Australian Government
Australian Centre for International Agricultural Research

Final report

Small research and development activity

project	Market and opportunity analysis to guide market-led development of the Myanmar Pulse Sector
project number	AGB/2019/154
date published	
prepared by	Deb Doan, Business for Development
co-authors / contributors / collaborators	Hsu Wai Htun, Kyar Nyo Thant and Einzali Aung, Thura Swiss Dr Laurie Bonney Dr Theingi Myint
approved by	Howard Hall
final report number	FR2021-038
ISBN	978-1-922635-45-7
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

Contents

1 Acknowledgements

This project has been conducted as two crises have unfolded – the COVID-19 global pandemic and Myanmar military coup d'état. We would like to express our sincere gratitude for the generosity of all those who contributed their time and knowledge for this project despite the significant and protracted uncertainty and unrest caused by these circumstances, particularly those interviewed as members of the pulse sector.

We would like to thank Ms Dulce Simmanivong (Regional Manager for Laos, Cambodia, Myanmar and Thailand, ACIAR) and Mr Myo Thura (Myanmar Program Coordinator, ACIAR) for their advice and support regarding stakeholder engagement, and Mr Howard Hall (Research Program Manager, Agribusiness, ACIAR) for providing input, feedback and support throughout project development and execution. We would also like to thank Her Excellency, Ms Andrea Faulkner (Australia's Ambassador to the Republic of the Union of Myanmar) for her keen interest in this project and offer of support.

Finally, we would like to acknowledge the perseverance and tenacity of the Thura Swiss team – Ms Hsu Wai Htun, Ms Kyar Nyo Thant and Ms Einzali Hsu Aung – who remained committed to delivering this project despite the widespread unrest and violence in Myanmar.

Image credit: The Myanmar Times

2 Executive summary

Myanmar is one of the fastest growing economies in Asia. Prior to the COVID-19 pandemic and military coup, economic growth was projected to reach 6.4 per cent in financial year 2020-21[1]. Agriculture is a key driver of Myanmar's economy, contributing 21.4 per cent to gross domestic product (GDP) in 2018[2], yet the sector is underdeveloped when compared to other countries in the region. Given that 95 per cent of agricultural work is undertaken by smallholder farmers[3], agriculture also plays a critical role in Myanmar's overall economic and social development. Recent developments were expected to lead to a significant transformation of the sector, largely captured under the Myanmar Sustainable Development Plan, 2018-30.

AGB/2018/215 Myanmar Private Sector Agribusiness Landscape Analysis was conducted in 2018/19 to better understand and assess the agribusiness landscape in Myanmar, using the rice and pulse sectors as case studies given their prioritisation by the Myanmar Government and ACIAR. Multiple priority areas were identified as an outcome of AGB/2018/215; however, the need to undertake a market development analysis for pulses was identified as an important precursor to other value chain interventions.

RESEARCH QUESTIONS

1. What are the top domestic and international market opportunities available to the Myanmar pulse industry based on the extent of value chain improvements required to access these opportunities and distribution of value along the value chain, prioritising the return to smallholder farmers?
2. Which stakeholders in the value chain are best positioned to drive the changes required to access top market opportunities?
3. Who in the chain contributes to these improvement challenges?
4. What changes are required to the enabling environment to facilitate value chain improvements and which stakeholders/players are best positioned to drive these changes?

1. World Bank Group (2020)
2. Analysis from World Bank data
3. FAO

The scope of work for this follow-on project, AGB/2019/154, includes identification of potential trade partners, understanding which pulse types or pulse alternatives are in demand (current and future), identifying value-add opportunities for pulses and understanding willingness to pay for different pulse characteristics. The value chain analysis identifies areas which require investment to better access existing and new market opportunities, and to maximise the benefits returned to smallholder farmers.

Refer Appendix 10.1 for specific project objectives and Appendix 10.2 for data challenges affecting the analysis.

The two-fold impact of COVID-19 and the military coup has affected project activities and delivery on objectives, as further described on page 8. With no sign of either crises waning, the impact on the business environment is expected to reverberate for years to come.

Key findings

- The pulses sector is a growth market, gaining increasing popularity due to a shift towards plant-based diets by developed nations, and population growth in countries where pulses are a staple food item. Green gram and chickpea are particularly suitable as plant-based protein ingredients.
- For Myanmar value chains, constraints are concentrated at the production and export ends, influencing the overall value chain structure.
- The regulatory environment is constraining the export end of the pulse value chain, with certifications such as MyanmarGAP and phytosanitary not recognised or trusted in the global market, and onerous export compliance requirements.
- The production end of the value chain is hampered by:
  - Increased competition for labour driving up costs of production.
  - Lack of mechanisation during the land preparation process resulting in high seeding rates.
  - Lack of access to improved seed varieties impacting yields, climate adaptivity and pest resistance.
  - Weak information flows connecting farmers to market forecasts and end-market demand requirements.
  - Barriers to farmer aggregation impeding smallholder farmers from achieving scale efficiencies and access to finance.
- Agricultural value chain finance is an impediment across the full value chain.

Infrastructure development such as the Belt and Road Initiative and Greater Mekong Subregion Initiative, and preferential trade agreements such as the Regional Comprehensive Economic Partnership will contribute towards an improved business environment for Myanmar. However, broader factors such as the military coup, COVID-19 pandemic, climate change and urbanisation are posed to greatly hinder Myanmar's progress.

Recommendations

Recommendations have been prioritised in order of effectiveness (most to least):

1. **Value chain skills development training** for all stages of the value chain.

2. **Improve the quantity and quality of labour supply** by encouraging famers to pool resources to secure labour and transforming the perception of agriculture by establishing career paths.

3. **Enhance information flows** to connect value chain members, particularly smallholder farmers, to market forecasts and end-market demand requirements.

4. **Improve access to finance**, linking to findings from ACIAR project AGB/2016/163 Inclusive Agricultural Value Chain Financing, and encourage investments in mechanisation.

5. **Improve the regulatory environment** by continuing to redesign the export process and enable farmer aggregation.

6. **Invest in pulse variety research**, ensuring research is commercialised.

7. **Benchmark MyanmarGAP against GLOBALG.A.P.** and develop a roadmap for bridging the gap.

3 Introduction

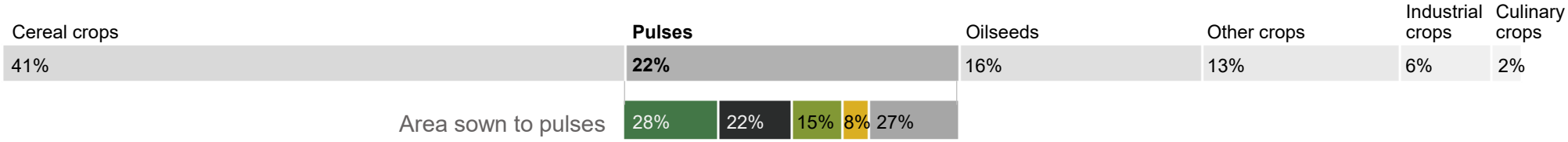
Pulses are a common feature of smallholder cropping systems in Myanmar and provide multiple benefits – as a short-season cash crop, improving the quality of soil by fixing nitrogen, while also being a nutrient dense source of food. Yet Myanmar's pulse sector has been constrained by trade conditions that hamper the country's competitiveness in the global market and limit Myanmar to the low-value bulk commodity segment. This has influenced the structure of Myanmar's pulse value chains, which are focused on sourcing high volumes of pulses at the expense of quality. Furthermore, on-farm production challenges have a compounding effect on Myanmar's position in the global pulse market, such as the extensive use of recycled seed.

Despite the multiple government strategies underway that are relevant to the pulse sector, agriculture is heavily underfunded and capability to execute on these strategies has been limited.

Government strategies and legislative reform to encourage development of the pulse sector, particularly by the private sector, include:

- Pulse Sector Development Strategy, 2017
- Agriculture Development Strategy and Investment Plan, 2018-19 to 2022-23
- Roadmap for Myanmar's Seed Sector, 2017-20
- National Export Strategy, 2020-25
- Myanmar Investment Law (2016)
- Myanmar Companies Law (2017)
- Myanmar Sustainable Development Plan, 2018-30

Sown area of major crops, 2018-19



Myanmar's 'Big Four' pulses: **Green gram** **Black gram** **Pigeon pea** **Chickpea** All other pulses (soybean 3%, sultapya 2%, butter bean 1%, garden pea 1%, other pulses 20%)

Analysis from Ministry of Agriculture, Livestock and Irrigation data

3.1 Methodology

The approach to this project was a blend of value chain member and other key stakeholder interviews, qualitative and quantitative desk research, complemented by on-the-ground insights from in-country project partners, Thura Swiss and Dr Theingi Myint. Further methodology details are as follows:

- Interviews with value chain members and key pulse sector stakeholders to understand constraints and opportunities.
- Desk research of reports and analysis with respect to macro-level trends, pulse market trends and Myanmar country strategies.
- Quantitative trade analysis for the Big Four pulses using available international trade databases.
- Institutional analysis to assess Myanmar's enabling environment for change and therefore determine Myanmar's readiness for change.

Unfortunately, COVID-19 and the military coup had a significant impact on project delivery, particularly with respect to stakeholder engagement and the likelihood of private sector co-investment in pulse value chain improvements, which has resulted in the project being descoped as noted.

Impact of COVID-19 and the military coup

Activities that could not be fully completed:

- Engagement with value chain members and government, particularly with respect to assessing the feasibility of potential value chain improvements identified and gauging interest in driving the changes required.
- Institutional analysis to assess Myanmar's enabling environment for change accounted for the current political uncertainty.

Activities that could not be delivered:

- Developing a framework for how the next phase of work could be structured to drive change across the value chain, including the scope of work and ecosystem of stakeholders required.
- Convening an in-country forum with key pulses sector stakeholders and influencers across all sections of the value chain, as well as institutional stakeholders such as government, research and development, financial services, and NGOs, to galvanise support and buy-in for the work ahead.

Stakeholder interviews

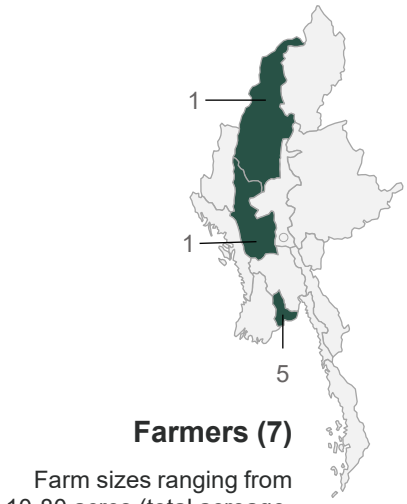
Stakeholder interviews covered eleven distinct and diverse value chains (refer Appendix 10.3 for value chain details). Stakeholders adjunct to these value chains have also been interviewed – for example, input providers and industry body, the Myanmar Pulses, Beans and Sesame Seed Merchants Association. Findings from the 40 interviews completed informed the topics and depth of the macro trend analysis.

The decision was made to focus on downstream value chain members first, taking a 'snowball' approach to value chain member interviews (asking each member interviewed for details of their suppliers) while also working around COVID-19-related travel restrictions, given downstream members were generally more comfortable with video/phone interviews.

However, given the deteriorating situation in Myanmar the project team was unable to complete the quantity and diversity of farmer interviews desired. Secondary research was used to supplement the interviews conducted for this project, which primarily impacted data collection of farmgate pricing and cashflow.

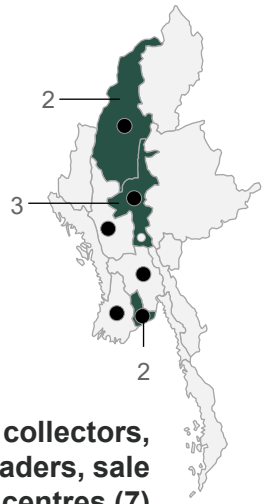
Number of interviews and geographic coverage

■ Value chain member location



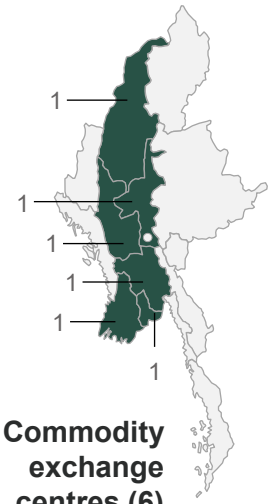
Farmers (7)

Farm sizes ranging from 10-80 acres (total acreage, not single block)

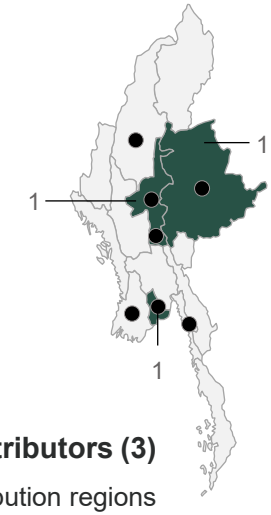


Village collectors, local traders, sale centres (7)

● Sourcing regions

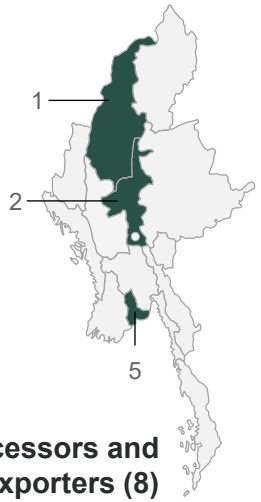


Commodity exchange centres (6)



Local distributors (3)

● Distribution regions



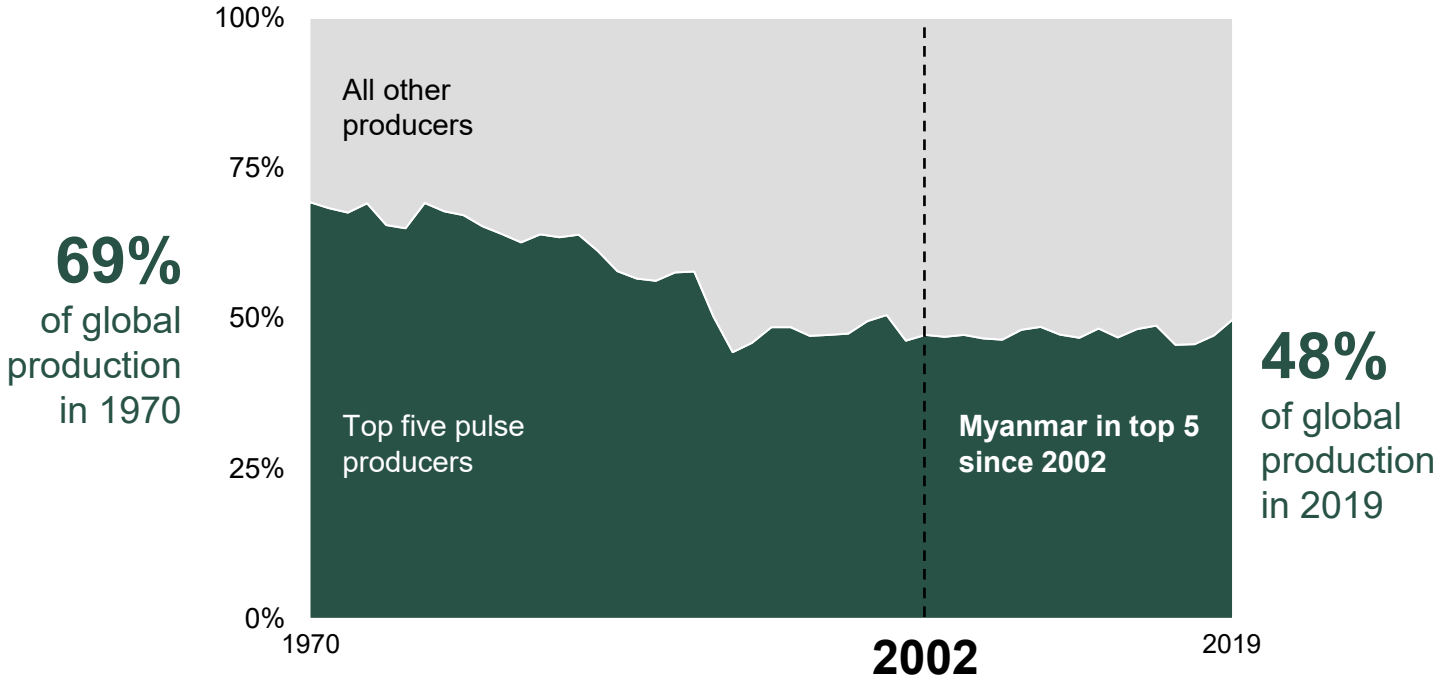
Processors and exporters (8)

4	Service providers (seed, mechanisation, finance)
1	Industry association
1	NGO
1	Australian pulse exporter
2	Pulse importers

3.2 History of pulse production

Over the past sixty years, global pulse production volumes have been heavily concentrated amongst the top five pulse producers in any given year, with Myanmar joining the ranks of the top five in 2002 despite a challenging political and economic environment (refer Section 3.4 for details).

Global pulse production volume



Analysis from FAOSTAT data

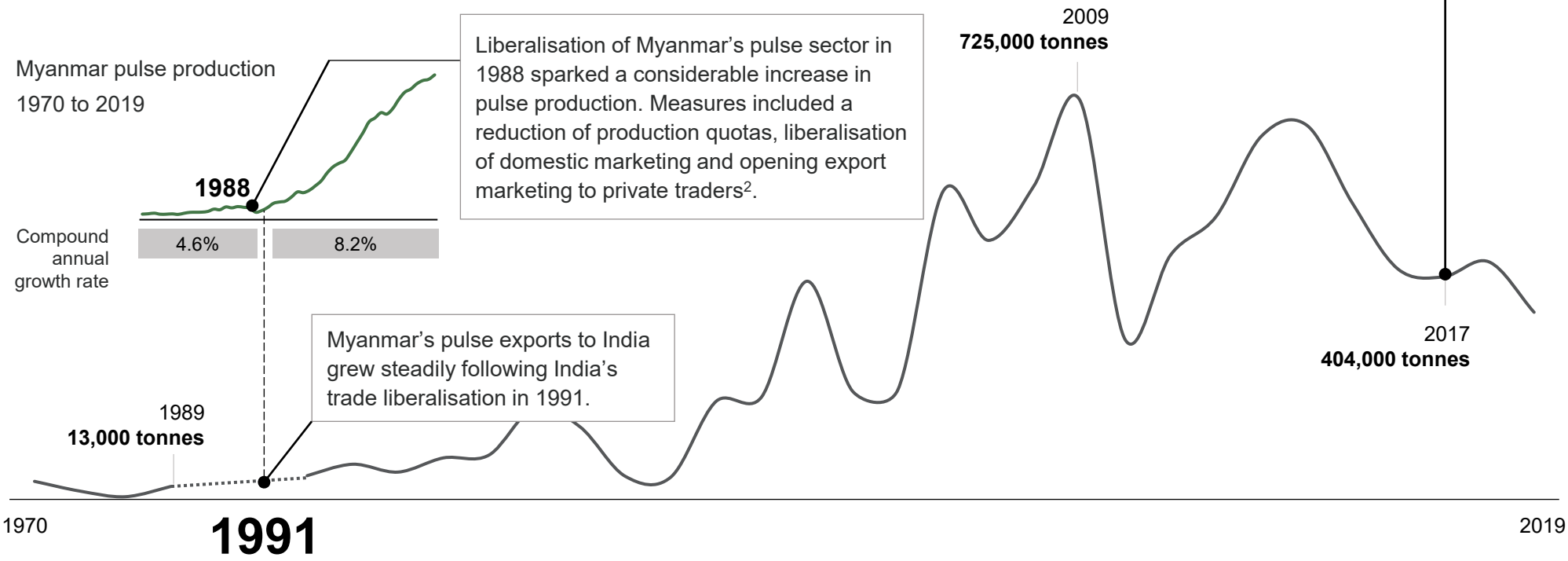
The rapid growth of Myanmar's pulse production volumes can be attributed to liberalisation of the country's pulse sector from 1988, as the country transitioned from a socialist to market economy.

Myanmar's economic transition coincided with India's trade liberalisation in 1991, creating a timely opportunity for Myanmar to become a major pulse trade partner. However, this has created an overreliance on India, with approximately 80 to 90 per cent of pigeon pea and 70 to 80 per cent of black gram production exported to India[1].

India announced substantial restrictions on pulse imports in 2017 to protect domestic production. This unprecedented move highlighted the overdependence of Myanmar's pulse sector on India trade.

Peaks and troughs in previous years were similarly tied to India's domestic environment.

India pulse imports from Myanmar by volume



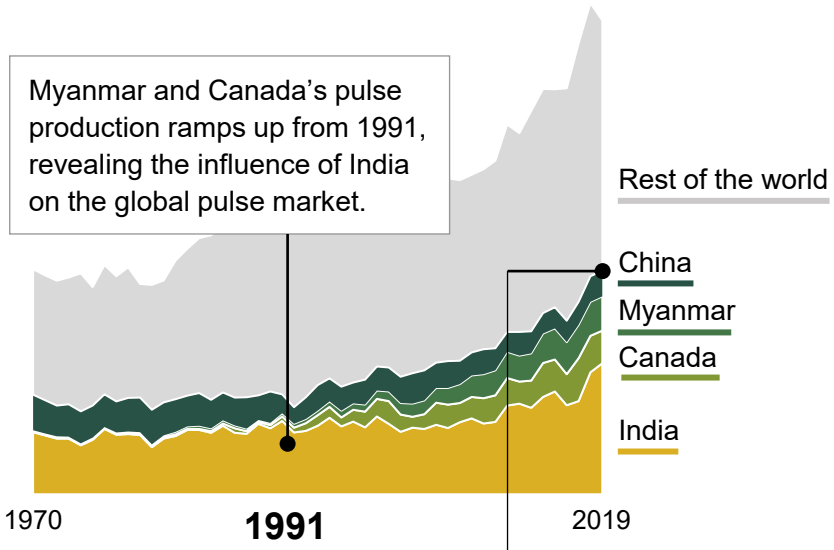
1. Global Agricultural Information Network (2020)
2. Boughton, D. et al. (2015)

Analysis from FAOSTAT data
No data available for the period 1990 to 1991

3.3 Current context

The past two decades have seen global pulse production dominated by India, Canada, Myanmar and China.

Global pulse production by volume



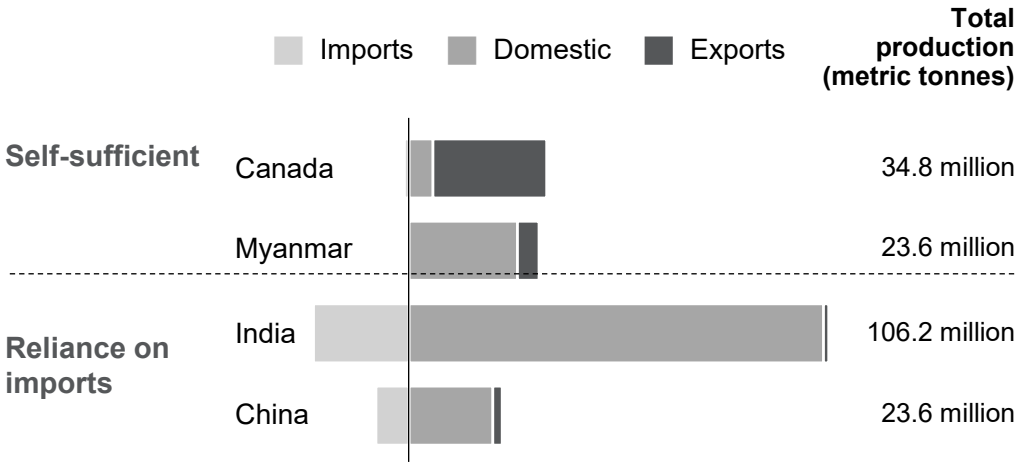
Analysis from FAOSTAT data

Of these four countries, Canada and Myanmar are effectively self-sufficient with minimal pulse imports required to meet domestic demand. While Canada's pulse industry is export driven, with 83 per cent of total production exported over the five-year period 2015 to 2019, 84 per cent of Myanmar's pulse production in the same period was directed to the domestic market.

In contrast, India and China's pulse production is driven by domestic consumption, with further imports required to meet domestic demand. Both countries are actively working towards food self-sufficiency.

Self-sufficiency versus a reliance on imports

All pulses, 2015 to 2019



Analysis from FAOSTAT data

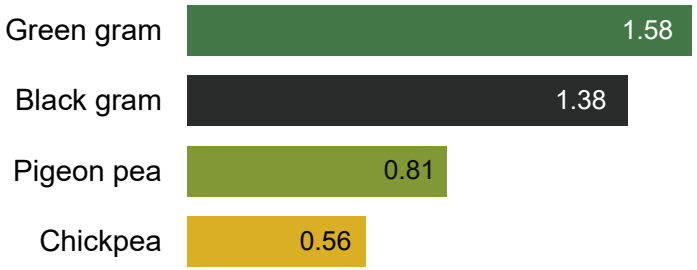
Myanmar's pulse production is concentrated on four pulses – green gram, black gram, chickpea and pigeon pea (the 'Big Four').

Chickpea production has grown exponentially over the past decade, increasing four-fold during the period 2000 to 2019[1]. Production is driven by Myanmar's domestic market and has benefited from improved seed varieties through programs such as those between ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) and Myanmar's Department of Agriculture.

Myanmar farmers are gradually shifting away from pigeon pea and black gram production given declining and volatile prices, with both pulses reliant on the Indian export market.

