 hectares, as per global definitions of smallholders) where leafy greens and some fruits are grown, and occasionally integrated with commercial crops (Taylor et al., 2016). Types of foods grown by workers in their PIC home countries were diverse, including but not limited to: banana, slippery cabbage, cassava, beans, bok choy, chillies, coconuts, sweet potato, pineapples, guava, a range of root crops, limes, mandarins, snake beans, peanuts, taro and a range of leafy greens. A country-specific summary of the food production, the three agriculture systems studied is presented in Table 2.

4 | RESULTS

Here we present results related to the range of agricultural skills and knowledge gained by SWP workers interviewed, as well as barriers to their acquisition. We use quotes throughout as illustrative examples of the individual perspectives of workers and employers, rather than seeking consensus views.

The top workplace activities that seasonal workers were undertaking on Australian farms were picking and harvesting (85 per cent of participants), planting (52 per cent), pruning/de-suckering

TABLE 2 Summary of nutrition outcomes, food production, and food consumption aspects of selected Pacific food systems.

Category and United/Country	Solomon Islands	Tonga	Vanuatu
Nutrition and demographic measures			
Stunting rate ^a (per cent under 5 years)	31.6	8.1	28.5
Wasting rate (per cent under 5 years)	8.5	5.2	4.4
Obesity (per cent male/female)	18/27	41/54	20/30
PRODUCTION			
Home garden context ^b	Home gardens account for an estimated 92,595 hectares of homestead land, or around 20 per cent of the total homestead land area	The average size of agricultural land per active household was 1.9 hectares, annual crops occupy 36 per cent, perennial crops 5 per cent, pastures 7 per cent, 1 per cent livestock, and fallow land 51 per cent	89 per cent are less than 1 hectare, often intercropped with cash crops
Agricultural land ^c (per cent land area)	40	45.8	15.3
Agriculture and fisheries, value added (per cent of GDP)	35	17.2	25.8
Per capita food production variability (2015) ^d (\$ per person constant 2004–2006)	2	9.8	16.8
Value of food imports over total merchandise exports (3-year average) (2015–2017) (Percent)	22	231	123
Top staple foods (note that most rice is imported)	Sweet potato, coconut, rice, cassava, banana taro, yam ^e	Cassava, coconut, sweetpotato, yam, taro, banana ^f	Taro, coconut, rice, banana, yam, cassava, sweetpotato ^g

^aGlobal Nutrition Report. (2020a,b,c) Country nutrition profiles.

^bGovernment of Solomon Islands (2017) *Report on national agricultural survey 2017*. Solomon Islands National Statistics Office, Ministry of Finance and Treasury and Ministry of Agriculture and Livestock, in collaboration with the Food and Agriculture Organization of the United Nations and the World Bank.

^cFAO (2021) FAO STAT, Food an Agriculture Organization of the United Nations for Tonga and Vanuatu. For Solomon Islands, see Government of Solomon Islands (2017).

^dAs above, FAO (2021).

^eGovernment of Solomon Islands (2015) *Agriculture and livestock sector policy*, Ministry of Agriculture and Livestock; Vanuatu NSO (2007) Vanuatu agriculture census 2007, Vanuatu National Statistics Office.; MAFF (2015) Tonga national agricultural census main report, Ministry of Agriculture, Food, Forests, and Fisheries.

^fFAO (2019b). *Country gender assessment of agriculture and the rural sector in Tonga*, Food and Agriculture Organization of the United Nations.

^gGovernment of Vanuatu (2020b) *Vanuatu agriculture sector policy*, Ministry of Agriculture, Livestock, Forestry, Fisheries, and Biosecurity.

(50 per cent) and weeding (34 per cent). Other in-field tasks SWP workers experienced on Australian farms included: seed preparation, pest management, water and irrigation management, nursery production, fertiliser application and tractor driving. In contrast, off-field tasks were related to work in packing sheds and included grading and sorting produce, packing produce and driving forklifts. Figure 3 summarises the types of farm activities participants performed in Australia. These work tasks provide the basis for some of the SWP workers' practical on-the-job learning of agricultural knowledge. Their broader observations while working on Australian farms also contributed to knowledge they acquired.

