



Evaluation of the potential to expand horticultural industries in Northern Australia

CRCNA Project Upstream Supply Chain Intelligence Report

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Background and purpose of the upstream supply chain analysis

Although Australia's export of mangoes, avocados and lychees as a percentage of production is relatively small, mango and avocado exports predominantly come from Queensland, Northern Territory and Western Australia, both making up around 90% of the national export combined. What is more, nearly all of Australia's lychees are exported from Queensland, with 99% of national production being produced in Queensland (HIA, 2018).

The CRCNA project focuses on three horticultural industries in Northern Australia. Mangoes and avocados are two established industries, while lychee is a newer industry with sufficient success to have a foothold in new markets. Northern Australia has long been regarded as an important gateway to the emerging markets of Asia. However, mangoes, avocados and lychees produced in the region are mostly exported from the capital cities, including Brisbane, Sydney and Melbourne, instead of exporting out of Cairns and Darwin.

The purpose of the analysis of upstream supply chains from Northern Australia is twofold:

- (1) Investigate developed supply chain structures and costs and lead time along the supply chains from major producing regions to major markets;
- (2) Identify the constraints in supply chain operations from major producing regions in Northern Australia to the main ports of export in Australia.

1. Port of Export

Queensland, Northern Territory, and Western Australia have a number of ports for exporting local products to international markets. However, from 2016 to 2018, most of the mango produced in Queensland and Northern Territory, and avocados and lychees produced in Queensland were exported from the ports of Brisbane and Sydney. Mangoes and avocados produced in Western Australia were exported mainly from Perth thanks to the geographical proximity. Although no official data is available for lychee exports, lychees were mostly exported from Brisbane as Asian customers prefer lychees from Brisbane which is close to the production region. Table 1 ranks the export ports for mangoes and avocados by percentage, calculated from the 2016 to 2018 data.

Table 1 Ports for the exports of mango and avocado in 2016-2018

Port of export		Australia	Queensland	Northern Territory	Western Australia
Mango export via	Brisbane	61.05%	75.51%	27.20%	3.10%
	Sydney	25.41%	13.01%	65.92%	13.53%
	Cairns	6.89%	8.80%	0	0
	Melbourne	4.44%	0.92%	4.44%	0
	Perth	0.64%	0.07%	0.30%	78.55%
	Darwin	0.02%	0	0.15%	0
Avocado export via	Brisbane	44.51%	69.65%	NA	1.35%
	Sydney	21.65%	17.89%	NA	0.72%
	Perth	16.66%	0.46%	NA	97.84%
	Melbourne	10.58%	2.16%	NA	0
	Cairns	0.04%	0.07%	NA	0

Source: calculated with World Trade Atlas data supplied by Hort Innovation Australia

Australia ranks poorly in global comparisons of productivity of freight and logistics (iMove, 2019). This is at least in part driven by inefficient supply chains that require far more transport modes and carriers and further distance than would seem optimal. Horticulture seems to suffer a similar fate to many other industries in this respect. The small proportion of mangoes and avocados produced in Queensland and shipped out of Cairns means the supply chain stretches from north Queensland to Brisbane, Sydney, and Melbourne before international shipment. Similar to mangoes produced in the Northern Territory, only 0.15% are directly shipped from Darwin. The long supply chain for North Australia's horticultural products not only leads to increased logistics costs, but also results in more handling, increasing the risk of reduced fruit quality upon arrival at their international destination. This is problematic when the price of Australian horticultural products is generally at the higher end.

2. Profile of companies interviewed

Several companies in Northern Australia across the supply chain have been interviewed as shown in Table 2 as part of the CRCNA funded project to capture a diversity of perspectives.

A total of 29 companies involved in mango, avocado and lychee industries within the boundary of Northern Australia, including Queensland, Northern Territory, and Western Australia were interviewed between 7 February and 30 July 2019. The 29 companies interviewed are clustered into three groups, namely growers, merchant exporters, and grower exporters. All 11 growers interviewed are involved in indirect exports, which means that they export via a middle person. It should be noted that only 1 mango grower in Western Australia and 1 lychee grower in North Queensland were interviewed due to the difficulties in getting more participants.

