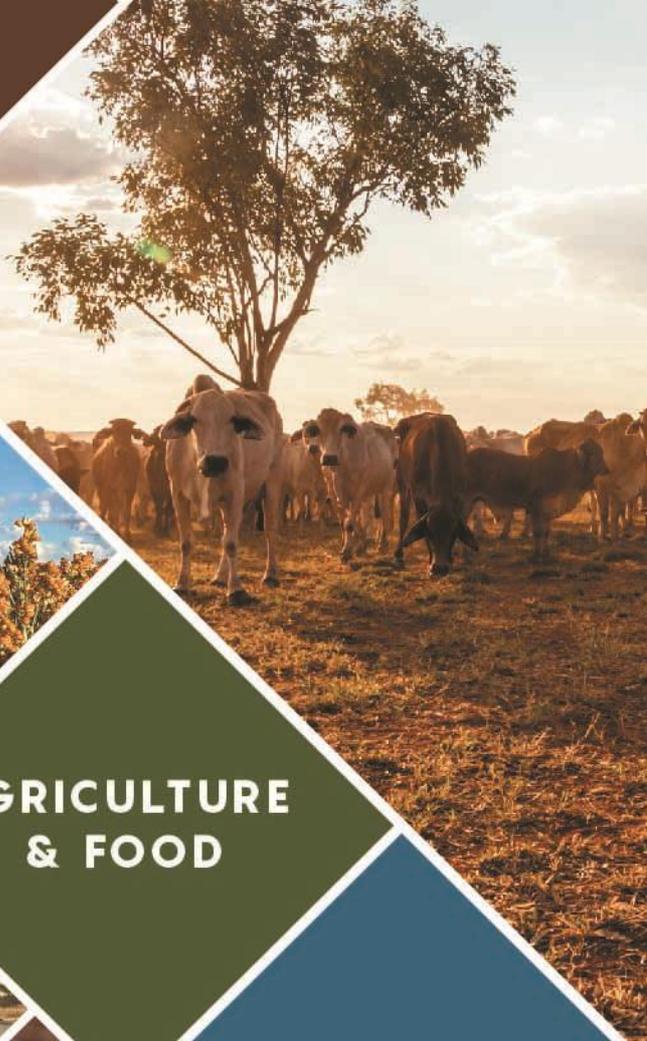
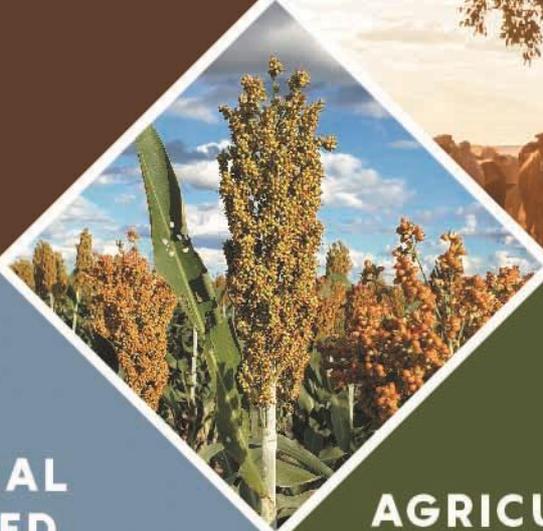


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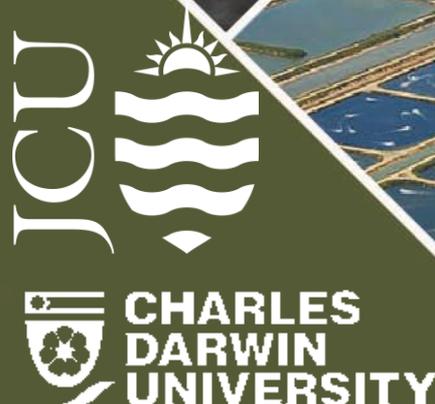
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# Reframing Smart Supply Chains in Northern Australia

Final Report

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Jennifer McHugh



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### Peer Review Statement

The CRCNA recognises the value of knowledge exchange and the importance of objective peer review. It is committed to encouraging and supporting its research teams in this regard.

The author(s) confirm(s) that this document has been reviewed and approved by the project's steering committee and by its program leader. These reviewers evaluated its:

- originality
- methodology
- rigour
- compliance with ethical guidelines
- conclusions against results
- conformity with the principles of the [Australian Code for the Responsible Conduct of Research](#) (NHMRC 2018), and provided constructive feedback which was considered and addressed by the author(s)



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## List of Acronyms

SHORT FORM	FULL FORM
AIS	Australian Industry Standards
ALC	Australian Logistics Council
ASEAN	Association of Southeast Asian Nations
CDU	Charles Darwin University
CRCNA	Cooperative Research Centre for Northern Australia
COVID-19	Coronavirus Disease 2019
DNAC	Developing Northern Australia Conference
FNQ	Far North Queensland
GDP	Gross Domestic Product
GVAP	Gross Value of Agricultural Production
IRC	Industry Reference Committee
JCU	James Cook University
NA	Northern Australia
NT	Northern Territory
OECD	Organisation for Economic Cooperation and Development
PWC	Price Waterhouse Coopers
QLD	Queensland
RAI	Regional Australia Institute
ROSI	Roads of Strategic Importance
WA	Western Australia



## Project Participants

This project was conducted by James Cook University and Charles Darwin University.



## Executive Summary

The value proposition of developing Northern Australia to bolster the economic growth, prosperity and security of the entire Australian nation is highlighted in the Australian Government's *Our North, Our Future: White Paper on Developing Northern Australia* (2015). Realising the potential for growth and capitalising on agricultural opportunities for Northern Australia requires strong and effective supply chains, supply chain infrastructure and effective logistics networks. Given the current rapid changes in trading, technological, consumer and natural resource environments, supply chains are critical in maintaining the overall competitiveness and productivity of Northern Australian industries. This is becoming increasingly important in the post-COVID environment. This research coincided with the outbreak of the Corona Virus Disease 2019 (COVID-19). The critical role that supply chains play in our lives have been highlighted during this crisis and participants saw that there were opportunities in this period for re-thinking Northern Australian supply chains.

The Cooperative Research Centre for Developing Northern Australia (CRCNA) has funded James Cook University (JCU) and Charles Darwin University (CDU) to jointly undertake this project called "Reframing smart supply chains in Northern Australia". The project involves the development and exploration of new and innovative thinking about the potential for substantive agricultural supply chain redesign in Northern Australia. The project utilised mixed-methodologies including literature review, an environmental scan, stakeholder analysis and communication, in-depth interviews with 25 stakeholders and two roundtables with over 85 participants. These participants ranged from industry peak bodies, Federal/State/Territory and local governments, businesses, education providers, major supply chain companies, regional economic development bodies and others. Please refer to Appendix 1 for a list of participants.

The study uncovered key issues that need addressing to re-frame supply chains. These include the:

- Lack of clear agricultural development vision, prioritisation and development sequencing for Northern Australia;
- Flow on impacts resulting in a lack of strategic thinking and priority focus areas for integrated supply chain planning and development, making it difficult to attract significant private sector logistical commitment and investment;
- Complexity of distances and the magnitude of the freight cost and task. In consideration of freight and non-freight subsidies, 71 % of respondents supported the idea of a subsidy for Northern Australia in recognition of the fact that the cost of doing business is higher, that significant market inefficiencies exist, and that there are substantive regional development aspirations nationally and within Northern Australian communities. Significant caution was proffered that the application of subsidies should only be applied in very specific contexts, be based on a strong economic case, and designed to achieve quite specific time-bound outcomes;
- Infrastructure challenges, including roads, aviation, ports, rail, digital connectivity, power, storage (particularly refrigerated), processing and distribution hubs. Infrastructure investment decisions were seen as being modelled on narrow cost assessments. The need for a more value creation-based approach to infrastructure was expressed. Arguments were put forward for a renewed approach to Northern infrastructure development, with a more coordinated infrastructure feasibility assessment process and shared financing methods;
- Fragmentation and lack of collaboration in the supply chain. This was a major theme to emerge in the research. Some 74% of respondents identified that there was limited or no collaboration across sectors while only some 26% identified that there was some or a lot of collaboration. The issues of fragmentation and lack of collaboration were discussed covered several aspects: i) within sectors; ii) across sectors; and iii) across jurisdictions. The lack of appropriate architecture for collaborative supply chain planning and coordination was identified. There was some 80% support for the idea of a supply chain coordinator role, to facilitate data development and the integration and coordination of effort across Northern Australia. The cross-jurisdictional fragmentation (between Commonwealth, State/Territory and Local Governments, and across the north) was seen to impact on de-risking and ability to attract investment;
- Focus of supply chains and the related infrastructure was mostly looking at the north-south connectivity. The need to look at east-west and more northern-oriented supply chain models and the establishment of a strengthened hub-spoke model was identified, particularly now in a post-COVID-19 environment;
- Respondents in this research identified that Northern Australia should focus on Asia and the Indo-Pacific, but particularly ASEAN opportunities for aggregation, processing and markets. In roundtable polling, 95% of respondents identified that there should be a greater focus on Asia. This was strongly the case, despite the research being conducted during COVID-19. Participants cautioned about not realising the potential from Asia and the Indo-Pacific and that these were long-standing aspirations. A range of barriers that required coordinated responses was identified. A need for a sub-regional trading-bloc with immediate neighbours (e.g. Indonesia, PNG, East Timor, Fiji) was thought to offer synergies and benefits, including joint supply chain hubs, joint workforce training and development, value-adding processing options and an efficient way to access to the bigger Asian markets;
- Transitioning economies of Northern Australia had impacts on the workforce, resulting in skills, gaps and shortages in the supply chain. Respondents in the roundtable polls overwhelmingly (98%) identified workforce shortages and



gaps across different supply chain industries in Northern Australia. The supply chain workforce is expected to grow 2-6% nationally, and the gaps in skills include literacies in new digital technologies, data analytics, cybersecurity as well as soft skills such as leadership, management, problem solving and communication. The decline in vocational education training in supply chain industries was identified and the urgent need to effectively engage with universities and other education providers in relation to industry needs was expressed. The difficulty of attracting employees to the types of jobs and locations was acknowledged to be a major barrier. Liveability factors were considered to be significant in attracting and retaining skilled workforce to Northern Australia. There was a call to think of supply chain infrastructure to include investments in schools, hospitals and amenities;

- This research coincided with the outbreak of the Corona Virus Disease 2019 (COVID-19). The critical role that supply chains play in our lives have been highlighted during this crisis and participants saw that there were opportunities in this period for re-thinking Northern Australian supply chains. The key areas of focus included building demand-resilient markets, the North playing a role in contributing to self-reliance and national recovery and strengthening the flexibility of supply chains in Northern Australia, including the consideration of regional supply chain and manufacturing hubs. The absence of research on how COVID-19 was affecting Northern Australian supply chains (as distinct from the south) was pointed to and the urgent need for an evidence base was emphasised; and
- While acknowledging the contribution that CRCNA has made to Northern Australia focused research since its beginning in 2015, respondents identified that there still remains major gaps in our knowledge on many issues relating to the development of Northern Australia. This was seen as a major drawback in making strategic decisions and prioritisation of future directions and with respondents arguing that further research is required.

In light of these findings from the research, the following recommendations are made to support the re-framing of supply chains in Northern Australia.

#### *Vision and priorities for agriculture and supply chains*

Recommendation 1.1: Commonwealth, State and Territory Governments in the North should work with pan-Northern stakeholders to develop a focused vision, spatial priorities and sequence for agricultural development across Northern Australia.

Recommendation 1.2: Within the context of this vision, within geographic or sectoral priorities, there is a need for collaborative supply chain development that creates partnerships among the relevant stakeholders to for deliberative planning, coordination and investment-focused discussions on Northern supply chain priorities.

#### *Enabling Investment for Northern Australia Supply Chains*

Recommendation 2.1: The Australian Government should establish a targeted Northern Australia Supply Chain Development Fund to enable and support supply chain collaboration and partnerships, strategy development, business case development and implementation.

Recommendation 2.2: Within geographically or sectorally prioritised supply chains, through the Supply Chain Development Fund, support the identification, prioritisation and development of freight and non-freight business case options/models for either targeted subsidies or priority infrastructure, in line with identified supply chain priorities.

#### *Infrastructure Development*

Recommendation 3.1: The Office for Northern Australia (ONA), in partnership with CRCNA, engage with Infrastructure Australia and relevant jurisdictional agencies to adopt alternative pan-Northern and regional frameworks for the planning and assessment of future infrastructure investment, particularly based on agricultural development potential, the whole of supply chain and wider sectoral, economic, social and sustainability considerations.

Recommendation 3.2: Establishment of improved cross-governmental coordination mechanisms (e.g. via Regional Deals) for major supply chain infrastructure planning and feasibility assessments and coordinated finance in Northern Australia.

#### *Supply Chain Collaboration and Coordination*

Recommendation 4.1: That a partnership-based Northern Australia supply chain collaboration/coordination plan and architecture be developed. The options for the development, testing and continuous improvement of hub-spoke supply chain models and data coordination in Northern Australia be explored.