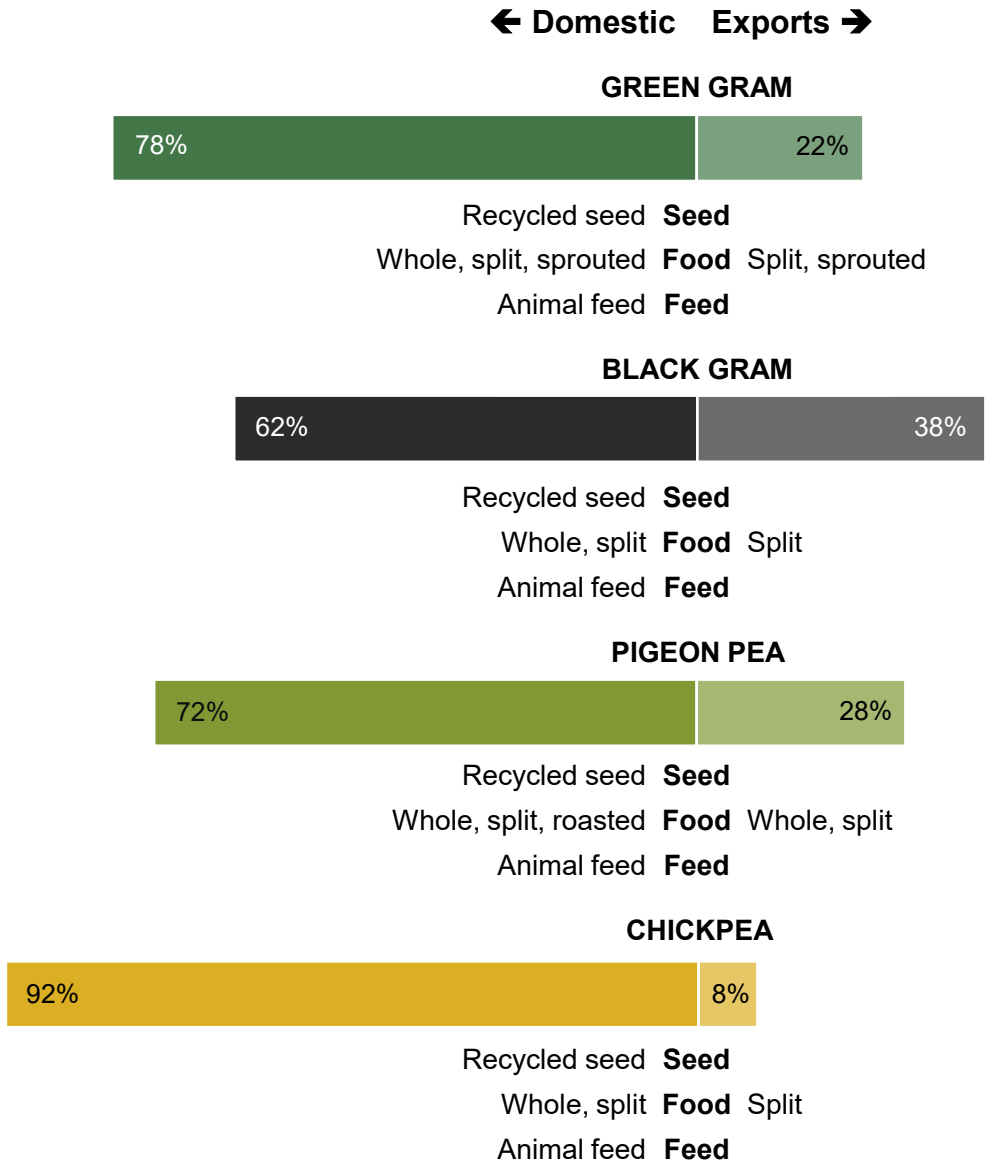
Total production, 2017-18

million metric tonnes



Analysis from Ministry of Commerce and Ministry of Agriculture, Livestock and Irrigation

Domestic and export market volumes (2017-18) and products



1. Analysis from FAOSTAT data

Globally, India and Myanmar are both top producers of the Big Four pulses, despite relatively poor yields in India.

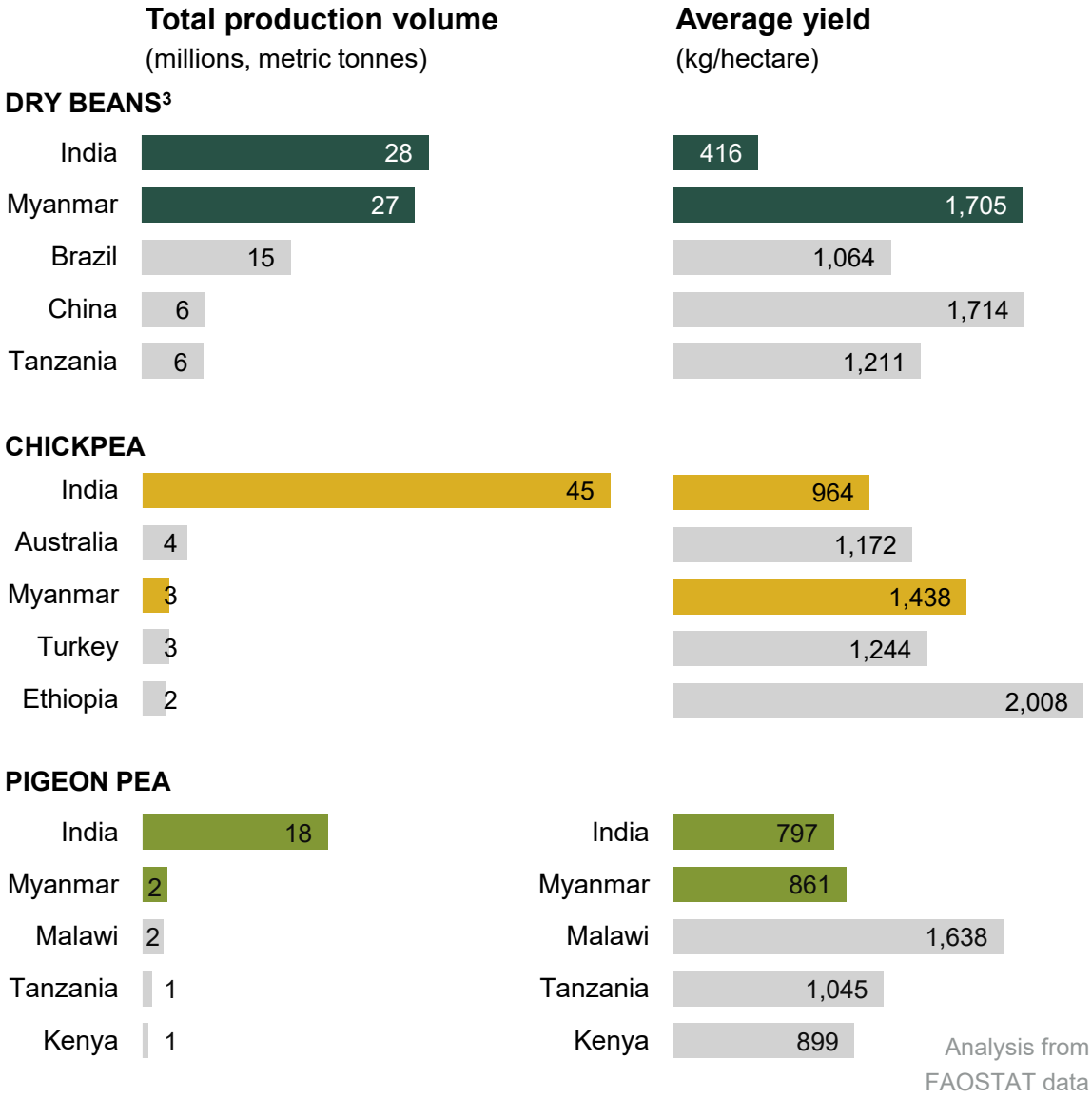
India's pulse production struggles to keep pace with increasing demand from a rapidly growing population – predicted to grow 18 per cent by 2050[1]. The country has been actively encouraging East African countries Tanzania, Ethiopia, Mozambique, Uganda and Malawi to increase pulse production to supplement India's local production, under the International Trade Centre's 'Supporting Indian Trade and Investment for Africa' (SITA) program, representing an emerging source of competition for Myanmar.

Examples of support under the SITA program includes guaranteed import volumes, providing agricultural extension services and cooperating in the areas of research and production of seeds[2].

1. United Nations World Population Prospects (2019)
2. IANS (2016)
3. Aggregated category that includes black gram, green gram, common bean, lima bean, scarlet runner, tepary bean, adzuki bean, rice bean and moth bean.

Top five producers of the Big Four pulses

2015-19

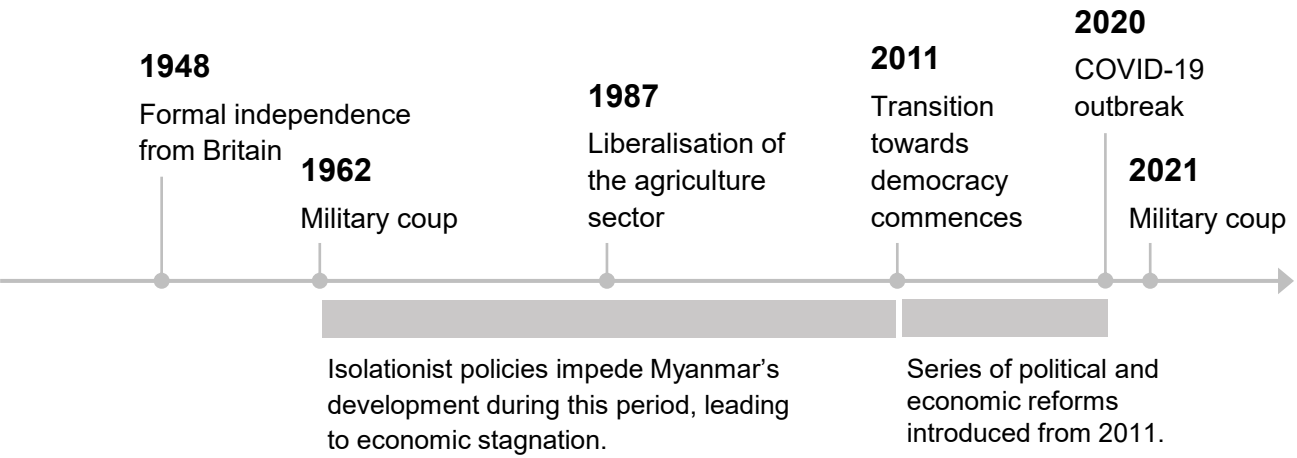


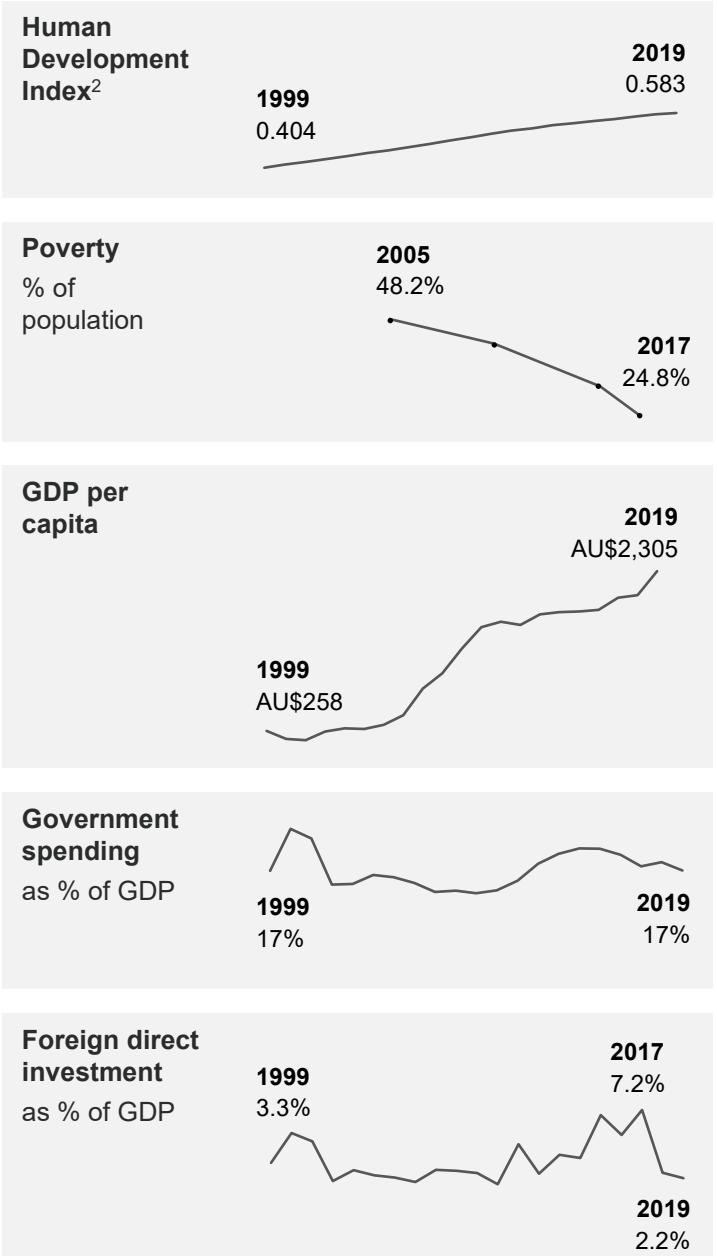
Analysis from FAOSTAT data

3.4 Institutional analysis

Myanmar's political instability has hindered economic growth and government capability, while also influencing the country's sociocultural dynamic.

Development indicators have steadily improved over the past few decades, with Myanmar positioned to graduate from United Nations' least developed country status in 2021 after reaching graduation thresholds in 2018. However, government spending has hovered around 17 per cent of GDP compared to a global average of 26 per cent between the period 1999 to 2019, and despite measures to encourage foreign direct investment, such as a relaxation of investment requirements, Myanmar's weak governance and business environment remain a concern for foreign investors[1].





Analysis from FAOSTAT, World Bank, Country Economy and UNDP data

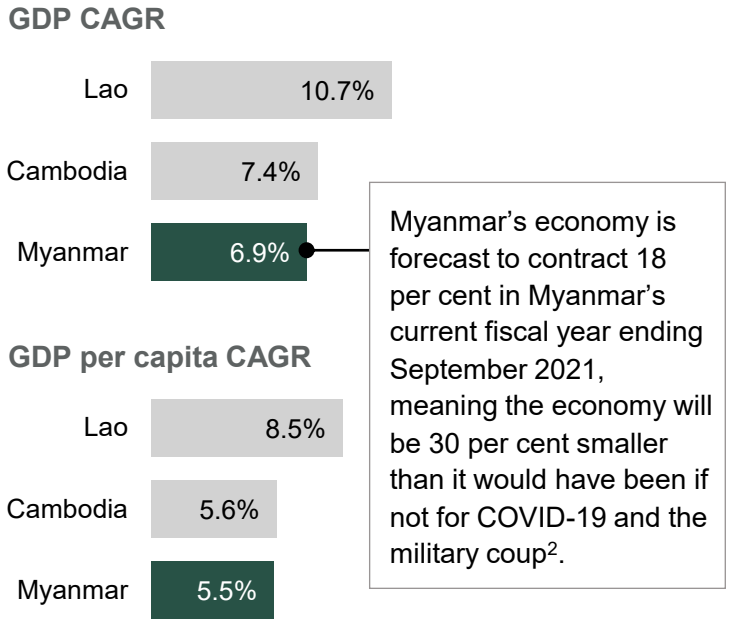
1. Worldwide Governance Indicators
2. Composite index measuring average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living.

Myanmar's advantageous geographic position and agro-ecological conditions are conducive to a flourishing agriculture sector; however, economic growth has been the slowest amongst comparable countries. A contributing factor is low government expenditure on agriculture compared to the rest of South-East Asia.

Although economic governance has improved over the past few years, the 2021 military coup is anticipated to revert the country to its 2005 development position, with the **poverty rate potentially doubling by the start of 2022**[1].

Economic growth, 1970 to 2019

Least developed countries, South-East Asia

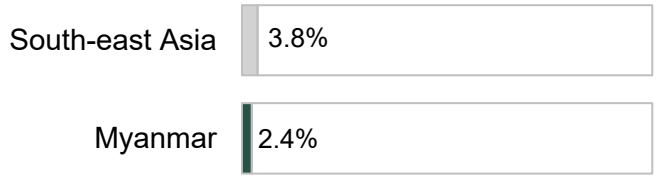


Myanmar's economy is forecast to contract 18 per cent in Myanmar's current fiscal year ending September 2021, meaning the economy will be 30 per cent smaller than it would have been if not for COVID-19 and the military coup[2].

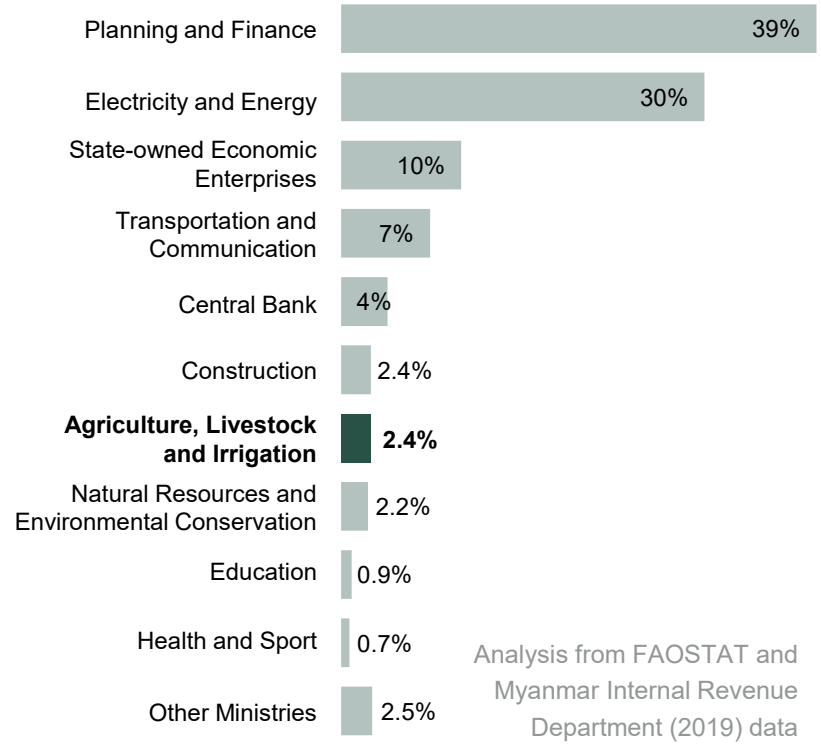
Analysis from FAOSTAT data

Agriculture as a percentage of government expenditure

2019-20



Myanmar 2019-20 budget breakdown



Analysis from FAOSTAT and Myanmar Internal Revenue Department (2019) data

1. United Nations Development Programme (2021)
2. World Bank Group (2021)

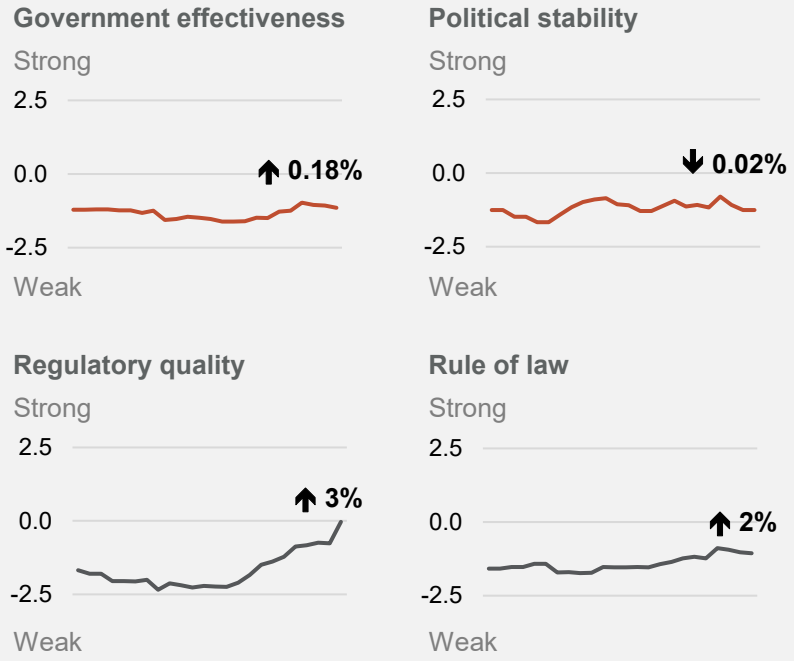
Despite some improvements to Myanmar's business and governance environment since the transition to democracy from 2011, government effectiveness and political stability have seen minimal change.

Five key areas impacted by the institutional environment are as follows (explored in further detail later in this report):

1. **Trade –** Certification that is not recognised in the global market and onerous export compliance requirements.
2. **Seed –** Lack of improved seed varieties held by government and regulatory changes required to approve seed varieties that meet the demands of high-quality markets.
3. **Farmer associations –** Disincentives to becoming a registered cooperative as the state becomes a part owner and cooperatives are subject to onerous compliance requirements.
4. **Land aggregation –** Aggregation of land to achieve the benefits of scale is hindered by unclear land ownership rights.
5. **Finance –** Heavily regulated sector disincentivises agricultural finance.

Furthermore, Myanmar's political history has led to distrust in formal institutions, reflected in the country's Fragile State and Corruption Perception indices.

Worldwide Governance Index, 1996 to 2019



Analysis from Worldwide Governance Index data

Fragile State Index: Factionalised elites, 2020[1]

highly factionalised

Analysis from Fragile State Index

Corruption Perception Index, 2019[2]

no corruption

Analysis from Transparency International

1. Considers the fragmentation of state institutions along ethnic, class, clan, racial or religious lines, as well as brinksmanship and gridlock between ruling elites.
2. Perceptions of public sector corruption, i.e., administrative and political corruption.

4 Myanmar pulse value chains overview

Pulses production is widespread across Myanmar, with 33 per cent of arable land sown to the Big Four pulses in 2018 – equivalent to 6 per cent of Myanmar's total land area[1].

Bago, Sagaing and Ayeyawady are the main producers of the Big Four pulses, contributing 72 per cent of total production in 2018 to 2019. These three regions benefit from being close to Myanmar's export hubs, Yangon and Mandalay.

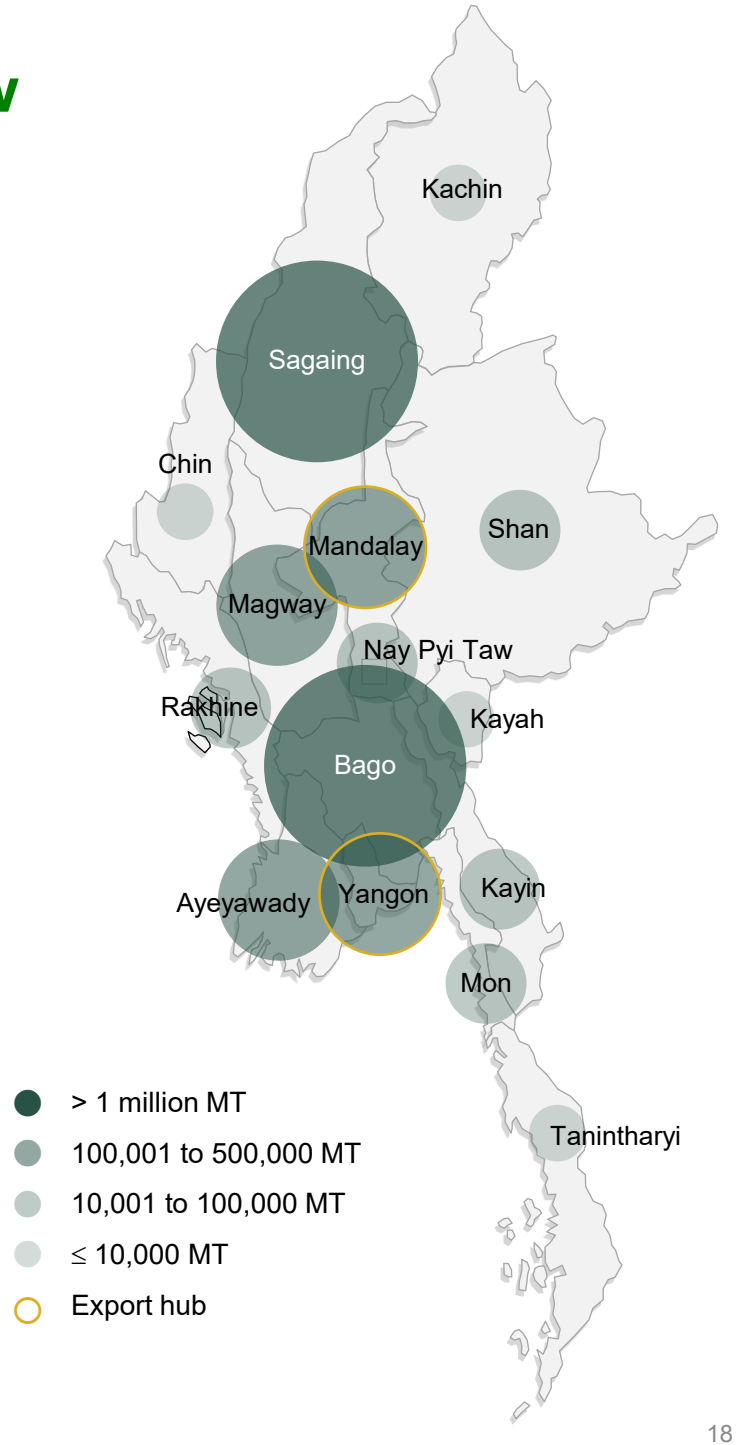
Exports from Mandalay Commodity Exchange are primarily destined for China through border trade, whereas Yangon services India and the rest of the export market.

Total production volume of the Big Four pulses

For the period 2018-19

Region	Production (metric tonnes)
Bago	1,159,235
Sagaing	1,014,202
Ayeyawady	656,844
Mandalay	353,765
Magway	345,383
Yangon	188,707
Nay Pyi Taw	65,197
Kayin	41,493
Shan	40,440
Mon	22,524
Rakhine	11,658
Kayah	5,672
Kachin	952
Chin	701
Tanintharyi	135

Analysis from Ministry of Agriculture, Livestock and Irrigation data



1. Analysis from FAOSTAT data

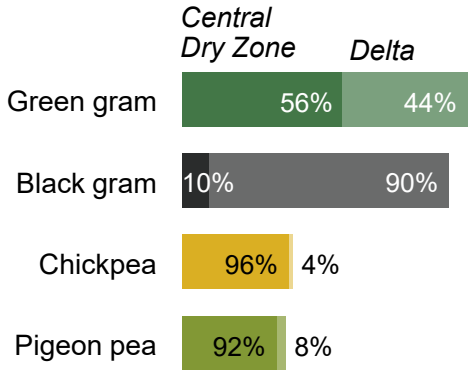
Green gram has the greatest spread of production regions, reflecting the suitability and diversity of varieties for different agro-ecological conditions, and relatively stable prices.

