

NON-DURABLE GOODS, EGGS INTRODUCTION

Pandemic Disruption: Trends in Egg consumption in Singapore during Pandemic

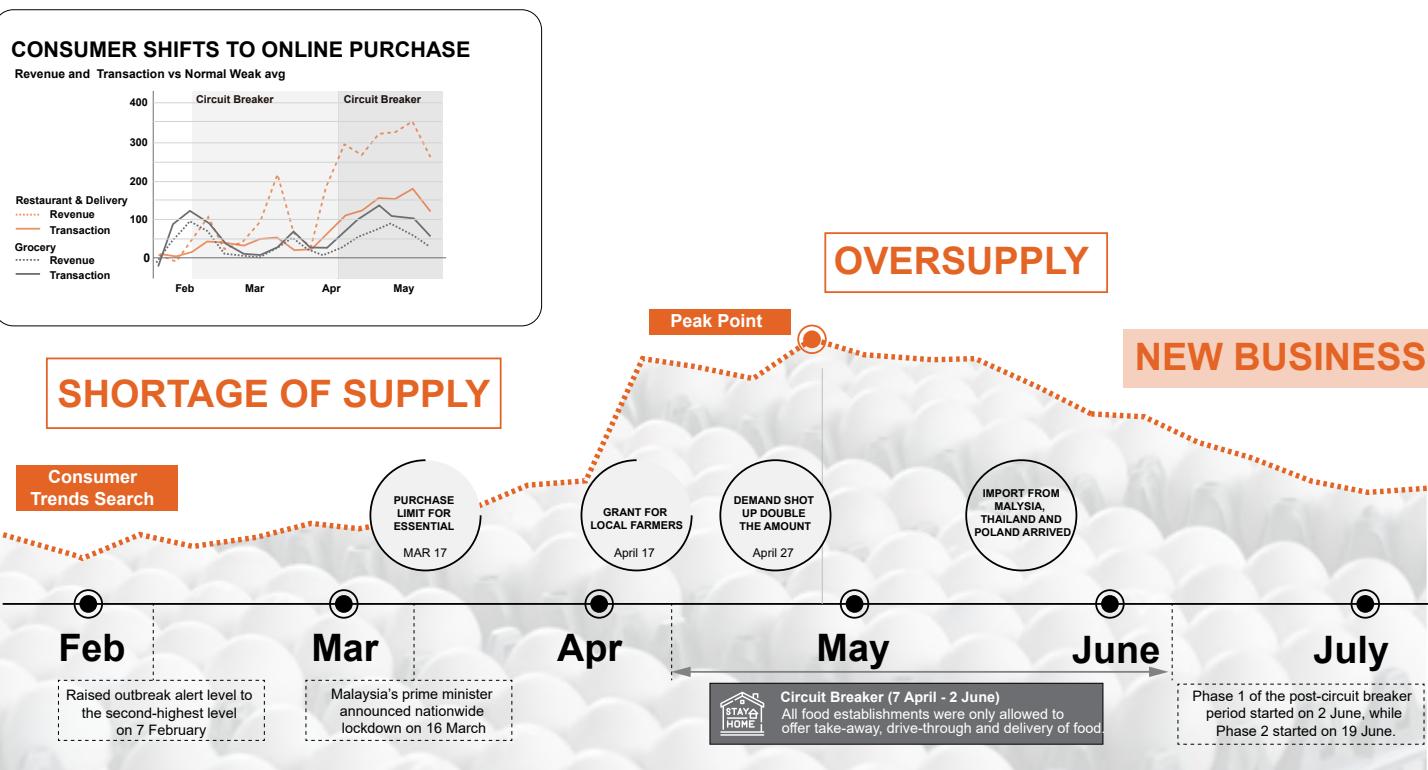
Ekta Rakholiya/ Han Cong / Mamiko Tanaka

EPISODES OF SHORTAGE & SURPLUS

During the month of March and April, Hen shell eggs were frequently missing from grocery shelves, both digital and in store. Distributors in the import-dependent city state scrambled to increase their stocks. Fast forward to June, when distributors had to throw away more than 250,000 eggs due to oversupply. Not only that, on of the local farmer had to sell 1/6th of the egg laying hens to slaughter houses.