Table 2 Profile of companies interviewed in Northern Australia

Cluster	Actor	Category	Region			Number of participants
			NT	NQ	WA	
Cluster 1	Grower	Indirect export to Asian open markets (AOMs)	G_M_NT	G_A_QLD_1, G_A_QLD_2, G_A_QLD_3, G_MAL_QLD, G_M_QLD_1, G_M_QLD_3, G_M_QLD_4, G_MA_QLD	G_M_WA	10
		Indirect export to Asian open & protocol markets (APMs)	x	G_M_QLD_2	x	1
Cluster 2	Exporter	Export to Asian open markets (AOM)	x	E_MA_QLD_1, E_MA_QLD_2, E_MAL_QLD_1, E_M_QLD_2, E_MAL_QLD_2, E_A_QLD	E_MA_WA_1, E_MA_WA_2	8
		Export to AOMs & POMs	x	E_M_QLD_1	E_A_WA_1	2
Cluster 3	Grower exporter	Export to Asian open markets only	GE_M_NT_1, GE_M_NT_2, GE_M_NT_3, GE_M_NT_4	x	x	4
		Export to Asian protocol markets only	GE_M_NT & QLD	GE_M_NT & QLD	x	1
		Exports to AOMs & POMs		GE_M_QLD_1, GE_M_QLD_2	GE_A_WA_2	3

3. Export supply chain structure

Australia's mango, avocado and lychee industries are currently heavily focused on the Australian domestic market (HIA, 2018), with fresh products exported to international markets accounting for 11.58%, 3.51%, and 16.99% respectively in 2016-17. However, all three industries have identified their strategy as the facilitation of export market growth into existing and new markets (de Vos, 2010; Allen, 2008; Noller, 2015).

3.1 Mango export supply chain

Asia is a major market for mangoes produced in Northern Australia. Exports are to open markets, such as Hong Kong and Singapore, and protocol markets, such as China and South Korea.

The mango export supply chain evolved in Northern Australia is depicted in Figure 1. Northern Australia's mangoes are exported to Asian markets through several modes. The exporters in Australia, including brand owners (growers), grower exporters, marketers/agents, and exporter traders, who ship mangoes either to importer consolidators or directly to importers.

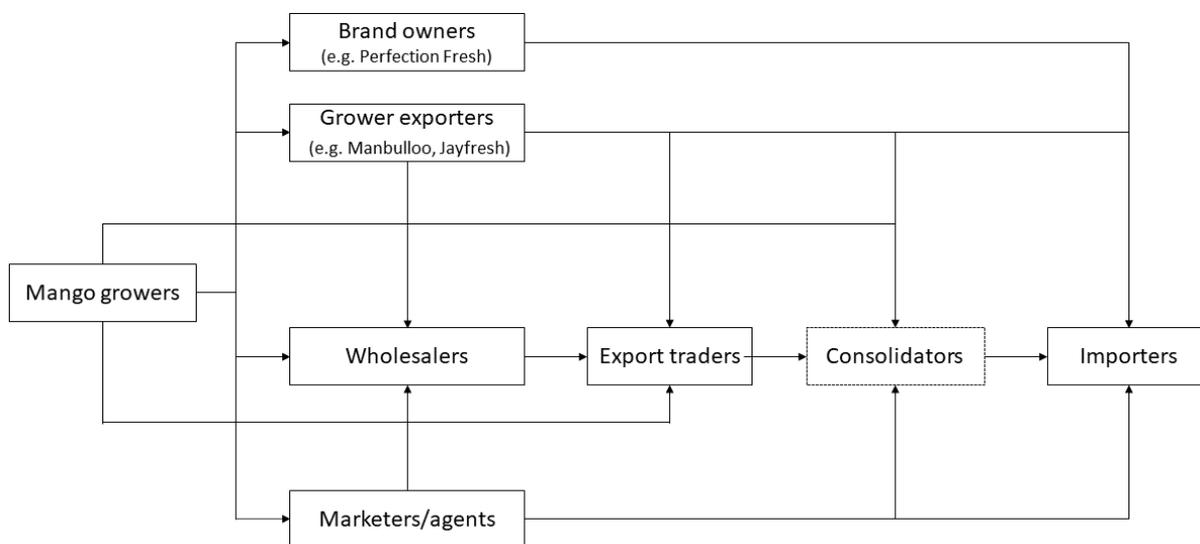


Figure 1 Northern Australia's mango export supply chain mapping

3.2 Avocado export supply chain

Avocados from Northern Australia are largely exported to open markets in Asia, such as Hong Kong and Singapore. Japan is a newly developed protocol market in Asia, which released a new protocol agreement for Hass avocado to Japan in May 2018 and stipulated that avocados must only be sourced from officially recognised areas free from Queensland fruit fly: Western Australia, Riverland (South Australia) and Tasmania. This means that Western Australia is the only state in Northern Australia that has official market access to Japan (AGDA, 2018).