### Looking to Asia and the Pacific

Recommendation 5.1: Explore options for establishing more durable sub-regional trading strategies or blocs for Northern Australian agriculture, focussing on building value in the supply chain within Northern Australian, including options for purpose-built or shared supply and value chain hubs with neighbouring countries.

Recommendation 5.2: More active and strategically focussed coordination of government trade-effort to progress these strategies, including industry and relevant stakeholder investment efforts to engage in ASEAN markets and supply chain relationships.

Recommendation: 5.3: The Australian Government to prioritise Northern Australian agendas in trade development strategies, particularly measures for accessing markets and developing deeper and more value-rich supply chain networks.

### Workforce Considerations

Recommendation 6.1: In partnership with key Northern Australian Universities, other education providers (e.g. schools vocational) and key industry and supply chain stakeholders, develop a North Australian Education Hub with a focus on regional engagement, coordinated workforce education/training and research. The Hub should work with a view to supporting industry needs including supply chain industry skills needs, workforce shortages and gaps in Northern Australia.

Recommendation 6.2: Support third party facilitated development of regional/place-based supply chain workforce strategies and plans across Northern Australia.

### COVID-19

Recommendation 7.1: Within national and jurisdictional COVID response and recovery strategies, the Commonwealth, States and Territory should identify the impacts of COVID-19 on agricultural supply chains and exploring ways to develop resilient and flexible supply chains in the Northern Australian context.

### Data and Research

Recommendation 8.1: Commissioning of long-term research on the development and continuous improvement of partnership-based and data-rich models of horizontal and vertical supply /value planning and collaboration within and across sectors in Northern Australia.

Given the history of Northern Australian development, addressing the topic of 're-framing' supply chains in Australia is no easy task and will not happen overnight. From the workshops, the top three responses for what needs to happen as a priority for reframing supply chains were:

- Improved supply chain multi-purpose/multi-sector enabling infrastructure;
- Cross-industry/sector synergies and multi-modal supply chains; and
- Better planning and coordination across jurisdictions.

The common theme running through these suggestions, from a very diverse range of stakeholders, is a need to increase strategic focus, collaboration, effort integration and coordination. This goes to the core of efforts to reframe supply chains in Northern Australia. The re-framing efforts of supply chain strengthening in Northern Australia will be influenced by the extent and nature of relationships cross sectors, across jurisdictions and with neighbouring countries. The challenge ahead is to invest more strategically at different scales of coordination to achieve a better understanding of supply chain potential and targeted investment in key supply chain collaboration. There is a need for a holistic and systemic approach, shifting supply chain thinking towards both meeting the cost reduction needs of individual producers and creating collaborative synergies across producers, sectors and value adding opportunities. This approach would enable demand-led thinking about critical mass and optimisation of the entire supply chain network.

## Introduction

The Australian Government is committed to the development of Northern Australia. *Our North, Our Future: White Paper on Developing Northern Australia* (2015) and identified the potential for diversifying the economy for a more prosperous Northern Australia. The value proposition of developing Northern Australia for the economic growth, prosperity and security of the entire Australian nation was reinforced as themes at the 2019 Developing Northern Australia Conference (DNAC, 2019). While Northern Australia comprises approximately 40% of the landmass of Australia, 17 million hectares of arable soil and 60% of the country's rainfall (PWC, 2020:11), it also contributes approximately 12% of the national Gross Domestic Product (GDP).

In addition to the significant natural resources, Northern Australia has significant production capabilities in agriculture including livestock, and horticulture. Northern Australia's agriculture sector, in particular, is a major contributor to the national economy with the annual value of agricultural production in the region exceeding \$7 billion in 2018 (PWC, 2020:10). The competitive advantages for agriculture in Northern Australia have been identified as:

- Significant production capability and potential to expand;
- Favourable conditions of trade;
- Proximity to fast growing Asian markets; and
- Being a developed economy in the tropics (PWC, 2020: 11).

Realising the potential for growth and capitalising on agricultural opportunities for Northern Australia requires strong and effective supply chains, supply chain infrastructure and effective logistics networks. Given the current rapid changes in trading, technological, consumer and natural resource environments, particularly in the post -COVID environment, supply chains are critical in maintaining the overall competitiveness of Northern Australian industries. In the context of agricultural development in Northern Australia, Ash and Watson (2018:302) argue that although there are climatic and environmental constraints, "it is mainly factors associated with finances and investment planning, land tenure and property rights, management, skills, and supply chains which provide the critical challenges". Among the well-accepted challenges facing Northern Australia's economic growth, supply chain shortcomings play a prevalent role. This can be attributed to the infrastructure development lag that the Northern region has accrued as a result of Australia's economic past, with historic underinvestment (RAI, 2013, Infrastructure Australia, 2019, Dale et al, 2020). Northern Australia's supply chains deficits constitute one of the key comparative disadvantages that the region faces, despite its outstanding resources, people and locational advantages.

The Cooperative Research Centre for Developing Northern Australia (CRCNA) has funded James Cook University (JCU) and Charles Darwin University (CDU) to jointly undertake this project called "Re-Framing Smart Supply Chains in Northern Australia". The project involves the development and exploration of new and innovative thinking about the potential for agricultural supply chain redesign in Northern Australia. The project aims to identify:

- The overall characteristics of supply chains in Northern Australia;
- Options, strategies and new ways of thinking about supply chain management for Northern Australia, with a focus on agricultural supply chains;
- Potential policy and budgetary directions to support effective supply chains for Northern Australia;
- Potential partnerships for collaborative planning and implementation of supply chain initiatives; and
- Options for investment attraction for relevant infrastructure to support supply and value chain effectiveness.

At the pan-northern level, the project explores ways to support the development of alternative thinking about supply chains for Northern Australia that are more efficient, more effective, smart and agile.

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## Project Methodology

The project derives its overall conceptual framework from a multidisciplinary base of regional development, economic development and development governance and policy. These disciplines enable recognition that the economies and communities of Northern Australia are dynamic and face a significant array of long-standing and emerging new challenges. The project also takes place within an intricate web of government (policy and governance), regional, industry and stakeholder relationships. Northern Australia's regions are diverse with unique patterns of development and change. Moreover, the economics of geography and place-based policy interventions are emerging as critical considerations in policy design and implementation.

The project was conducted from over a 12-month period, and utilised a mixed-methodology. Project implementation was undertaken in a number of stages:

- An environmental scan to identify key factors in the Northern Australia industry and government landscapes, key developments and emerging themes;
- Stakeholder analysis to identify and mobilise the critical stakeholders for the research. Over 100 agencies/ individuals were identified and contacted. This analysis also included a communication plan to inform participants of about the project;
- A literature search of academic, research and grey literature to identify previous work on the topic. A literature review report was completed, highlighting the key issues and themes. This provided the foundations for the interviews and roundtables that were to follow;
- Initial engagement undertaken on an informal basis with select stakeholders to canvas their perceptions of key issues and who were other critical stakeholders;
- Interviews conducted with 25 key stakeholders in industry/business, government, industry peak bodies, consultants and other critical stakeholders;
- A discussion paper was prepared, circulated and feedback sort from over 150 people and agencies; and
- Two roundtables conducted on May 27<sup>th</sup> and June 3<sup>rd</sup>, 2020, using virtual platforms. Over 85 participants took part in the two roundtables. The participants were from industry peak bodies, Federal/State/Territory and local governments, businesses, education providers, major supply chain industries, regional economic development bodies and others.

The data was analysed through a series of specific analytical steps. The first was *data reduction*, where data was coded, factual data summarised, and all the collated material was categorised. The second stage was *data organisation*; where the data was thematically assembled. The third phase was *interpretation and evaluation* that involved identifying patterns, trends and explanations that lead to the conclusions. Appropriate ethical clearances to undertake the project were obtained from James Cook University Human Research Ethics Committee.

## Characteristics of Supply Chains in Northern Australia

Supply chains in Northern Australia are complex and involve a dynamic and interconnected network of organisations. The Australian Logistics Council estimates that for every 1% increase in efficiency gained in the supply chain sector, GDP will be boosted by \$2 million (ALC, 2016:3). With Northern Australia constituting approximately 12% of Australia's GDP, equivalent to \$187 billion in 2016-17 (Dale et al, 2020:8), there are significant gains to be made from infrastructure that provides supply chain efficiencies. The most significant challenge for development in Northern Australia remains the under-development of higher value and more efficient, low impact supply chains (Dale et al 2020).

Opportunities and barriers for supply chains in Northern Australia display commodity, industry and region-specific characteristics. A number of studies have been funded by the CRCNA from, 2018-2020, (PWC 2019; ACIL Allen 2020; KPMG, 2020; KPMG, 2019; Chilcott et al., 2020) examining supply chains in selected regions, including Far North Queensland, Northern Queensland and Mackay, Whitsundays and Isaac region. Additionally, a recent study was also undertaken to examine the key opportunities for Northern Australian exports to the ASEAN region. Moreover, there has been industry-specific situational studies in forestry, rice, aquaculture, broadacre crops and beef. The supply chain barriers in Northern Australia identified across commodities can be summarised as:

Table 1: Supply Chain Barriers Across Commodities

Supply Chain Barriers in Northern Australia	
The vast geographic footprint of supply chains across Northern Australia	Biosecurity considerations and risks
The high cost of freight	Provenance, certification, traceability
Challenges of access to transport, air, sea, rail, road	Challenges of access to markets, particularly in Asia and non-tariff barriers
Lack of interoperability	Difficulty attracting supply chain investment
Lack of adequate storage facilities, particularly cold storage	Challenging digital connectivity
Lack of refrigerated container freight access	Water allocation and access for production
Infrastructure challenges	Lack of processing facilities and limited value-adding
Regulatory fragmentation across jurisdictions and/or regulatory burden	Challenges of production and scaling up
Workforce skills gaps and shortages	Lack of coordination multi-purpose/multi-sector supply chains
High cost of energy and power	Long established supply chain patterns, risk aversiveness by producers
Source: ACIL Allen 2020; Babacan & Tremblay, 2020a; KPMG, 2020; KPMG,2019;, AustCham, 2019	

For industry specific supply chain characteristics refer to Babacan and Tremblay (2020a), ACIL Allen (2020), KPMG (2019, 2020) and Akbar et al. (2019).

The overall findings from the studies indicate that:

- There is potential for economic growth in Northern Australia across different industries if supply chains can be strengthened, trade volumes intensified, digitally smart technologies adopted and a more targeted market approach taken, particularly export to ASEAN countries;
- Cooperation is needed along supply chains and the development of multi-purpose/multi-sector supply chains;
- Freight networks and logistical connectivity between production stages need to be more efficient;
- There is a need for multi-purpose/multisector enabling infrastructure;
- Infrastructure gaps exist in areas such as transport, storage, biosecurity and export facilities and digital connectivity;
- Supply chain thinking tends to be driven by the commercial realities facing individual producers residing within various parts of the supply chain;
- The emergence of high value products (such as cotton) are crucial in driving new supply chains;
- The cost of doing business is much higher in Northern Australia, particularly for freight;
- There is a need for horizontal integration across supply chains and to 'value-add' via appropriate processing, storage, packing and handling facilities; and
- Requisite investment in infrastructure, research and human capital is needed (Babacan and Tremblay, 2020).

Northern Australia faces excessive freight costs (particularly for low volume agricultural products) and supply chains are best served by highly collaborative networks where limited options exist. This is needed to resolve inadequate access to markets due to capacity constraints, high costs, low volumes and, more generally, network unreliability. Considering these challenges, Northern Australia struggles to attract the capital investment needed to expand, the skills (except during mining booms) and it endures stickiness issues (i.e. inability for economic adjustment) typical of peripheral regions around the world. The long-term impacts include a constant loss of key human capabilities and of the constant boom and bust approaches to efforts to build a sustainable economic base.

## Reframing Supply Chains in Northern Australia

Building on our previous literature review and discussion paper, this paper specifically aims to synthesise in-depth discussions from interviews and two roundtables held with over 85 participants. These engagements highlighted some key issues for consideration in reframing the supply chains. This section explores the main considerations for radically shifting concepts behind and the capacity of Northern Australian supply chains into the future.

### *Vision and priorities for agriculture and supply chains*

Northern Australian agricultural production constitutes approximately 14% of Australia's agricultural production (Dale et al, 2020:8). Agricultural development and expansion are a key part of developing Northern Australia through the intensification of cattle production, new irrigated and dryland cropping systems, the expansion in aquaculture, timber and forest industry development and the expansion of horticultural production.

The feedback from stakeholders of concern to supply chain reframing has identified a range of issues in relating to agricultural development in Northern Australia including the:

- Lack of a clear agricultural development vision, as agreed by key stakeholders in industry, government and community, for the development of Northern Australia;
- Lack of defined priorities in agricultural development and the need to take a more focused sectoral and spatial prioritisation to guide scale and policy and industry interventions;
- Absence of strategic prioritisation impacting on the ability to attract significant private sector investment; and
- Flow on impacts of lack of priority focus areas for supply chains such where investments may be made in areas such as roads, water development and other infrastructure.