The wild swing from deficit to surplus – known in logistics circles as the bullwhip effect – has highlighted the susceptibility of supply chains to such shocks.

What does this trend inform us - is that - Singapore heavily rely on import for it's nutritional needs and extremely vulnerable to any hiccups in supply chain.



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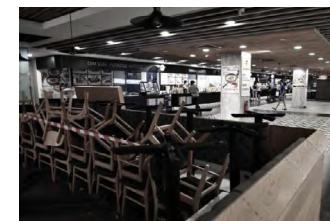
MASSIVE INCREASE IN DEMAND FOR TABLE EGGS

Customers queue at a supermarket in Singapore after the Singapore Ministry of Health raised its alert level for the coronavirus outbreak.



HUGE DROP IN EGG SALES IN THE FOOD CENTER

Dining in at food and beverage outlets will be subject to a cap of five people per group phase 2



EGG DESTROYED

Egg distributors had to deal with an oversupply prompted by panic buying. Kim Hock Eggs Merchant destroyed 250,000 imported eggs in May. N&N Agriculture cuts 30% import from Malaysia (from 10 million to 7 million eggs a month now)



EMERGENCY DIVERSIFICATION OF EGG IMPORT COUNTRY

On 5th June, Singapore received the first shipment of hen shell eggs from Poland. This is part of Singapore's efforts to diversify food supply sources to ensure food supply remains resilient.



NON-DURABLE GOODS, EGGS

OVERVIEW

Egg industry in Singapore

Ekta Rakholiya/ Han Cong / Mamiko Tanaka

OUTLOOK ON LOCAL PRODUCTION, CONSUMPTION TRENDS AND IMPORT DYNAMICS

As eggs are industrial products which have limited shelf life of about 3-4 weeks, it is spoiled within 8 hours after breakage of shell eggs in order to process and consider a good source of nutrients. This factor leads to organisation of whole industry around the factor of time and fresh availability. Due to limited shelf life and high perishability, the Egg production and import stays highly dependent on Malaysia.

Presently, Singapore import over 70% eggs from other countries & only 27% is produced locally. The egg farms in Singapore produce 1,230,000 eggs a day. AVA's target by 2030 to tackle population growth is for the production of at least 30% daily consumption, which is projected to be 1,831,808 eggs a day.

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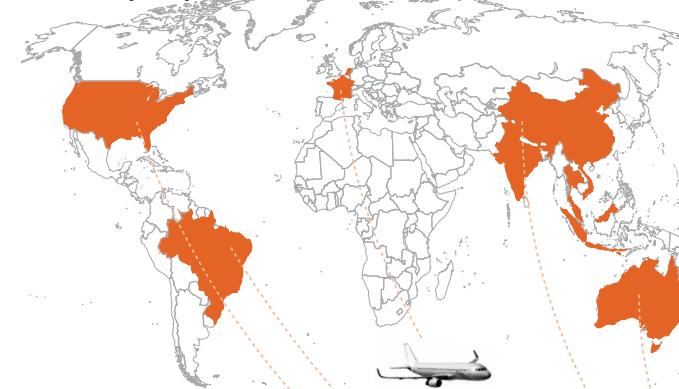
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LEGEND

- EGG FARMS
- EGG SUPPLIERS
- BEEF
- CHICKEN
- HEN SHELL EGGS
- FISH
- FRUITS
- PORK
- RICE
- VEGETABLES
- COOKING OIL
- SUGAR
- MILK

SINGAPORE'S FOOD IMPORT FOOTPRINT

Source country of key food items



Egg sources



72% Malaysia
25% Singapore (local)
1% Ukraine
1% Thailand
<1% New Zealand & other countries

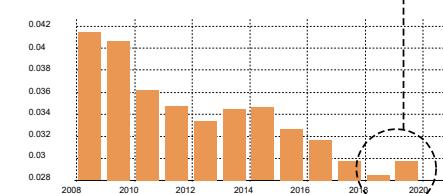
Chicken sources



46% Brazil
37% Malaysia
12% USA
3% Argentina
<1% Denmark & other countries

Agriculture & Value-added (% of GDP)

Agriculture, forestry, and fishing, value added (% of GDP) in Singapore was reported at 0.02967 % in 2019, according to the World Bank collection of development indicators.