The avocado export supply chain evolved in Queensland and Western Australia is depicted in Figure 2. Several supply chain modes are used in exporting Northern Australia's avocados where grower exporters, marketing companies (either grower-owned or private) and export traders are involved with export businesses either directly with importers or with importer consolidators in Australia.

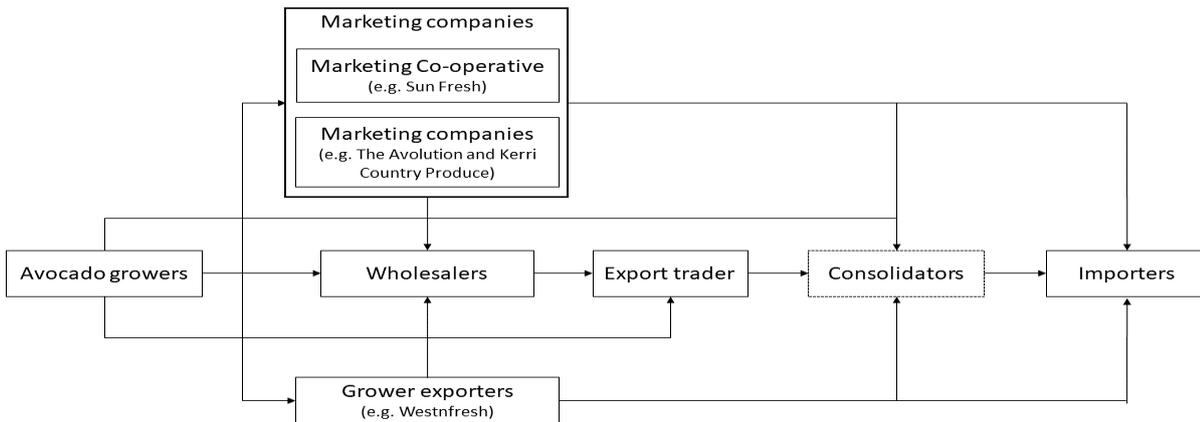


Figure 2 Northern Australia's avocado export supply chain mapping

3.3 Lychee export supply chain

The Australian lychee industry currently exports to several countries, but only have a foothold in the quarantine free countries in Asia, including Singapore, Malaysia and Hong Kong due to the quarantine protocols in most countries, such as China, Japan, Taiwan, Korea, Thailand, and Vietnam.

The lychee export supply chain evolved in North Queensland is depicted in Figure 3. The lychee industry has already established at least two effective supply chain modes for lychee exports, one being grower-owned collaborative marketing groups, such as Top Crops, the others being driven by one of the industry fresh fruit marketers under their brands (HIA, 2018). The majority of exports are quality-controlled fruit from two marketing groups – United Lychee Marketing Association and Top Crop. There are also opportunistic exports from Sydney, Brisbane, and Melbourne markets, where exporters buy off the market floor and ship to international markets (ALGA, 2018).

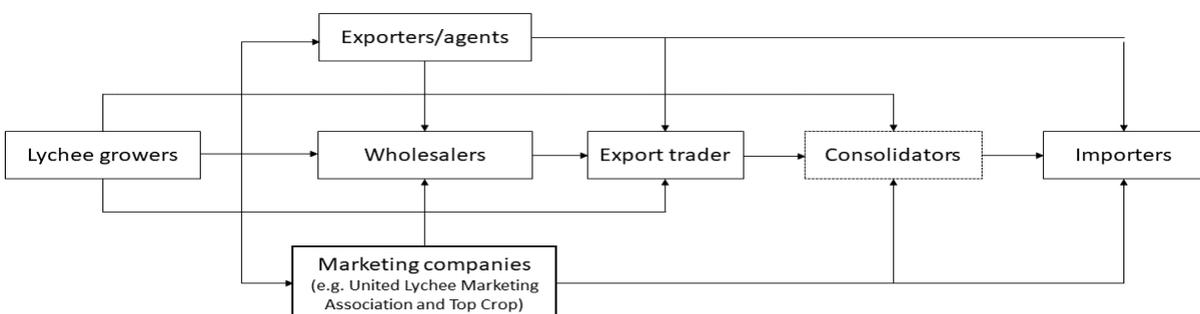


Figure 3 Northern Australia's lychee export supply chain mapping

4. Supply chain cost and lead time

4.1 Transport time and cost from producing regions to main markets

Table 3 offers a summary of alternative transport costs and lead time facing Northern Australia's horticultural producers.