Going deeper than the broad intention of the *Our North, Our Future: White Paper on Developing Northern Australia* (2015) and *Agricultural Competitiveness White Papers* (Commonwealth of Australia, 2015) there is a compelling economic argument for a significant and collaboratively developed agricultural development policy in northern Australia based on the vision and opportunity (PWC, 2020; Dale et al., 2020). Agricultural development currently takes place within a complex set of fragmented industry and jurisdictional actions. Apart from a clearer pan-northern vision, there is a need for more regionally focused place/region- based direction setting to determine agricultural priorities. This approach needs to be linked with the 'de-risking' efforts of government, critically examining the way that policies, regulations and approval processes enable investment in agricultural development. Critical areas of de-risking include water allocation, vegetation and land use planning, the progression of tenure security, impact approvals (e.g. environmental), infrastructure analysis and planning, and the management of workforce risks and other social and ecosystems risks (PWC, 2019, Dale et al., 2020). Improved processes aimed at de-risking will enable the attraction of suitable investment for agricultural development (PWC, 2020).

Linked with the prioritisation of agricultural development is supply chain development prioritisation which may be arranged on regional, sector or market (demand) considerations. Current supply chain patterns and linkages are well established across Northern Australia. There is a reliance on produce from Northern Australia going through supply chain networks into southern Australia, even when ultimately the products are northbound (Acil Allen, 2020; KPMG, 2020; KPMG, 2019). Individual producers have developed bespoke, 'fit for purpose' supply chains driven by managing risk/uncertainty, production cycles and weather conditions. Individuals and small groups of producers, for example, arrange the transportation of their produce to meet their independent needs. Hall and Frew (2017:4) suggest that, in the context of Queensland, "these specific conditions make arranging efficient large-scale transportation difficult... and this creates gaps in knowledge of what is moving where and when hence the issues with the transfer of information. In turn, this leads to less efficient supply chains and constrains the ability of the sector to move its produce at the lowest possible cost". Infrastructure investments in the past, particularly road and rail infrastructure, have reinforced Northern Australia's connections with and perhaps dependency on the southern network, at the expense of improving northbound trade and gateways (shipping and aviation). This builds on the insights above, and the possibility that redirecting traffic could lead to more efficient freight solutions. There is a need to ensure the development of higher value, efficient and smarter supply chains for Northern Australia. There is a need to develop supply chain priorities for Northern Australia, particularly in a post-COVID-19 environment, based on agricultural development priorities and supply chain potential. These need to be very focused and specific and guide targeted investment across the demand and supply side of supply chain issues. These focused priorities will need to consider supply chain opportunities to develop more direct international links where scale and value can be demonstrated, more East-West links across Northern Australia rather than just North-South ones.

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### ***Vision and priorities for agricultural supply chains***

- Recommendation 1.1: Commonwealth, State and Territory Governments in the North should work with pan-Northern stakeholders to develop a focused vision, spatial priorities and sequence for agricultural development across Northern Australia.
- Recommendation 1.2: Within the context of this vision, within geographic or sectoral priorities, there is a need for collaborative supply chain development that creates partnerships among the relevant stakeholders to for deliberative planning, coordination and investment-focused discussions on Northern supply chain priorities.

*Pathway to Implementation:* Bringing stakeholders together, led by ONA in partnership relevant agricultural departments, CRCNA and key industry sectors, the ALC and Infrastructure Australia. This would be a first step to enable a deliberative and shared process to gain agreement on what should be achieved, planning, prioritizing and joint course of action/plan.

*Potential Impact:* A clear, shared workplan, prioritising and delivering multi-year investment in priority Northern Australian supply and value chain infrastructure.

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### ***Enabling investment for Northern Australian supply chains***

Resolving Northern Australia's freight task/gap is going to be a key to improving sectoral competitiveness as identified in numerous research findings (ACIL Allen, 2020; KPMG, 2020; KPMG, 2019). Rural industries in Northern Australia are characterised by long and fragile supply chains between production, processing and markets. Climatic conditions, sparse and limited road networks challenge industries in accessing inputs and supplying products. The viability and profitability of North Australian industries are affected by many factors such as cost of productions, access to finance and farm debt, productivity, domestic and global prices and markets (KPMG, 2020). Direct costs, such as freight, are a major contributor to enterprise profitability. Freight costs can constitute up to 35% (Higgins et al, 2015:32) and up to 48.5% of farm gate prices (PWC, 2019:37).

The transport options for Northern Australia span across all major modes of transport, including sea, air, road and rail. The rail and road options mostly provide north-south connectivity. Airfreight options are limited and costly, particularly due to lack of carriers, low international air freight volumes, lack of availability of wide-body passenger aircraft, and limited and/or no refrigerated container capability which limits the export of high-quality agricultural products from the region. Each port has their unique challenges depending on the natural characteristics of the port, the nature of commodities traded, channel depth for vessel entry, capability of vessels and terminal area and specialised port infrastructure (for storage, handling, stockpiling). Increase in port capacity is linked to changes in activity at the port driven by market demand such as the expansion of the nature of commodities or a change in the volume of commodities going through the port. Infrastructure Australia notes the variable growth the freight task in the different North Australia ports and identifies that there are key growth regions with specialised port infrastructure, mostly driven by minerals, while other areas are at a further distance from ports or the ports do not have adequate infrastructure. Key challenges exist in the rail freight system with no consistency around rail gauges or axle load limits, affecting the efficiency of general freight and bulk commodity movements (Reed, 2017:5). Studies have shown that increased efficiencies can be achieved via improvements to the railways such as narrow gauge in Central Queensland (Acil Allen, 2020). The *National Rail Vision and Work* program, endorsed by the Transport and Infrastructure Council in November 2016, provides the key reform areas including access, pricing and interoperability, safety and incident regulation, environmental regulation and corridor protection along with funding and investment, performance measurement and management, much of which is applicable to Northern Australia. Roads form a major consideration in the freight task for Northern Australia and for connecting industries with economic activity.

The Northern Australia road network is identified as extensive and characterised by long isolated roads and low daily traffic volumes, as well as major national highways. In some industries, there is significant over-reliance on road networks, such as the cattle industry (Ash & Watson, 2018). Significant proportions of Northern Australia's agricultural market are not serviced by any other freight options other than roads (Reed, 2017; Tremblay & Babacan, 2020). The quality of road links

across Northern Australia is varied with large portions of the road in WA, NT and western QLD being unsealed. Climate conditions challenge road reliability, especially during floods and annual monsoons. Limited road options are most often manifested in inadequate quality and reliability and are the main source of uncertainty for the delivery of many key commodities commonly resulting in excessive freight costs, as well as related impacts in the form of road deterioration, and time delays getting products to market. The level of service the road network is able to provide is impacted by a number of factors including the climate (wet and dry seasons), levels of economic activity and the configuration of the road e.g. sealed, unsealed, weight restrictions (Infrastructure Australia, 2015). The Northern Australian Strategic Roads Programme is a cohesive and positive investment made by the Australian Government and includes upgrades, safety and productivity improvements, such as road widening, overtaking lane construction and pavement renewal. Similarly, the Australia Beef Roads Programme was a targeted investment for key roads necessary for transporting cattle. In the 2019-2020 Commonwealth budget, an additional \$4.5 billion funding was committed on a national level to the Roads of Strategic Importance (ROSI), funded by the Department of Infrastructure, Transport, Regional Development and Communications, with a view to improving freight connectivity for agricultural and mining regions. In the context of agriculture, Ash and Watson (2018:302) state that “supply chains and associated transport logistics and infrastructure such as roads and ports, processing facilities and power are all significant challenges for establishing a larger-scale agricultural sector in northern Australia”.

Stakeholders raised the consideration of a freight subsidy for Northern Australia. A subsidy is defined as any form of government support provided to producers or consumers (Riley, 2020). It is an economic benefit that is granted directly or indirectly. There a range of subsidies such as guaranteed payment on the factor cost of a product (e.g. minimum price on a commodity); an input subsidy which subsidises the costs of inputs in production; grants to cover losses; industry bailout; and financial assistance (loans and grants) (Riley, 2020).

There are strongly mixed views among economists and policymakers about the effects and impacts of subsidies applied to support specific industries or sectors. The key benefits and disadvantages are outlined below.

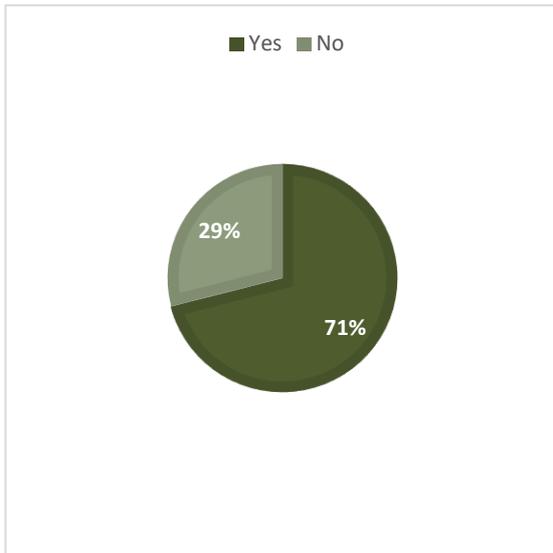
The *benefits* of a subsidy have been identified as:

- Enabling industry/enterprises to respond to problematic situations;
- Reducing production and input cost for suppliers;
- Assisting disadvantaged industry or regions to be competitive, level out the playing field by assisting in gaining a comparative advantage;
- Providing encouragement and incentive to develop more efficient and innovative production and distribution processes;
- Providing economic stability or stimulate economic development in particular regions or industries, including support to indirect beneficiaries;
- Correcting imperfections in the market and enable market adjustments; and
- Leveraging and attracting private sector investment.

The *disadvantages* of a subsidy may include:

- Market distortion effects (e.g. competition, price, demand and supply levels) and weakens profit-loss signals in the economy and reduces entrepreneurship;
- Creating reliance on subsidy by industry/enterprise and continue inefficient production processes;
- The impact of the subsidy can consolidate particular types of enterprises and exclude others, with unseen losses of unsubsidised competitors;
- That subsidies have been shown to benefit the wealthy first and have not gone to the enterprises that need it;
- That subsidies may contradict some international agreements and increase transaction and administrative costs;
- Public expenditure supporting private gains that raise social distribution and equity considerations, and the opportunity cost of public investment in other areas may result in net welfare loss; and
- Government subsidies creating favouritism of specialist groups (e.g. between northern and southern Australia) or have other corrupting influences (Li et al, 2018; Simpson & Clifton, 2016; Mitra & Webster, 2008; Bartik, 2005; Baum, 1987).

Simpson and Clifton (2016) identify that there are major distributional, procedural and outcome issues in relation to subsidies. In the decision to provide subsidies, it is important for policymakers to ensure that comprehensive data and market analytics is available, a vision for market/industry direction is articulated, modelling is undertaken to understand the impact of the intervention against economic and regional development objectives and a realistic assessment of direct and indirect costs and benefits across beneficiaries. The policy interventions that are discretionary and ad-hoc have been shown to result in distortions, unpredictability, leading to unintended consequences (Pernechele et al, 2018). As economists have long debated the merit of subsidies as a policy mechanism, the importance of keeping a long- perspective on the costs and benefits derived from subsidy interventions is critical in policy deliberations (Baum, 1987).



Participants, in the roundtable polling, were asked about whether they support a freight subsidy for Northern Australia. There was significant (71%) support for the consideration of a subsidy while 29% did not agree.

Diagram 1: Support for freight subsidy in Northern Australia

Source: Roundtable polls

Those who supported a freight subsidy saw a range of benefits (in order of most benefits) as highlighted in Diagram 2.

Supportive participants identified that a freight subsidy can be used to leverage investment attraction, particularly signaling to investors that the government are committed to Northern Australia. An additional significant benefit was the development of regional economies through the subsidy and this would be easier to justify investment via the subsidy using a broader set of regional development outcomes and if it was addressing significant market failure.

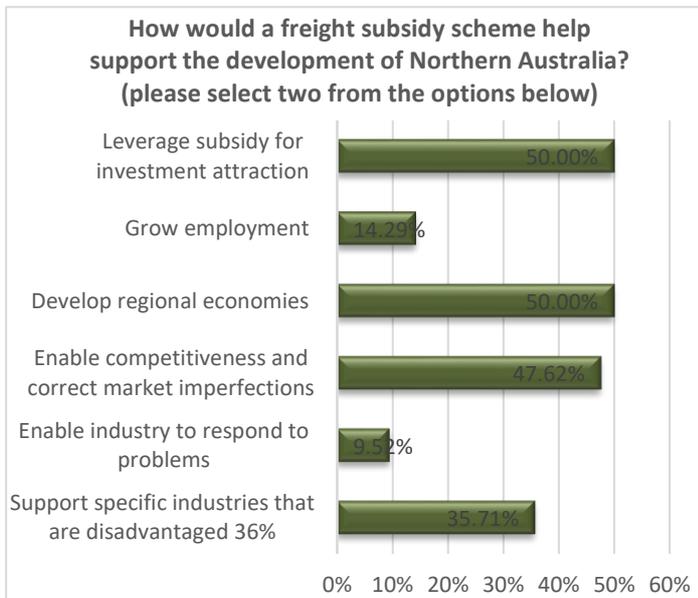


Diagram 2: *Stakeholder perceptions of benefit of a freight subsidy scheme* (multiple responses)  
Source: Roundtable polls

Other positive responses included subsidies enabling competitiveness and correcting to market imperfections; supporting challenges in specific industries; growing employment; and enabling industry to respond to specific problems. Some argued that a subsidy recognised the higher cost of doing business in Australia and enabled competitiveness and resilience to be developed in the supply chain networks.