The substantial difference in the scale of Australian farms compared to Pacific Island farms or 'home gardens' was acknowledged by workers as a major factor in determining how they acquired and applied agricultural skills as part of their circular migration. One group of Solomon Islands workers discussed that the mixed farming systems used in their home food gardens are very different from the monocropping systems they experienced in Australia. One worker said that in Australia 'farm size is big, and time management is important – time spent for production is very critical to Australian farmers' (Solomon Islands Worker 1). These differences in scale created both barriers and opportunities for SWP workers to gain new knowledge on Australian farms and influenced how workers involved in this study perceived the transferability and relevance of their Australian farm experience to everyday farming practices in their countries. Workers may spend one season working on a large banana plantation in Australia, where they interact with hundreds of other workers under various labour visa conditions. In these large systems they may never interact with the employer nor have enough time to see the farm managers' work on the property, given the high-pressure and time-sensitive nature of harvesting. In following seasons, they may be recruited to work on a much smaller farm, where the employer works alongside them, every day. Daily interactions with their employers – i.e., Australian farmers – can expose SWP workers to multiple types of farm management processes that would likely contrast with their home garden systems in the PICs. Despite the differences in the scale of farming, workers identified several techniques they had learnt while in Australia and implemented in their farming contexts in the Pacific.

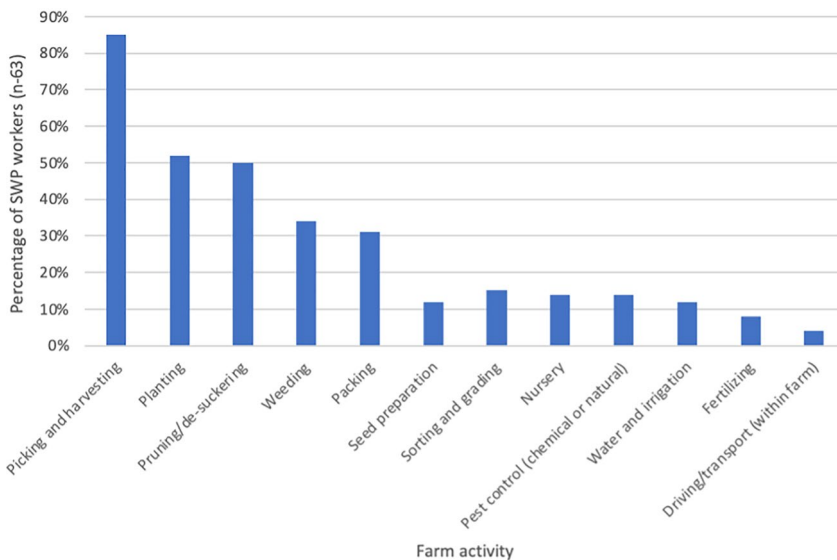


FIGURE 3 Type of farm activities undertaken by Seasonal Worker Programme (SWP) participants when on Australian farms, as reported by study respondents.

4.1 | Agricultural skills acquired and applied by Seasonal Worker Programme participants

Despite landscape and scale differences between Queensland and PICs, 70 per cent of the study participants said they had learned something relevant from Australian farms, indicating their appetite and capacity for acquiring new agricultural knowledge. For instance, one worker referenced how the large-scale monocropping of bananas was of interest, particularly regarding the use of planned and monitored irrigation systems (ni-Vanuatu Worker 7). Another seasonal worker employed on a farm growing leafy green vegetables reflected on the differences between agricultural systems and how the experience of working in Australia provided insight into other modes of farm management:

Here [in Queensland], we have a time to plant, and then after eight weeks we harvest. Every week [we work on] one block. For us [back at home] we don't follow the time and we just plant. [In terms of learning], how they manage the farm is what I learn. [One employer] is always coming out with us in the field and [the other] is in the office' (Solomon Islands worker 13).

Approximately 45 per cent of interviewed workers said they had invested in their Pacific Island farms via SWP income, and 46 per cent provided examples of how their SWP experience had been put to use in their home gardens or on their farmland in PICs. Workers discussed their experience in developing horticulture management, farm infrastructure, and packing skills. One Solomon Island worker said that in Australia they noticed 'proper spacing for each crop and ... use [of] proper harvesting tools, [and] also harvesting at the right time for selling to avoid spoilage' (Solomon Islands Worker 17). The worker indicated that they shared knowledge about spacing, fertiliser, and pesticide use with their family members upon their return home.