Table 3 Transport time and lead time from Northern Australia to key capital markets

Producing region	Place of despatch	Destination	Transport time	Transport cost (\$/pallet)	Number of tray per pallet		
					Mango	Avocado	Lychee
Northern Territory	Katherine	Sydney	3-5 days	\$354	120 - R2E2, 136 KP or 128 Keit and others	170 Hass or Shepard	168
		Melbourne	3 days	\$261			
		Brisbane	3 days	\$267			
		Perth	5 days	\$502			
		Adelaide	2 days	\$195			
	Darwin	Sydney	3 days	\$440			
		Melbourne	4-5 days	\$440			
		Brisbane	5 days	\$630			
		Perth	5 days	\$650			
		Adelaide	3 days	\$400			
Western Australia	Carnarvon	Perth	2 days				
	Kununurra	Perth	4 days	\$156			
North Queensland	Mareeba/ Dimbulah/ Cairns	Sydney	3 days	\$272			
		Melbourne	4 days	\$280			
		Brisbane	1 day	\$195			
		Adelaide	5 days	\$358			
	Atherton	Brisbane	1 day	\$180			
		Cairns	2 hours	\$15-16			
	Bowen/ Burdekin	Sydney	2 days	\$300			
		Melbourne	3 days	\$360			
Brisbane		14 hours	\$228				
Adelaide		4 days					

4.2 Lead time and freight costs of export supply chain into Asia

Table 3 provides a snapshot of freight cost and transit time from some Australian ports to target Asian markets.

Table 4 Freight cost and lead time from Australia to targeted Asian markets

Place of despatch	Destination	Air freight				Sea freight		
		AKE		PMC		20 foot	40 foot	Lead time
		Loading	Air fare	Loading	Air fare			
Brisbane – QLD	Singapore		\$1,105	\$325	\$3,100		\$3500	12 days
	Hong Kong		\$1,285	\$325	\$2,850			
	Shanghai	\$520	\$1,782	\$1100	\$3,921			
	Tokyo		\$1,950		\$3,850			
	Seoul		\$1,758		\$4,552			
Townsville – QLD	HK/Shenzhen	-	-	-	-			28 days
	Busan	-	-	-	-			29 days
Perth – WA	Singapore		\$1,350		\$2,700			
	Hong Kong		\$1,485		\$2,935			
	Tokyo		\$2,500		\$3,500			
Darwin – NT	Singapore							
	Hong Kong							21 days

Note: (1) AKE – 1500 KG Max; PMC – 4500 KG Max.

5. Supply chain constraints

In the work for the CRCNA project to date, twelve supply chain constraints that affect the cost, timelines, quality, efficiency and presentation either separately or in combination have been identified. Supply chain constraints reported by 24 interviewees are shown in Figure 4.