United States



Netherlands



China



Thailand



Vietnam



Brazil



France



India



Malaysia



Australia



New Zealand

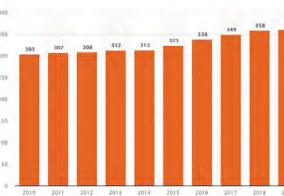


Indonesia



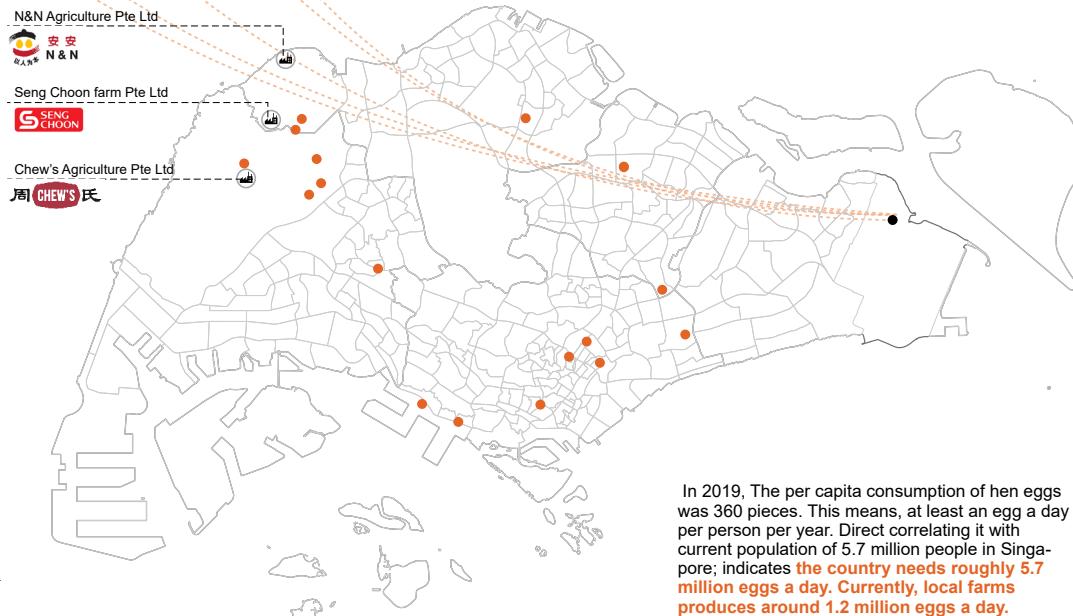
Production Volume in million pieces

310 384 402 418 433 471 452 521 488 528



Per capita consumption

360 367 369 368 312 313 373 338 349 358 366



NON-DURABLE GOODS, EGGS SOURCE FLOWS

Parent stock and Poultry feed flow

Ekta Rakholiya / Han Cong / Mamiko Tanaka

OUTLOOK ON LOCAL PRODUCTION, CONSUMPTION TRENDS AND IMPORT DYNAMICS

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LEGEND

- MAIZE
- WHEAT
- FISHMEAL
- MEAT AND BONE MEAL
- MILK POWDER
- SOYBEAN MEAL
- MICRO INGREDIENT
- PARENT STOCK

SINGAPORE'S PARENT STOCK AND POULTRY FEED

Source country

Singapore mostly imported agricultural products, such as parent stocks and feed from Malaysia. Where do other products come to Malaysia from?