Another example of skills learnt was the practice of de-suckering and pruning crops. These were tasks performed by 50 per cent of SWP workers during the time spent working on Australian farms. De-suckering is a common horticultural technique used on banana plants where new suckers are removed from the base of the plant to improve plant growth by allowing a single stem to develop, rather than having multiple stems competing for resources. In Pacific mixed-farm systems, suckers are commonly left to grow on banana trees. On large-scale commercial banana farms in Australia, de-suckering banana plants is a common task that requires skill and precision. Seasonal Worker Programme workers articulated their interest in de-suckering and its applicability to agriculture in their home countries. In one group interview, there was a conversation around the importance of de-suckering, with four Solomon Islands workers explaining the value of these skills in their country. During that conversation, one worker explained that:

Back home, we do not thin the baby [plant]. At home we just let it grow. I [got some] ideas from this. [I noticed that] after cutting the babies out, the plant grows better. There is a difference. I have not seen people doing this [before, in the Solomon Islands] (Solomon Island Worker 20).

Another worker, in Tonga, similarly noted that SWP participation had led him to prune breadfruit, avocado and mango trees on his home plot for the first time. He explained that the trees 'have been in the [my] plantation for more than 15 years without pruning'. Similarly, a Solomon Islands worker said that upon their return home, they used techniques learned in Australia to prune lemon and local apple trees around their house to improve plant productivity. Moreover,

he described training family members ‘on how to proper[ly] prune their fruit trees and plants around their homes’ based on techniques learned in Australia (Solomon Islands Worker 6). An interview with a Tongan worker also illustrated the value of pruning skills, learned in Australia, for his family at home. He explained:

I went back home [and] did some pruning of the mandarins and lemons and so next time my grandma says, “Wow this makes a lot” and I said, “Yeah, you have to do a lot of pruning ... Pruning creates more food. I do it in the little mango tree, because when there’s lots of branches coming down I do the bad ones and keep the good ones (Solomon Islands Worker 6).

These examples provided by workers show that commonplace horticultural and crop maintenance practices from Australia are being readily and easily transferred to Pacific Island contexts, and Pacific Island farmers are noting improved harvests based on the application of these techniques.

Workers also reflected on how Australian farmers use infrastructure and technology to grow food. In an interview conducted in Honiara (Solomon Islands), one worker mentioned the value of seeing how irrigation was set up in Australia, how machines were maintained and used, and how weeds were managed (Solomon Islands Worker 14). Participants discussed technologies – such as chainsaws, blowers (for pollination), water tanks, new seeds, or materials to establish shade or hydroponic production – that they had become accustomed to using in Australia, and subsequently wanted to use to support agriculture in their home countries. Participants interviewed in PICs reflected on how they had prioritised changes in their use of technologies upon returning from Australia. A worker from Efate (Vanuatu) indicated that the overarching greenhouse system she had seen in Australia was not relevant to her farm, but the priority water management concept she had observed being used in greenhouses was. Accordingly, she decided ‘to build a water catchment system – [using SWP income] to invest in a water well’ (ni-Vanuatu Worker 2). Two other participants, one in Efate and one in Malaita (Solomon Islands), spoke of the funds earned during SWP participation being used to establish tanks for water capture for home and garden use. While exposure to technologies is of interest to workers, a major limitation is the cost and accessibility of these resources in their home countries, making it hard to adopt and transfer skills related to technology use.

With regard to the ‘beyond farm gate’ part of the value chain, workers discussed issues of product quality, packing, and marketing. Of the workers interviewed, 31 per cent were involved in packaging activities while engaged in the SWP. Packing sheds in Australia can be large operations with multiple workers involved in sorting, packing, and loading produce onto trucks. Participants identified product quality to meet consumer preferences as one thing they had learned during their time working in Australia. One participant from Vanuatu said they had ‘learnt harvesting skills of requirement for quality in the supermarket’ (ni-Vanuatu Worker 1). A Tongan respondent, meanwhile, said that they learnt ‘how to harvest the orange according to customer need’ (Tongan Worker 8). Another worker said that ‘the technique of harvest [in Australia] is the best experience’ to help Tongan growers because experience in the SWP taught him the value of advocating for higher-quality packaging to protect produce in Tonga (Tongan Worker 9). Another said that ‘the skills for packing is new to us but, we share [with] each other during working to learn [from] each other and get a good result at work’ (Tongan Worker 3). The workers noted the value of these practices for their home countries and explained that their farm practices have changed and that they are now packing ‘crops to be hygienic’ (Tongan Worker 5).