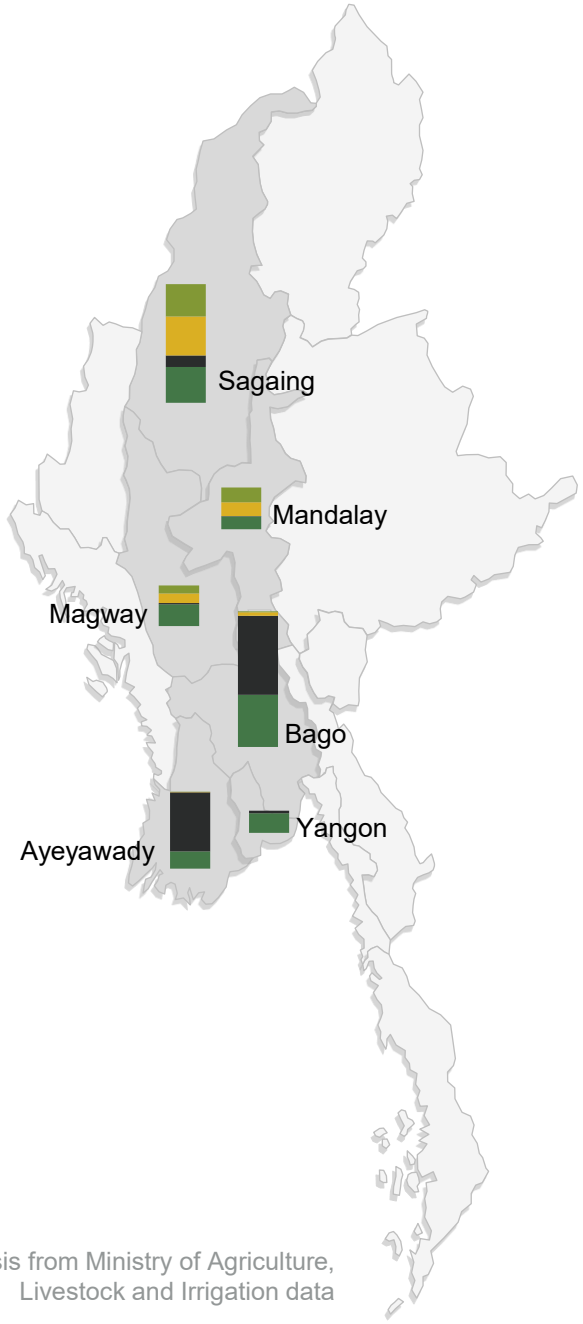
The Yangon township of Khayan-Thongwa is well-known for producing superior quality green gram.

Chickpea and pigeon pea production is concentrated in the Central Dry Zone and black gram in the Delta.

Top production regions

By volume for the period 2018-19

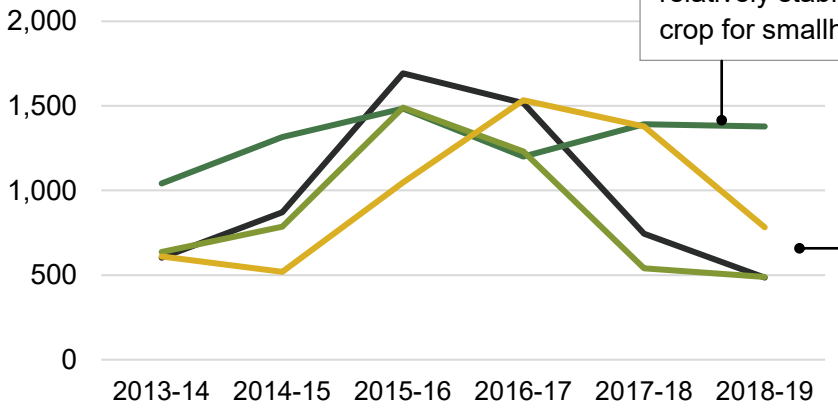




Analysis from Ministry of Agriculture, Livestock and Irrigation data

Domestic pulse prices

AU$ per metric tonne



The price of green gram has been relatively stable, making it an attractive crop for smallholder farmers.

Chickpea, black gram and pigeon pea prices varied 200-250 per cent over the five-year period. Chickpea and pigeon pea production has fallen over the past few years due to a lack of demand.

Analysis from Ministry of Commerce data

Growth in production volumes across the four pulse types has been driven by an increase in total area harvested, with minimal improvements in yields.

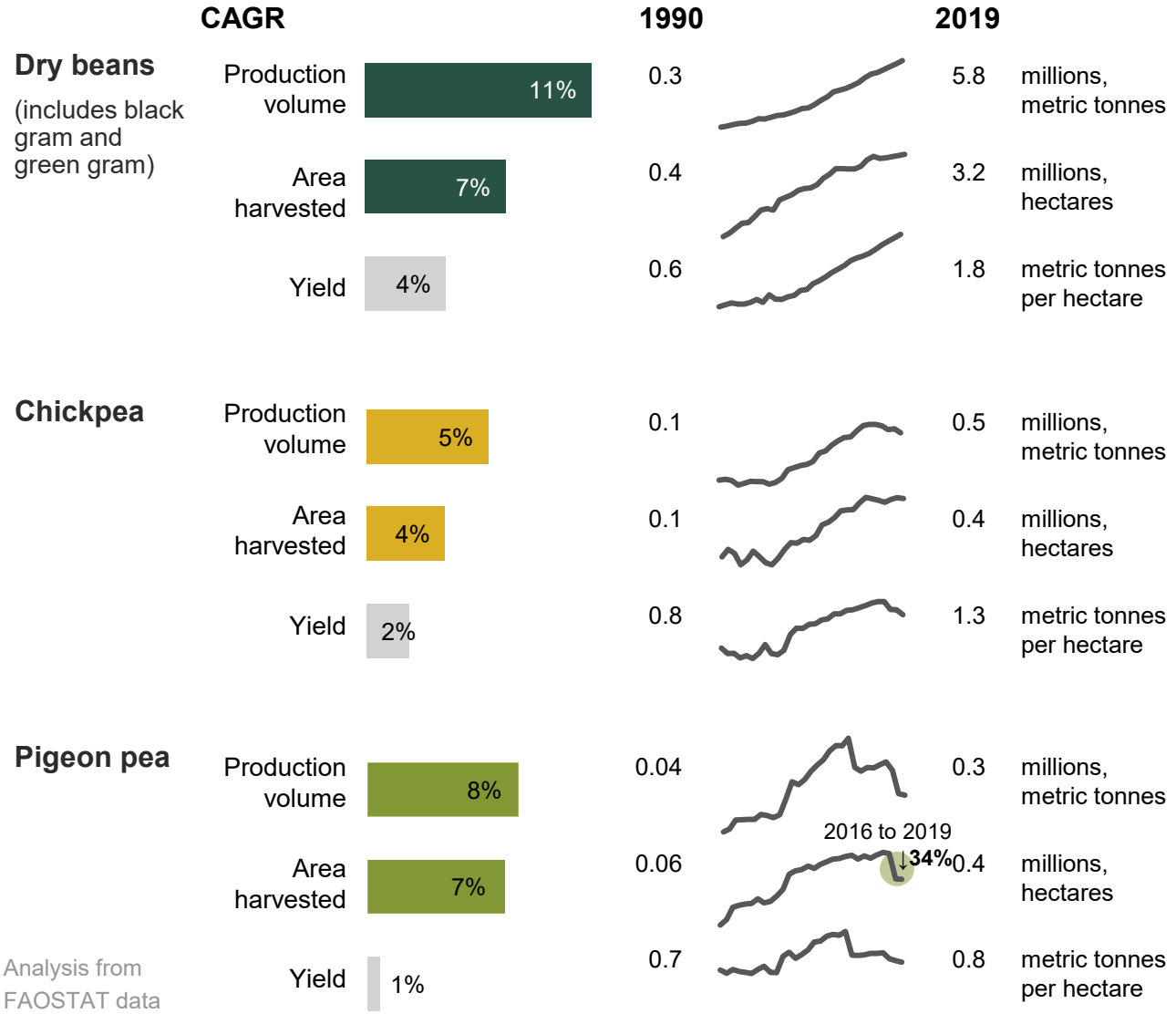
Yield improvements have been hampered by the almost exclusive use of recycled seed by pulse farmers (explored further on page 42).

The use of area sown/harvested to different crop types is a primary mechanism used by farmers to respond to market dynamics. For example, black gram and pigeon pea experienced notable reductions in area harvested in 2017, in response to India's restrictions on pulse imports that year.

In another example in Kyauktaga Township (Bago region), area sown to black gram reduced by 15 per cent from Winter 2016 to Winter 2017 – before and after the Indian import suspension. In comparison, area sown to green gram increased by 90 per cent[1].

Production of the Big Four pulses

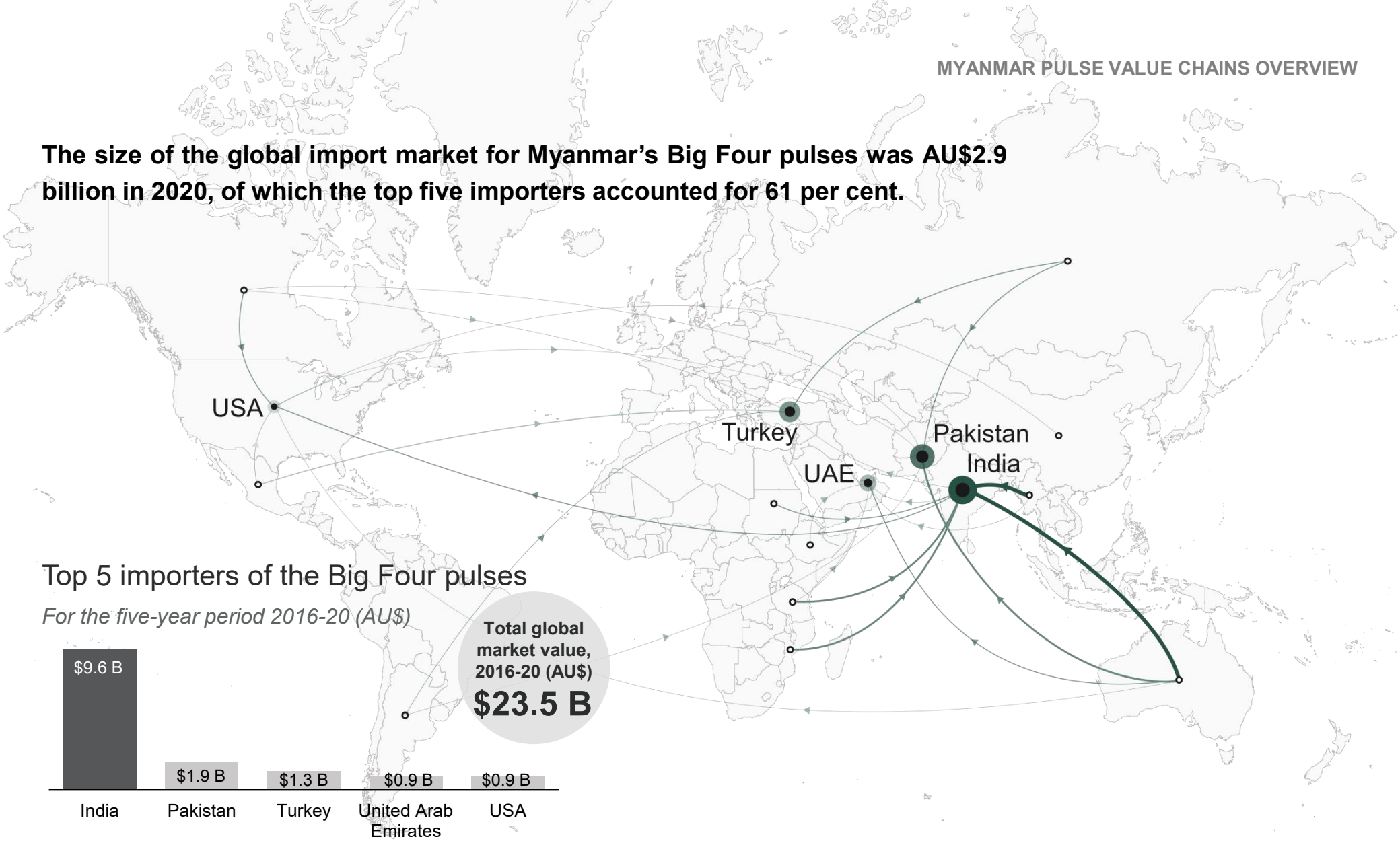
For the period 1990 to 2019



Analysis from FAOSTAT data

1. Wai, P. P. et al. (2019)

The size of the global import market for Myanmar's Big Four pulses was AU$2.9 billion in 2020, of which the top five importers accounted for 61 per cent.



Top 5 importers of the Big Four pulses

For the five-year period 2016-20 (AU$)

Total global market value, 2016-20 (AU$)
$23.5 B

Myanmar	Australia	Mexico	Australia	India
Australia	Russia	Russia	Tanzania	Canada
Tanzania	USA	Argentina	India	China
Mozambique	Canada	India	Myanmar	Mexico
Sudan	Argentina	Canada	Ethiopia	Australia

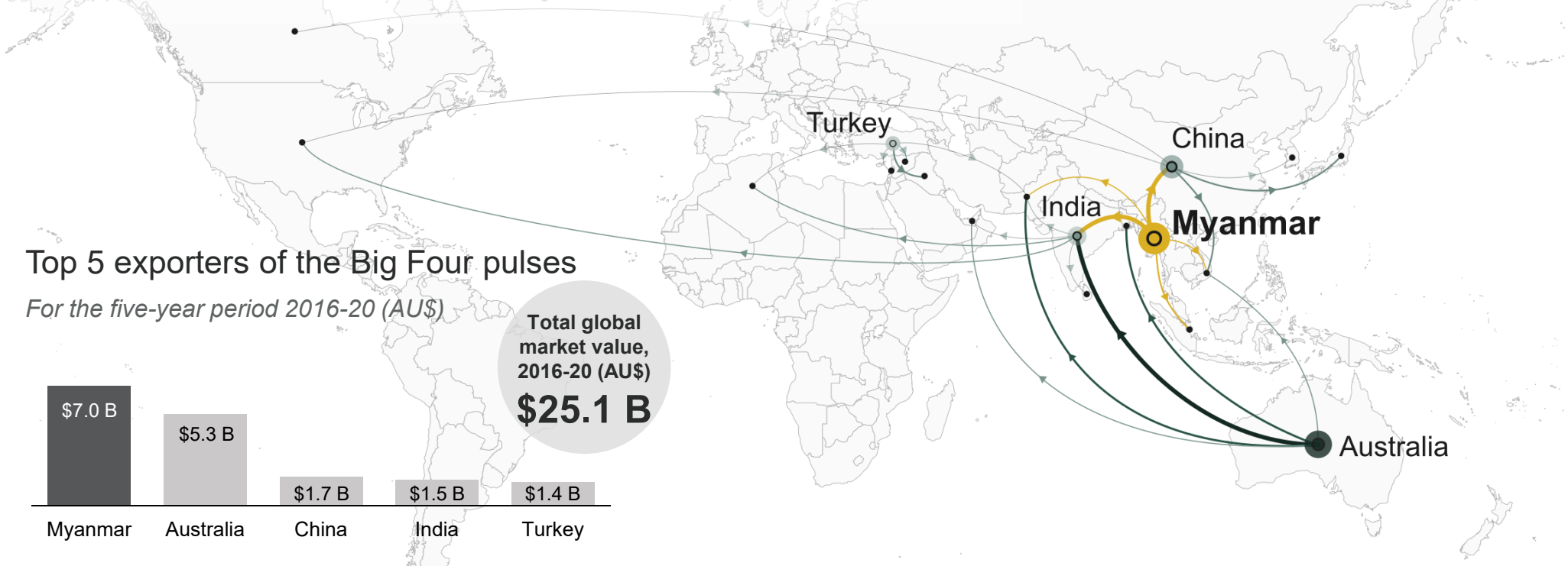
Top 5 sources

- > AU$1 billion
- AU$250 million-1 billion
- AU$100-250 million
- < AU$100 million

Analysis from UN Comtrade data

The size of the global export market for Myanmar's Big Four pulses was AU$4 billion in 2020, of which Myanmar contributed 41 per cent by trade value as top exporter.

Myanmar's exports are skewed towards countries in the surrounding region, with 66 per cent of pulses by trade value exported to India and China over the five-year period to 2020.



Top 5 exporters of the Big Four pulses

For the five-year period 2016-20 (AU$)

Total global market value, 2016-20 (AU$)
$25.1 B

India	India	Japan	Algeria	Iraq
China	Pakistan	Vietnam	USA	Syria
Singapore	Bangladesh	USA	UAE	Pakistan
Pakistan	UAE	South Korea	Sri Lanka	Lebanon
Indonesia	Vietnam	Canada	Pakistan	Algeria

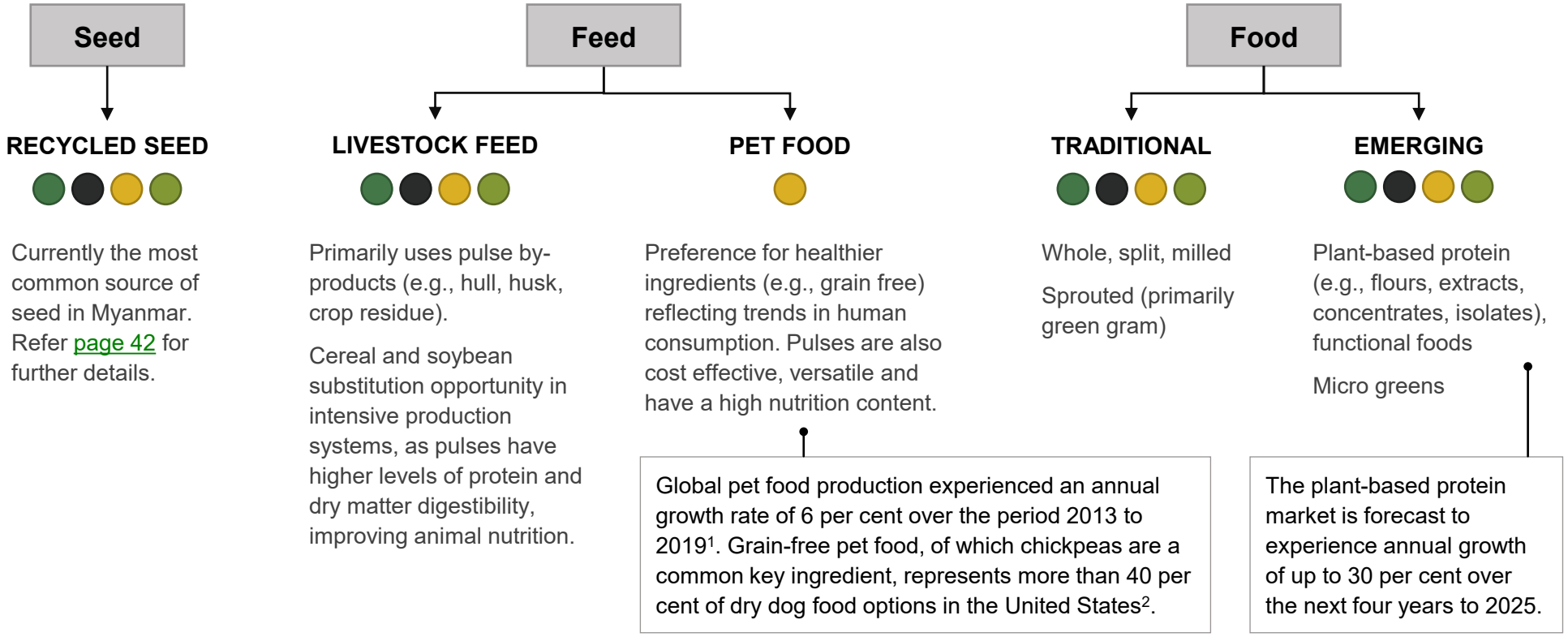
Top 5 destinations

- > AU$1 billion
- AU$500 million-1 billion
- AU$250-500 million
- AU$100-250 million
- < AU$100 million

Analysis from UN Comtrade data

5 Consumer research

Pulses are versatile crops that can be used for seed, animal feed and food, highlighting the potential for Myanmar to access a broader diversity of markets. Pulses also play a key role in sustainable agricultural systems, appealing to the growing environmentally-conscious consumer segment.



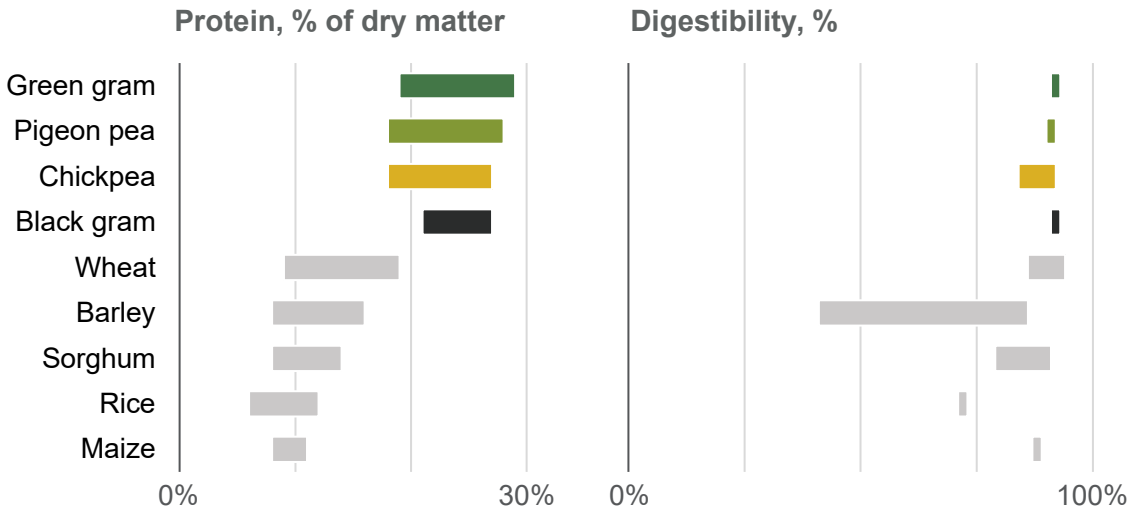
1. Pulse Australia & Grain Research and Development Corporation (2019)
2. Banton, S. et al. (2021)

Despite the growing popularity of plant-based diets in high-income countries, animal proteins will continue to feature in diets – increasingly so in low- and middle-income countries as they experience economic growth and urbanisation in line with the different stages of 'nutrition transition'[1].

Animal feed represents an opportunity to improve the sustainability of production systems without competing as a source of human food. By-products from pulse processing can be used in animal feed formulations while crop residue left after harvesting can be used as a source of dry fodder, minimising waste in the production process.

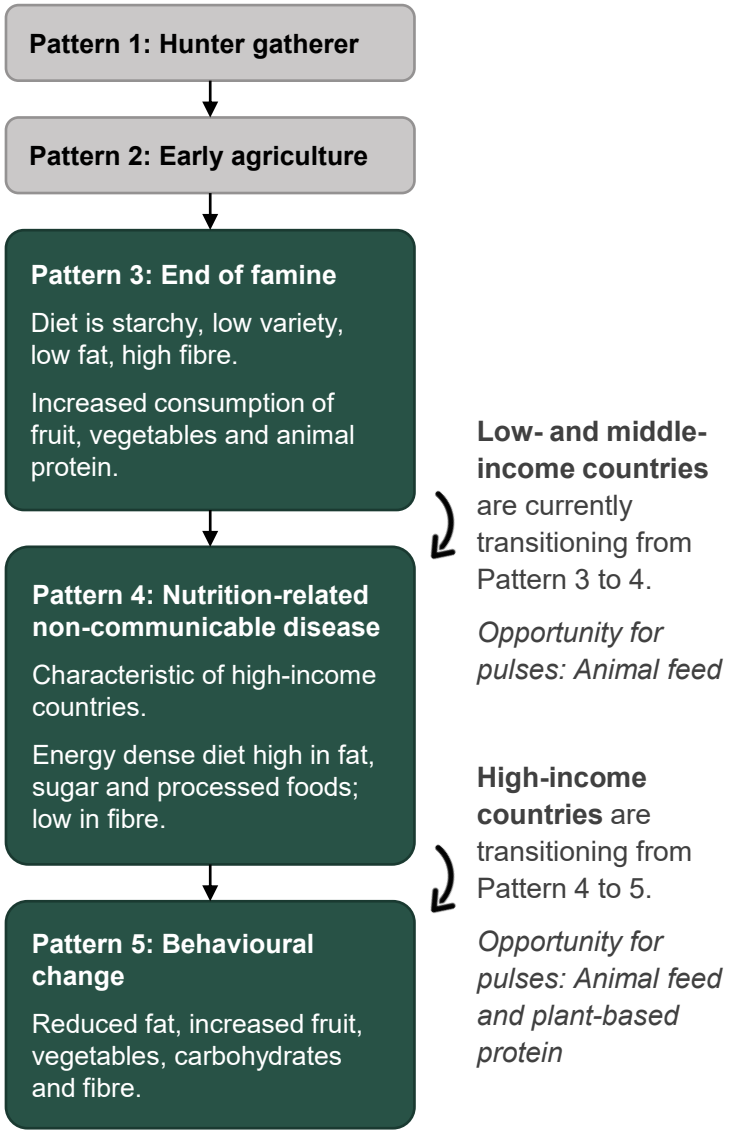
Animal protein sources

Pulses outperform cereal sources across both protein and digestibility



Analysis from Sherasia, P.L. et al. (2017)

Nutrition transition framework



1. Popkin, B. M. (2002)

Current food consumption of the Big Four pulses can be split into two broad categories – high value and non-quality discerning, reflecting the income levels of countries. Consumer preferences for certain quality attributes are primarily based on end use.

High value

Includes the EU, China, US and Japan.

Per capita consumption is low; however, end products such as sprouted green gram require higher quality pulses, valuing colour, purity and size.

The EU's Farm-to-Fork Strategy was released in 2020 and aims to improve the sustainability of the region's food systems, contributing towards the European Green Deal, which has the overarching goal of making Europe the first climate-neutral continent by 2050. The Farm-to-Fork Strategy is focused on increasing the availability of alternative protein sources, of which increased pulse consumption is expected to play a part.

Myanmar

Of the Big Four pulses chickpea is the dominant pulse type consumed domestically, with pigeon pea to a lesser extent. Split chickpeas are the most popular pulse product sold in Myanmar's largest supermarket chain[2].

Despite the popularity of green gram within the Asian region it is seen as a 'poor person's' food in Myanmar[2]. Projects are underway to improve the appeal of green gram to the domestic consumer, exploring the use of flours in baked goods, for example[2].