Those who did not support a freight subsidy identified a range of challenges including:

- The purpose of the freight subsidy will need to be made clearer, particularly what problem is it addressing;
- The need to align freight subsidy with priority focus areas;
- Subsidies not being a viable option for the long run as it discouraged good business models and created dependencies; The need for subsidies to be set in specific cases, targeted and with a time frame.

The roundtable discussions illustrated the complexity of freight subsidies and the diversity of views on the matter. Any subsidy is an investment and needs to be weighed against other options for other forms of intervention, such as improved infrastructure. Participants identified that a subsidy may be non-freight related. A number of areas were identified for other forms of subsidy. One suggestion was a time-limited subsidy for supply reliability and intensification in a specific industry in Northern Australia, in line with potential benefits. Another suggestion that had support from participants was the use of a subsidy to develop a regional-hub and spoke model of supply chains within Northern Australia, with a focus on key investments to develop east-west supply chain network. Another idea proposed was to examine the import-export connection, as to what is coming into Northern Australia, particularly via container shipping and what can be exported from the region via the same channels. Ideas were also put forward about subsidy for areas in which there was a market failure in infrastructure including freight infrastructure, digital connectivity and energy, with the view that this may provide longer-term sustainable benefits. A final proposal was that subsidies should be made available to value-adding options rather than freight.

Overall, the results suggest a need to be cautious and stakeholders identified the need for subsidy-type support, however acknowledging that it needed further and more detailed work for identifying which industries, what priority issues and the benefits. It was identified that any subsidy needed to have a clear strategy but be specifically targeted to shift outcomes and productivity from existing to a more significant scale. Some argued that subsidies may be utilised to encourage/discourage particular producer behaviours towards sustainability and resilience in the long term. As such, in the absence of a clear subsidy approach in the shorter term, a midterm solution may be the need to increase further analysis and data collection, the collaborative governance of key supply chains, associated infrastructure assessments and ongoing grant and concessional finance for investment.

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### ***Enabling investment for Northern Australia supply chains***

Recommendation 2.1: The Australian Government should establish a targeted Northern Australia Supply Chain Development Fund to enable and support supply chain collaboration and partnerships, strategy development, business case development and implementation.

Recommendation 2.2: Within geographically or sectorally prioritised supply chains, through the Supply Chain Development Fund, support the identification, prioritisation and development of freight and non-freight business case options/models for either targeted subsidies or priority infrastructure, in line with identified supply chain priorities.

*Pathway to Implementation:* CRCNA to commission work to identify what might specific freight and non-freight scenarios, options and cost-benefit scenarios which are time specific and address key market failures, and regional development outcomes. The Supply Chain Development Fund to be integrated into the current review of the Northern Australian Agenda.

*Potential Impacts:* Mid-term: Strategic interventions in key sectoral and geographic supply chains and later interventions for significant upscaling of supply and value chains in Northern Australia.

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## Infrastructure Development

The *Industry Innovation and Competitiveness Agenda, 2014*, identified that infrastructure was fundamental to Australia's competitiveness (DPC 2014). The Harper Competition Review (2015) identified that the roads are the least reformed of the infrastructure sectors with little change to funding, and institutional arrangements in the past 20 years. The Review argued that "more effective institutional arrangements are needed to promote efficient investment in and usage of roads and to put road transport on a similar footing with other infrastructure sectors" and that appropriate pricing policy options needed to be identified (Harper et al, 2015:38).

Northern Australia's critical infrastructure challenges have been identified to fall within four characteristics:

- *Demand gaps* for infrastructure where demand exceeds capacity, or approaches capacity such that the service becomes congested, unreliable, unsafe, or where capacity is inadequate for larger, more efficient services;
- *Opportunity gaps* where the provision of improved or lower-cost infrastructure could generate demand that is not currently present, stimulating economic development or population growth;
- *Cost gaps* where the cost of providing infrastructure is higher than in other locations or facilities, due to scale differences or other factors, limiting or deterring economic development activity; and
- *Service standard gaps* where the level of infrastructure service falls short of community, policy-based or legislated standards for attributes such as safety, availability and quality (Infrastructure Australia, 2015:15).

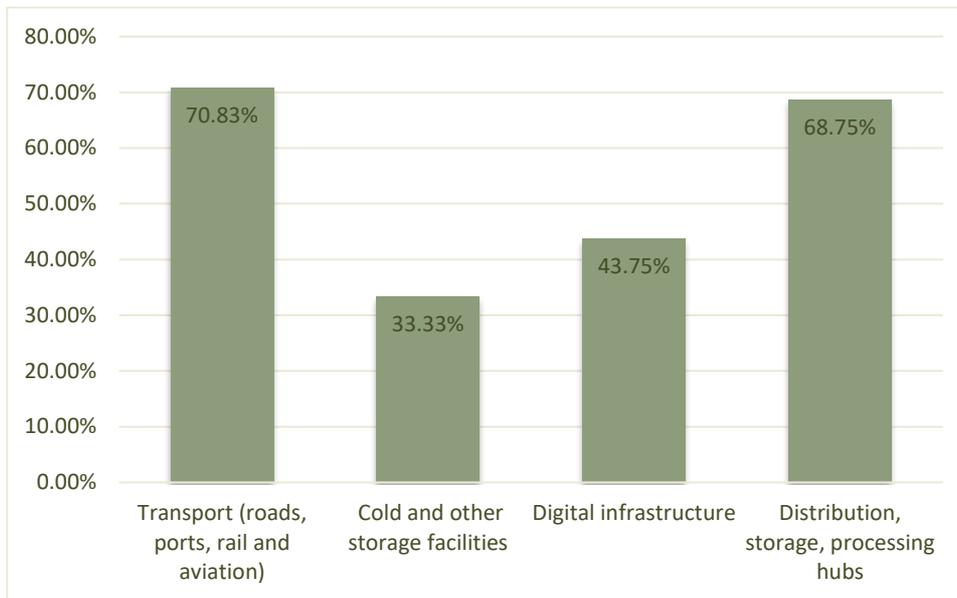
Stakeholders identified a range of critical infrastructure challenges that were also identified in the regional studies funded by CRCNA. These include:

- *Roads*: access, condition upgrades, bridges and networks;
- *Aviation*: routes, hubs, storage and refrigeration;
- *Ports*: access to infrastructure that can enable multi-modal use, cold chains;
- *Rail*: interoperability, rail gauges or axle load limits, routes;
- *Digital* connectivity, communications, internet, and including black spots;
- *Power*: cost of energy, access to power;
- *Water*: water access for irrigation, water supply; and
- *Distribution*, storage, processing hubs (Roundtable feedback, Acil Allen, 2020; KPMG, 2020; KPMG, 2019).

Roads dominated the input from participants, as the critical lifeline of bulk of the supply chain logistics and freight effort. The following statement by a roundtable participants illustrates the nature of the concerns in relation to road infrastructure:

"...much of northern QLD relies on the road network for freight and the quality and reliability of the network is a high risk and negative impact on productivity. Floods and accidents close roads, roughness factors due to unsealed roads impact cattle weight and produce quality, longer travel times on poorer quality roads lead to higher costs "(Roundtable participant).

The priority areas of investment for supply chain infrastructure were identified as transport and distribution, storage and processing hubs, as outlined in the diagram below.



*Diagram 3: Supply chain infrastructure investment priorities for Northern Australia (multiple responses)*

Source: Roundtable polling

Transport and distribution, storage and processing hubs were seen as priority areas of supply chain infrastructure. Other areas were digital infrastructure and cold storage infrastructure.

Roundtable discussions raised critical issues about how infrastructure decisions are made. This is reflected in the following statement by a roundtable participant:

“Public infrastructure investment is driven by cost benefit analysis that uses a framework that favours metropolitan areas (and sheer population numbers); future assessments could be better modelled on whole of supply chain and wider economic and social benefits to take into account other benefits such as governments priorities like decentralisation” (Roundtable participant).

The feedback relating to infrastructure decisions raised a range of issues:

- A lack of place based considerations;
- The cost and population approaches are too narrow without wider social, economic and sustainability benefits;
- Local/regional players are not engaged;
- The lack of evidence in the need and options;
- Fragmentation in infrastructure planning and decision making;
- The lack of private sector investment.
- The need to include liveability considerations as part of supply chain infrastructure investment;
- The lack of cross sectoral infrastructure planning and utilisation;
- The need to examine sharing options with existing infrastructure both private and public sector; and
- The need to consider enhancing some of the existing infrastructures rather than new ones e.g. remote community airports and airstrips for multi-sector and community use.

The need to take a more value creation approach to infrastructure and supply chains, more generally, is supported as one of the megatrends that will revolutionise supply chains. Stank et al (2015:19) argue that there is a need to move from managerial accounting to a total value orientation, being guided by overall value creation rather than costs being the main driver.

The Productivity Commission inquiry into public infrastructure argued that the key drivers behind the focus on public infrastructure include perceptions about what deficiencies are, apprehensions about the costs of delivering new

infrastructure, long term debt commitment and budgetary pressures and macroeconomic considerations to offset decreasing investment in other sectors (Productivity Commission, 2014:3). Participants in the roundtable acknowledge that the whole of benefits approach to infrastructure development was beginning to emerge.

Roundtable participants raised that fragmentation occurs across jurisdictions concerning infrastructure planning across Northern Australia. In relation to supply chains, one participant stated that “more targeted supply chain investment is required”. Lack of consistency across jurisdictions was identified, particularly in relation to road infrastructure and digital connectivity, affecting continuity and efficiency issues in the supply chain networks. There are significant differences between jurisdictions in their level of privatisation, preparedness to embark on large new infrastructure programs and funding flexibility. The views from participants is supported by research studies that indicate that there is no consolidated understanding of investment requirements in Northern Australia that in turn hinders potential foreign investments in the area, leading to investor uncertainty and increasing level of risk (PWC, 2019:12, Dale et al. 2020). Infrastructure Australia (2019:193) concludes that lack of coordination and planning and investment across jurisdictions in Northern Australia has resulted in disconnected transport and energy networks and inefficient supply chains.

The Productivity Commission (2014) argued that there is a need to overhaul the processes for assessing and developing public infrastructure in Australia, much of it relevant to Northern Australia. The issues of infrastructure in Northern Australia are influenced by the national trends and deficiencies and will need a whole of Australian Government approach. The Commission (2014:2) called for a reform in governance and institutional arrangements for public infrastructure for better decision making in project selection, transparent cost-benefit analysis, risk analysis, financing and delivery of services from new and existing infrastructure.

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### Infrastructure Development

Recommendation 3.1: The Office for Northern Australia (ONA), in partnership with CRCNA, engage with Infrastructure Australia and relevant jurisdictional agencies to adopt alternative pan-Northern and regional frameworks for the planning and assessment of future infrastructure investment, particularly based on agricultural development potential, the whole of supply chain and wider sectoral, economic, social and sustainability considerations.

Recommendation 3.2: Establishment of improved cross-governmental coordination mechanisms (e.g. via Regional Deals) for major supply chain infrastructure planning and feasibility assessments and coordinated finance in Northern Australia.

*Pathway to Implementation:* The parties working together to identify alternative and coordinated efforts to select, conduct feasibility assessment and secure coordinated finance for major infrastructure needs across different agencies for effective supply chain infrastructure in Northern Australia.

*Potential Impacts:* Progress away from project by project lobbying by regions and establishment of a significant uplift in supply chain performance, productivity and network connectivity. This will enable burden sharing for infrastructure development and asset management in the long run.

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### Supply Chain Collaboration and Coordination

The supply chain environment across Northern Australia is a complex network of organisations. At the *government level*, Northern Australia comprises of 74 local government, 3 State/Territory government and the Australian Government. Each level of government is undertaking initiatives to develop their region, State/Territory or Northern Australia. Accompanying the public sector frameworks is a crisscrossing of a multitude of private sector organisations, businesses and networks.

The roundtables identified that there was generally a lack of coordination and collaboration across sectors. 74% of respondents identified that there was a limited or no collaboration across sectors while 26% identified that there was some or a lot of collaboration. The fragmentation and lack of collaboration were identified in several ways: i) within sectors; ii) across sectors, and iii) across jurisdictions.