4.2 | Barriers to sharing, acquiring, and applying agricultural knowledge while in Australia

We found only 15 (25 per cent) of participants mentioned they had shared their own farming knowledge with their Australian farm employers. Sometimes the scale of the Australian farms simply meant that there was limited opportunity for workers to meet with their Australian farm owners. A ni-Vanuatu worker stated that ‘owners are not present at the spot [where we work], only workers and supervisors’ (ni-Vanuatu Worker 3). Another worker explained that they interact only with their supervisors, not farm owners (Solomon Islands Worker 1). This reduces workers’ opportunities to share information and build relationships directly with Australian farmers, in addition to possible language and cultural barriers that may be present. Additionally, power relations between employees and employers may make workers hesitant to offer suggestions about farming practices to their bosses/supervisors. As one ni-Vanuatu worker expressed, ‘No way, we look up to them as our bosses’ (ni-Vanuatu Worker 7). Other workers did not see talking to the employer as part of their role, stating, ‘I see them [employers] as people with higher skills and knowledge’ (ni-Vanuatu Worker 2).

There was also a tendency, amongst workers, to dismiss their own agricultural knowledge entirely or believe that their agricultural expertise was of limited value to Australian employers. Despite growing food and raising livestock on one acre of land in Tonga, one worker stated, ‘I do not have any farming skills to share to the Australians’ (Tongan Worker 5). Furthermore, SWP workers framed their Australian employers or Australian ways of farming as being more advanced, and therefore considered it unlikely that farming practices from PICs could be beneficial for Australian farms. For example, one Tongan worker stated he had not shared any knowledge ‘because Australia is more advanced than Tonga in farming knowledge’ (Tongan Worker 15), and a ni-Vanuatu worker explained, ‘Australian farms have moved away from what we are doing today [in the Pacific Islands] many, many years ago. They have moved forward so we are still far behind’ (ni-Vanuatu Worker 7). In other cases, workers did not share their knowledge because they recognised that Australian farmers were likely to consider themselves more advanced than their Pacific Islands counterparts. A worker from Vanuatu concluded that ‘advanced’ societies expect others to follow their trajectory: ‘Aussies think they are more advanced than us. So they expect us to follow their way of farming’ (ni-Vanuatu Worker 5). This further prevents sharing of knowledge from Pacific Islands farmers to Australian farmers and farm managers as part of the SWP.

Administrative barriers in Australia also prevented SWP workers who participated in this study from gaining certain skills they hoped to acquire while in Australia, such as obtaining licences to drive farm vehicles and accessing training to operate forklifts or tractors. As one participant noted:

[We would like to learn] forklift, tractor but getting licence is one of the problems because we don’t know how to go about how to get our licence ... When we go back to Solomons and there is a company there, they need someone to work on those machines (Solomon Islands Worker 25).

Seasonal Worker Programme workers expressed that restriction to certain roles on farms in Australia limited their capacity to learn because of a lack of exposure across all value chain elements (production, processing and marketing). This included repeat roles on only one type of crop and is exemplified by the following quote from a worker:

[We] spend too much time in the field, we don't get to work in other techniques. For example, not just spending time in the farm field but [we want to] move to other section[s] [such as] plant nursery, fruit trees/orchard, seed saving, packaging and marketing (Solomon Islands Worker 1).

4.3 | Barriers to sharing, acquiring, and applying agricultural knowledge after returning to Pacific Island Countries

We also found barriers which make it difficult to (a) apply new learning acquired; and (b) share this new knowledge with fellow Pacific Islanders upon workers' return home. The majority of Pacific Islanders who participate in the SWP have goals to support their families and livelihoods, and using SWP earnings to invest in agriculture may not be their top priority. As one ni-Vanuatu worker expressed, their farming activities had not changed since participating in the SWP 'because scale of farming is too big compared to mine. Also, before I went to Australia to work, I have a plan to build house, not invest in agriculture' (ni-Vanuatu Worker 5). A Tongan worker, meanwhile, explained they were not investing in agriculture, saying that 'my purpose of joining the SWP is for children's school fees and family/church function' (Tongan Worker 5).

Some workers are interested in making investments in agriculture (be it financial or learning new practices and relevant knowledge) as part of their SWP participation. Two workers from the Solomon Islands invested in water-related infrastructure, pointing towards direct links between incomes and agricultural development. However, other workers explained they did not have the necessary land, tools and/or equipment to implement Australian farming practices in the Pacific Islands (and the prohibitive expense of acquiring these). For some workers, a barrier to implementing changes to their farming or food growing practices in the Pacific Islands is their own physical absence from their land during time spent in Australia. Workers commonly engage family members to tend their land and crops while they are in Australia, or use their earnings to hire farm labour; some do not have anybody to look after their land or farm during their absence.