Canada



Germany



Denmark



Netherland



France



Spain



United States



India



China



Thailand



Australia



New Zealand



Chile



Argentina



PARENT STOCK SPECIES AND FEED

PARENT STOCK SPECIES

Lohmann Brown Hisex Brown Dekalb ISA Brown Novogen



FEED INGREDIENT

ANIMAL BASED FEED

Protein Meals
Meat & Bone, Blood,
Feather, Poultry

Omega-3 & Omega-6 meals:
Fish oil & Fats

PLANT BASED FEED

Cereal Grains
Wheat, Corn, Barley, Rye,
Triticale, Oats

Protein Meals
Soybeans, Canola,
Cottonseed, Sunflower,
Peas, Lupins

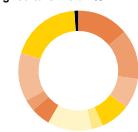
FEED ADDITIVES

Growth Promotion Additives
Antimicrobials,
Feed enzymes,
Antioxidants, Acidifiers,
Probiotics, Prebiotics

DECREASE IN AGRICULTURAL LAND IN SINGAPORE

LAND USAGE

- Housing 14%
- Industry 13%
- Parks and Nature Reserve 8%
- Recreation Facilities 8%
- Utilities 3%
- Land Transportation Infrastructure 12%
- Reservoirs 5%
- Airports 3%
- Others 4%
- Domestic Requirements 19%
- Agriculture Field 1%