### Cross-Sectoral Collaboration and Coordination Challenges:

Respondents in the research identified a range of collaboration and coordination challenges. The key challenges across sectors included:

- Contradictory actions at the industry or regional level;
- Duplication of effort, infrastructure and training;
- Lack of awareness of what others in the region are doing;
- Lack of potential cost savings and efficiencies as a result of joint initiatives and resource sharing;
- Lack of scale or volume as industries are working alone;
- Inability to produce multiple commodities; and
- Lack of joint advocacy and unified voice

Participants identified that greater prioritisation of a collaborative effort to progress key development areas was needed. There were mixed views about the types of collaborations that were needed. Some identified that it was important to take a sector-by-sector approach, achieving intra-sectoral collaboration outcomes as a more manageable approach. Others identified that there were synergies across sectors and some major issues that were cross-cutting themes and it was important to take a multi-sector approach. The research and data on collaboration across sectors are limited. Coordination through the supply chain between growers, processors, marketers and transporters is the main impediment to exporting perishable commodities to Asian markets (Akbar et al., 2019). In a study of horizontal collaboration within the mango industry in Central Queensland, it was identified that currently there was limited collaboration among farmers and the other actors involved in the exports of perishable commodities into the Asian markets (Akbar et al., 2019:23). In workshops conducted, participants identified the benefits of collaboration on achieving supply volumes, collaborative activities such as communication, information sharing on production standards, production inputs, market access and demand, price setting, risk sharing and profit-sharing as well as marketing benefits such as clean -green motto, global brand development, traceability, quality control and sharing lessons (Akbar et al., 2019).

Participants identified a range of areas for potential supply chain collaboration:

- Establishing regional or spatial inter-modal hubs to address common issues such as biosecurity, traceability, protocols, regulatory requirements and sharing infrastructure;
- Expanding market development: joint initiatives for market relationships, leveraging existing markets, developing new markets together, improving marketing skills, and sharing market intelligence;
- Reliability of supply, particularly delivering volume through collaboration within Northern Australia but with producers in southern parts of Australia to take advantage of climatic variations;
- Embarking on multi-commodity production and processing opportunities e.g. beef, timber and broadacre crops, and horticulture and aquaculture in addressing perishable nature of goods, prolonging shelf life, cold storage options; and
- Opportunities for value add including understanding consumer demand, trends in agribusiness, processing options (particularly for perishable commodities) and shared packing plants.

Recent coordination efforts were beginning to emerge at the sub-regional level, such as Mackay, Whitsundays and Isaac, North Queensland and Far North Queensland were identified. At the national level, the Australian Logistics Council has developed a North Australian Working Group which enables engagement with national agendas. These efforts were applauded as beginnings of coordination efforts which, unless supported, could result in a loss of momentum. The House of Representatives Select Committee on Regional Development and Decentralisation (Commonwealth of Australia, 2018) identified the development of capacity in regional leadership as a key issue. The role of leadership is critical in achieving collaborative frameworks, particularly capability of leaders, setting the vision for working together and strong governance frameworks are identified (Akbar et al 2019; Babacan & Dale, 2019).

### Cross-Jurisdictional Collaboration and Coordination Challenges

Participants in this research acknowledged that a more comprehensive approach is being taken to the Northern Australian development agenda, particularly since the *White Paper on Developing Northern Australia* was adopted. There was recognition of the initiatives to integrate Commonwealth, State and Territory Government efforts through Northern Australian Strategic Partnership, the Northern Australian Ministerial Forum and the Northern Australian Advisory Group. These initiatives aim to drive integrated approaches to the development of Northern Australia. The recent announcement of Northern Australia Agenda Taskforce Advisory Committee is a cross-sectoral group of people, to advise the Australian Government on the development of the next five-year plan for Northern Australia.

The participants identified a range of issues in relation to cross-jurisdictional challenges. These include:

- Contradictory interventions at place-level across three tiers of government;
- Inconsistent decision making between different levels of government;
- Non-harmonised policy frameworks e.g. road safety, heavy vehicle regulation, biosecurity, load limits, land use, waste management;
- Excessive red tape, regulation and protocols;
- Duplication or major gaps;
- Lack of joint infrastructure planning;
- Jurisdictional priorities upheld over joint ones;
- Political imperatives and election cycles;
- Top-down decision-making processes;
- The capacity of the public sector for collaboration;
- Blurring of roles and responsibilities;
- Crowded advisory mechanisms;
- Lack of engagement and partial engagement of stakeholders; and
- Lack of long-term strategic land use and infrastructure planning.

Participants argued the need for focus coordinated effort on supply chain and agricultural constraints in Northern Australia, with a clear mapping of policy and regulatory settings across each jurisdiction with a view to resolving conflicts and harmonisation. There was a need identified for governments to support the process of de-risking, to enable private sector investment. The benefits of such a collaboration to supply chain development in Northern Australia was identified as coordinated long term planning, efficiencies gained through policy and regulatory streamlining, improved flexibility of supply chains, reduced uncertainties and attracting private sector investment due to conducive environments and making it 'easy to do business'. Some 91% of respondents to the poll identified that the absence of cross-jurisdictional harmonisation was affecting supply chain efficiencies, economic development more broadly and attracting investment.

The CRCNA argues that "the identification and resolution of higher-level policy thinking and the development of coordinated cross-jurisdictional responses will be important for the future of Northern Australia" (Dale et al, 2020:32). While Northern Australia is a focus for many government bodies across the jurisdictions, their strategies are not unified and have different actions. As noted by PWC (2020:55), this may "inhibit or limit the progress of the development in the region" due to unclear focus, lack of consolidated vision and disparate focus of effort.

### De-risking priority focus areas for investment

The lexicon of 'de-risking' was becoming increasingly well-known across the respondents in this research. The concept of de-risking for investment in agriculture in the north was closely linked with streamlining regulatory and policy processes to facilitate private sector investment in agricultural development, infrastructure and supply chains. There was strong support for collaborative effort for the development of processes and models that aimed at de-risking critical areas for investment. This included:

- Identifying priority areas for investment;
- Developing a Northern Australia or regional brand;

- Removal of risks to investment such as infrastructure, water-based schemes, land use planning and tenure, and other risks;
- Coordinated efforts for investment attraction;
- Streamlining regulatory and approval processes within and across jurisdictions for agricultural development; and
- Developing brokerage models of investment in agricultural and supply chain development.

The participants identified the need for an integrative mechanism that brings together the government, businesses, investors and other stakeholders to improve planning and investment in supply and value chains. An urgent and strategic focus on attracting investment in supply and value chain development and efficiency to increase scale and to drive down costs was identified as a key theme at the Developing Northern Australia Conference (2019).

#### Mechanisms to achieve coordination and collaboration

The need for a framework for collaborative co-design between government, private sector/industry and other key stakeholders was clearly identified in the research. It was also noted that the landscape was a 'crowded' system of regional, State and national structures, some with ambiguity of roles and responsibilities at different levels of government. This is confirmed by the Productivity Commission work on regional development when they observe that "there is significant confusion, overlap and unhealthy competition between the Australian, State, Territory, and local governments in the pursuit of regional development... These issues are made more challenging by inadequacies in the institutional and governance arrangements that limit the effectiveness of planning and expenditure in regions with respect to transition and development" (Productivity Commission 2017:163). Both industry and government processes indicate discrete and fragmented and all with limited resources.

In this landscape of multiple agencies and stakeholders, participants identified that there was no coordinating mechanism for supply chains in Northern Australia. There was a gap in the supply chain architecture for Northern Australia, and the absence of a strategic, coordinated supply chain plan. Many agencies identified that they have mandate or the resources to undertake a supply chain coordination function. 80% of participants identified the need for a supply chain coordination function for Northern Australia, with the primary responsibility of coordination of stakeholders and designing collaborative effort in line with identified priority focus areas. The discussions identified that such a role can:

- Facilitate a stronger place-based and leadership-rich supply chain partnerships;
- Enable cross-sectoral supply chain integrative mechanisms for coordination; and
- Provide oversight on cross-cutting policy and program supply chain issues.

In the context of broader regional economic development, Rodriquez-Pose identifies the complexity of regional institutional arrangements and suggests a range of considerations, including the mix of endogenous institutions and external agency dynamics in regional locations, the equilibrium between regional development strategies and institutional arrangements, weak capacity of local institutions and the role of leadership in institutions. The development of appropriate 'institutional arrangements' (referring to specific customs, procedures that shape interaction, economic exchanges) are relevant discussions for supply chain development in Northern Australia and point to the need to determine the type and quality supply chain architecture needed for development intervention to take hold (Rodriquez-Pose, 2013: 1043).

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## Supply Chain Coordination and Collaboration

Recommendation 4:1: That a partnership-based Northern Australia supply chain collaboration/coordination plan and architecture be developed. The options for the development, testing and continuous improvement of hub-spoke supply chain models and data coordination in Northern Australia be explored.

*Pathway to Implementation:* Through the current review of the Northern Australian agenda, support employment of a dedicated role and approach for supply chain coordination, collaboration architecture and multi-stakeholder integration.

*Potential Impacts:* Joined up efforts and increased capacity for impact and significant scale performance improvement.

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## Looking to Asia and the Pacific

A number of studies have identified that there is a global demand for Australia's agricultural products. For example, KPMG (2019) estimated that there \$3 billion in unmet global market demand across ten of Australia's leading agricultural export destinations and identified five priority products: beef, avocado, macadamia, onshore aquaculture and soybean. Austcham ASEAN (2019) concluded that there is a large potential opportunity for accelerated export growth for Northern Australia in the agri-food sector in ASEAN (Association of Southeast Asian Nations) due to population growth, the rise of consuming middle class, rapid urbanisation, constraints on land available for agriculture and the promotion of clean and healthy food. Austcham ASEAN (2019:5) identified that the top 15 agricultural commodities for export from Australia are wheat, live cattle, beef, milk and cream powder, malt, table grapes, sheep meat, cheese, milk and cream, oranges, infant food preparations, rock lobsters, macadamias, avocados, and soybeans. For Northern Australia, the products with the highest untapped export potential and supply feasibility in Northern Australia are live cattle and beef, and to lesser extent avocados and macadamias. A KPMG study (2020:2) identified that Far North Queensland (FNQ) can double high-value food exports to \$120 million by 2030, particularly in seafood, horticultural tree products, vegetables and beef.

The respondents in this research identified that Northern Australia should focus on Asia, particularly ASEAN markets. In roundtable polling, 95% of respondents identified that there should be a greater focus on Asia, while 5% said there should not be a greater focus on Asia. Those who believed we should focus on Asia argued that there were greater market opportunities, while the 5% argued that we should build domestic markets and capability. While the studies above were conducted the current pre-Coronavirus Disease 2019 (COVID-19) crisis, the research was undertaken during COVID-19 and the various measures for border closure and social distancing. Despite this uncertainty, participants believed the Asian markets were critical to Northern Australia.

One participant stated that we should not continue to have "all potential, never realised", cautioning to be realistic. Key barriers identified by participants included:

- Cost of freight;
- Availability of air freight options;
- Cold storage options particularly for seafood and perishables;
- Tariff and non-tariff barriers;
- Complexities in certification;
- A lack of exporter and producer knowledge about Asian markets, lack of market intelligence; and
- Biases against Asia.

These barriers were identified in the studies. For example, Austcham ASEAN (2019) points out that despite progress due to free trade agreements, key gaps in the trade environment remain, including a lack of supporting trade infrastructure

(e.g. cold storage facilities), regulatory bottlenecks (e.g. non-tariff measures, foreign direct investment restrictions, lengthy red tape) and skills gaps.

Discussions highlighted that there were synergies in supply chains between Northern Australia and neighbouring countries and that there was a need to more effectively engage with the country based chambers of commerce in Australia to keep abreast of developments on those countries. Key synergies identified included:

- Supply chain workforce supply and training needs;
- Processing, packaging and storage options;
- Niche markets and value add opportunities; and
- Sub-regional trading blocs.

These were identified as being “synergistic with what we need in Northern Australia”. Some pointed out that strategic collaboration across nations, particularly with Indonesia, East Timor, Papua New Guinea, and Fiji may create a ‘trade and exchange bubble’ and may bring benefits during times of supply chain and economic shocks such as COVID-19. The idea of either purpose-built supply/value hubs or collaborating with existing agribusiness hubs in selected hubs was identified.

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### **Looking to Asia and the Pacific**

Recommendation 5.1: Explore options for establishing more durable sub-regional trading strategies or blocs for Northern Australian agriculture, focussing on building value in the supply chain within Northern Australian, including options for purpose-built or shared supply and value chain hubs with neighbouring countries.

Recommendation 5.2: More active and strategically focussed coordination of government trade-effort to progress these strategies, including industry and relevant stakeholder investment efforts to engage in ASEAN markets and supply chain relationships.

Recommendation: 5.3: The Australian Government to prioritise Northern Australian agendas in trade development strategies, particularly measures.

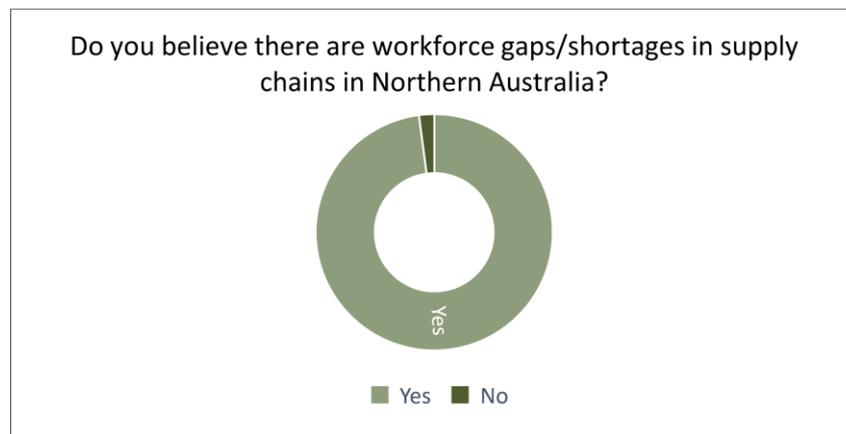
*Pathways to Implementation:* Ensuring Northern Australian development is linked to other strategies such as trade and multi-lateral relations to leverage supply chain development initiatives. Rather than a broad focus on Asia, effort should be limited to sub-regions which will enable consolidation of and increasing within supply chain efforts.