Beyond competing priorities for their investments and physical absence from their farms, workers identified several actual or perceived barriers in terms of the applicability of the farming experience they were gaining in Australia to their Pacific Island contexts. Some workers did not see the relevance of their work experience in Australia, because of the differences in the crops grown: 'Cannot plant berries and apply skills because we don't have them in Vanuatu' (ni-Vanuatu Worker 4). Several workers perceived Australian farming systems to be too advanced, expensive, complicated and different. And without similar large-scale systems being present in the Pacific Islands, they could not comprehend how what they were learning could be applicable, as the following two quotes demonstrate:

[I am] following the idea of planting in Australia but in a much smaller scale. [But in Australia there is] commercial farm – [in Solomon Islands there is] small garden in backyard so hard to apply the techniques learned (Solomon Islands Worker 3).

[I'm] not really learning anything in Australia that could help with family cassava exporting business because [I'm] only really exporting to family in Melbourne in Australia. It's not the same type of commercial business as the banana farms I am working on in Australia (Tongan Worker 24).

The absence of relevant infrastructure in their Pacific Island home countries was also a barrier identified by workers, despite their interest in applying newly acquired agricultural knowledge and skills. This included an absence of relevant value chain elements (production, processing and marketing) in the Pacific Islands and not having the necessary domestic market (physical venue and/or potential buyers) where workers could grow and sell a larger volume of produce. As one worker explained: 'I can plant more bananas here in Vanuatu but there is no market to sell to. There will be no money on banana if I plant on a larger scale unless there is a market' (ni-Vanuatu Worker 7). We note this worker grows bananas in Vanuatu and worked on a banana farm in Australia.

In terms of SWP workers sharing new knowledge and skills gained in Australia with fellow Pacific Islanders upon returning home, some (but very few) SWP participants simply did not want to share their newly acquired knowledge. Others stated that they had not shared knowledge because 'no-one asked for [it]' (ni-Vanuatu Worker 3), suggesting that other people are not interested and/or opportunities for knowledge exchange might need to be facilitated. That neighbours do not ask returned SWP workers about new knowledge acquired might also be a case of villagers needing to witness new knowledge applied in practice before their interest is sparked (Dun et al., 2023). Certainly, as our results above show, some returned SWP workers do share knowledge with others upon return home, leading to the diffusion of some agricultural skills from Australia to PICs.

These barriers highlight some of the limits to transferring and exchanging agricultural skills and knowledge acquired via circular labour mobility programs, suggesting that structural interventions may be needed to help facilitate more effective skills and knowledge exchange.

4.4 | Opportunities: two-way learning and desired skills to develop during labour mobility

While the results indicated a largely one-way (Australia to Pacific) learning loop, there were some selected examples of workers either expressing their desire to share their knowledge with Australian employers, or actively sharing with other migrant workers in Australia or in their home countries. Some workers mentioned they could see ways in which Australian farms could benefit from the Pacific way of growing food. For example, one Solomon Islands worker highlighted that Australian farms could benefit from the Pacific 'harvesting process' and practice of growing 'multiple crops in one farm' (Solomon Islands Worker 5). One worker explained that he had exchanged knowledge with an Australian farmer 'on how to properly plant [without] ... use of fertiliser and use of organic farming' (Solomon Islands Worker 16). As earlier results noted, workers' dismissal of their own expert knowledge continues to be an inhibiting factor to actively sharing their insights with Australian farmers and remains an under-studied area of research. This is despite evidence that when Australian farmers and farm managers listen to the workers insights and knowledge, benefits flow to the full farm operation (Klocker et al., 2020).

Agricultural knowledge sharing with other migrant workers also takes place. Some workers were employed alongside SWP workers from a range of other PICs; in other cases, they worked alongside other types of migrant workers on Australian farms. For example, one worker discussed sharing knowledge about 'kava planting with Vanuatu SWP workers' (Solomon Islands Worker 14). Another mentioned sharing knowledge about 'natural growing technique[s] in farms and gardens in the Solomon Islands' with seasonal workers from Fiji, PNG and Vanuatu as well as co-workers from Asia and Europe (Solomon Islands Worker 12). This 'on the job' knowledge

exchange is very incidental, but signals potential avenues for better facilitating farmer knowledge exchange events and platforms for SWP workers (now PALM scheme workers) while they are in Australia.