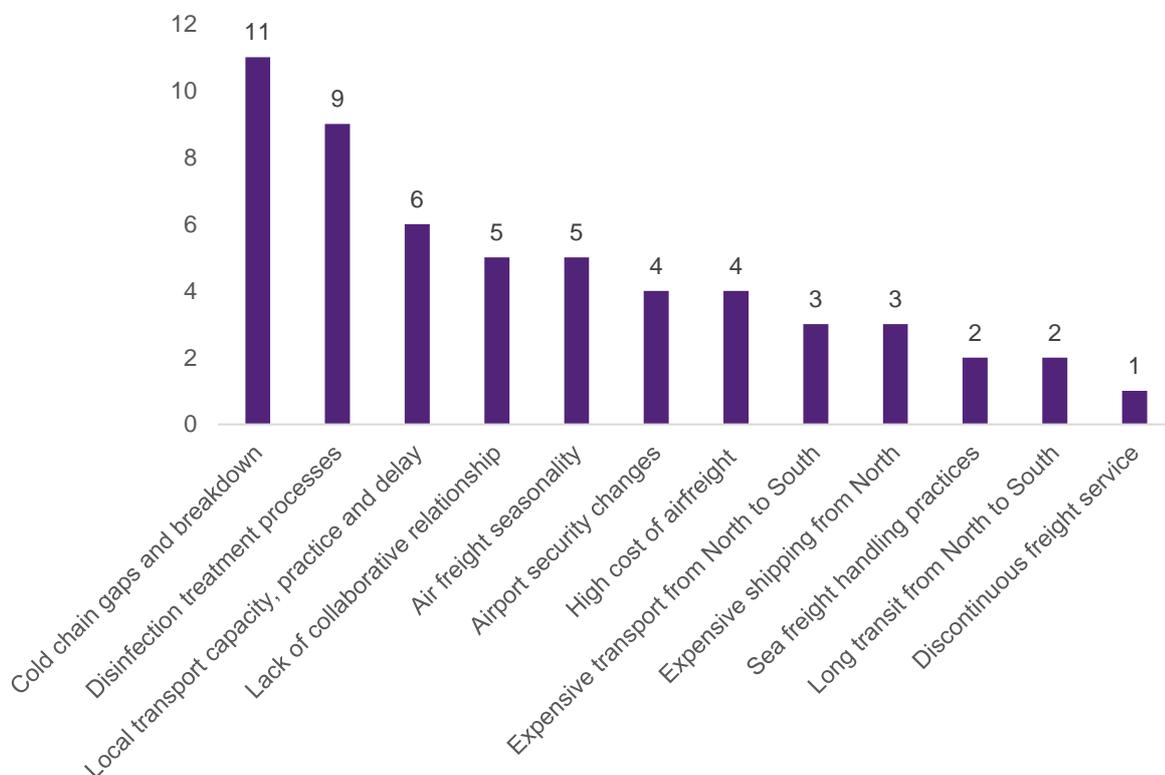


Figure 4 Frequency of supply chain constraints reported by 24 interviewees

Constraints in export supply chains are raised by 24 out of 29 (82.76%) companies interviewed across mango, avocado and lychee industries within the boundary of Northern Australia. The interactive mapping between supply chain constraints and 24 companies interviewed is illustrated in Figure 5.

Among the identified 12 constraints in export supply chains, cold chain gaps and breakdown in either domestic transit or international shipping is the most concerned, which is indicated by 11 interviewees. Given that the respondents come from mango, avocado and lychee industries, this constraint appears across all three export supply chains. Disinfection treatment processes are the next concern, indicated by eight interviewees from the mango industry and one from the avocado industry (9 interviewees in total). The disinfection treatment required for mangoes exported to protocol markets, such as China and Korea and Japan, is Vapour Heat Treatment, which could damage fruit and bring in extra costs. It also leads to the increased lead time of supply chain as this process takes 6-8 hours to treat fruit and involves re-packing after treatment. As noted by one interviewee, it could take up to three days to complete the treatment when counting the dates when the fruit is brought in and re-packed. The disinfection treatment for avocado exported to Japan is pallet segregation packing, which means that a small number of trays can be shipped in an AKE or PMC. This treatment makes the cost of shipping significantly more expensive to Japan.

Local transport capacity, practice and delay indicated by six interviewees is the third-highest constraint. This constraint is applied to the supply chains of mango, avocado and lychee. Local transport delays are the most constraint indicated by four interviewees compared with local transport capacity and practice, indicated by one interviewee each. Similarly, lack of collaborative relationships across the chain and freight seasonality are indicated by five interviewees each. These two constraints are indicated by merchant exporters and grower exporters. As indicated, the lack of collaborative relationships not only happens in their relationship with upstream growers but also in their relationship with international customers. Given that mangoes, avocados and lychees are mainly air freighted from Brisbane and Sydney, air freight seasonality refers to the seasonal unavailability of air freight space in these two airports, particularly in the Christmas season. This constraint not only gives rise to delivery delay but also leads to increased airfreight costs.

With current export supply chains stretching from Northern Territory and north Queensland to Brisbane, Sydney and Melbourne, expensive transport from North to South and long transit from North to South are raised by three and two interviewees who are growers and grower exporters respectively. The mainstream supply chain mode increases supply chain costs as well as leads to a longer supply chain lead time. Although some interviewees expressed their interest and even attempted to ship directly from Darwin and Cairns, the reality is that direct shipping from the North is more expensive compared with shipping from Brisbane, as indicated by three interviewees. The high cost of airfreight in Brisbane and Perth are also raised by four interviewees from Western Australia and Queensland. While interviewees indicated that air freight service runs smoothly in Brisbane and Sydney, discontinuous airfreight services in Perth is raised by one interviewee from Western Australia. Besides, airport security changes refer to the screening process effected

on 1st April 2019. Four interviewees from Western Australia and Brisbane indicated that the airport security changes can lead to extra costs.