*Potential Impacts:* Through cross-national collaborations and a strategic trade focus, building North Australia’s deep engagement with Asia in an embedded way with a long term outlook.

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### **Workforce Considerations**

The economies of Northern Australia have undergone structural change and adjustment due to increasing and rapid exposure to global markets, deregulation, withdrawal of industry protection measures, fluctuating terms of trade, impacts of technological change, environmental concerns and changing consumer demand. The regions, industries, and enterprises are all being affected by industry transition with varying “speed, magnitude and severity” across different industries (Jobs Queensland, 2018: 7). The resultant change has been variable in terms of impacts on communities; the nature of labour markets and workforce needs in different locations. These transitions, likewise, impact on the workforce – skills, gaps and shortages (Productivity Commission, 2017; Wibrow & Circelli, 2016; Beer, 2015).



*Diagram 4: Perceptions of workshop gaps and shortages in Northern Australia*  
Source: Roundtable polling

Respondents in the roundtable polls overwhelmingly (98%) identified workforce shortages and gaps across different supply chain industries in Northern Australia. The key issues identified in addressing workforce needs include:

- Mismatches in the labour market between what industry needs and education/training provided;
- A negative perception of the industry and difficulty to recruit local staff;
- Decrease in enrolments in key transport and skills courses;
- Changing industry with digital transformation and shortage of skills in digital literacy, telematics, cybersecurity, and data analytics;
- Shortage of non-technical skills such as leadership, management, teamwork, problem solving and communication;
- Lack of employer skills (e.g. recruitment);
- Problems with attracting and retention of workers in rural areas (including work satisfaction, wages and conditions);
- Liveability factors including health, education, digital connectivity and other infrastructure;
- An ageing workforce, limited options (for education, training);
- Senior roles in the industry is through a range of qualifications pathways necessarily in supply chains management, but usually through other degrees such as business and agriculture; and
- Boom and bust cycles in rural economies causing insecurity of jobs.

The feedback from research participants is supported by industry, with 20-70% of employers in Northern Australia identifying difficulties in recruitment in 2016 (Department of Employment, 2016:6). This trend is also reflected in the transport and supply chain industries, an industry that is an important part of supply chains in Australia. The Transport and Infrastructure Council (2019:17) points out that “the Australian freight sector is having difficulties in attracting skilled workers across its various functions - including logistics, quality control, warehousing and trade negotiations”. The Australian Industry Council surveyed the transport and logistics industry workforce needs in 2018-2019. Over 80% of employers in the industry reported experiencing skills shortages in the last 12 months. The occupations reported as being in shortage were heavy vehicle drivers, drivers (general), educators, trainers and assessors, warehousing, and supervisors/managers (AIS, 2019:27). The reason for the shortages was identified as ageing population and retirement of current staff; unattractive job prospects; poor industry image; cost and time to achieve the required qualification; competition from other organisations (within and outside the industry) and wages considered too low (AIS, 2019:28).

Respondents identified technological innovations will continue to disrupt the supply chain industry at a rapid pace and provide opportunities and challenges. The new industrial revolution, incorporating complex computerised systems, data and software to create ‘smart’ processes and products are significantly altering the skills required. Participants identified that is a critical role to play for education providers in Northern Australia in supporting the workforce development needs of both agricultural development and supply chains sector and the need for better engagement between education providers and industry. Enrolments in the Transport Logistics Training Packages have decreased, across the nation, by 51% over the last four years, for occupations involved in warehousing and logistics operations, driving operations,

stevedoring, yard operations freight handler, international freight forwarding, mobile crane operations, waste driving operations, material and deployment logistics, traffic operations, bus and coach operations and customs broking (AIS, 2019:15).

The participants pointed to the gaps in planning and recruitment effort at a regional scale. One participant stated that “there are minimal regional planning and appropriate recruitment strategies for workforce succession”. Smaller employers were identified as needing support in aspects such as recruitment, performance management, coaching of staff and enabling workplaces with career progression. It was suggested that attracting and retaining a workforce to the regions involves an interaction of a complex set of factors including job opportunities, comparable wage levels, family networks, demographics and liveability aspects such as access to schools, health facilities and social amenities. It is suggested that supply workforce considerations needed a whole of region/place approach with joint efforts to attract and retain people and deliver attractive places to live and work in.

The supply chain workforce, across different sub-sectors, is expected to grow between 2-6% (Deloitte Access Economics, 2018; AIS 2019; ABS, 2020). AIS (2019) has identified the major changes to the industry that will require new workforce skills:

- New technological innovations including robotisation and artificial intelligence, Internet of Things, cloud technology;
- Disruptive technologies including the potential gig economy labour market characteristics of work using digital platforms;
- Big data used in increasing volumes to inform decision making; vehicles equipped with sensors collecting data in real-time which can be used for improved delivery, route optimisation, remote diagnostics to monitor the condition of equipment and transport;
- Deployment of telematics which transmits computerised information over long distances;
- Industry-specific cybersecurity due to increased risks of technological innovation;
- Digital supply chains and omnichannel logistics with personalised supply chain demands e.g. customer service is online, 24 per day, multiple methods of delivery and convenience to the customer;
- An increasing need for traceability and visibility of products through technologies such as blockchain; and
- Environmental pressures to reduce greenhouse gas emissions and environmental compliance and safety and regulation.

In addition to the digital technologies skills, an industry survey has also identified the need for ‘soft skills’ such as leadership, management, teamwork, problem-solving, critical thinking, communication, and innovation (AIS, 2019). Deloitte Access Economics (2018) identifies continued growth in the supply chain workforce. Improving educational status was linked with direct income benefits with completion of a postgraduate qualification in Management and Commerce, estimated to bring a lifetime wage premium of 48% (relative to workers with no post-school qualifications) is directly attributable to their qualification. The average annual income of supply chain and logistics workers with a postgraduate qualification was \$140,949 in 2016-17, and this is forecast to rise to \$164,360 in 2021-22. Additionally, further study in the supply chain and logistics area can also enable workers to develop advanced skills that accelerate career progression, and allow professionals in other areas to move into supply chain management roles within their industry (Deloitte Access Economics, 2018:8). The innovations in supply chains offer new opportunities, as well as disruptions to organisations and communities. The impact of COVID-19 in the supply chain workforce is unknown. Given the challenges of attracting and retaining workers in rural/regional areas and the lower levels of qualifications and barriers to access to education, upskilling and retraining the current and future workforce a priority for Northern Australia in order to keep pace with future changes.

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### **Workforce Considerations**

Recommendation 6.1: In partnership with key Northern Australian Universities, other education providers (e.g. schools vocational) and key industry and supply chain stakeholders, develop a North Australian Education Hub with a focus on regional engagement, coordinated workforce education/training and research. The Hub should work with a view to supporting industry needs including supply chain industry skills needs, workforce shortages and gaps in Northern Australia.

Recommendation 6.2: Support third party facilitated development of regional/place-based supply chain workforce strategies and plans across Northern Australia.

*Pathway to Implementation:* Building a much needed evidence base on supply chain workforce in Northern Australia will guide measures to address workforce skills and gaps. Supply chain workforce is strongly connected to place-based approaches and the need for workforce planning at the regional level. Bringing together the key education players in a North Australia education hub provides ongoing focus on training and education needs in Northern Australia.

*Potential Impacts:* Workforce and human capability is linked with vitality and prosperity of North Australia. These measures will ensure knowledge and skills capability and readiness for the 21st century knowledge economy and the disruption that will be arising from digital transformation.

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### **COVID-19 and supply chains**

This research project has coincided to the outbreak of the Corona Virus Disease 2019 (COVID-19). COVID-19 has introduced shocks to all aspect of economic and social life. The critical role that supply chains play in our lives have been highlighted during this crisis and the “supply chain has become the main protagonist everywhere” (Buatois, 2020). High levels of uncertainty remain as the situation continues to evolve. The full impact of COVID-19 on supply chains is still unknown with various optimistic and pessimistic scenarios. The impacts of this pandemic are expected to be unlike previous crises and that “this disruption has affected nearly all layers of supply chains – from manufacturing and distribution, through to delivery” (Bowden & Thorpe, 2020: 21). The early impacts on agricultural supply and value chains include:

- Impacts on business viability of particular sectors including retail, tourism, food and catering and travel industries;
- Limits on the mobility of people are contributing to labour shortages in the agricultural sector, particularly those characterised by periods of peak seasonal labour demand;
- Accumulation of surplus products, surpluses to accumulate, putting a strain on storage facilities and, for high perishables, increasing food losses on perishables;
- Availability of key intermediate inputs due to port closures or restrictions on transport;
- Panic buying, stretching supply chains;
- Shifts in consumer demand away from high-value products to staple products, drop in consumption away from home (e.g. restrictions on cafes and restaurants). Some areas of demand to increase, putting pressure on supply chains; and
- Grounding of airlines, increasing cost of airfreight, lower trade volumes (OECD, 2020; Deloitte, 2020).

In looking to the future, COVID-19 offers an opportunity to enhance resilience and sustainability. Some suggested ideas include:

- Identifying choke points and bottlenecks;
- Determining weaknesses and vulnerabilities in the supply chains systems and determining ways to strengthen them;
- Understanding the full impacts on supply chains, identifying and mitigating supply and demand-side risks;
- Effective workforce planning;
- Determining production agility;
- Prioritising supply chain investments towards building flexibility and resilience; and
- Communication strategies to improve consumer trust in safety and supply.

Participants in this research identified that the way we do business has been tremendously altered by COVID-19. A number of issues were raised for consideration:

- *Self-reliance and the move from global to national and regional sufficiency.* This is a focus on elimination of single-source dependencies for inputs and markets, enabling reduced supply-side risks. Some believed that it is timely to consider the development of new logistics hubs for Northern Australia. This is supported by the literature with industry and experts seeing the role of logistics hubs to “establish a flexible and adaptable supply chain, product integrators, and sub-system suppliers” (Buatois, 2020). Shifts to local production, localised supply chains and more modular chains were identified as options for the future. Northern Australia was seen to be in a strong position to help in the national economic recovery efforts through the development of regional and responsive supply chain hubs and networks.
- *Resilient demand chains:* Participants raised the idea of taking measures to eliminate volatility in the demand for North Australia products overseas. The idea of “resilient demand chains” was raised. As one roundtable participant aptly stated “the COVID experience has shown us that supply chains are fragile to demand shocks, but this has now created an opportunity to reorient new supply chain investment towards longer-term and more resilient centres of demand. From an overall Northern Australia perspective, there is value in identifying the right mix of commodities and markets in ASEAN and where such resilient demand is expected and pursue supply chain scaling and optimisation for a prioritised set of opportunities” (Roundtable participant). The resilient demand chains were identified as a way to minimise risks and volatility. Respondents suggested an evidence-based approach to identifying and prioritising demand resilient markets.
- *Flexible supply chains:* Northern Australia’s production systems are accustomed to shock, particularly arising from climatic conditions such as drought and floods and have evolved flexible production systems. The extent to which North Australia supply chains are flexible and adaptable is unknown and is identified as a critical area of research. Key aspects include reliance on single/multi-sourced commodities and inputs; workforce, supply chain relationships; distribution networks; transport inter-operability; interchangeability, alignment with other suppliers, and systems agility.

Resilience in supply chains is identified as one of the major forces shaping Australia and will determine recovery from the pandemic (Bowden & Thorpe, 2020). Building resilient supply chains will also result in competitive businesses that will be sustainable in the long term (Michelman, 2007).

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## COVID-19

Recommendation 7.1: Within national and jurisdictional COVID response and recovery strategies, the Commonwealth, States and Territory should identify the impacts of COVID-19 on agricultural supply chains and exploring ways to develop resilient and flexible supply chains in the Northern Australian context.

*Pathway to Implementation:* Addressing a gap in understanding of how Northern Australian supply chains are impacted will enable the development of strategies for resilience. Pathway should focus on the use of the formal COVID response and recovery mechanisms at Federal, State and Territory scale.

*Potential Impacts:* COVID-19 will have long term impacts in Northern Australia. COVID-19 will have long-term impacts in Northern Australia. Response and recovery efforts will be continuous across the Northern Australian landscape and enable flexible and resilient supply chains to be developed.

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## Data and Research

Evidence-based practice to inform decision making in Northern Australia was raised by research participants as a critical component of re-framing supply chains in Northern Australia. As one respondent stated, “we do not enough data, evidence and information to base our decisions” (Roundtable participant). The key issues in taking an evidence base were identified as:

- Lack of adequate data across the whole of the agricultural supply chains;
- Lack of granular data across different locations/regions;
- Research gaps in key areas such as workforce, trade and governance;
- Need to be more deliberative in the use of data, particularly the integration of data on different topics, areas of research and sources;
- Lack of translation and/or uptake of existing data/research in practice ;
- Existing data patchy and data collection is fragmented (e.g. definitions of regions, focus topic); and
- Lack of resources for research;

Some participants identified the confidential nature of research in some government agencies and lack of public accessibility of data. Many participants identified that research was often seen as an ‘optional’ when budgets were pressured. Participants acknowledged that CRCNA had contributed to building a significant body of work in a relatively short period of time, particularly in relation to agricultural development and supply chains.