Seasonal Worker Programme workers expressed interest in acquiring skills in various aspects of agricultural systems, and provided several suggestions for activities, infrastructure, resources or training that could support their upskilling. Workers expressed a desire to develop skills in using machinery, notably tractors and irrigation, and advancing their skills in packaging and marketing to improve the quality of their harvests in their home countries. For example, one worker stated that they were interested in ‘drip irrigation[as] a way to not waste water’ (ni-Vanuatu Worker 1), and another worker said they would like to learn ‘the process on how to “nursery” the plants, different harvesting techniques, [and] how to plough the field before planting’ (Solomon Islands Worker 5). Training in new skills and re-integrating these skills in their home country agriculture systems was discussed at length. For example, one worker said that training in packaging techniques should be done by their local government, and that the SWP could extend training into the most cost-effective way of packaging and marketing products to niche markets. One worker said that there should be ‘training in every pathway of vegetables and fruit to the market ... and training should be done by the local Ministry of Agriculture’ (Tongan worker 5). The responsibility of ‘who does reintegration training’ was suggested to be the task of either local agriculture departments, or existing agriculture training centres and farmer support networks. These groups were perceived by workers as being adequate for bridging their Australian experience with the Pacific context.

5 | DISCUSSION

We conducted an exploratory qualitative study to understand how circular migration programs, such as the SWP, can enable agricultural skills development and knowledge exchange between PICs and Australia. Previous analyses have pointed towards the economic benefits of circular migration and international labour mobility. Yet there have been limited studies looking at circular migration as a multidimensional driver of development which can benefit multiple sectors. Here, we discuss the findings in the context of the circular migration-agriculture nexus and the opportunities that exist for future agriculture skills development in labour mobility programming.

5.1 | Elevating circular migration for regional agricultural development

Circular migration continues to grow between PICs and Australia, bringing substantial economic benefits to the former (World Bank, 2018) and filling crucial agriculture labour gaps in the latter. This study has found that while the main benefit for workers is financial, there is an intellectual element related to agricultural knowledge exchange in circular migration that enables knowledge flows back to Pacific Islands. This study illustrates the incidental learning that takes place on Australian farms, expanding on results of previous studies with i-Kiribati, PNG, Tongan and Solomon Islands workers’ experiences (Dun et al., 2018; Dun et al., 2022). Our study indicated that workers were interested in expanding their skill development beyond core agricultural production – they also wanted to learn about value chains, packaging, and marketing, and how this can be adapted to their Pacific context. Efforts to support long-term food security for the Pacific region

can benefit from techniques that improve crop productivity (e.g. pruning), water efficiency (e.g. irrigation), and reduce wastage (e.g. packaging). Furthermore, as new economic development strategies focused on regionalism and internal trade advance in the Pacific region (PIFS, 2022), there are opportunities for returning workers to diversify and adapt their production systems to support development of marketing strategies to target emerging markets. As evidenced in this study, some workers are interested in learning and implementing these diverse types of skills.

Strategies to embed acquired and future skills learnt during labour mobility will, however, need cautious approaches to avoid undermining the strong traditional approaches to farming that dominate Pacific rural systems (Curry et al., 2015) which have been shown to engender long term resilience and adaptive capacity (Campbell, 2015; Taylor et al., 2016). To be clear, we are not advocating the transfer of Australia's monocultural farming practices and chemical pesticide dependency to PICs. The successful adoption of infrastructure, technology, and farming practices must be highly attuned to the socio-cultural, economic, and labour context of communities (Curry et al., 2021).

The skills that workers in this study considered most relevant, such as crop maintenance and nursery establishment, or the ones they wish to develop, such as marketing, can be translated and adapted to the Pacific context via existing agricultural training centres and farmer organisations. For example, the Tutu Rural Training Centres, originally from Taveuni in Fiji, have been adapted in other countries such as Vanuatu to support farmer extension and learning (McGregor & Matairatu, 2014). They involve village youth, including women, in commercial agriculture, and embed a range of planting, harvesting and commercialisation strategies into the training (McGregor & Matairatu, 2014). Similarly, the Solomon Islands Youth @ Work program links youth with agricultural skills development, offering a platform to link with labour mobility schemes for re-introducing returning workers (McDonald & Kylvoh, 2015). Farmer groups such as PIFON has several subsidiary farmer organisations throughout the Pacific that can act as knowledge sharing entities in agricultural systems. Pacific Island Farmer Organisations Network provides an institutional platform to formally engage with PALM and support workers' translation of Australian experience to a Pacific context. Pacific-led groups such as these can act as boundary agencies (Cash, 2001) that support the translation of foreign experience in Australia to a Pacific cultural and agronomic context, enabling the advancement the agricultural knowledge system. Such boundary agencies that provide structural support for knowledge translation are crucial to mitigate the risks of maladaptive outcomes from knowledge transfer, such as the overapplication of agro-chemicals that would compromise the sustainability of many low-input farm systems in the Pacific.