TRANSITION OF AGRICULTURAL



2005-2015

Malaysia

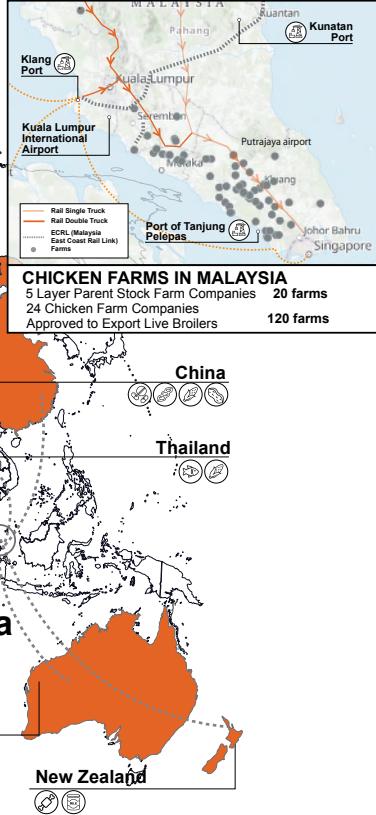
5.7 million

1960

1.6 million

1984

2.7 million



NON-DURABLE GOODS, EGGS

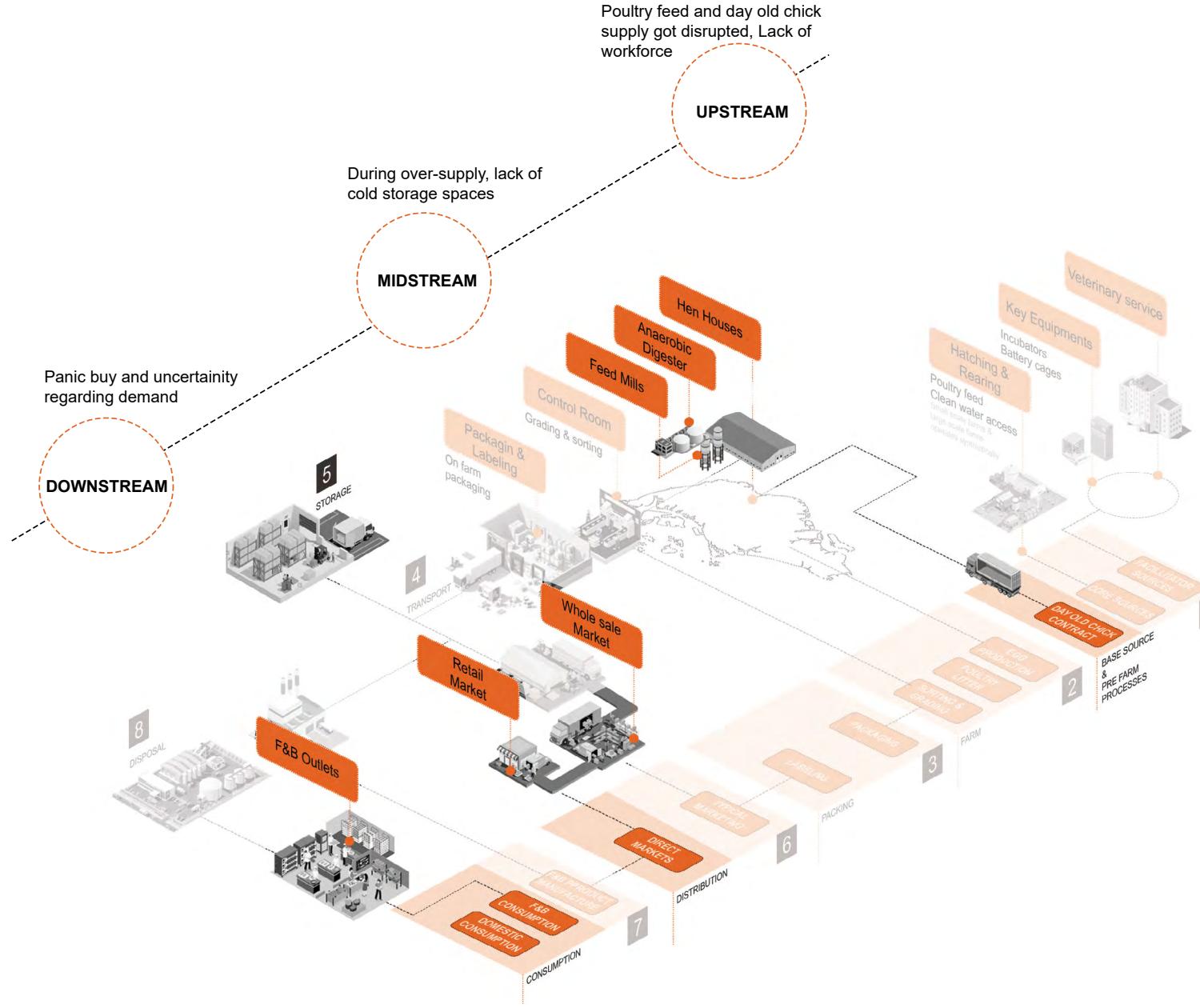
SUPPLY CHAIN

DISRUPTION

Impacts of Circuit breaker measures

Ekta Rakholiya / Han Cang / Mamiko Tanaka

The impacts of major supply chain disruptions in poultry industry was experienced across the chain. The region's food system is highly dependent on transport based flows and disruption to any of its part potentially have significant unforeseen knock-on effects. In upstream, this was experienced in terms temporary lack of supply. Another major shock in the process of production was lack of workforce because of movement control order; which shrunk the production capacity by 30%. Across mid-stream, the major shocks were because of shift in consumption. The closure of F&B outlets created vacuum in whole sale while demand from Retail market shot up. Suppliers struggled to adjust to the rapid shifts.



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NON-DURABLE GOODS, EGGS

SCENARIOS

*Impacts of Circuit breaker
measures*

Ekta Rakholiya / Han Cang / Mamiko Tanaka

Out of 13 key food items consumed in Singapore - Pork, Chicken, and eggs are the most consumed animal-based products. It is a strategic move to focus on boosting egg industry because the production process will cater to two major dietary needs from similar set of farming infrastructure and systems. The challenge is that, in Singapore, the Egg production as well as daily consumption supply are highly dependent on transport networks and transnational material flows. In turn, this highly depends on foreign trade relations, policy structures and network of people who make these transactions possible. This not only make the country's food security highly vulnerable to International supply chain disruption but adds to Food's carbon footprint as well. So, the focus of proposed three scenarios and intervention is to make supply chain resilient in terms of local production as well as table eggs import, while considering both the short term as well as long term needs.