Non-quality discerning

Dominated by India, which represented 49 per cent of global consumption of the Big Four pulses in 2018[1]. Other countries include Brazil, Mexico, Tanzania, Kenya and Ethiopia.

In this market segment pulses are generally used in processed form (e.g., to make dahl), therefore market demand is primarily driven by price. Chickpea is the main exception among the Big Four pulses given that it is consumed whole; the preference is for larger, yellow or whitish-yellow varieties.

1. Analysis from FAOSTAT data
2. Based on stakeholder interviews

5.1 Impact of plant-based diets

Plant-based diets are becoming increasingly popular as consumers become more conscious of the impact of food production and dietary preferences on social, economic and environmental sustainability.

In a 2020 study of 31,000 people across 26 countries, approximately one-third of respondents followed a diet that either minimised or eliminated animal protein[1]. Pulses play a key role in the shift away from animal protein given their nutritional and health benefits (e.g., lowering blood cholesterol, improving digestion, reducing blood glucose) and contribution towards sustainable agricultural systems through their nitrogen-fixing properties. The EAT-Lancet diet, which focuses on a reference diet that 'meets nutritional requirements within planetary boundaries' (i.e., sustainable from a production and consumption perspective), recommends pulses contribute 11 per cent of a healthy diet (kcal per day), more than double the current average intake[2].

The plant-based protein market is forecast to reach AU$24.3 billion by 2026. COVID-19 is expected to accelerate growth, with increasing fears of animal-borne diseases and a recognition that food systems and supply chains need to become more resilient.

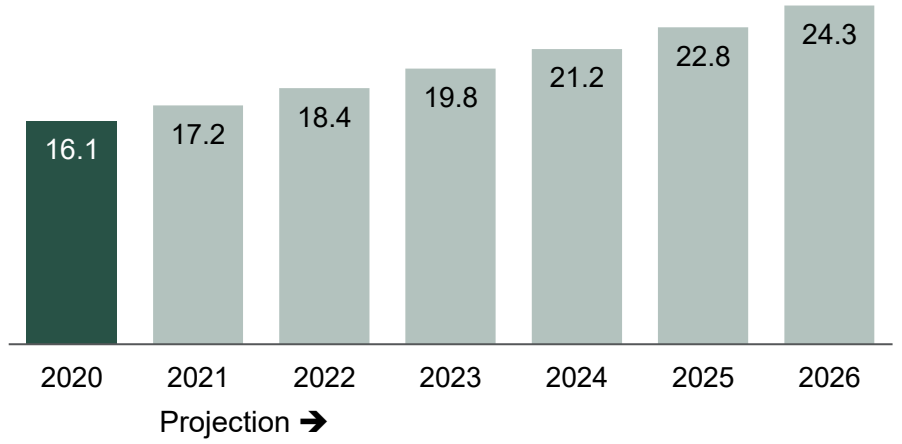
Global consumer preferences

3% Vegan
11% Vegetarian
20% Flexitarian

Analysis from Vegconomist (2020)

Plant-based protein market

Projected annual growth of 6% per annum (AU$ billion)



Analysis from MarketsandMarkets (2021)

1. Vegconomist (2020)
2. EAT-Lancet Commission (2019)

All four of the Big Four pulses can be used as sources of plant-based protein, although chickpea and green gram have the most potential given their characteristics.

Chickpea is a way of meeting the shortfall in supply of pea protein and is an ideal substitute for dairy and meat products, given its nutritional profile, taste and texture. Green gram takes on the flavour of whatever it is cooked in, providing a suitable base for alternative protein product companies to work with.

Asia is a growth engine of demand and although development of protein fractionation facilities in Myanmar in the current business environment (excluding the impact of the military coup) would be challenging and minimum quality requirements would still need to be met, Myanmar could link into the growth opportunity by making the most of existing trade routes, given the significant investment in production facilities across Asia by industry startups and established players such as Nestlé.

Refer Appendix 10.4 for an overview of the steps involved in plant-based processing.

Plant-based protein products[1]

Feedstock	Application	Benefits
Chickpea, green gram and pigeon pea hulls	Meat additive	Antioxidant, antimicrobial
Chickpea husk	Baking additive	Calcium content, antioxidant, increased shelf life, physical and sensory attributes
Chickpea hulls	Food additives	Dietary fiber, antioxidant
Aquafaba (liquid leftover from cooked chickpeas)	Egg white substitute	Foaming and emulsification properties
Green gram	Egg substitute	Same amino acid and emulsification properties
Pigeon pea	High protein biscuits	Chemical composition; physical and sensory attributes
Black gram	Food ingredients	Nutritional qualities; potential antioxidant and anti-diabetic properties

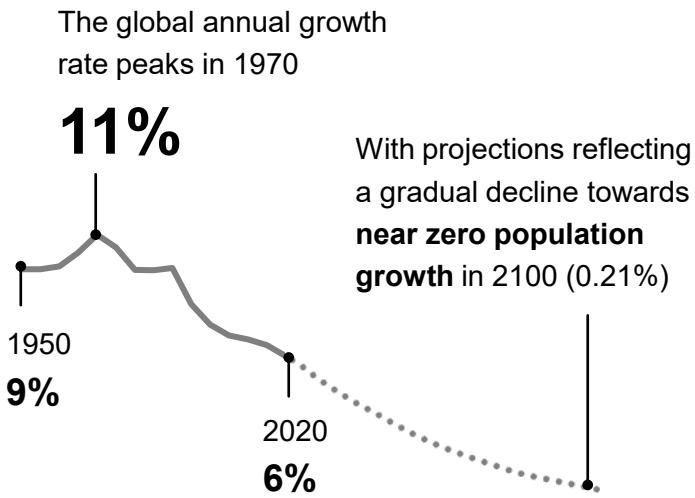
1. Tassoni, A, et al. (2020)

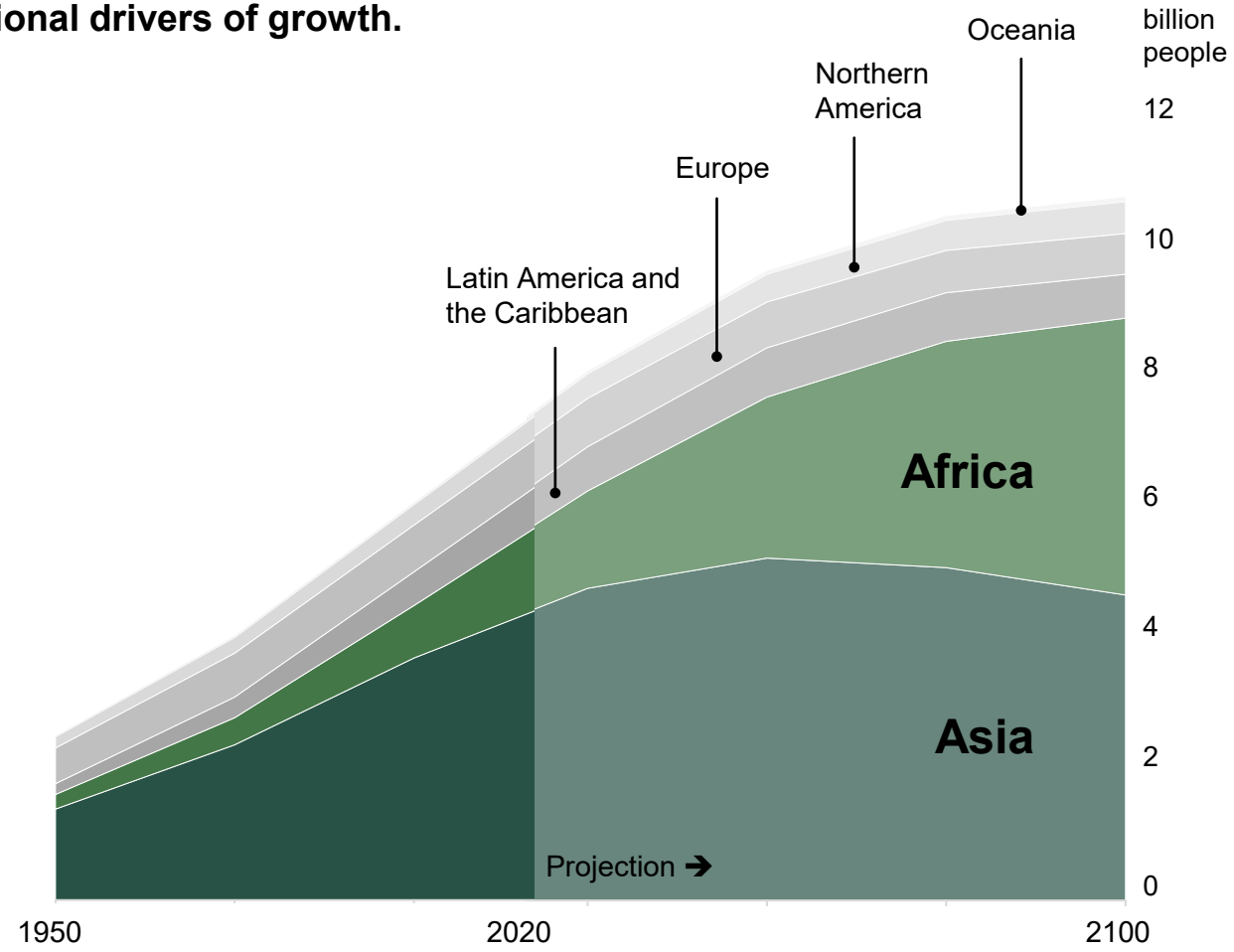
5.2 Impact of population growth

Global population is expected to grow 40 per cent over the next 80 years, with Asia and Africa the key regional drivers of growth.

Global annual growth rate

For the period 1950 to 2100





Analysis from United Nations World Population Prospects (2019) data

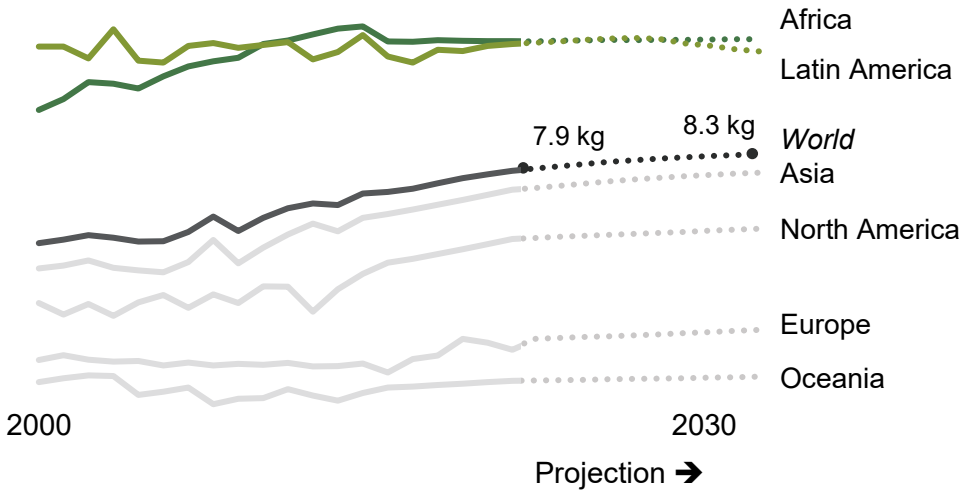
Asia's population growth rate will be the driver for a continued increase in the region's consumption of pulses over the next 10 years, with the region projected to consume 38.7 million metric tonnes in 2030.

Africa and Latin America are expected to retain the highest consumption per capita rates over the same period (11.4 kg and 11.1 kg respectively), with pulses remaining a staple food in the diets of these regions.

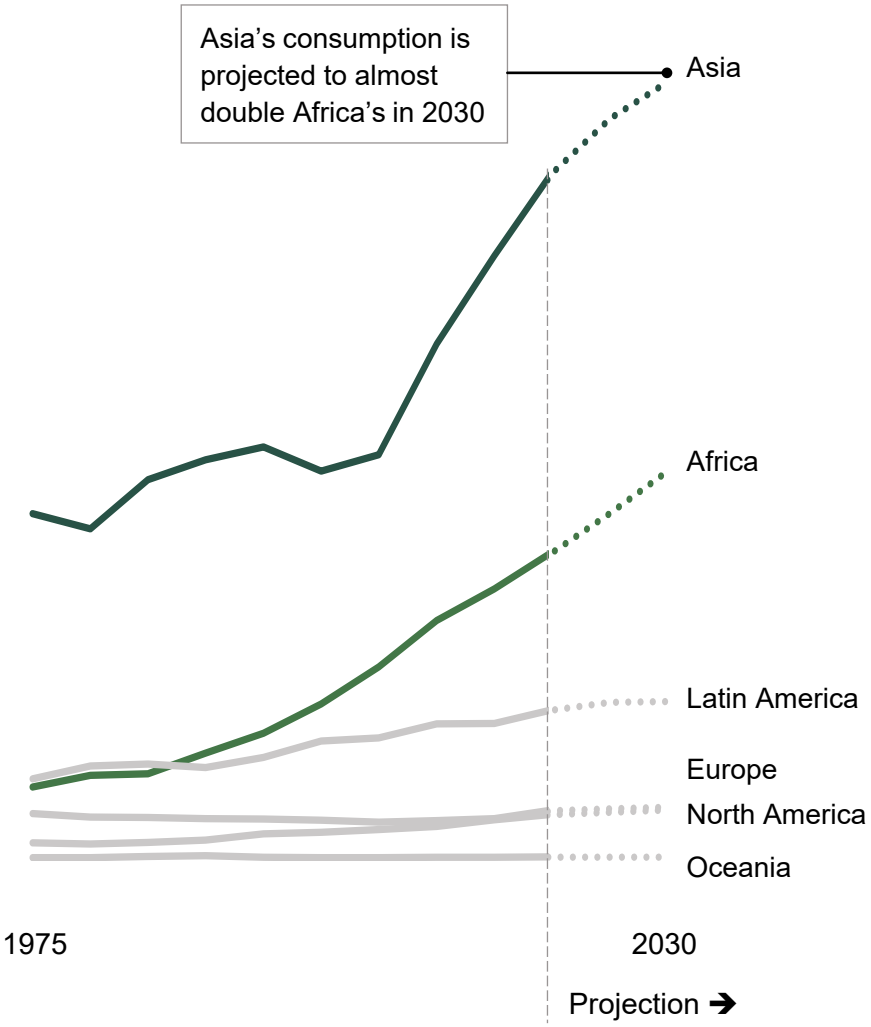
Globally, pulse consumption per capita is projected to increase by 5 per cent from 7.9 kg to 8.3 kg per capita per year, driven by rising incomes, shifts towards plant-based diets and urbanisation.

Projected pulse consumption per capita

Kilograms per capita per year



Projected total pulse consumption

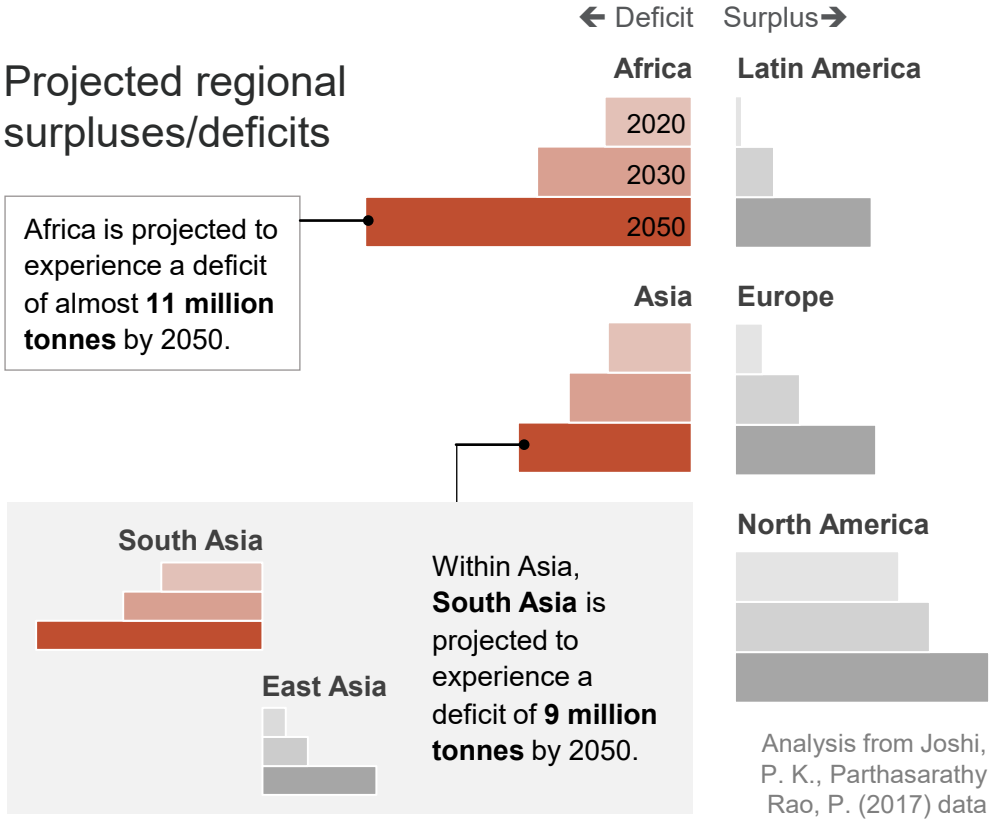


Analysis from United Nations World Population Prospects (2019) and OECD/FAO (2020) data

Africa and South Asia are forecast to experience growing pulse deficits, with domestic production unable to keep up with projected demand.

This presents an opportunity for Myanmar to take advantage of its proximity to the Asian market and preferential trade conditions, such as those available as a member of the Association of Southeast Asian Nations (ASEAN) and the Regional Comprehensive Economic Partnership.

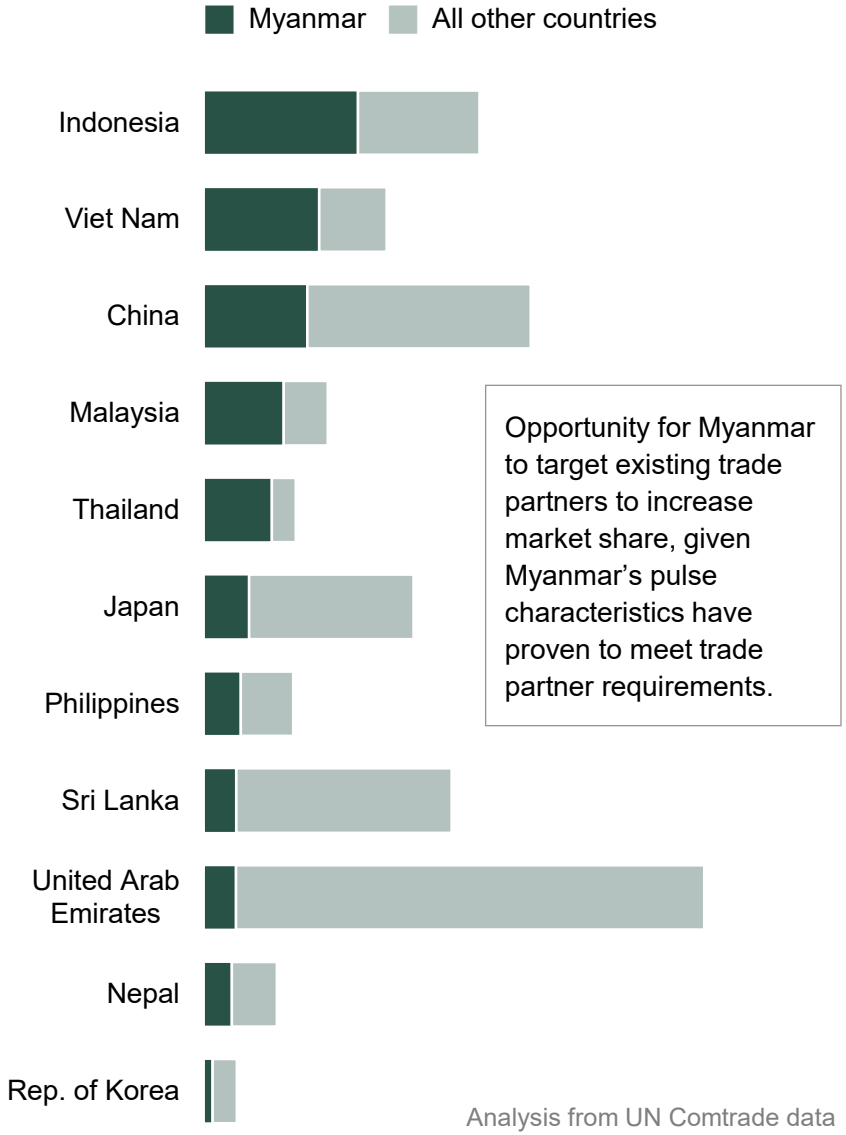
Projected regional surpluses/deficits



Analysis from Joshi, P. K., Parthasarathy Rao, P. (2017) data

Top importers of Big Four pulses from Myanmar

Total imports by volume, 2016 to 2020[1]



Analysis from UN Comtrade data

1. India excluded given Myanmar's current overreliance on exports to India.

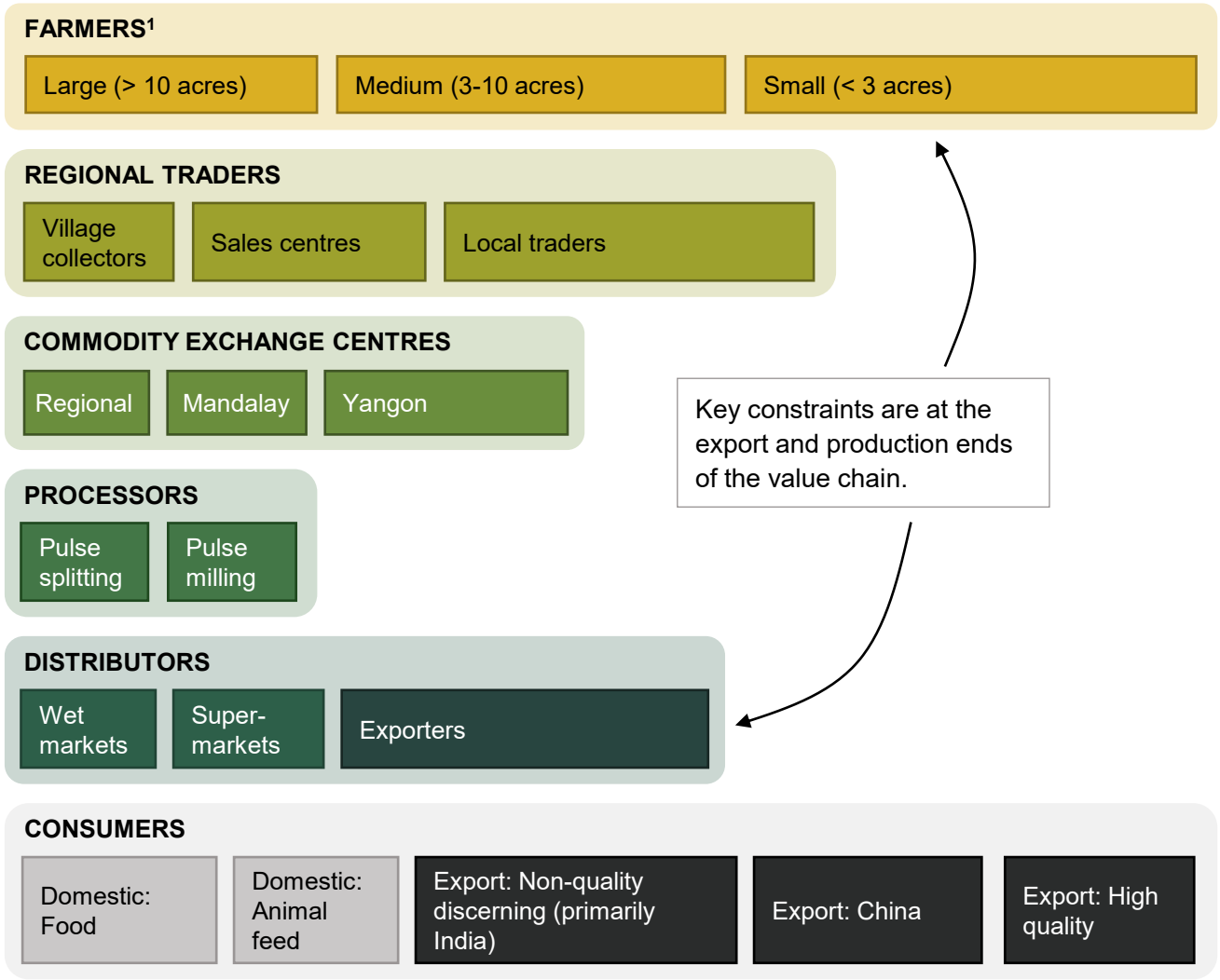
6 Value chain analysis

Myanmar's pulse value chains are fragmented with minimal cooperation. Constraints are concentrated at the production and export ends, influencing the overall value chain structure.

At the export end, constraints include certification that is not recognised by high-quality markets and onerous export compliance requirements. Some of these barriers can be circumvented by focusing on the non-quality-discerning market. To achieve profitability however, value chains need to prioritise proximate export markets and focus on volume, requiring multiple levels of traders to achieve the aggregation required. Direct sourcing is become more prevalent in Myanmar, where larger farmers are supplying directly to processors and exporters.

Pulse value chain members

Refer Appendix 3 for details of the value chains and members interviewed for this project.



1. Based on World Bank Group (2016)

Myanmar's value chains contrast starkly with Australia, another top pulse producer. Australian value chains are generally comprised of two or three stages – farmers, warehousing and exporters, or with warehousing and exporting capability integrated.