Our results indicate workers gain new agricultural skills as they work in Australia's farming landscapes. These skills already make their way to Pacific countries on an ad hoc, individual basis. As our research shows, some workers share their knowledge with family and friends upon their return home. Such individual efforts could be better supported. Pacific Island governments are increasingly developing worker re-integration policies to help workers re-adjust after being away from their communities for long periods. For example, the Government of Vanuatu has developed a *Framework for the Reintegration of Agricultural Workers in Labour Mobility Programs* which has skills development for seasonal workers as a core objective (Government of Vanuatu, 2020a). This framework has a vision for a 'highly skilled agriculture sector for Vanuatu with workers investing their human and financial resources into the agricultural sector' (Government of Vanuatu, 2020a, p. 10). Similar strategic focus is currently lacking on the Australian end of the circular migration relationship. This is problematic because the Pacific Islands region, more broadly, continues to remain heavily focused on agriculture and fisheries

as key sectors contributing to socioeconomic development, and the COVID-19 pandemic has emphasised how crucial they are for long-term food security and livelihoods (Davila et al., 2021; Ferguson et al., 2022).

Australian policy mechanisms for engaging with the Pacific have an explicit focus on agriculture and labour mobility as areas of priority, but they are not connected with each other. The Partnerships for Recovery: Australia's COVID-19 Development Response framework (DFAT, 2020b) positions international labour mobility as one of the tools for supporting economic recovery in the Pacific Islands region in light of pandemic impacts and the critical role financial remittances were playing at the time (DFAT, 2020a). In the Partnerships for Recovery framework, supporting food security is emphasised as an important component of regional stability (DFAT, 2020b), however, the PALM scheme was not explicitly identified as having a role in enabling food security. Our research suggests that Australia can amplify its contributions to agricultural development through enabling connections between agriculture and labour mobility – as some PICs are already beginning to do (e.g. Vanuatu, as noted above). The new PALM circular migration scheme provides a platform to build new structures that better support knowledge exchange opportunities for Pacific Island workers who help to fill extensive, unmet labour needs in Australia's agricultural sector. The skills workers wish to develop further that are documented in this study – in marketing, packaging and farm infrastructure – provide direct examples of how agricultural development and labour mobility can be connected as labour mobility programs continue to evolve.

While limited, there were instances of workers in this study finding opportunities to informally share their Pacific agriculture knowledge with Australian farmers, and with workers from other PICs. There is a need to re-frame notions of knowledge production in agriculture that captures more than technology and productivity narratives, and embeds diversity of knowledges and sustainability into how food is grown. Fundamental to supporting equity and more inclusive development is challenging the narrative that horticulture work is 'unskilled', when in fact workers often possess advanced skills and knowledge of food production systems that can benefit high-income country food production (Klocker et al., 2020). There is an opportunity for Pacific farmers to share their adaptation strategies with producers in Australia, notably those with similar scale farms or low-input farm systems that are more comparable to Pacific agricultural systems. Pacific rural communities continue to evidence their adaptive capacity and develop adaptation pathways that resonate with the reality of climate impacts in the region (Basel et al., 2020; Iese et al., 2017). The agro-climatic similarities between Queensland and Melanesian countries may offer strong opportunities for circular migration to develop novel agricultural adaptation knowledge sharing and experimentation between employers and workers.

5.2 | Researching international labour mobility's impact on agriculture

This study was exploratory and provided an initial set of questions focused on workers' experiences of agricultural skills development through labour mobility. There are still substantial knowledge gaps at the nexus of circular migration and agriculture. Firstly, the limited sample size makes it difficult to determine the range of ways in which skills are developed, including on very large properties and in different Australian states and territories. Secondly, there is a knowledge gap on whether changes in Pacific farming practices lead to improvements in productivity, livelihoods, and broader changes in diets and food security. There is an opportunity to be attentive to the potential

for changes in workers' farming practices upon returning home to spread and thereby influence their broader communities' ways of farming, as well as studying the cash crop systems that seasonal workers are part of. Thirdly, there is very limited evidence on how employers perceive Pacific workers' knowledge, and how this can be integrated into Australia's farm systems. Pacific workers' experiences of climatic shocks and adaptive capacity may offer important lessons for Australian mixed-cropping farm systems with similar agroecological conditions to Melanesian home gardens. There are limited studies of how employers interact with workers, what they look for with respect to agronomic and social skills, and how seasonal workers contribute (beyond labour) to Australian farming systems. Fourthly, there are opportunities to co-develop training materials for workers in a culturally appropriate way that allows both employers and workers to develop an understanding of the potential agricultural skills that interested workers can develop when in Australia. Finally, the re-integration of workers in their PICs offers opportunities for understanding how agricultural skills can be embedded in re-integration practices, and for how the application of skills varies across types of agriculture from very remote village agriculture to peri-urban home gardens.