Addressing gaps in our knowledge base was identified as a key measure in re-framing supply chains. In an age of big data analytics, sharing data and information and joint interpretation across businesses and stakeholders improve competitiveness (Stank et al., 2015). The absence of quality data and research is a major drawback in making strategic decisions and prioritisation of future directions.

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**Data and Research**

Recommendation 8.1: Commissioning of long-term research on the development and continuous improvement of partnership-based and data-rich models of horizontal and vertical supply /value planning and collaboration within and across sectors in Northern Australia.

*Pathway to Implementation:* Complimenting existing CRCNA, iMove and FFS CRC research investment, establishment of a fund dedicated to supply chain development can address gaps in knowledge.

*Potential Impacts:* Evidence based approaches will result in strategic decision making, making accurate analysis and successful interventions for supply chain outcomes.

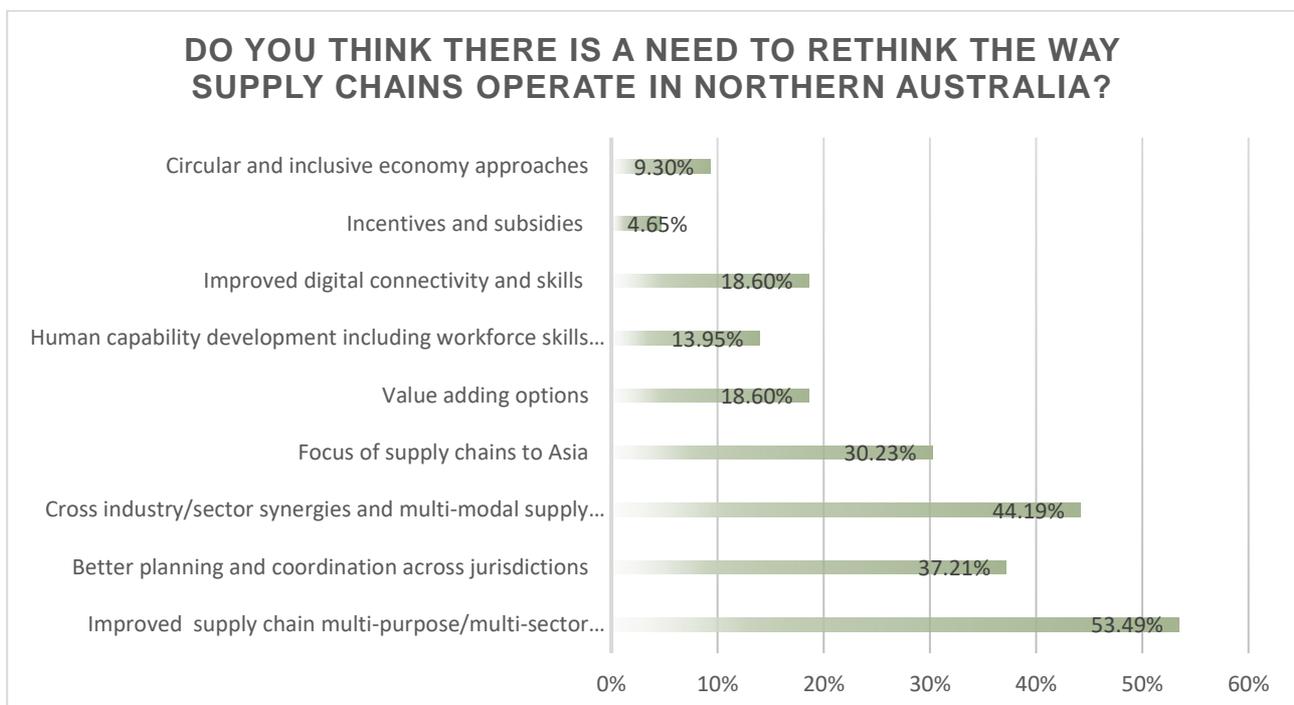
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## Concluding Remarks

“Many previous efforts to develop the north have floundered through a lack of foresight and the absence of markets in our region for high-value goods and services “(Australian Government, 2015:1)

These words from the Australian Government’s *Our North, Our Future: White Paper on Developing Northern Australia* illustrates the complexities of development in Northern Australia over decades of effort. Given the history before us, addressing the topic of ‘re-framing’ supply chains in Australia is no easy task. A respondent stated that “supply chain development does not happen overnight and we need a clear vision for the next decade” (Roundtable participant).

Participants were asked their views on what needs to happen as a priority to re-frame supply chains in Northern Australia. The responses are illustrated in the following diagram:



*Diagram 5: Perceptions of what needs to happen to reframe supply chains in Northern Australia*  
Source: Roundtable Poll

The top three responses for what needs to happen as a priority for reframing supply chains were:

- Improved supply chain multi-purpose/multi-sector enabling infrastructure;
- Cross-industry/sector synergies and multi-modal supply chains; and
- Better planning and coordination across jurisdictions.

The common theme running through these suggestions, from a very diverse range of stakeholders, is the coordination, collaboration and integration. This goes to the core of efforts to reframe supply chains in Northern Australia. The re-framing efforts of supply chain strengthening in Northern Australia is going to be determined by ‘how’ we work across sectors.

The multi-stakeholder supply chain collaboration, integration and coordination needs to be at different levels:

- At place or sub-regional scale. This is linked with collaboration within sectors but also across different sectors in regional economic and agricultural development planning;
- Sectoral, horizontal collaboration, within specific sectors across Northern Australia;

- Multi-sector level, cutting across different sectors, at different scales;
- Across the jurisdictions that constitute Northern Australia, for harmonised approaches;
- Pan-Northern Australia integration, for overarching issues that are cross-cutting such as de-risking, infrastructure feasibility and coordinated finance; and
- Global, sub-regional trading blocs, with neighbouring countries.

The challenge ahead is to invest more strategically at different scales of coordination to achieve a better understanding of supply chain potential and targeted investment in key supply chain collaboration. Developing integrated approaches that enable the development of a shared vision, strategic planning, prioritisation and coordinated action across industry, government and community towards identified priorities will be fundamental to achieving significant impact. Some supply chain co-ordination architecture and governance arrangements are emerging at a regional scale and the pan-Northern Australia level. Supporting these initiatives to gain momentum and consolidate is part of the immediate next steps. In a review of megatrends that revolutionise supply chains, Stank et al. 2015 introduce the idea of 'vested' relationships to achieve win-win outcomes for all. The focus is ensuring long-term success for all parties by developing operational and strategic plans detailing joint rewards. Vested relationships also require joint accountability if they are to be successful. The ultimate goal is to optimise the total system value creation (Stank et al., 2015: 15).

Coordinated supply chain approaches will transform supply chains re-framing, to a shift from '*function focus to process focus to systemic focus*' (Stank et al., 2015). This holistic approach represents an evolution of supply chain thinking from a focus on improving activities within internal supply chain functions to optimising the entire supply chain network of processes to optimise value co-creation. The overall outcomes is that supply chain networks are able to address the key challenges as a system, rather than as individual actors. Reframing supply chains in Northern Australia requires a transformational approach. This necessitates coordinated effort to prioritising and assigning resources to have a significant impact to shape future supply chain outcomes in Northern Australia.

## Strategic recommendations

This section represents the strategic recommendations arising from the findings of this study. A high level action plan for each recommendations is suggested. The time frames, pathway to implementation and the impact of each recommendation is also outlined.

<b>Strategic Recommendations</b>			
<b>1. Vision and priorities for agriculture and supply chains</b>			
<p>Recommendation 1.1: Commonwealth, State and Territory Governments in the North should work with pan-Northern stakeholders to develop a focused vision, spatial priorities and sequence for agricultural development across Northern Australia.</p> <p>Recommendation 1.2: Within the context of this vision, within geographic or sectoral priorities, there is a need for collaborative supply chain development that creates partnerships among the relevant stakeholders to for deliberative planning, coordination and investment-focused discussions on Northern supply chain priorities.</p>			
<b>Key actions</b>	<b>Owner/Partners</b>	<b>Pathways to implementation and timeline</b>	<b>Impacts</b>
<ul style="list-style-type: none"> <li>Meeting of key stakeholders.</li> <li>Review of available evidence.</li> <li>Identification of priorities.</li> <li>Development of vision and strategy.</li> <li>Consultation with wider industry and community.</li> <li>Adoption of vision by relevant departments.</li> <li>Implement actions</li> </ul>	<p><i>Owner:</i> ONA, State/Territory and Commonwealth agricultural departments</p> <p><i>Partners:</i> CRCNA Relevant local government agencies Infrastructure Australia Industry peak groups</p>	<ul style="list-style-type: none"> <li>Stakeholders engaged in deliberative planning and coordination.</li> <li>Commitment to agreed action.</li> <li>Timeline: 2-3 years</li> </ul>	<ul style="list-style-type: none"> <li>Investment focused, agreed vision and priorities for agriculture and supply chains in Northern Australia developed.</li> <li>Coordinated and targeted approaches to agricultural development in Northern Australia.</li> </ul>
<b>2. Enabling investment for Northern Australia supply chains</b>			
<p>Recommendation 2.1: The Australian Government should establish a targeted Northern Australia Supply Chain Development Fund to enable and support supply chain collaboration and partnerships, strategy development, business case development and implementation.</p> <p>Recommendation 2.2: Within geographically or sectorally prioritised supply chains, through the Supply Chain Development Fund, support the identification, prioritisation and development of freight and non-freight business case options/models for either targeted subsidies or priority infrastructure, in line with identified supply chain priorities.</p>			
<b>Key actions</b>	<b>Owner/Partners</b>	<b>Pathways to implementation and timeline</b>	<b>Impacts</b>
<ul style="list-style-type: none"> <li>Discussions with State/Territory and Australian Government about the establishment of a Northern Australia Supply Chain Development Fund.</li> <li>Appropriate policy work to support the development of such a fund (e.g. level of funding, eligibility requirements).</li> </ul>	<p><i>Owner:</i> Department of Industry, Science and Energy and Resources ONA</p> <p><i>Partners:</i> CRCNA, relevant WA, NT and QLD government agencies</p>	<ul style="list-style-type: none"> <li>Stakeholders need to be engaged.</li> <li>Supply Chain Development Fund incorporated into the review of Northern Australian development agenda.</li> <li>Budgetary commitment needs to be secured</li> <li>Business case models and options for supply chain development prioritised and funded.</li> </ul>	<ul style="list-style-type: none"> <li>Supply Chain Fund delivers coordinated approaches, detailed business cases for freight and non-freight subsidies.</li> <li>Long term impact of lifting agricultural outcomes to a significant scale.</li> </ul>

<ul style="list-style-type: none"> <li>Development of targeted freight and non-freight subsidy business case options.</li> </ul>		<ul style="list-style-type: none"> <li>Timeline: 1-2 years</li> </ul>	
<b>3. Infrastructure Development</b>			
<p>Recommendation 3.1: The Office for Northern Australia (ONA), in partnership with CRCNA, engage with Infrastructure Australia and relevant jurisdictional agencies to adopt alternative pan-Northern and regional frameworks for the planning and assessment of future infrastructure investment, particularly based on agricultural development potential, the whole of supply chain and wider sectoral, economic, social and sustainability considerations.</p> <p>Recommendation 3.2: Establishment of improved cross-governmental coordination mechanisms (e.g. via Regional Deals) for major supply chain infrastructure planning and feasibility assessments and coordinated finance in Northern Australia.</p>			
<b>Key actions</b>	<b>Owner/Partners</b>	<b>Pathways to implementation and timeline</b>	<b>Impacts</b>
<ul style="list-style-type: none"> <li>Partnership development between ONA, CRCNA and Infrastructure Australia. Relevant NT, QLD and WA governments and other stakeholders for infrastructure planning and coordination in Northern Australia.</li> <li>Prioritisation of key infrastructure developments for Northern Australia.</li> <li>Development of mechanisms for infrastructure planning, feasibility and coordinated finance.</li> </ul>	<p><i>Owner:</i> ONA, Infrastructure Australia</p> <p><i>Partners:</i> Relevant NT, QLD and WA governments Local governments Relevant industries Investors</p>	<ul style="list-style-type: none"> <li>Engagement of the critical stakeholders.</li> <li>Agreement on mechanism for coordination of infrastructure planning, feasibility and finance.</li> <li>Timeline: 1-2 years</li> </ul>	<ul style="list-style-type: none"> <li>Shift from project by project advocacy by regions.</li> <li>Establishment of a significant uplift in supply chain performance, productivity and network connectivity.</li> <li>Coordinated infrastructure mechanism will enable burden sharing for infrastructure development and asset management in the long run.</li> </ul>
<b>4. Supply Chain Collaboration and Coordination</b>			
<p>Recommendation 4.1: That a partnership-based Northern Australia supply chain collaboration/coordination plan and architecture be developed. The options for the development, testing and continuous improvement of hub-spoke supply chain models and data coordination in Northern Australia be explored.</p>			
<b>Key actions</b>	<b>Owner/Partners</b>	<b>Pathways to implementation and timeline</b>	<b>Impacts</b>
<ul style="list-style-type: none"> <li>Identification of key stakeholders for collaboration.</li> <li>Formation of a taskforce to develop coordination architecture.</li> <li>Development of coordination plans and strategies.</li> <li>Implementation of plans.</li> </ul>	<p><i>Owner:</i> ONA, Department of Industry, Science and Energy and Resources</p> <p><i>Partners:</i> Relevant NT, QLD and WA governments CRCNA Local governments Relevant industries Peak industry bodies</p>	<ul style="list-style-type: none"> <li>Agreed coordination mechanism established.</li> <li>The employment of a dedicated role for supply chain coordination, collaboration and multi-stakeholder integration.</li> <li>Innovative models of hub-spoke models exploration.</li> <li>Timeline: 1 year</li> </ul>	<ul style="list-style-type: none"> <li>Joined up efforts and increased capacity for impact and significant scale performance improvement.</li> </ul>

### 5. Looking to Asia and the Pacific

Recommendation 5.1: Explore options for establishing more durable sub-regional trading strategies or blocs for Northern Australian agriculture, focussing on building value in the supply chain within Northern Australian, including options for purpose-built or shared supply and value chain hubs with neighbouring countries.