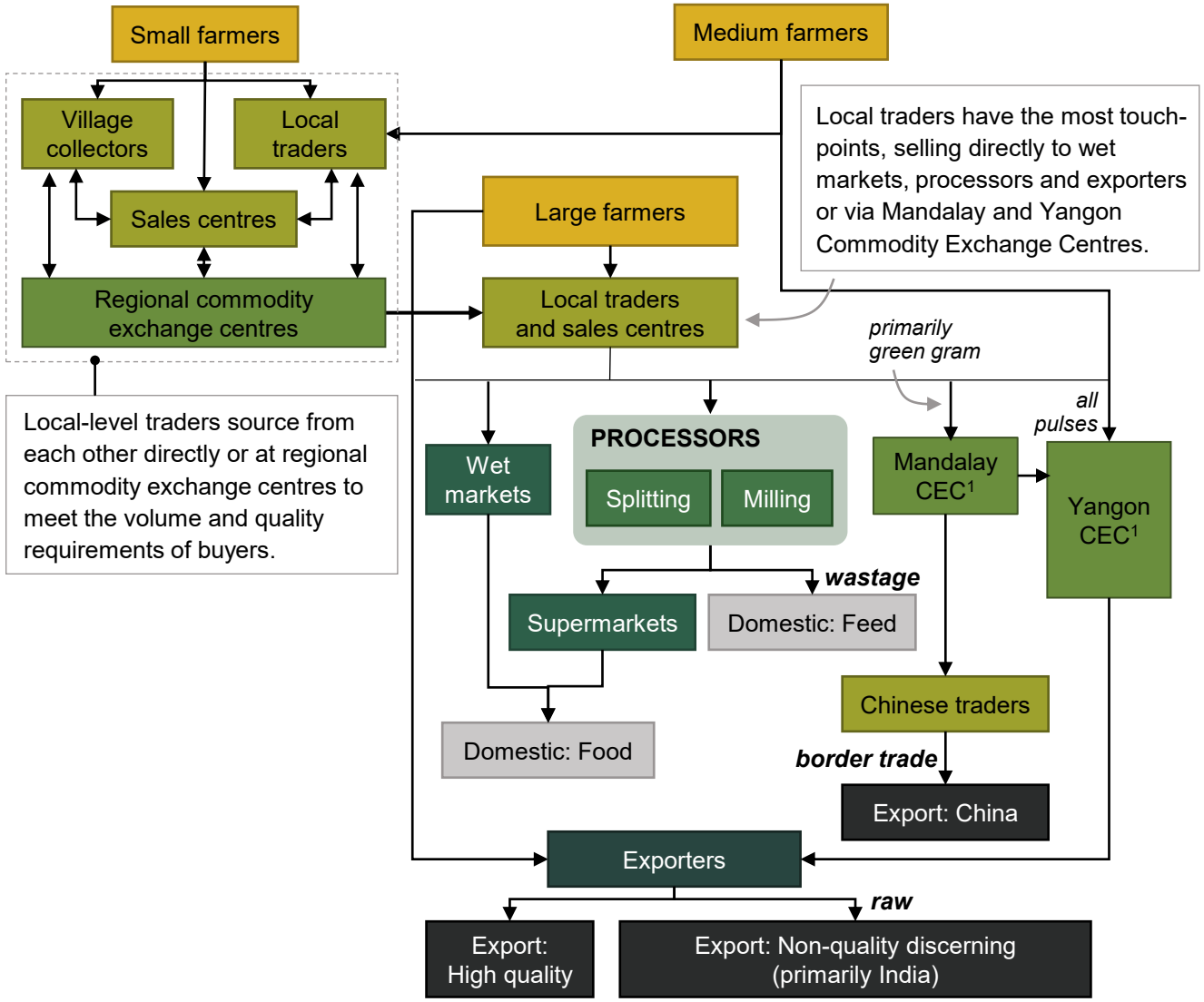
The 2021 military coup has triggered widespread trade sanctions against Myanmar, significantly impacting exports.

At the production end, poor land preparation, a lack of improved seed varieties, mechanisation and risk mitigation options, barriers to farmer aggregation and cooperation, and access to labour are key constraints. Furthermore, macro factors such as climate change and urbanisation are expected to significantly impact pulse production if current farming practices continue unchanged.

Finally, the state of agricultural finance in Myanmar is affecting the whole value chain, given inadequacies in meeting the needs of pulse value chain members, particularly smallholder farmers.

Pulse value chains in Myanmar

Generally fall into two categories – traditional (via traders) or direct sourcing

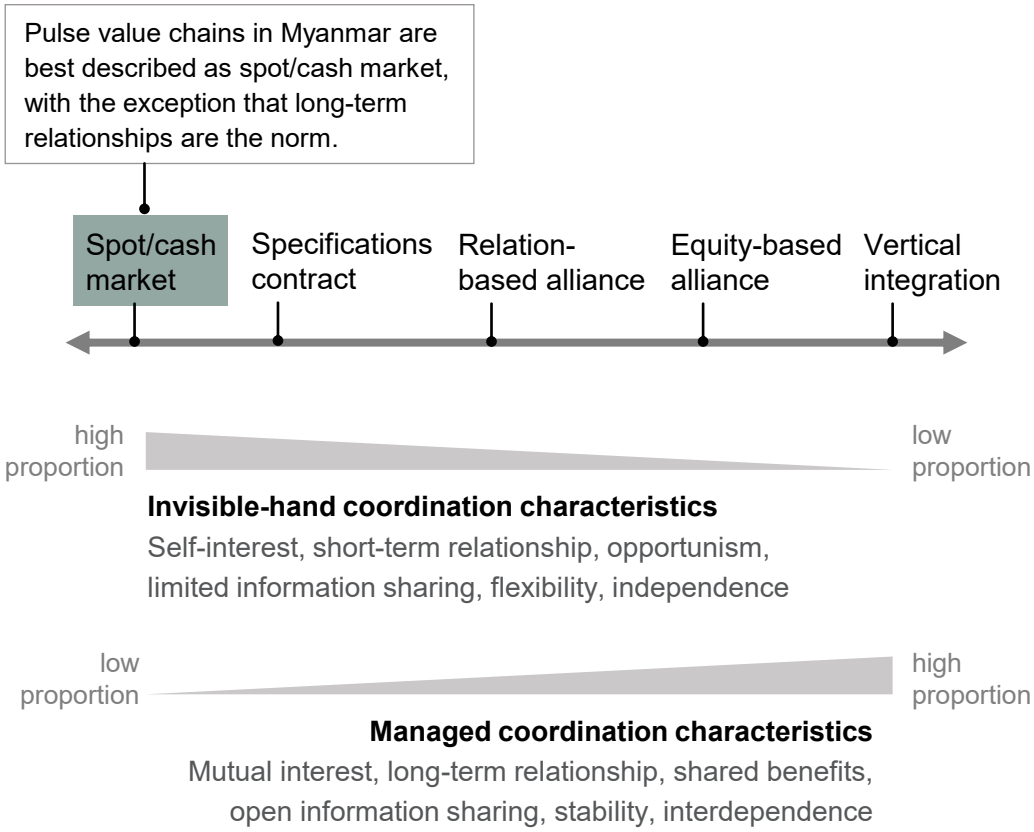


1. CEC – Commodity Exchange Centre

The following characteristics are descriptive of both types of value chains in Myanmar (traditional and direct sourcing).

- Best described as spot/cash markets, with low coordination throughout the value chain.
- Market-based prices with premiums paid for quality. In some direct sourcing arrangements, additional premiums are paid for following specific production practices (e.g., Good Agricultural Practices).
- Payment terms are cash on delivery. Advanced payment is the exception and typically reserved for longstanding relationships or upon request in direct sourcing relationships.
- Relationships are based on trust; formal contracts are rare. Given the volatility of pulse prices and the lack of access to market information other than spot prices, farmers either sell immediately upon harvesting or store pulses (third party storage) in the hope that prices increase, taking the risk that prices will decrease.
- The key exception to a typical spot/cash market is the prevalence of long-term relationships. Of the value chain members interviewed, 10- to 20-year relationships between buyers and suppliers was the norm.

Vertical coordination continuum of value chains



Adapted from Peterson, H. et al. (2001)

Analysis of product, information and governance flows

Types of flows

- Product
- Information
- Governance
- Direction of flow

Quality of flows

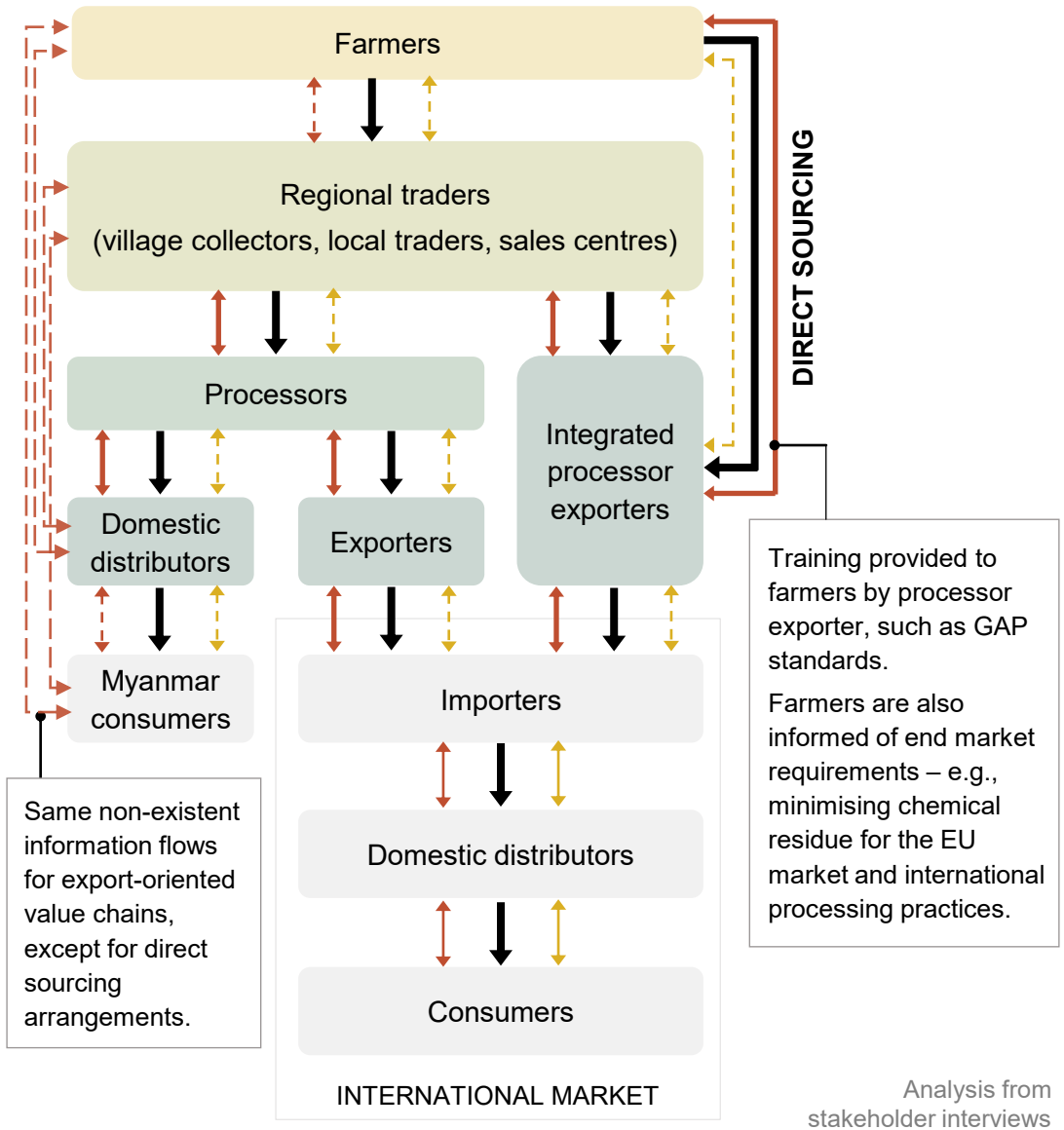
- Non-existent
- Weak
- Moderate
- Strong

Note: International flows not rated.

Prices are shared daily on the Yangon and Mandalay Commodity Exchange Centre websites. Informal channels such as Viber and Facebook groups are also heavily used to share daily prices and market trend information.

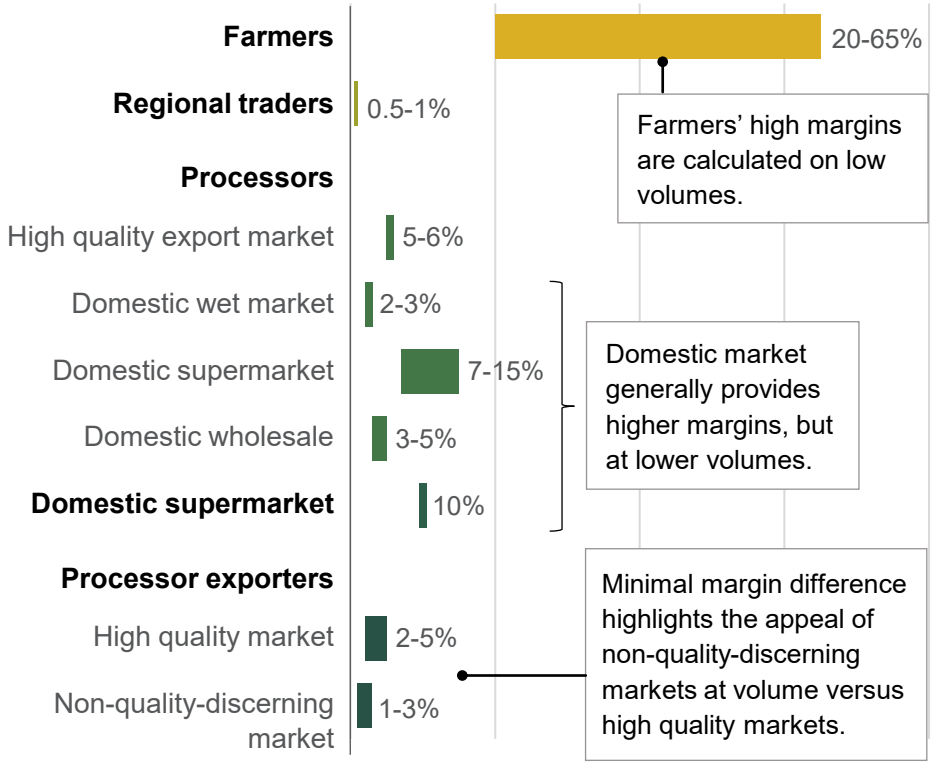
In traditional value chains, information flows are strongest between traders and processors, and processors and exporters/domestic distributors, sharing supply/demand information as well as market forecasts. In contrast, information flows between farmers and consumers, and farmers and domestic distributors are non-existent, with distributors often unaware of where pulses were sourced from and farmers unaware of the end markets for their pulses.

In direct sourcing arrangements, the key differentiator is the flow of information between farmers and processor exporters, where farmers are trained on end-market requirements.



Analysis from stakeholder interviews

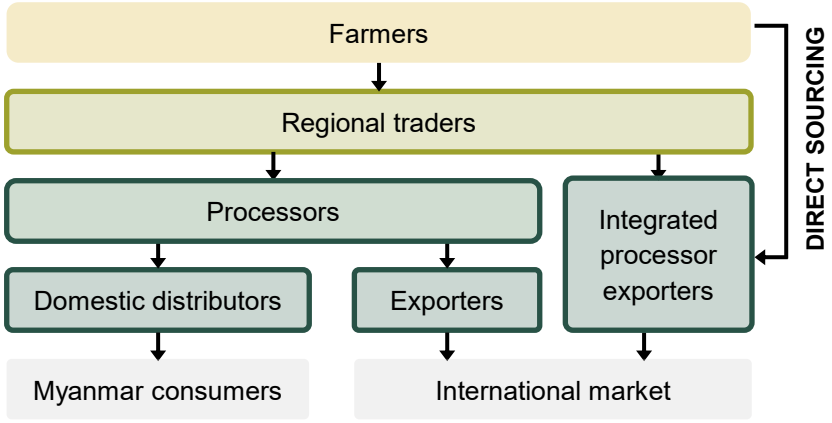
Margins



	Key costs	Waste %
Farmers	Material inputs, labour, livestock, machinery, fuel, transport, storage	Unknown
Traders	Storage, labour, transport	Minimal
Processors	Processing, storage, labour, transport	10-25%
Exporters	Certification, export compliance, storage, labour, transport	5-30%

Analysis from stakeholder interviews.
Sample sizes: Farmers 7, regional traders 13, processors 4 (one of each type), supermarket 1, processor exporters 5.

Storage



Boxes outlined above indicate value chain members that typically have storage facilities.

Traders benefit the most from access to storage and market forecast information, storing pulses for up to 10 days to maximise buy-sell spreads as prices increase.

Farmers can access storage via regional traders or in direct sourcing arrangements with processor exporters. Storage is either free of charge or at minimal charge (e.g., 0.03 per cent of sale price) in exchange for spraying the bags with pesticide. Farmers will typically store pulses for up to one month in the hope that prices will increase during this period.

6.1 Key export constraints

1. Certification not recognised in the global market.

Good Agricultural Practices (GAP) is defined as “practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products”. The four components of GAP encompass food safety and quality, economic viability, environmental sustainability and social acceptability. The widely accepted global standard is GLOBALG.A.P (refer Appendix 5 for further details).

MyanmarGAP protocol and guidelines were released in November 2017 for certifying 15 crops, including pulses. However, farmer adoption has been slow with the first smallholders receiving GAP certification in 2019 through ICCO’s P4 Project[1]. MyanmarGAP certification is not equivalent to GLOBALG.A.P[2] and is therefore not trusted by the EU market, minimising incentives for farmers to work towards certification. Other challenges include a lack of Department of Agriculture extension services to educate farmers on the benefits of adopting GAP, due to a limited budget for staff; farmers not seeing the value in adopting GAP given the volatility of pulse markets; and a perception that GAP requirements are too complicated (e.g., keeping records)[2].

As food safety standards continue to rise globally it will become increasingly important for Myanmar to meet internationally recognised standards to access higher quality markets. Furthermore, an estimated 80 per cent of MyanmarGAP content is the same as GLOBALG.A.P.[3].

Similarly, lab testing certificates such as phytosanitary certificates issued by Myanmar’s Ministry of Agriculture, Livestock and Irrigation (MoALI) are not recognised by high quality markets and lack credibility within the global market. Exporters instead send samples internationally to Thailand for example, requiring additional time and costs (e.g., lab test certificates can cost AU$300 to AU$400.

GAP General term for all types of GAP systems

GLOBALG.A.P. Global verification framework managed by a private sector body.

ASEANGAP Designed to harmonise GAP standards of member countries to enhance trade and provide a development pathway for less developed countries.

Country-specific GAP

Brunei	**Myanmar**
Cambodia	Philippines
Indonesia	Singapore
Lao PDR	Thailand
Malaysia	Viet Nam

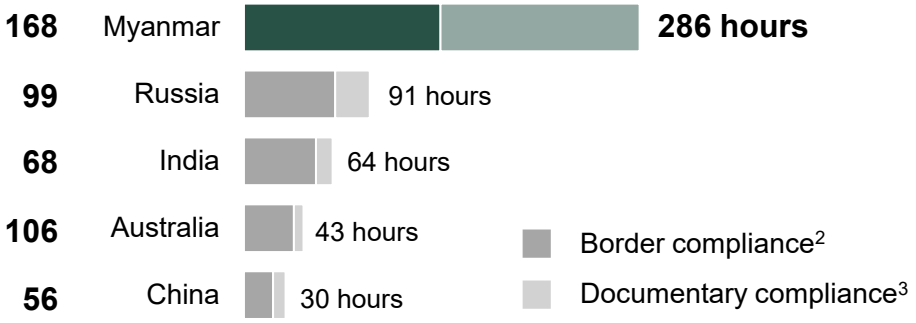
1. ICCO (now Cordaid) (2020)
2. DaNa Facility (2019)
3. Myanmar Centre for Responsible Business (2016)

2. Myanmar's trade is hampered by onerous export compliance requirements.

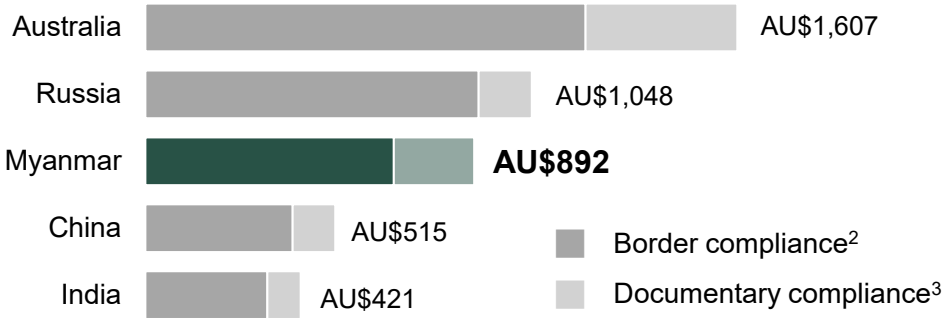
Ranked 168 out of 190 in the World Bank's 2020 'Doing Business' review[1] for 'Trading across Borders', impacting Myanmar's competitiveness against other pulse exporters.

TOP 5 PULSE EXPORTERS

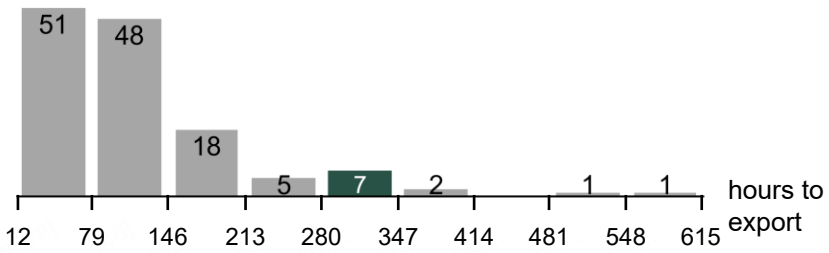
Rankings / Time to export



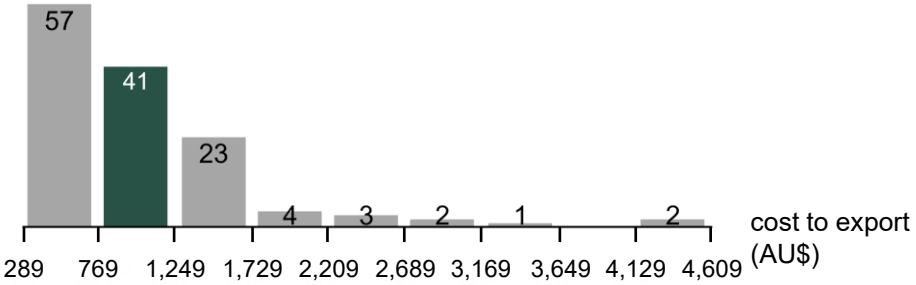
Cost to export



Number of countries within each time band (port only[4])



Number of countries within each cost band (port only[4])



Analysis from World Bank – Doing Business 2020 data

1. Assesses the ease of doing business in various countries.
2. Compliance with a country's customs regulations and other inspections mandatory for the shipment to cross the country's border, and handling that takes place at its port or border.
3. Compliance with the documentary requirements of all government agencies of the origin economy, the destination economy and any transit economies.
4. Excludes countries with land-based export borders.

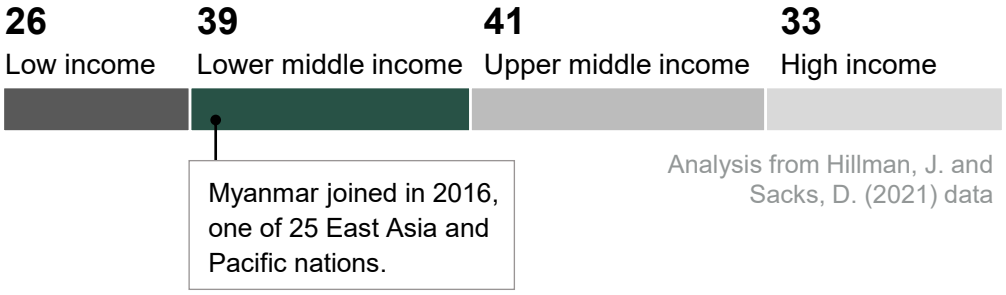
6.2 Impact of the Belt and Road Initiative

The Belt and Road Initiative is an ambitious infrastructure development project driven by China, aiming to connect six main economic corridors.

Economies directly impacted by the Belt and Road Initiative represent one-third of global GDP, close to two-thirds of the world's population[1]. While precise trade routes remain unclear, the Bangladesh-China-India-Myanmar economic corridor[2] is the primary corridor that will run through Myanmar. Coupled with the Greater Mekong Subregion initiative, which was launched in 1992 by Cambodia, China, Lao PDR, Myanmar, Thailand and Vietnam, the Belt and Road Initiative is anticipated to have a significant impact on trade flows within the region.

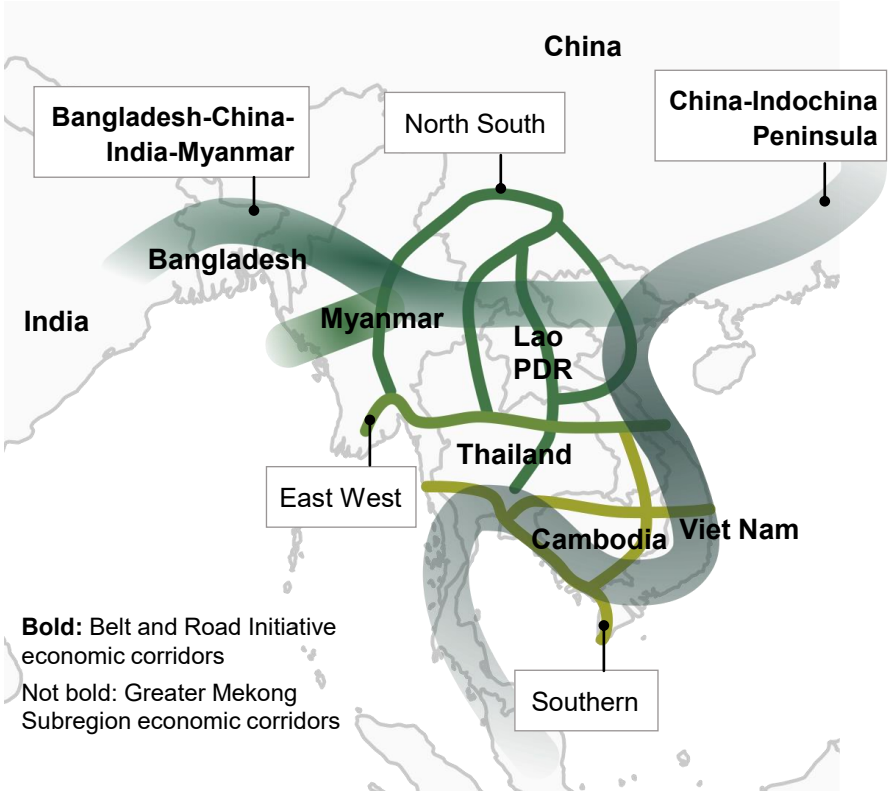
Official Belt and Road Initiative participants

Number of countries by income group



Analysis from Hillman, J. and Sacks, D. (2021) data

Economic corridors through Myanmar



Adapted from Raymond, G. (2021)

1. Ruta, M. (2018)
2. Also referred to as the China-Myanmar economic corridor given partial opposition from India.

Myanmar's infrastructure is a major constraint to trade, ranking 135 out of 140 countries for quality of overall infrastructure in 2015-16[1]. The Belt and Road Initiative is expected to significantly improve road linkages for Myanmar, greatly benefiting the pulse sector given trucks are the primary form of transport for intra-country trade.