6 | CONCLUSION

Circular migration between PICs and Australia continues to be an important contributor to socioeconomic development for the Pacific and for Australia's agricultural sector. Australia has played an important role in enabling economic opportunities for Pacific Island workers through the SWP and PLS, now amalgamated into the PALM scheme. Pacific Island workers, meanwhile, have played an important role in supporting Australian agriculture, especially as Australian agribusinesses, notably horticulture, continue to face labour shortages and skills gaps (EY, 2020). This study has shown how the circular migration aspect of Australia's labour mobility scheme, the SWP, has allowed opportunities for learning and sharing knowledge about agricultural practices and wider value chain operations. Despite these opportunities, some cultural and structural barriers remain for maximising the learning benefits of participating in seasonal work on Australian farms. As of 2022, the PALM scheme continues to connect Australian employers in a number of sectors to Pacific Island seasonal workers seeking higher income-earning opportunities through work on Australian farms. Labour mobility can make substantial economic contributions but also, as this study shows, support agrifood systems knowledge exchange and acquisition. Our study has provided an exploratory data set for deepening understanding of the types of knowledge exchange that takes place in labour mobility programs. Any strategies that are developed in this vein should learn from workers' experiences and build upon their existing efforts to bolster economic and food security in PIC households and communities through circular migration.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest/competing interest is reported by the authors.

DATA AVAILABILITY STATEMENT

The data that supports this study is not available in line with ethics and participant confidentiality protocols.

ETHICS STANDARDS

This study acquired research ethics approval, number ETH21-6538, at the Institute for Sustainable Futures, University of Technology Sydney.

ORCID

Federico Davila  <https://orcid.org/0000-0002-6899-1854>

Olivia Dun  <https://orcid.org/0000-0002-3660-6827>

Carol Farbotko  <https://orcid.org/0000-0001-8257-2085>

Brent Jacobs  <https://orcid.org/0000-0003-3147-341X>

Natascha Klocker  <https://orcid.org/0000-0001-7526-3292>

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AUTHOR BIOGRAPHIES

Federico Davila is a research director in food systems at the Institute for Sustainable Futures, University of Technology Sydney. He specialises in governance and sustainability in Australian and Pacific Islands' food systems.

Olivia Dun is a research fellow at Australian Centre for Culture, Environment, Society and Space, University of Wollongong. She has a background in environmental science, migration studies and international development.

Carol Farbotko is an ARC Future Fellow at the Centre for Social and Cultural Research, Griffith University. She works on resilience, decolonizing methodologies, climate change adaptation and migration, mainly focussed on the Pacific Islands.

Brent Jacobs is an Associate Professor of climate change adaptation at the Institute for Sustainable Futures, University of Technology Sydney.

Natascha Klocker is an associate professor of social and cultural geography at the University of Wollongong and the Australian Centre for Culture, Environment, Society and Space (ACCESS).

Emma Vueti is the president of the Pacific Islands Council of Queensland. She has extensive experience in consulting, advocacy and research with Pacific communities.

Lavinia Kaumaitotoya is based in Fiji as an independent researcher, working on multiple projects in the Pacific and supporting farmer groups.

Angela Birch has worked with farmers through farmer organisations for the last three years. Her focus is on helping farmer organisations build capacity to better serve their members in different Pacific countries.

Peter Kaoh is an agricultural agronomist, researcher and farmer in Vanuatu. His experience and expertise is in sustainable and green farming in the context of climate change and population growth.

Tikai Pitakia works with Solomon Islands farmers in supporting their sustainable land management, and undertakes research activities with multiple partners in the Solomon Islands, Pacific Island Countries, and Australia.

Sinaitakala Tu'itahi is currently the CEO of the Growers Federation of Tonga. She is an economist with 38 years working experience, including training and research in agriculture, business, socioeconomic development, human resources and management/leadership.

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