Recommendation 5.2: More active and strategically focussed coordination of government trade-effort to progress these strategies, including industry and relevant stakeholder investment efforts to engage in ASEAN markets and supply chain relationships.

Recommendation 5.3: The Australian Government to prioritise Northern Australian agendas in trade development strategies, particularly measures for accessing markets and developing deeper and more value-rich supply chain networks.

Key actions	Owner/Partners	Pathways to implementation and timeline	Impacts
<ul style="list-style-type: none"> <li>Engagement of key trade agencies across Australian and State/Territory governments.</li> <li>Review existing trade strategies and bloc for leveraging Northern Australia agendas.</li> <li>Coordination of North Australian trade-efforts in ASEAN markets to leverage supply chain development.</li> <li>Identify the value of priority sub-training blocs.</li> </ul>	<p><i>Owner:</i> Department of Foreign Affairs and Trade, ONA</p> <p><i>Partners:</i> Relevant NT, QLD and WA governments trade agencies CRCNA Relevant industries Peak industry bodies Country specific chambers of commerce Relevant consuls and embassies</p>	<ul style="list-style-type: none"> <li>Ensuring Northern Australian development is linked to other strategies</li> <li>such as trade and multi-lateral relations to leverage supply chain development</li> <li>Rather than a broad focus on Asia, effort should be limited to sub-regions which will enable consolidation of and increasing supply chain efforts.</li> <li>Timeline: 1-3 years</li> </ul>	<ul style="list-style-type: none"> <li>Through cross-national collaborations and a strategic trade focus, building North Australia's deep engagement with Asia in an embedded way with a long term outlook.</li> <li>Development of value rich and enduring supply chain relationships in Asia.</li> </ul>

### 6. Workforce Considerations

Recommendation 6.1: In partnership with key Northern Australian Universities, other education providers (e.g. schools vocational) and key industry and supply chain stakeholders, develop a North Australian Education Hub with a focus on regional engagement, coordinated workforce education/training and research. The Hub should work with a view to supporting industry needs including supply chain industry skills needs, workforce shortages and gaps in Northern Australia.

Recommendation 6.2: Support third party facilitated development of regional/place-based supply chain workforce strategies and plans across Northern Australia.

Key actions	Owner/Partners	Pathways to implementation and timeline	Impacts
<ul style="list-style-type: none"> <li>Engagement of key educational institutions, departments of education and industry stakeholders in Northern Australia in a discussion about the Hub.</li> <li>Development of the Hub concept.</li> <li>Consultation with supply chain industry.</li> <li>Implementation to establish Hub.</li> </ul>	<p><i>Owner:</i> Departments of education and training across jurisdictions in Northern Australia.</p> <p><i>Partners:</i> Universities, VET providers, industry bodies, skills relevant skills councils (e.g. transport, agriculture), ONA, CRCNA.</p>	<ul style="list-style-type: none"> <li>Bringing educational and industry stakeholders together.</li> <li>Regional and place based workforce and skills planning approaches.</li> <li>Coordinated skills and education delivery.</li> <li>Timeline: 2 years</li> </ul>	<ul style="list-style-type: none"> <li>Workforce and human capability is linked with vitality and prosperity of North Australia. These measures will ensure knowledge and skills capability and readiness for the 21<sup>st</sup> century knowledge economy and the disruption that will be arising from digital transformation.</li> </ul>

**7. COVID-19**

Recommendation 7.1: Within national and jurisdictional COVID response and recovery strategies, the Commonwealth, States and Territory should identify the impacts of COVID-19 on agricultural supply chains and exploring ways to develop resilient and flexible supply chains in the Northern Australian context.

Key actions	Owner/Partners	Pathways to implementation and timeline	Impacts
<ul style="list-style-type: none"> <li>Research on impacts of COVID-19 on supply chains in Northern Australia.</li> <li>Ensuring COVID-19 economic response and recovery strategies have focus on Northern Australia supply chains.</li> <li>Cross jurisdictional dialogue about supply chain resilience across State and Territory boundaries</li> </ul>	<p><i>Owner:</i> Relevant COVID-19 response co-ordination agencies in Australian and State/Territory governments, ONA.</p> <p><i>Partners:</i> CRCNA, Universities, VET providers, industry bodies, relevant skills councils (e.g. transport, agriculture),</p>	<ul style="list-style-type: none"> <li>Development of evidence base for impacts of COVID-19 on supply chains in Northern Australia.</li> <li>Response and recovery efforts focused on Northern Australia supply chain impacts.</li> <li>Timeframe: 1 year +ongoing response as COVID-19 endures.</li> </ul>	<ul style="list-style-type: none"> <li>COVID-19 will have long-term impacts in Northern Australia. Response and recovery efforts will be continuous across the Northern Australian landscape and enable flexible and resilient supply chains to be developed.</li> </ul>

**8. Data and Research**

Recommendation 8.1: Commissioning of long-term research on the development and continuous improvement of partnership-based and data-rich models of horizontal and vertical supply /value planning and collaboration within and across sectors in Northern Australia.

Key actions	Owner/Partners	Pathways to implementation and timeline	Impacts
<ul style="list-style-type: none"> <li>Development of a Supply Chain Fund</li> <li>Supply chain projects funded by CRCNA via EOI process</li> </ul>	<p><i>Owner:</i> Department of Industry, Science and Energy and Resources ONA, CRCNA</p> <p><i>Partners:</i> relevant WA, NT and QLD government agencies, Universities, other research agencies</p>	<ul style="list-style-type: none"> <li>Complimenting existing research investment, through the establishment of a fund dedicated to supply chain development can address gaps in knowledge</li> <li>Timeline: 1 year +ongoing</li> </ul>	<p>Evidence based approaches will result in strategic decision making, making accurate analysis and successful interventions for supply chain outcomes</p>

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## Appendices

### Appendix 1: Stakeholder Consultation List

The following organisations and stakeholders have been consulted either individually or in the context of interviews or roundtables. In large organisations, multiple stakeholders were engaged as they work in different sections of the agency. This list is not exhaustive and a number of informal meetings have been held to inform the research.

Organisation	Category
ACIL Allen	Consulting firm
Advance Cairns	Regional economic development body
AEC Group, Townsville	Consulting firm
AgForce	Queensland rural producer peak body
AlphaBeta	Consulting firm, Singapore
Austcham	ASEAN focused Chamber of Commerce
Ausindustry	Government agency
Australian Logistics Council	Peak body
Broome Futures	Regional economic development body
Cairns Airport	Transport
FNQ Growers	Regional horticultural body
FNQROC	Local government
Central Queensland University	University
Chain Consulting	Consulting firm
Charles Darwin University	University
CRCNA	Research agency
CSIRO	Research agency
Darwin Port	Transport
Deakin University	University
Department of Defence	Government agency

Department of Industry, Science, Energy and Resources	Government agency
Department of Transport NT	Government agency
Grow Com	Horticulture peak body
GW3	Regional economic development body
iMove	Peak industry Body
James Cook University	University
KPMG	Consulting body
LGA NT	Local Government peak body
LGAQ	Local Government peak body
Linfox Logistics	Transport company
Logistics Consultant	Consultant
Meat and Livestock Australia	Peak industry body
Melon Australia	Peak industry body
Northern Australia Infrastructure Facility (NAIF)	Government agency
North Regional TAFE- WA	VET provider
North Queensland Bulk Ports Corporation	Transport
NT Department of Primary Industry and Resources	Government agency
NT Department of Trade Business and Innovation	Government agency
NT Department Infrastructure Planning and Logistics	Government agency
NT Farmers	Peak body
NT Road Transport Association	Government agency
NT Seafood Council	Peak industry body
Office of Northern Australia	Government agency
Piccones IGA	Private enterprise
Pivotal Management Consulting	Consulting firm
Port of Townsville	Transport
Ports North	Transport

PwC Australia	Consulting firm
QLD Department of Agriculture and Fisheries	Government agency
QLD State Development, Manufacturing, Infrastructure & Planning	Government agency
Queensland University of Technology	University
RDA Central and Western Queensland	Regional development body
RDA Kimberley	Regional development body
RDA Townsville and North West	Regional development body
Reef and Rainforest Research Centre	Research body
Rural Economies Centre of Excellence	University/research
STS Strategic Services	Consulting firm
Tagai Management Consultancy	Indigenous consulting firm
Timber Queensland	Industry body
Tiwi Plantations Corporation	Forestry enterprise/body
Townsville Enterprises	Regional development body
WA: Department of Primary Industries and Regional Development	Government agency
Western Roads Federation	Government agency
Westport	Transport/Government
*8 participants who did not want to be named	A range of agencies

## Appendix 2: Roundtable and interview questions

### Roundtable Questions

Question	
1	Do you support a freight subsidy scheme for Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
2	How would a freight subsidy scheme help support the development of Northern Australia? (please select two from the options below)
	<ul style="list-style-type: none"> <li>a) Support specific industries that are disadvantaged</li> <li>b) Enable industry to respond to problems</li> <li>c) Enable competitiveness and correct market imperfections</li> <li>d) Develop regional economies</li> <li>e) Grow employment</li> <li>f) Leverage subsidy for investment attraction</li> </ul>
3	Should Northern Australian supply chains increase focus towards Asia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
4	Is there cross-industry/sector supply chain collaboration in Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
5	Do you believe there are workforce gaps/shortages in supply chains in Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
6	Do you believe Northern Australian industries, generally, are adapting to disruption and technological change?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
7	What are the major investment priorities for supply chain infrastructure in Northern Australia? (please select two from the options below)
	<ul style="list-style-type: none"> <li>a) Transport (roads, ports, rail and aviation)</li> <li>b) Cold and other storage facilities</li> <li>c) Digital infrastructure</li> <li>d) Distribution, storage, processing hubs</li> </ul>
8	Do you believe digital connectivity (affordability, access and digital ability) are hindering supply chains and economic development in Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
9	Do you please that lack of cross jurisdictional harmonization is impacting on supply chains, economic development and investment attraction in Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
10	Do you support the establishment of a supply chain co-ordinator role for Northern Australia to facilitate coordination efforts

	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
11	Do you think there is a need to rethink the way supply chains operate in Northern Australia?
	<ul style="list-style-type: none"> <li>• Yes or No</li> </ul>
12	What needs to happen as a priority to re-frame supply chains in Northern Australia? (please select two from the options below)
	<ul style="list-style-type: none"> <li>a) Improved supply chain multi-purpose/multi-sector enabling infrastructure</li> <li>b) Better planning and coordination across jurisdictions</li> <li>c) Cross industry/sector synergies and multi-modal supply chains</li> <li>d) Focus of supply chains to Asia</li> <li>e) Value adding options</li> <li>f) Human capability development including workforce skills and gaps</li> <li>g) Improved digital connectivity and skills</li> <li>h) Incentives and subsidies</li> <li>i) Circular and inclusive economy approaches</li> </ul>

### Interview Questions

1. What are the key features of supply chains in Northern Australia?
2. How are these different from other parts of Australia?
3. Do you see differences in in supply chains across commodities? What similarities and differences in supply chains have you noticed across different commodities?
4. Are you able to comment on freight, rail, air and sea supply chain options in Northern Australia? (probe for availability, infrastructure and access)
5. Are you able to comment on public and private supply chain infrastructure and investment?
6. Are you aware of what disruptions are occurring in supply chains? How is this affecting your business/economic development in Northern Australia?
7. What are the key constraints in supply chains in Northern Australia?
8. Where do you think are new market opportunities for Northern Australia? How can supply chain efficiencies enable Northern Australia to capitalise on those opportunities?
9. What changes need to take place to make supply chains in Northern Australia smarter and more efficient to capture new markets?
10. What regulatory and policy changes do you think are needed to make supply chains more efficient in Northern Australia?
11. Are you aware of any best practice examples in supply chain management?
12. Would you like to make any other comments?