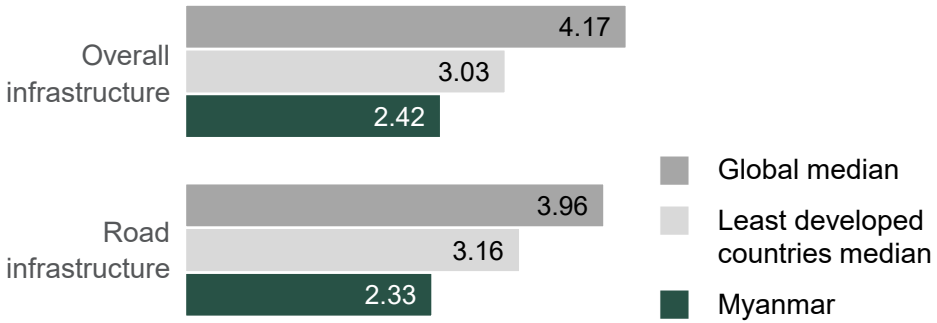
Myanmar is plagued by poor transport infrastructure, with development prioritised in national strategies and plans such as the Myanmar Sustainable Development Plan, 2018-30, the Myanmar National Transport Master Plan 2016 and National Export Strategy, 2015-19. However, significant investment is required, with a 2016 study estimating that AU$82 billion would be required over the period 2016 to 2030 to meet Myanmar's infrastructure needs[2].

The Belt and Road Initiative could fast-track transport infrastructure development, depending on the impact of COVID-19 and the military coup, with the World Bank predicting that BRI transport projects could reduce travel times along economic corridors by 12 per cent and reduce shipping times for Myanmar by more than 5 per cent[3].

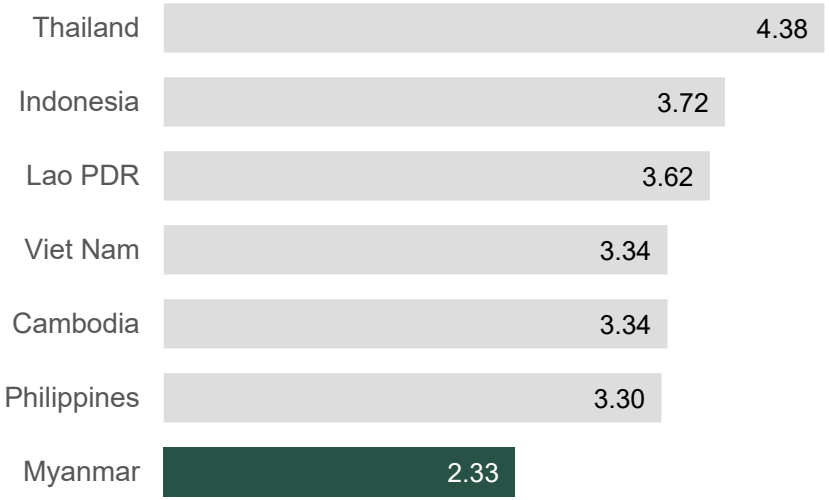
1. World Economic Forum (2015)
2. Asian Development Bank (2016)
3. World Bank Group (2018)

Quality of infrastructure

2015-16 index values, 1 (worst) to 7 (best)



ROAD INFRASTRUCTURE



Analysis from World Economic Forum (2015) data

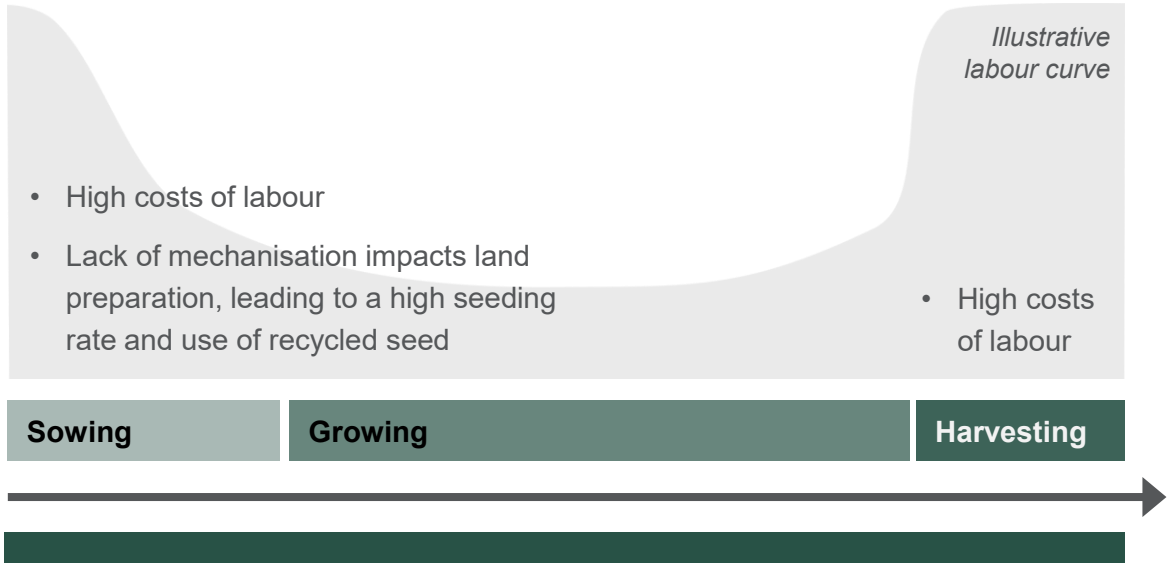
6.3 Key production constraints

Smallholder farmers in Myanmar are becoming increasingly vulnerable, as the benefits of interventions and regulatory reforms to improve agricultural production and smallholder farmer resilience are eroded by increasing labour costs and irregular weather patterns, amongst other challenges.

Myanmar agriculture remains a primarily rainfed system, with only 11 per cent of agricultural land irrigated in 2019[1]. Pulses are grown as a monsoon crop or immediately after the monsoon paddy harvest to take advantage of residual moisture.

Although constraints to production span the season, the challenge consistently mentioned by farmers interviewed for this project was a shortage of labour – for harvesting pulse crops generally, and specifically for monsoon crops, given the small window of opportunity for monsoon paddy to be harvested and threshed and the land prepared for the pulses crop.

Constraints to production span the season



1. Calculation from FAOSTAT data.

1. Increased competition for labour resulting in increased costs of production.

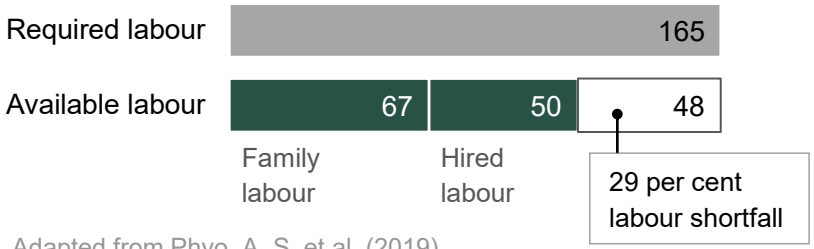
There are two key drivers for the shortage of labour experienced by Myanmar's smallholder farmers, both related to better working conditions and a regular and/or higher wage; specifically, urbanisation and increased non-farm employment, (explored in detail in Section 6.5), and migration to neighbouring countries.

The impact on pulse farmers is particularly pronounced given the need to hand harvest green gram to achieve the desired quality requirements of higher value markets. Despite the greater profitability of green gram compared to other crops, some farmers have had to limit sown area based on a predicted shortage of labour for the harvesting period.

Methods to secure labour include offering higher wages, paying for labour one year in advance, sourcing labourers from other regions and offering to cover accommodation and travel expenses.

Labour shortage for rice-pulse farmers

Average working days per hectare per year



Adapted from Phyo, A. S. et al. (2019)

2. Lack of mechanisation during the land preparation process results in high seeding rates.

Recognising the need to improve farm productivity, mechanisation has become increasingly popular among Myanmar farmers. The Ministry of Agriculture, Livestock and Irrigation has also increased investment in mechanisation although this is skewed towards mechanisation for rice, and the purchase of tractors and other agricultural machines, overlooking funding requirements such as training extension staff on mechanisation. Similarly smallholder farmers' use of mechanisation is focused on combine harvesters for rice given their multi-functional abilities (harvesting, threshing and bagging).

Pulse farmers commonly till their land multiple times manually using a harrow, leading to shallow ploughing, which impacts soil water retention over the longer term, and uneven land. This in turn leads to poor germination rates, which farmers compensate for by using a high seeding rate, discouraging investment in improved seed varieties due to the higher input cost. Uneven land also means that harvesters cannot be used for pulses that do not require hand harvesting.

Refer page 49 for further details regarding mechanisation for pulses.

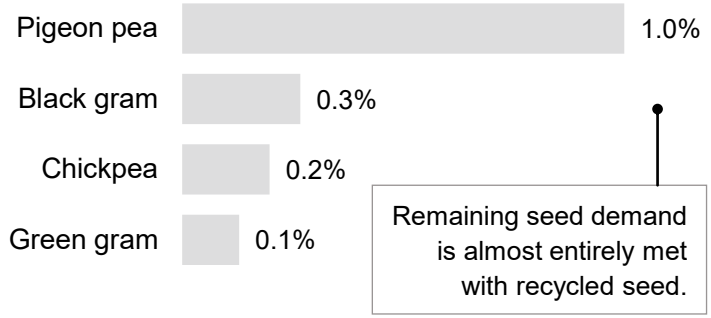
3. Lack of access to improved seed varieties impacting yields, climate adaptivity and pest resistance.

The lack of access to improved seed varieties continues to be an ongoing challenge within Myanmar's pulse sector. Seed produced by the Department of Agriculture is limited, meeting less than 1 per cent of farmer demand. Seed research and development has proven to generate significant benefits to Myanmar smallholder farmers, highlighting the importance of distribution of improved seed varieties. For example, an impact assessment of green gram research led by the World Vegetable Center found that approximately AU$2 billion of economic gains accrued to smallholder farmers over the period 2010 to 2016 from the adoption of improved varieties, representing 95 per cent of total economic gains to Myanmar[1].

Farmer producer organisations are emerging for seed production where farmers work together collectively to gain access to earlier generation seed from the Department of Agriculture, then breed them and sell them into the local community[2].

Another example is Pahtama Seed Company – originally a LIFT (Livelihoods and Food Security Fund) project implemented by Myanmar agricultural company Awba, commencing in 2018. Pahtama Seed Company has since been established as a commercial seed company, currently with 1,000 acres dedicated to seed production and focused on meeting the needs of Myanmar smallholder farmers.

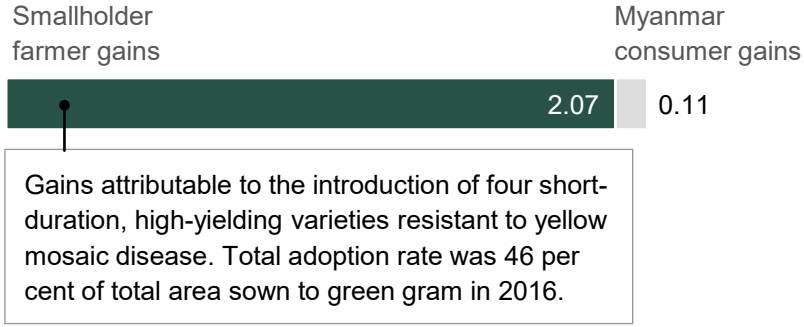
Percentage of farmer seed demand met by the Department of Agriculture



Analysis from Syngenta Foundation & AgriSource (2016)

Green gram research and development return on investment

AU$ billion gains to Myanmar



Analysis from Sequeros, T. et al. (2020)

1. Sequeros, T. et al. (2020).
2. This 'village seed bank' approach was the focus of a collaborative project between ACIAR, Myanmar's Department of Agricultural Research, Department of Agriculture and ICRISAT, under ACIAR's broader MyPulses project (SMCN-2011-047).

4. Weak information flows connecting farmers to market forecasts and end-market demand requirements.

As highlighted in the value chain analysis diagram on page 33, the information that farmers receive in traditional pulse value chains is limited to spot pricing and feedback on the quality of their pulses. Therefore even where farmers have access to storage, they do not necessarily know the optimum time to sell.

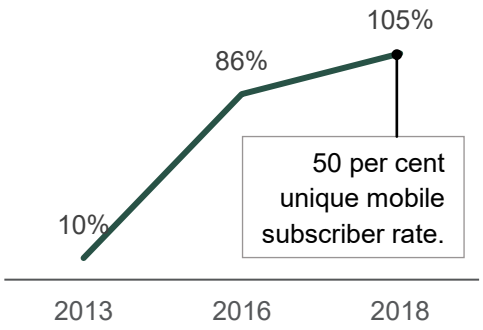
Information flows are better in direct sourcing arrangements. Farmers are equipped with information on how to improve the value and quality of their pulses – for example, they are trained on buyer requirements, improved production practices, distinguishing the different qualities of pulses and linking quality improvement to price premiums.

With smartphones becoming more prevalent, even amongst smallholder farmers, digital tools ('agri-tech') are well-positioned to bolster information flows. Services already available in Myanmar designed specifically for smallholder farmers include apps that provide market pricing and guidance on when to sell, weather forecasts, training on farming practices, creating virtual farmer communities, connecting farmers to agronomists, and connecting farmers to owners and operators of tractors and other agricultural machinery for hire.

Agri-tech is benefiting from the growth of mobile and internet usage in Myanmar

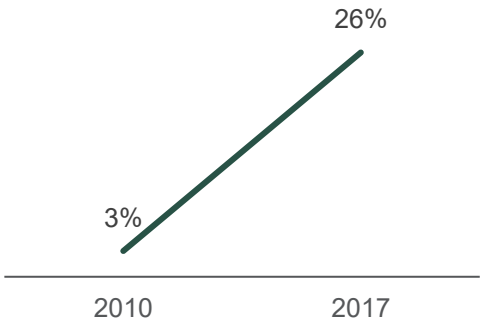
SIM PENETRATION

% of population



INTERNET PENETRATION

% of population



Adapted from Oxford Business Group (2020b)

Funding was established in 2018 to expand telecommunications services to the most remote regions of Myanmar.

Target of 99 per cent mobile penetration by 2022.

5. Barriers to farmer aggregation impede smallholder farmers from achieving economies of scale and access to finance.

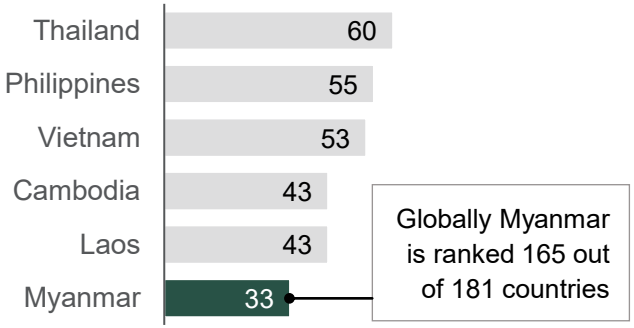
A key constraint to direct sourcing from smallholder farmers is the transaction cost from working with multiple farmers to achieve the volumes required, including the costs of transport, labour, and time; hence the role of local-level traders. A common method of tackling this global smallholder challenge is farmer aggregation through farmer producer organisations, often through cooperatives. Farmer aggregation enables improved bargaining power, which can diversify market access opportunities, reduce costs of production and enable access to finance (refer Section 6.6 for further details).

Smallholder farmers are reluctant to form cooperatives as the registration process in Myanmar is onerous and once registered, cooperatives fall under the remit of the Ministry of Cooperatives and the state becomes a part owner. The reporting and regulatory requirements applicable to registered cooperatives are also onerous and complex.

An alternative is to form as a 'social development entity' – a community-based organisation that is much easier to register and involves less control by Ministries, but is discouraged from acting as a commercial entity, albeit for the benefit of smallholder farmer members/shareholders. Another option is to adopt a commercial model with smallholder farmer producers also receiving shares and dividends Land consolidation is an alternative way of achieving scale; however, the high proportion of landless farmers (estimated to be 50 per cent in 2014[1]) and prevalence of customary land ownership rather than formal land titles is an impedance to this approach, given that all unregistered land is considered to be under the ownership of the Myanmar Government.

The controversial Vacant, Fallow and Virgin Lands Management Law requires anyone living on land to apply for a permit to continue using the land for 30 years, with the March 2019 introduction of a two-year prison sentence for those without a permit[2].

Property Rights Index[3], 2020

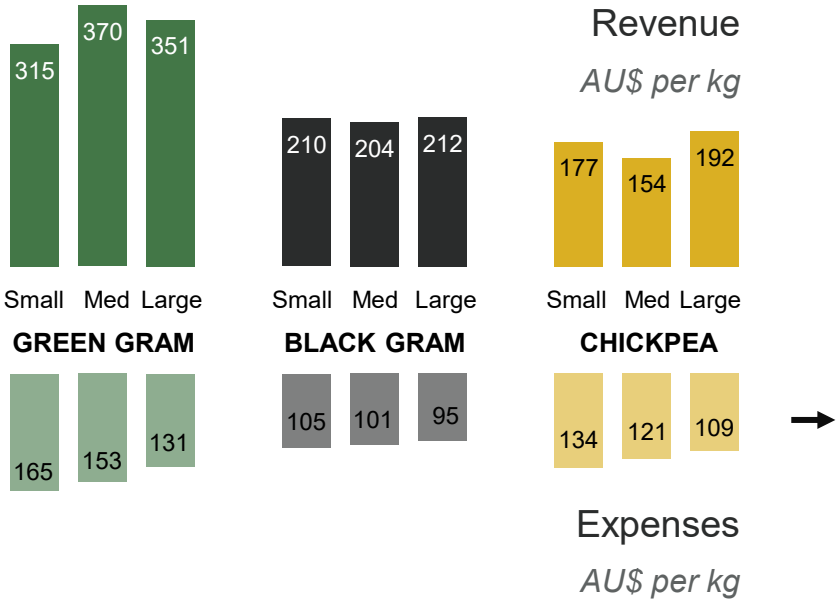


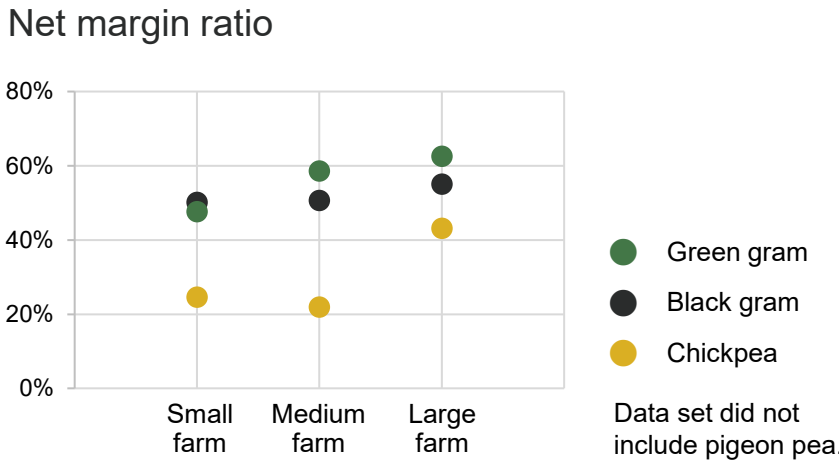
Analysis from The Heritage Foundation data

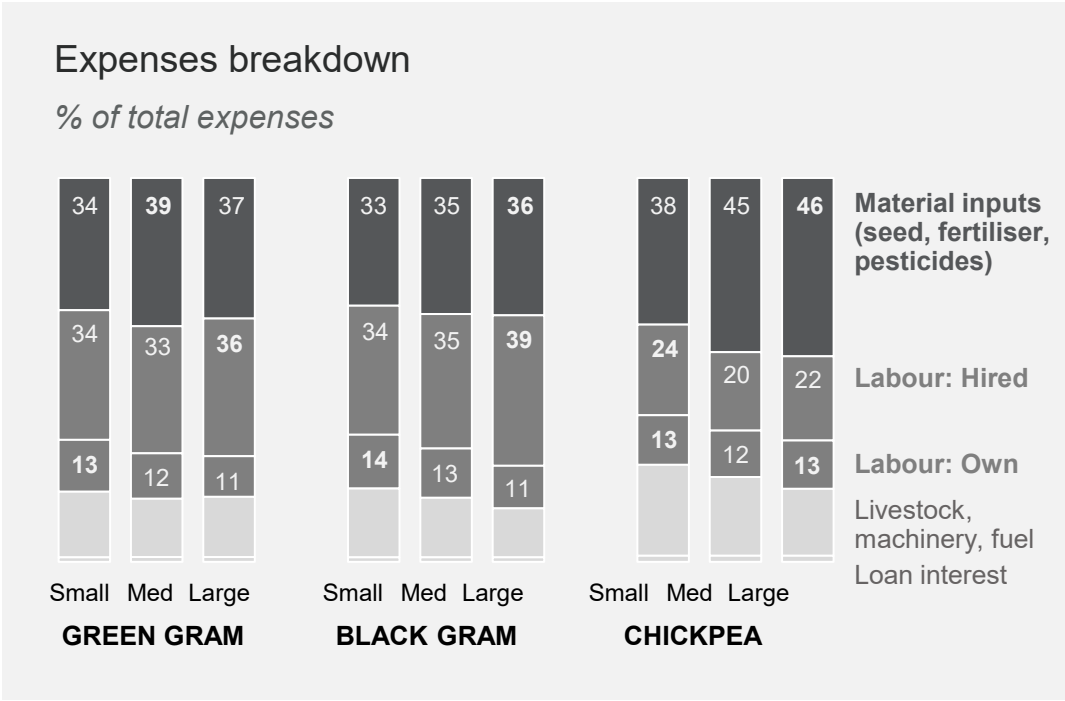
1. Tanaka, M. (2014)
2. United Nations Human Rights | Office of the High Commissioner (2019)
3. Measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws, the likelihood that private property will be expropriated. A higher index value denotes more certain legal protection of property, with a maximum value of 100

An analysis of farm production economics highlights the profitability of green gram compared to other crops, particularly for larger farms. While there is no clear correlation between farm size and gross revenue generated, farmers benefit from economies of scale with costs reducing as farm size increases.

Refer Appendix 10.6 for a detailed breakdown.







Analysis from World Bank Group (2016) data

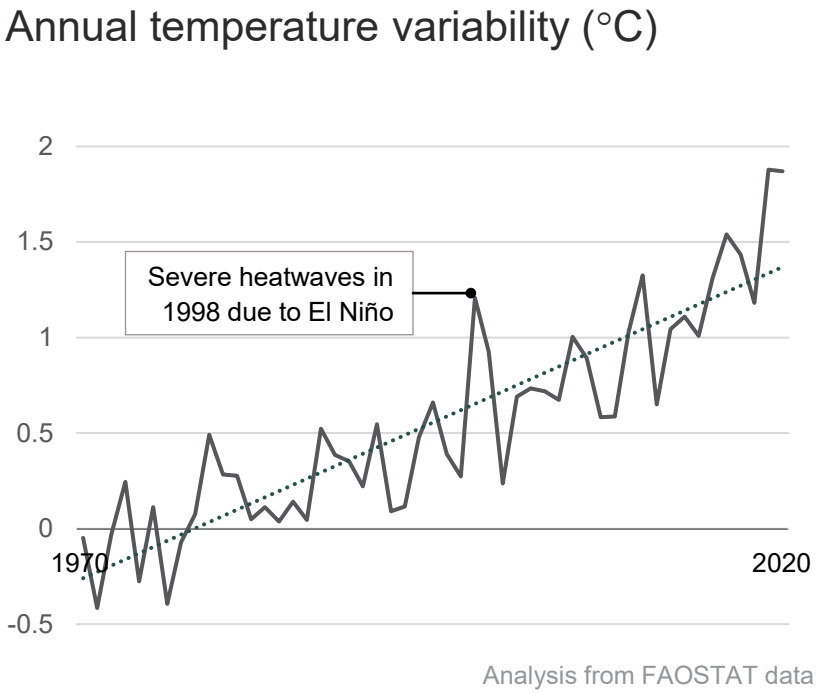
6.4 Impact of climate change

Myanmar is one of the most vulnerable countries in the world to climate change, creating additional challenges for the agricultural sector.

Myanmar ranks second in the list of countries most affected by climate change between 1999 and 2019, primarily due to the impact of Cyclone Nargis in 2008[1]. Recognising the role of agriculture in poverty alleviation, one of the sectoral outcomes in the Myanmar Climate Change Master Plan (2018-30) is "Climate-resilient productivity and climate-smart responses in the agriculture, fisheries and livestock sectors to support food security and livelihood strategies while also promoting resource-efficient and low-carbon practices"[2].

The key impacts of climate change on agriculture include the following:

- A reduction in the productivity of current agricultural techniques and crops.
- The risk of sudden destruction of crops by extreme weather events.
- Erosion of soil over the longer term.
- Increasingly challenging for smallholder farmers to make decisions such as crop selection, when to sell, etc.