Production

Knock on effect of disruption in global flow of breeding stock will likely to have impact on production capacity of local egg farms. Eventually, a global food crisis can hit hard singapore in terms of food safety as 90% of nutritional needs are imported. The focus on local production has to be ramped up to ensure accessibility and affordability of food.

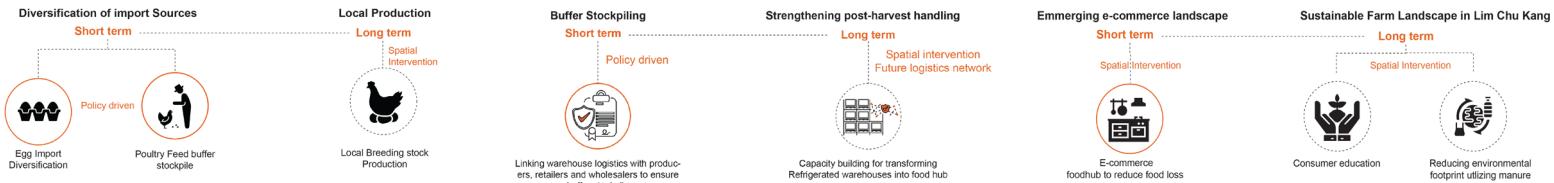
Transportation

Border control movements and near to hault transport networks globally brought extreme challenges for non-durable edible goods like eggs. Short self life and perishability demands new networks and typologies of logistic infrastructure. In order to ensure food safety, Singapore will have to consider new ways of logistic facilities to surf through future uncertainties.

Consumption

The circuit breaker catalysed an already booming trend of e-commerce in grocery as well as f&b industry. This new way of consumption have created the need of integration and intensification of production, storage, sale as well as preparation. Moving forward, there will be need of effectively manage and redesign these spaces and networks to optimise environmental impacts.

6 INTERVENTION



NON-DURABLE GOODS, EGGS

SCENARIO 1

Short term Interventions

Ekta Rakholya / Han Cong / Mamiko Tanaka

A sharp reduction in airline traffic globally, caused by the Covid-19 pandemic left some Egg production companies without breeding stock, feed supply and hatching eggs. Local farms completely depends on Malaysia for breeding stock and poultry feed. Malaysia in turn is susceptible to Global shocks in Poultry industry. Singapore's complete dependency on imports of base sources from Malaysia might create uncertainties in local egg production.

In the short-term, the current situation could cause some problems to animal welfare, because many eggs were placed in hatcheries before the beginning of the current crisis. This will lead to decrease in breeding stock. However, in the long-run the supply disruptions jeopardised food security globally. Based on these trends, two interventions are proposed.

SHORT TERM

1. DIVERSIFICATION OF IMPORT SOURCES

DIVERSIFY EGG IMPORT SOURCES

Physical proximity, fast delivery and competitive prices drives local egg suppliers to import most of their Hen shell eggs from Malaysia. Policy such as minimum 20% to 30% of import from other countries might help mitigate any future hiccups from single source.