Sea freight can be an alternative solution as shipping by sea is usually cheaper than by air. However, sea freight handling practices which are raised by two interviews make it unattractive compared with air freight. One interviewee indicated that they have to send their fruit to Brisbane, where double handling is required due to pallet size differences. The other interviewee who shipped mangoes from the port of Townsville mentioned that fruit has to be delivered the containers 3-5 days to the port before the vessel arrives, which extends supply chain lead time.

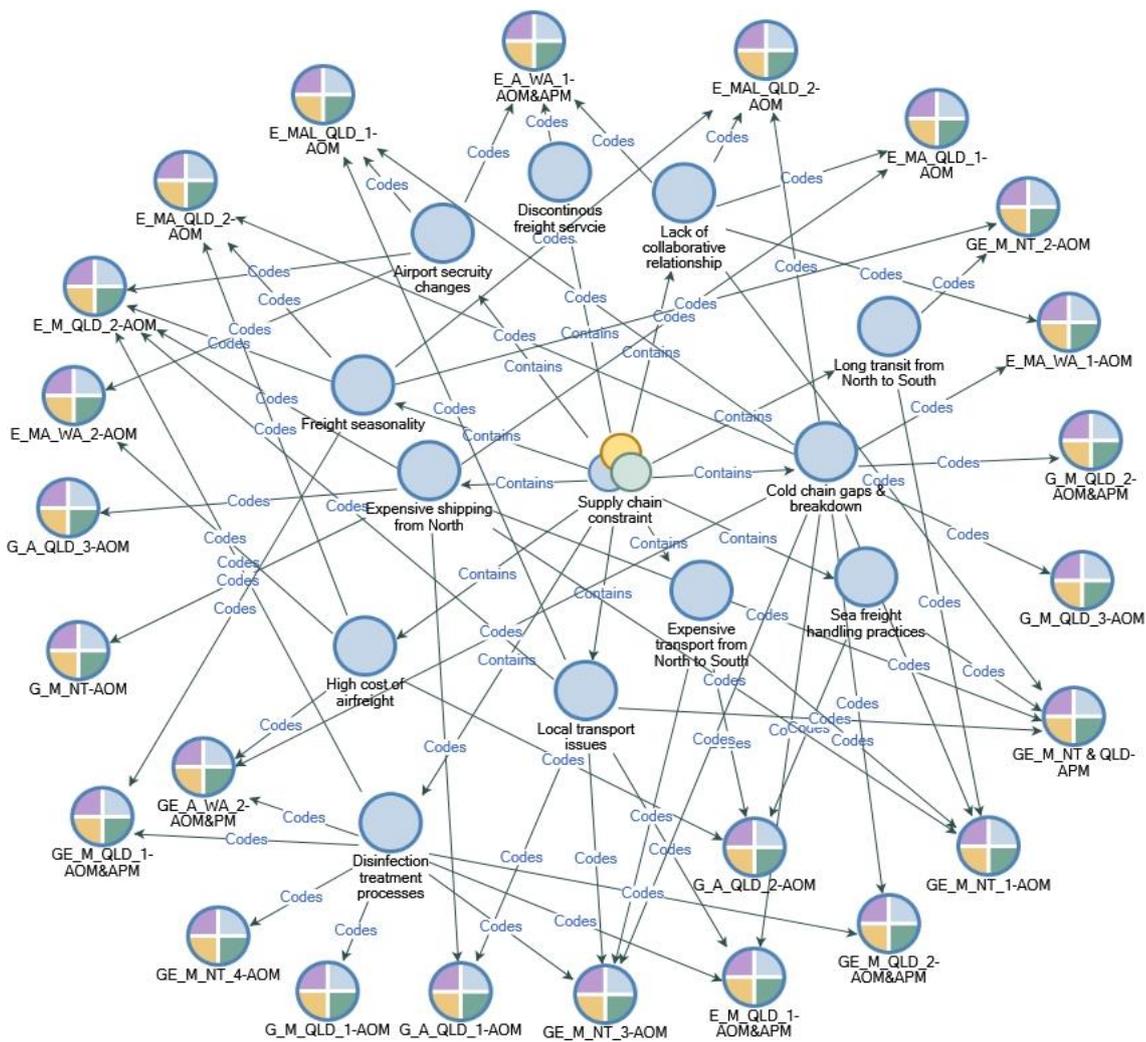


Figure 5 Interaction between supply chain constraints and companies interviewed

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