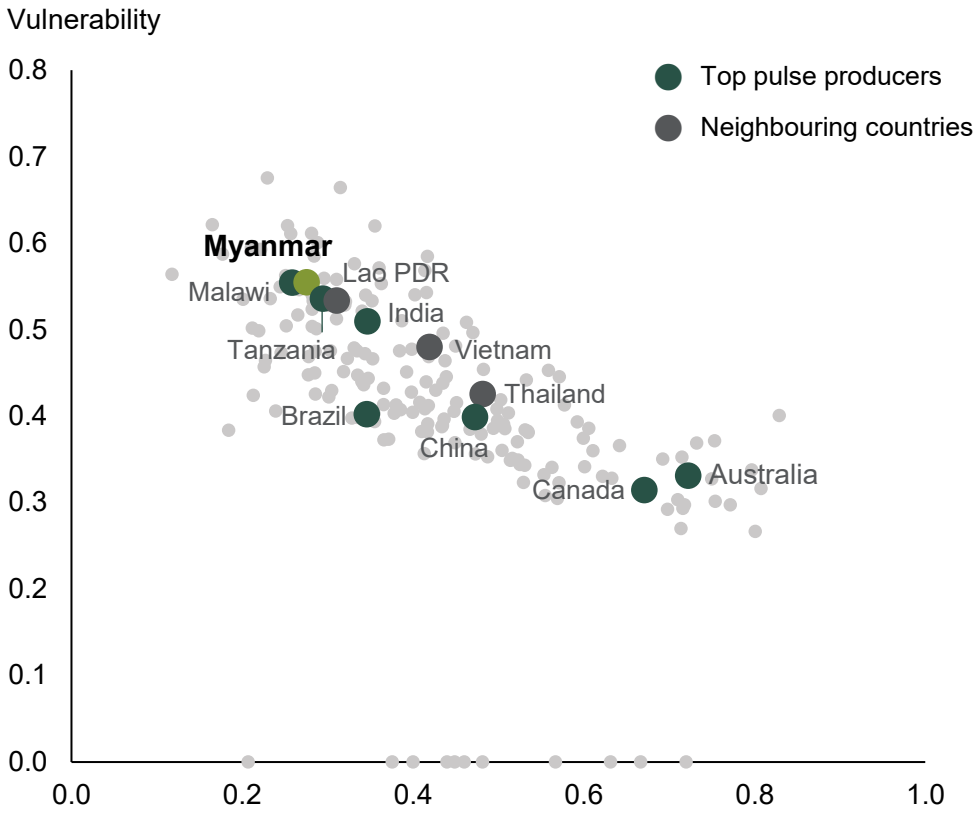
1. Eckstein, D. et al. (2021)
2. The Republic of the Union of Myanmar (2019)

Erratic rainfall was the main climate change impact observed by pulse farmers interviewed for this project, consistent with the findings of ACIAR project 'Cropping systems and integrated nutrient management in the Central Dry Zone of Myanmar' (SRA 2016/051). Pulses are highly sensitive to torrential rain, particularly at key points in the crop cycle. High moisture content can also lead to disease infestation, prompting farmers to use greater quantities of pesticides. Given the strict chemical residue limits of high-quality markets such as the EU, heavy rains have a two-fold impact on profit margins –increasing the cost of inputs and reducing the price a farmer can sell their crops for.

Findings from a 2018 study on the impact of erratic rainfall on pulse production efficiency in Lower Myanmar include the increased use of climate adaptive seed and risk management options such as weather index-based crop insurance[1].

Crop insurance is in its infancy in Myanmar, with the first ever crop insurance program approved in 2018 and current options are limited to rice crops[2].

Country resilience to climate change



Analysis from ND-GAIN (2020) data

1. Mar, S. et al. (2018)
2. Oxford Business Group (2020a)

6.5 Impact of urbanisation

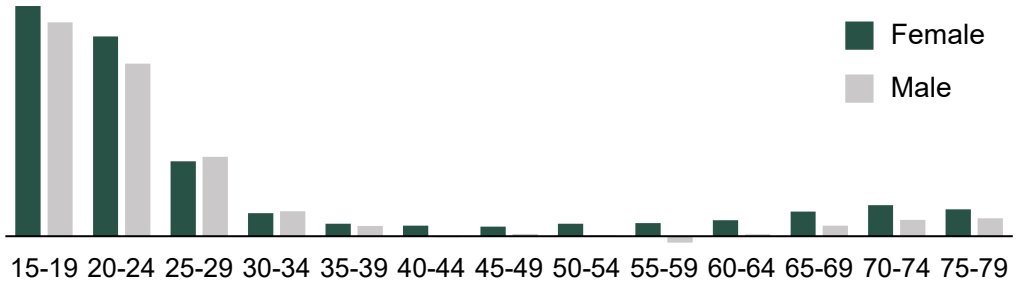
Urbanisation in Myanmar is projected to increase to 35 per cent in 2050, driven primarily by internal migration.

The latest urbanisation statistics for Myanmar report an urbanisation rate of 30 per cent in 2014 (most recent Myanmar census), with 24 per cent of rural-to-urban migration attributed to the agriculture, forestry and fishing industries.

Myanmar's burgeoning garment industry (trade value annual growth rate of 38 per cent over the period 2015 to 2019[1]) has been a notable contributor towards female rural-to-urban migration, with more than 90 per cent of the garment industry workforce comprised of young women who have migrated from rural areas for the specific purpose of working in the garment industry[2].

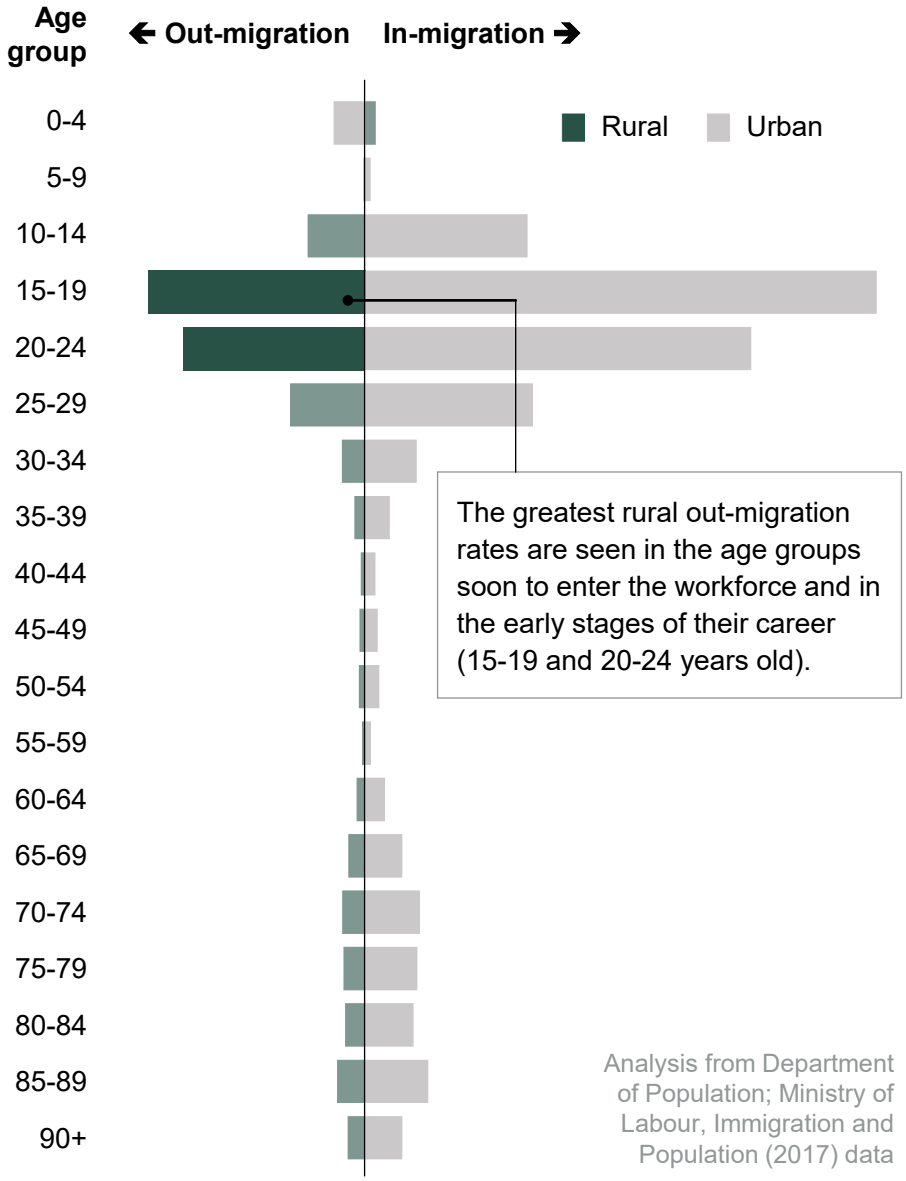
Out-migration rates by gender

Rural out-migration for females exceeds males across most age groups



Net internal migration rates

Per 10,000 people, 2014 Census results



Analysis from Department of Population; Ministry of Labour, Immigration and Population (2017) data

1. Calculation from UN Comtrade data
2. International Labour Organization (2019)

Labour is the largest production cost for smallholder farmers, ranging between 35 per cent for chickpea 50 per cent for green gram[1]), with labour productivity improvements in Myanmar lagging well behind comparable countries.

Rural outmigration will drive labour costs even higher, highlighting the need for Myanmar's agriculture sector to create greater cost efficiencies. Even now, farmers may pay labourers one year in advance to secure labour for the next season.

Agriculture value added per worker

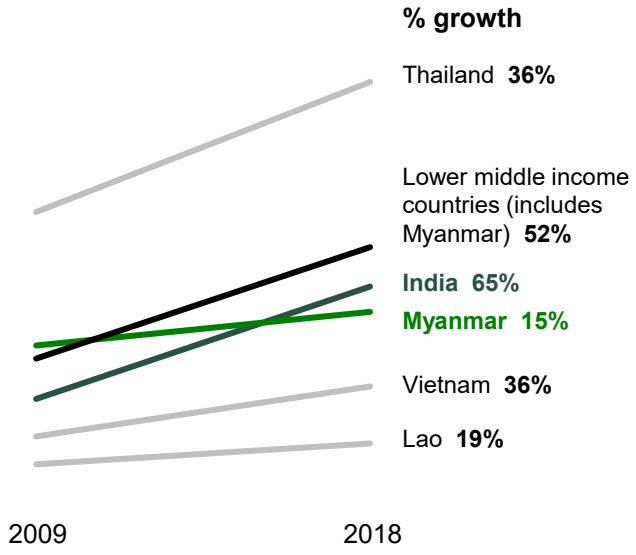
Measure of labour productivity

India 65%

India has made significant advances in agricultural productivity through measures such as higher-yielding seed varieties and government subsidised farm inputs.

Myanmar 15%

By comparison, Myanmar's slow labour productivity growth is a key constraint to the country's agriculture sector.



Analysis from World Bank Open Data

Mechanisation

Mechanisation is one approach to improving labour productivity. Although there has been a gradual increase in the adoption of mechanisation in Myanmar pulse farming, the focus is on pre-harvest activities, such as the use of mechanised planters.

Mechanised green gram harvesting is not yet feasible in Myanmar due to variations in the maturity times of pods. Furthermore, land size is an important factor in the effectiveness of mechanisation. For example, yields achieved through hand harvesting remain superior to mechanical harvesting and larger machinery such as tractors and combine harvesters cannot be used for small-sized plots. This challenge is the focus of ACIAR project 'Improved mung bean harvesting and seed production systems for Bangladesh, Myanmar and Pakistan' (CIM/2016/174).

Land aggregation, which would improve the feasibility of mechanisation by increasing the size of plots, is challenged by land tenure security (refer page 43 for further details).

1. Oo, K. (2018)

6.6 Finance

Inadequate agricultural value chain finance is affecting the entire Myanmar pulse value chain and is the subject of a separate ACIAR project 'Inclusive Agricultural Value Chain Financing' (AGB/2016/163)[1].

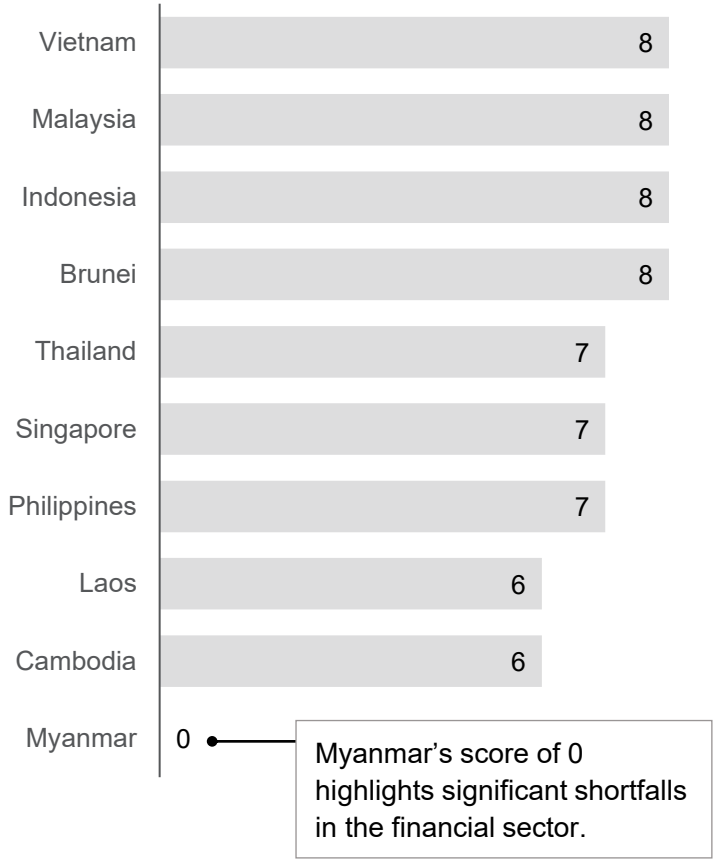
Seasonal agricultural loans are available to farmers from the Myanmar Agricultural Development Bank, but terms are rigid and not reflective of the needs of smallholder farmers. For example, loans can only be used to purchase seed and fertiliser and are not reflective of cropping patterns and cashflow constraints. The heavy regulation of the financial sector also limits the ability for commercial banks to develop profitable financial products or take on higher risks that are typical of agriculture.

Projects such as ICCO's P4 Project has experienced success in securing finance by applying for loans through the farmer group entity rather than individual farmers, and through letter-of-credit financing, where a loan is issued based on a buyer providing assurance of payment to the supplier – in this case, the farmer group entity[2].

Emerging technology such as digital credit scores may accelerate progress in agricultural value chain financing, given that currently there is limited sharing of credit information amongst financial services providers.

Depth of credit information index[3], 2019

ASEAN region



Analysis from World Bank – GovData360 data

1. Basu, S. et al. (2020)
2. Stakeholder interviews.
3. Measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries, public registry or a private bureau, to facilitate lending decisions; higher index denotes greater availability of information.

7 Conclusions

Agricultural development is widely accepted as being capable of having a multifaceted impact on a country's social and economic development – triggering economic growth, reducing poverty, narrowing income disparities, providing food security, and delivering environmental benefits[1].

Geographically and agriculturally, Myanmar teeters on the edge of the epicentre of global pulse production and consumption. The size of the global import market for Big Four pulses was AU$2.9 billion in 2020 and with global population expected to grow 40 per cent over the next 80 years, the demand for pulses in the South Asia region will potentially grow by 54 per cent[2], with both Africa and South Asia forecast to experience increasing pulse deficits. By improving the quality of pulses, enabling scale efficiencies, implementing an effective and internationally recognised quality assurance system, and improving the efficiency of export compliance processes, Myanmar could take advantage of its proximity to major markets, capturing market share from export-oriented countries that are geographically further away.

The make-up of market demand for pulses is anticipated to evolve in the coming years. As low- and middle-income regions of the world develop there will be increased consumption of animal protein (i.e., meat), driving demand for animal feed. In parallel, high-income regions have started to incorporate a greater proportion of plant-based proteins in their diets, in which pulses play a key role. As a general trend, consumers are becoming more conscientious of food safety and the sustainability of food systems.

1. Byerlee, D. et al. (2009)
2. Based on population growth multiplied by the current market size.

Despite Myanmar's strong pulse production base, sector transformation has been slow. The institutional environment has hindered development through poor quality assurance systems, onerous export compliance requirements, a lack of improved seed varieties, disincentives to farmer associations becoming registered cooperatives, unclear land ownership rights preventing land aggregation and therefore impeding scale efficiencies, and disincentives to agricultural finance through a heavily regulated sector.

Myanmar's pulse value chains are fragmented with minimal cooperation throughout the chain. Constraints are concentrated at the production and export ends, influencing the overall value chain structure and preventing scale efficiencies, particularly for smallholder farmers. The quality of pulse production is also a major challenge – fundamentally due to a lack of:

- knowledge, information and skills at key stages of the chain;
- understanding of the overall system and the part each value chain member plays; and
- incentives for value chain members at key stages to improve their part of the chain system.

These challenges, as well as the country's poor infrastructure, impact on Myanmar's competitiveness in the global pulse market and reduces competition within the domestic market. The Belt and Road Initiative promises to fast-track transport infrastructure development.

Although Myanmar has experienced growth in production volumes since liberalisation of the sector in 1988, it has been driven by an increase in total area harvested, with minimal yield improvements. Weak to non-existent information flows to farmers regarding market forecasts and supply performance, rising labour costs, and erratic and extreme weather patterns impact on the productivity, profitability and resilience of smallholder farmers, making decision-making increasingly complex. Further challenges faced by smallholder farmers include barriers to farmer aggregation, which limits their bargaining power, constraints to market diversification and access to finance. Together, these challenges disincentive buyers from working directly with smallholder farmers as the ability to reduce supply risk is hampered.

There are emerging trade opportunities with respect to preferential trade agreements and infrastructure development, as well as market-driven opportunities such as plant-based protein. However, Myanmar needs to focus on fundamental challenges in the short-term, or risk shrinking its share of the global pulse market.

8 Recommendations

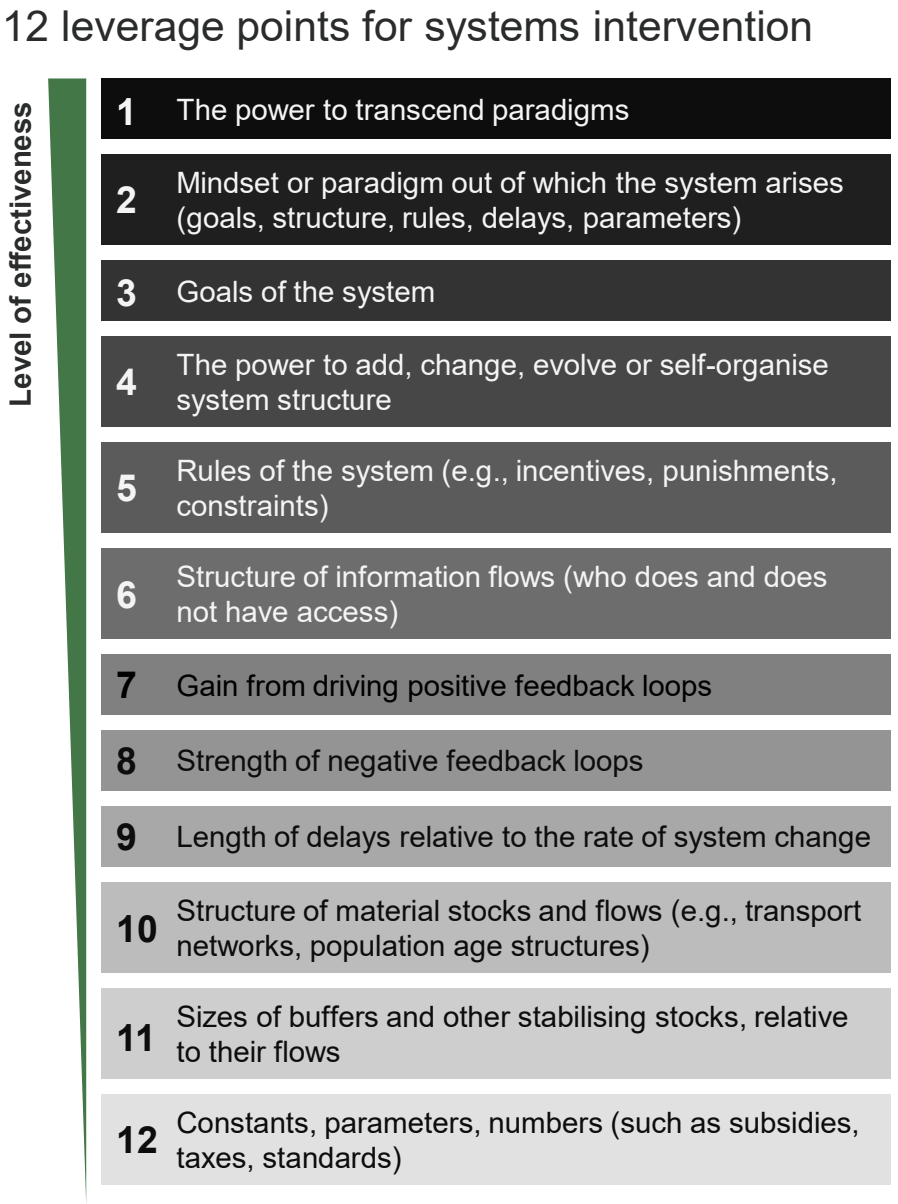
The following recommendations have been prioritised in line with Meadow's 12 leverage points to systems intervention[1], focusing on small changes that create the biggest impact.

1. **Value chain skills development training** for all stages of the value chain, starting with regulators and advisers. Institutionalise value chain training in the post-secondary education system.

2. **Improve the quantity and quality of labour supply** by encouraging farmers to pool resources to secure labour and transforming the perception of agriculture by establishing career paths, incorporating agri-tech to attract younger generations.

3. **Improve information flows** to connect value chain members, particularly smallholder farmers, to market forecasts and end-market demand requirements using cost-effective technologies that account for literacy and digital literacy levels. Invest in the agri-tech space to create an enabling environment and catalyse existing activity and innovation.

4. **Improve access to finance** (refer recommendations from AGB/2016/163 Inclusive Agricultural Value Chain Financing project), particularly investments in mechanisation.



1. Meadows, D. (1999)

6. **Improve the regulatory environment** by continuing to redesign the export process to reduce time and cost involved for exporters and enabling farmer aggregation by clarifying land ownership laws.

7. **Invest in pulse variety research**, ensuring research is commercialised by improving access to improved open-pollinated seed varieties by seed producers.

8. **Benchmark MyanmarGAP against GLOBALG.A.P.** and develop a roadmap for bridging the 20 per cent gap to achieve equivalent status (refer Appendix 10.5 for further scheme details). Raise awareness on the value of GAP systems and invest in training programs, leveraging technology such as chat bots.

Successful pulse sector initiatives have involved multi-stakeholder partnerships between value chain members who are willing to collaborate, and catalysed with donor funding, such as in the case of ICCO's P4 Project[2] and the Pahtama Seed Company (refer page 42). However, COVID-19 and the unrest caused by the military coup has unraveled years of investment in this space and is likely to impact the business environment for many years to come.

Image credit: Myanmar Business Today

1. ICCO (now Cordaid) (2020)

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INTERVIEWS

40 interviews with value chain members and stakeholders via phone/video call, July 2020 to January 2021.

10 Appendixes

10.1 Project objectives

1. Complete a market trend analysis to determine Myanmar's current positioning in the global pulses markets and opportunities to improve/secure its position.

2. Perform a Myanmar country analysis to understand the country's current market performance and capacity to better access existing and new market opportunities, to deliver higher value/returns to Myanmar smallholders, and to assess the country's readiness for change. This includes consideration of key Myanmar Government policies, regulations and strategies that may be impacting access to market opportunities.

3. Identify value chain improvements required to meet market requirements and maximise returns to smallholders. This includes consideration of storage, logistics, aggregators (village collectors, local traders, assembly market traders/commodity exchanges), sorting and processing, and quality assurance/control.

4. Undertake preliminary stakeholder engagement activities with potential partners who can help drive the changes required in the pulse value chains.

5. Develop in-country capacity to execute market development analyses by working with a suitable Myanmar partner(s) and produce a framework for future market development analyses.

6. Provide recommendations on developing and coordinating an ecosystem of stakeholders:

    - Across the entire value chain (producer to consumer), who will drive the value chain improvements required to better access the market opportunities identified.

    - Peripheral to the value chain but critical to creating the enabling environment necessary to facilitate value chain improvements (for example, government, financial services and technology).

The scope of the quantitative analysis was limited to the Big Four pulses – black gram, green gram, chickpea, pigeon pea – however, recommendations for further research are in scope if diversification opportunities with other commodities are identified as part of the market trend analysis.

10.2 Data notes and challenges

Date challenges

- Trade data is likely to be underreported given the prevalence of illegal border trade between Myanmar and China.
- Black gram and green gram are incorporated under an overarching 'dry beans' category in key databases (FAOSTAT and UN Comtrade). Black gram and green gram are approached very differently in Myanmar – for example, desired quality attributes and end markets. Being able to disaggregate the data would have provided a more precise understanding of production and value chain dynamics.
- Global databases were prioritised for the analysis in this report given the following:
  - Data sourced from various ministries of the Myanmar Central Government were highly inconsistent with global databases such as FAOSTAT and UN Comtrade.
  - Myanmar's fiscal year is not aligned with the standard 1 July to 30 June period that most global databases use. Myanmar's fiscal year was also changed in 2019.

Data notes

- Given the volatility of the global pulse market and trade flows, five-year periods (e.g., 2016 to 2020) have been prioritised for the analysis over single years.
- All currency conversions have been based on the following exchange rates (median exchange rate for the 12-month period to August 2020):

  USD/AUD = 1.56 MMK/AUD = 0.001085

- Refer next page for commodity codes used for the data analysis in this report.

Myanmar's fiscal year

Prior to 1 April 2019

Transition period in 2019 From 1 Oct 2019

Commodity codes

FAOSTAT

FAO item code	HS code	Commodity	Description
191	071320	Chick peas	Chickpea, Bengal gram, garbanzos (Cicer arietinum).
197	071360	Pigeon peas	Pigeon pea, cajan pea, Congo bean (Cajanus cajan).
176	071331 071332 071333 071339	Beans, dry	Phaseolus spp.: kidney, haricot bean (Ph. vulgaris); lima, butter bean (Ph. lunatus); adzuki bean (Ph. angularis); mungo bean, golden, **green gram** (Ph. aureus); **black gram**, urd (Ph. mungo); scarlet runner bean (Ph. coccineus); rice bean (Ph. calcaratus); moth bean (Ph. aconitifolius); tepary bean (Ph. acutifolius). Only species of Phaseolus should be included, though several countries also include certain types of beans. Commonly classified as Vigna (angularis, mungo, radiata, aconitifolia). In the past, these species were also classified as Phaseolus.
1954	Aggregated item	Pulses	

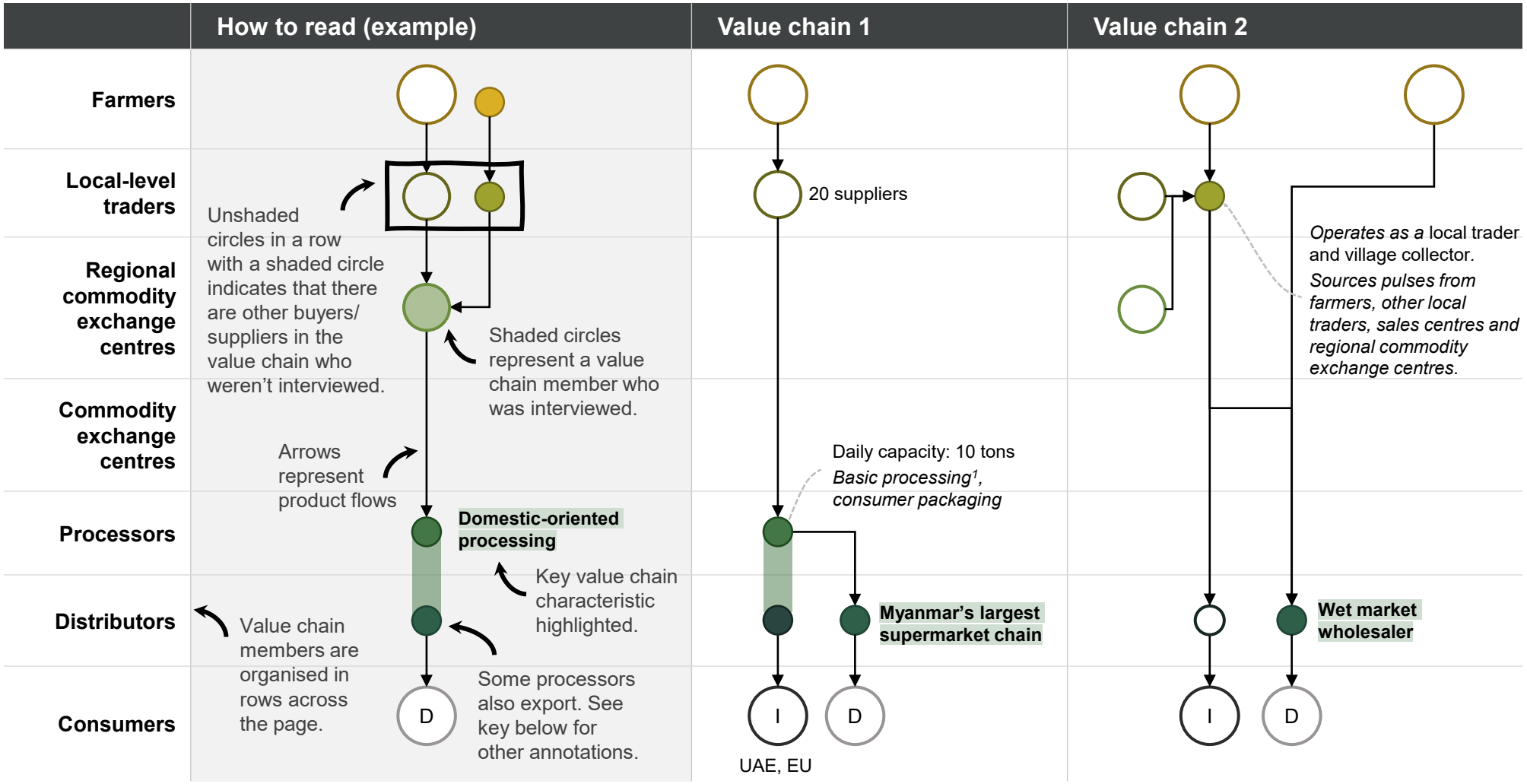
UN Comtrade

HS code	Commodity	UN Comtrade description
071320	Chick peas	Vegetables, leguminous; chickpeas (garbanzos), shelled, whether or not skinned or split, dried
071360	Pigeon peas	Vegetables, leguminous; pigeon peas (Cajanus cajan), shelled, whether or not skinned or split, dried
071331	Beans, dry	Vegetables, leguminous; beans of the species vigna mungo (l.) hepper or vigna radiata (l.) wilczek, shelled, whether or not skinned or split, dried
0713	All pulses	Vegetables, leguminous; shelled, whether or not skinned or split, dried

Note: *Vigna mungo* is green gram and *Vigna radiata* is black gram.

10.3 Value chains and members interviewed

Not all value chain members could be interviewed; value chain diagrams have been constructed based on information provided during the interviews completed.



Interviewed

Did not interview

Domestic distributor

Integrated processor and distributor

Exporter

Integrated processor and exporter

D Domestic market

I International market

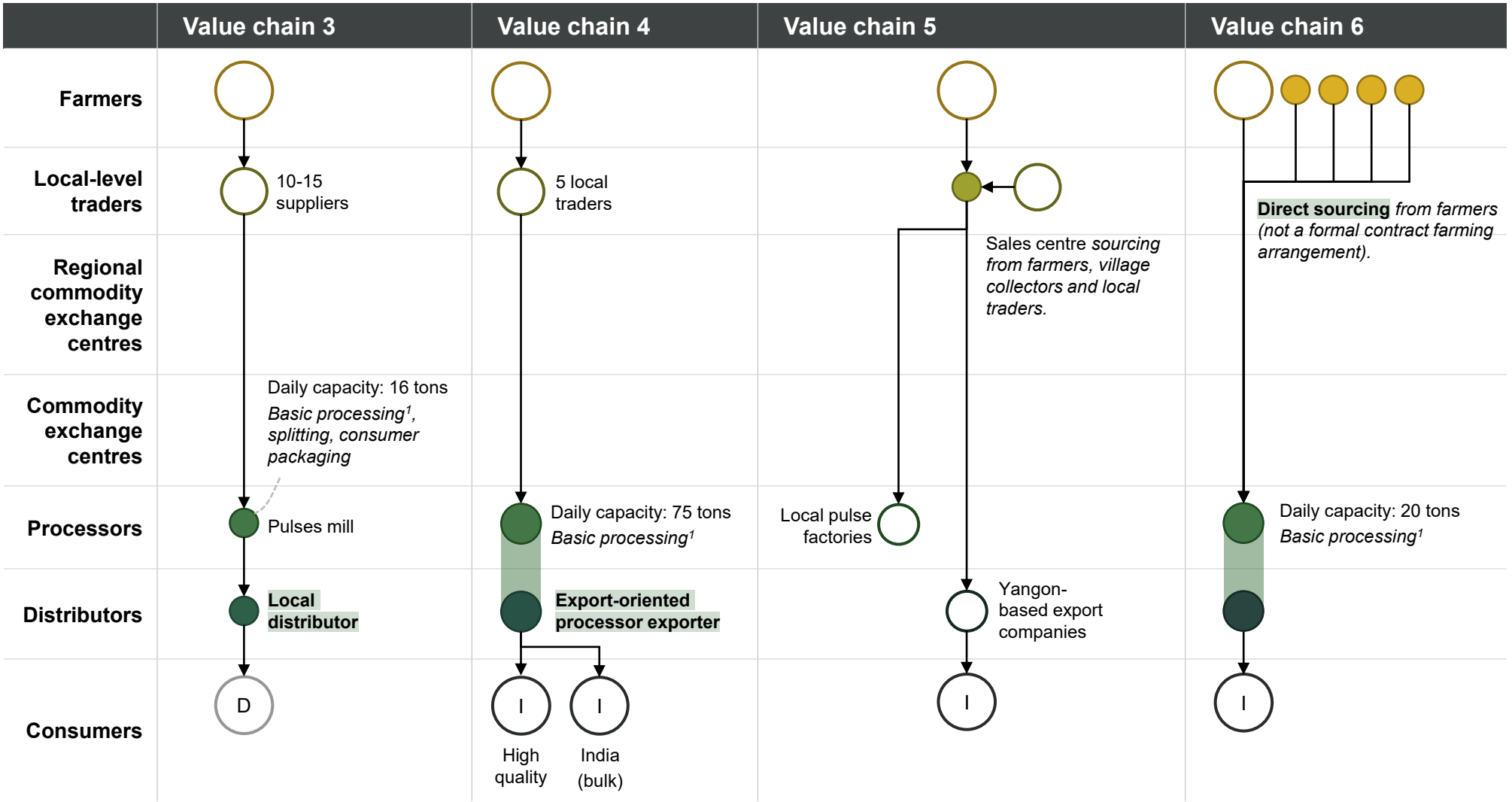
Daily processing capacity

< 20 tons

20-100 tons

> 100 tons

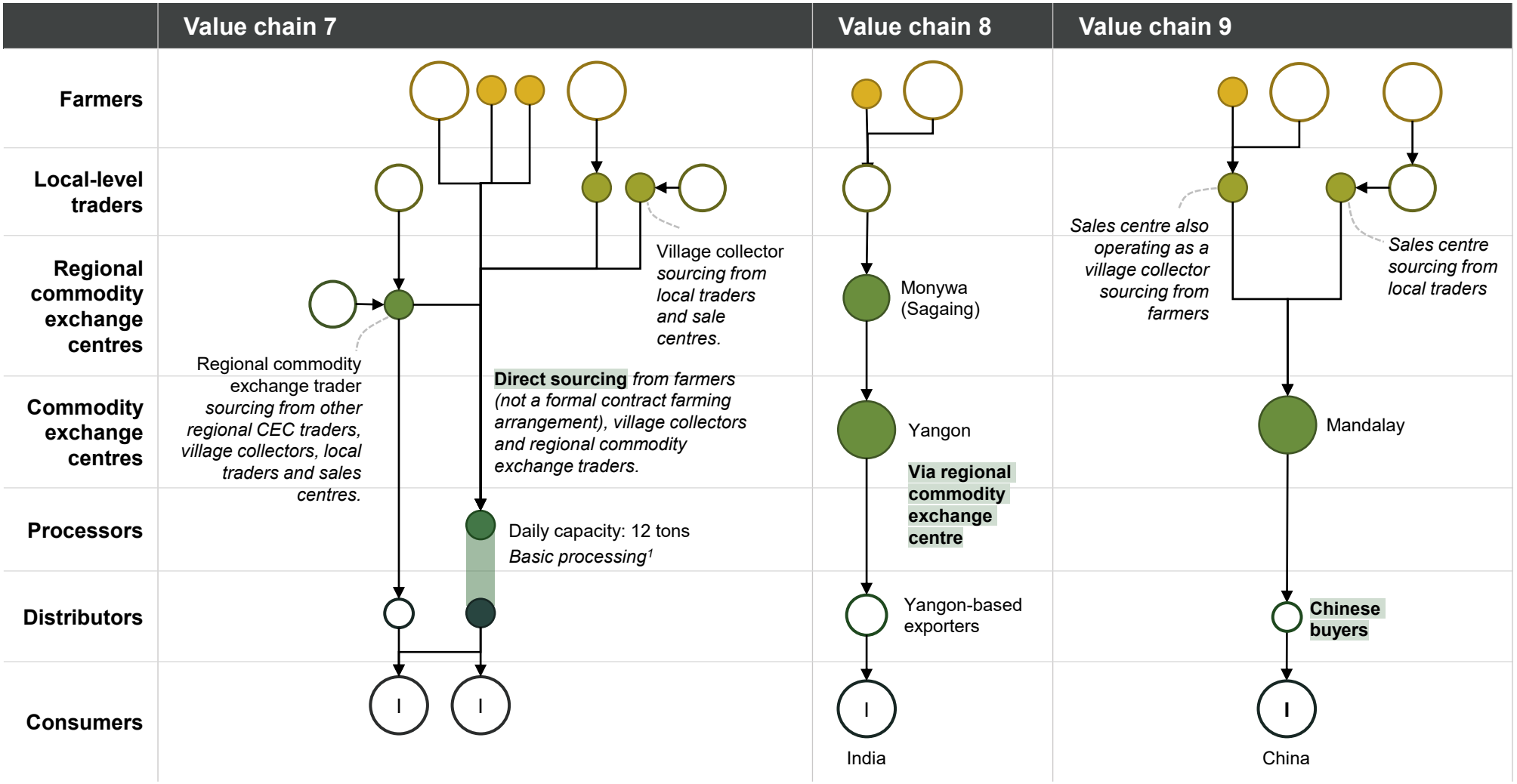
[1] Basic processing – Cleaning, grading, sorting



Interviewed
Did not interview
Domestic distributor
Integrated processor and distributor
Exporter
Integrated processor and exporter
D Domestic market
I International market

Daily processing capacity
< 20 tons
20-100 tons
> 100 tons

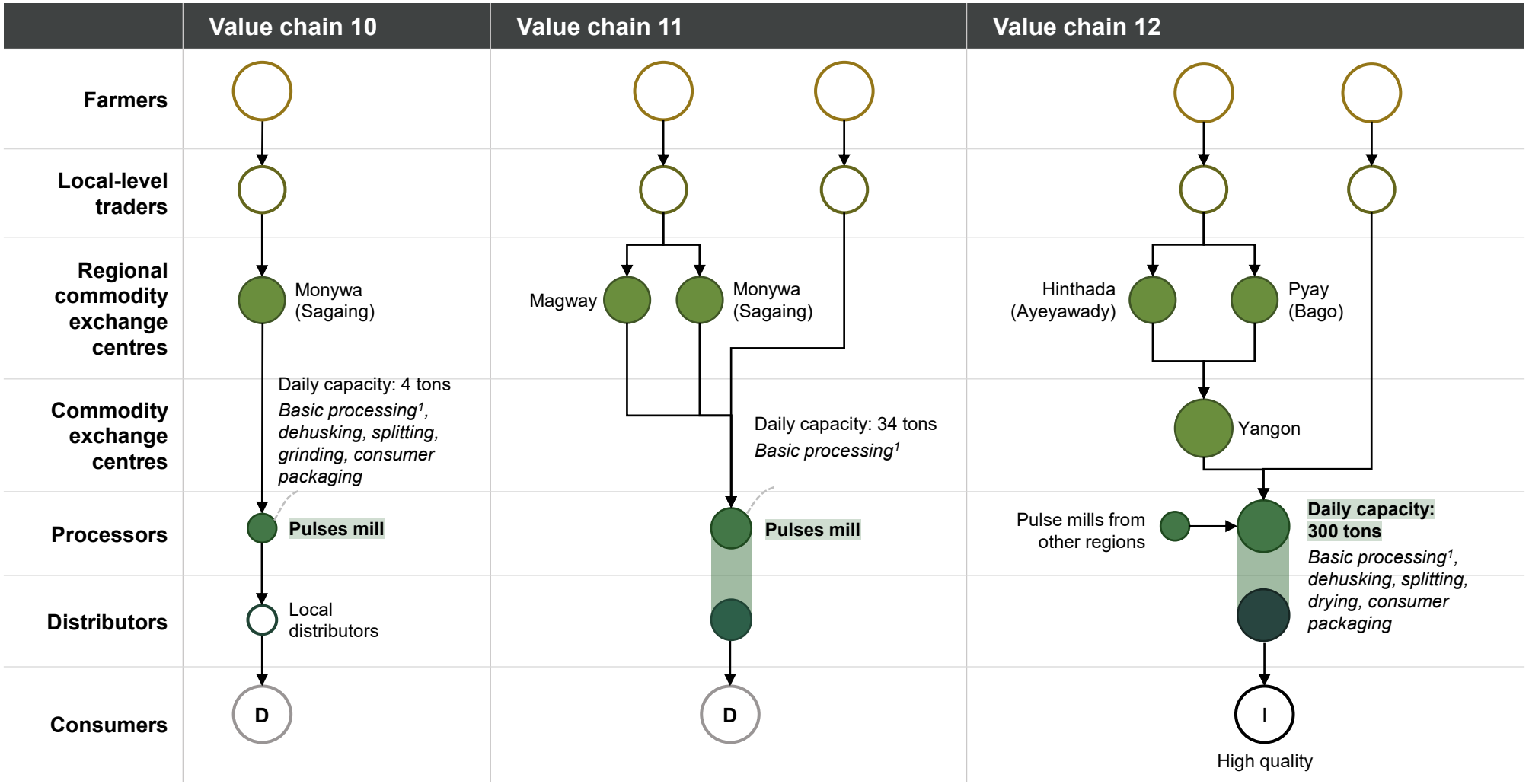
[1] Basic processing – Cleaning, grading, sorting



Interviewed
Did not interview
Domestic distributor
Integrated processor and distributor
Exporter
Integrated processor and exporter
Domestic market
International market

Daily processing capacity
< 20 tons
20-100 tons
> 100 tons

[1] Basic processing – Cleaning, grading, sorting



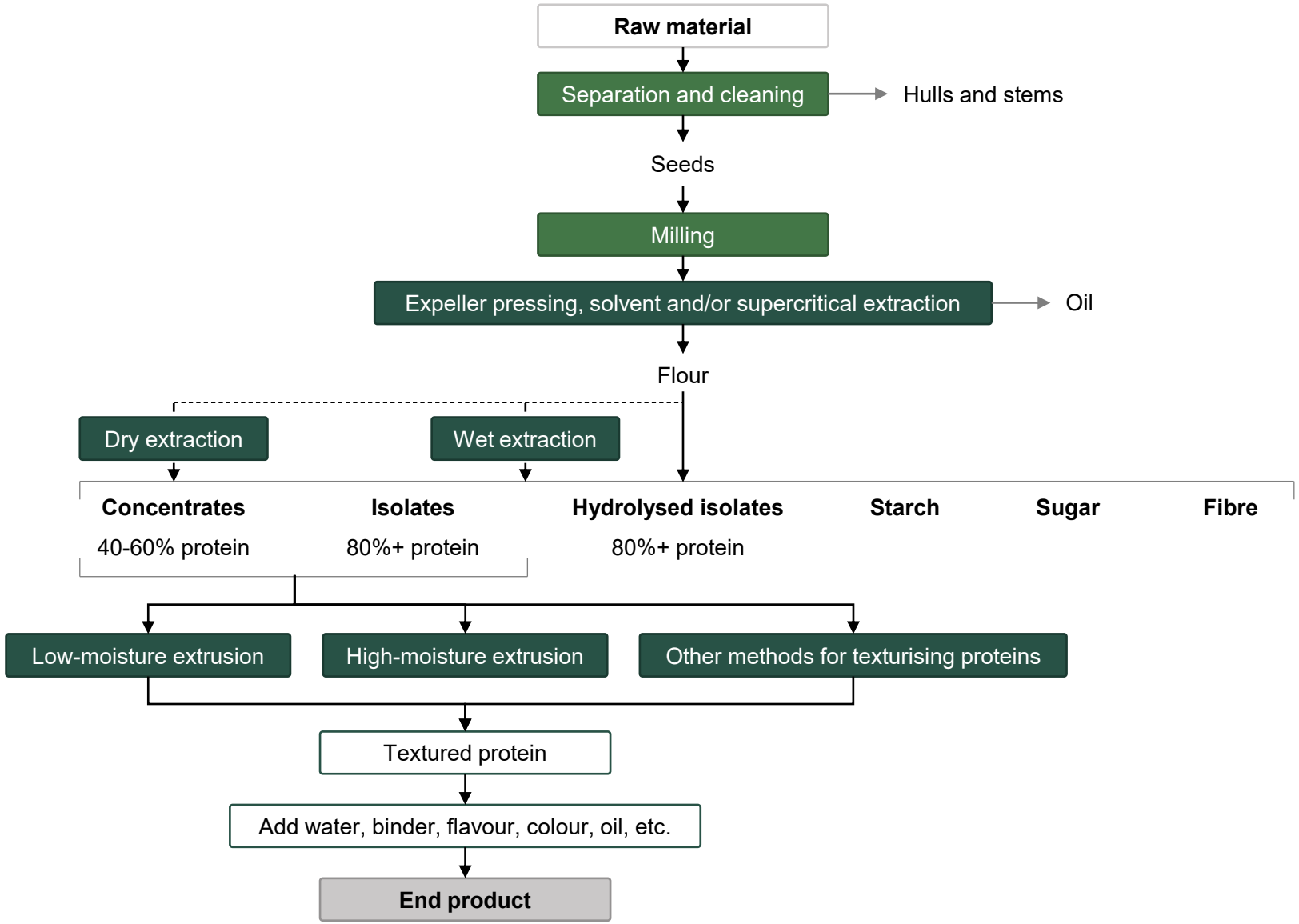
Refer page 8 for a summary of other stakeholders interviewed.

Interviewed
Did not interview
Domestic distributor
Integrated processor and distributor
Exporter
Integrated processor and exporter
D Domestic market
I International market

Daily processing capacity
< 20 tons
20-100 tons
> 100 tons

[1] Basic processing – Cleaning, grading, sorting

10.4 Plant-based processing



Adapted from Good Food Institute APAC (2020)

10.5 GLOBALG.A.P.

GLOBALG.A.P. is a global verification framework and voluntary standard for certification of safe and sustainable agricultural products across crops, livestock and aquaculture.

The framework is focused on pre-farm gate activities and covers:

- Food safety and traceability
- Environment (including biodiversity)
- Workers' health, safety and welfare
- Animal welfare

Other G.A.P. schemes are recognised by GLOBALG.A.P. as conforming to GLOBALG.A.P. requirements under one of three categories (equivalent schemes, approved modified checklist, resembling scheme).

MyanmarGAP is not recognised under any of the three categories.

Farm Assurers provide farmers with GLOBALG.A.P. training to help farmers implement the system and prepare for audits.

Certification bodies conduct announced and unannounced farm audits, issuing certificates to farmers who fulfil the requirements of the GLOBALG.A.P. system.

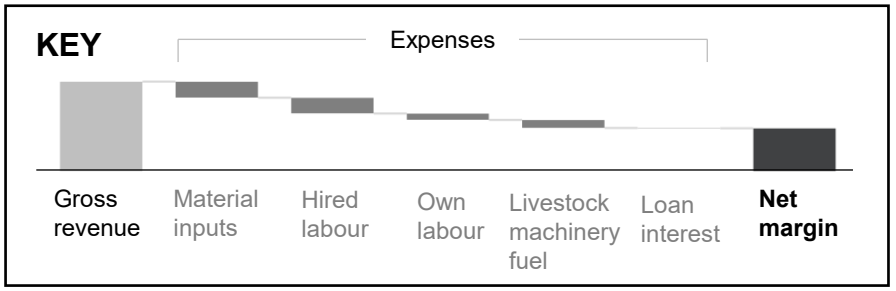
The **GLOBALG.A.P. database** stores records of all farmer assessments and certifications, supporting traceability, sustainability standards, etc. through online validation of certificates.

Validation of GLOBALG.A.P. certificate

GLOBALG.A.P.-compliant farmers are audited annually to ensure ongoing compliance with certification requirements. Certification enables farmers to demonstrate to buyers a minimum standard of food safety and sustainability.

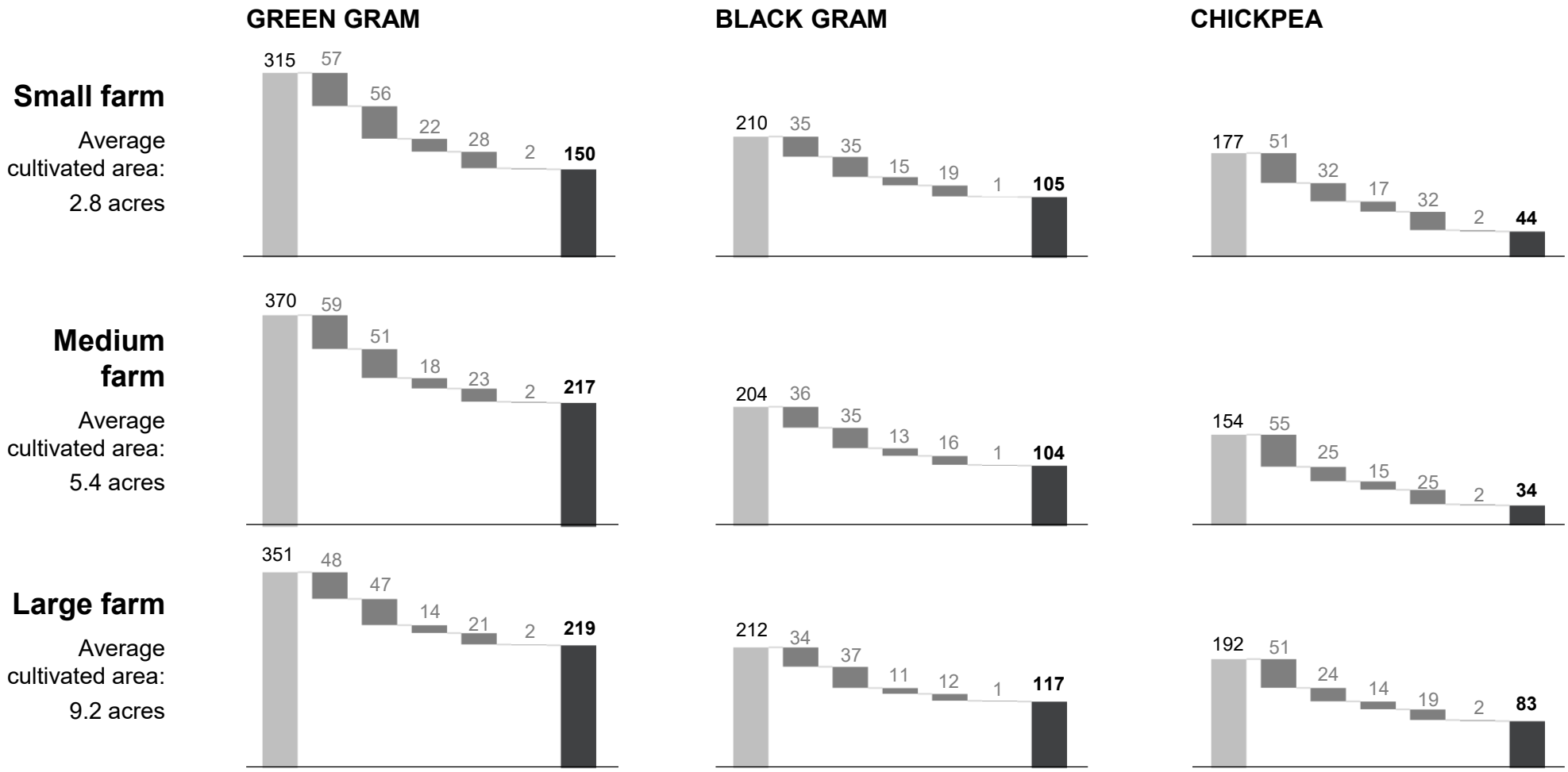
Buyers are provided with assurance of food safety and sustainability by sourcing only from certified farmers.

10.6 Farm production economics



Farm production economics breakdown

AU$ per kg



Analysis from World Bank (2016)