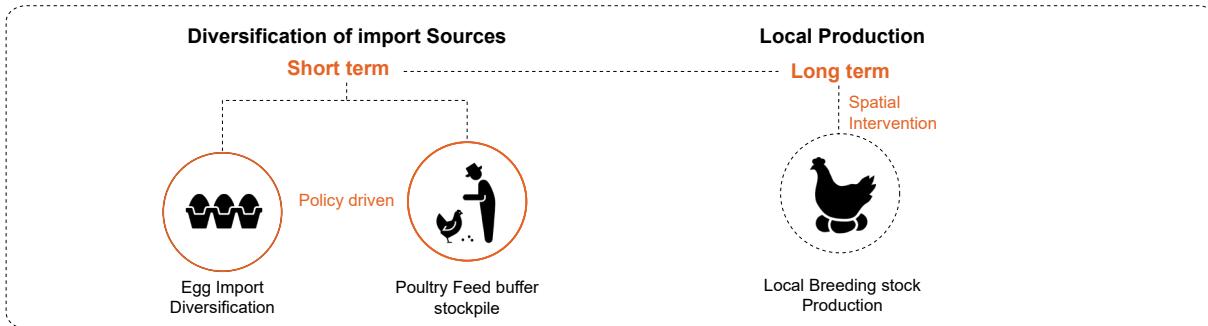
POULTRY FEED BUFFER STOCKPILE

The fluctuating feed prices and uncertain International flows might affect local production capacity. Feed is needed on daily basis and in case of shortagen, can decrease the egg production capacity. Stockpiling can help to stay prepared and combat short term uncertainties.

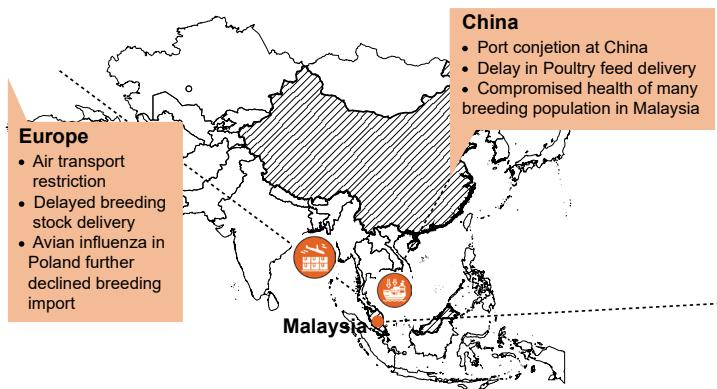
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KNOCK ON EFFECTS OF GLOBAL POULTRY SUPPLY CHAIN DISRUPTION



Global poultry trade outlook for 2H 2020



Less Breeding stock in Malaysia

What if export from Malaysia is restricted to ensure local poultry needs in Malaysia



POLICY DRIVEN INTERVENTION



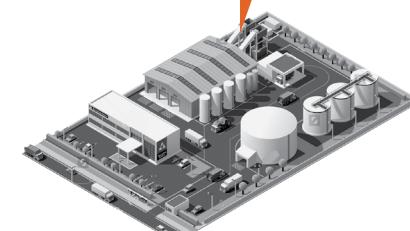
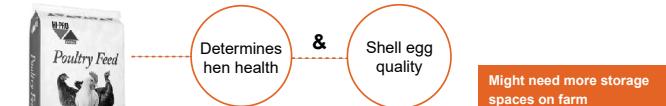
1. Minimum 20% import from country other than dominant source country

After 2008 crisis, the import source diversification was ramped up. But, these 3 key food items couldnt be diversified because of short shelf life and the frequency of demand.

- Physical Proximity
- Fast Delivery
- Competitive prices

This will require policy structure that ensure that retailers and suppliers import eggs from diverse countries. Added transport cost might make it challenging to do so. Hence, Price cap and other similar incentives can be ramped up.

2. Farmers shall import feed from diverse countries and also make arrangements for minimum 3 months buffer stockpile



NON-DURABLE GOODS, EGGS

SCENARIO 2

Short term Interventions

Ekta Rakholiya / Han Cong / Mamiko Tanaka

Before the pandemic began, demand for cold room facilities in Singapore had been lukewarm. The efficient distribution channels that brought food straight from ports of ingress to final customers' storage facilities reduced the need for such infrastructure.

Due to current fluctuation in demand and supply of eggs (perishable edible goods), there will be need for greater physical storage space (logistics) and the expansion of demand for refrigerated warehousing with Just-in-Case inventories. This shift of inventory management moving from "just-in-time" to "just-in-case" will need appropriate cold storage facilities to surf through uncertain consumption trend related to Non-durable edible goods.

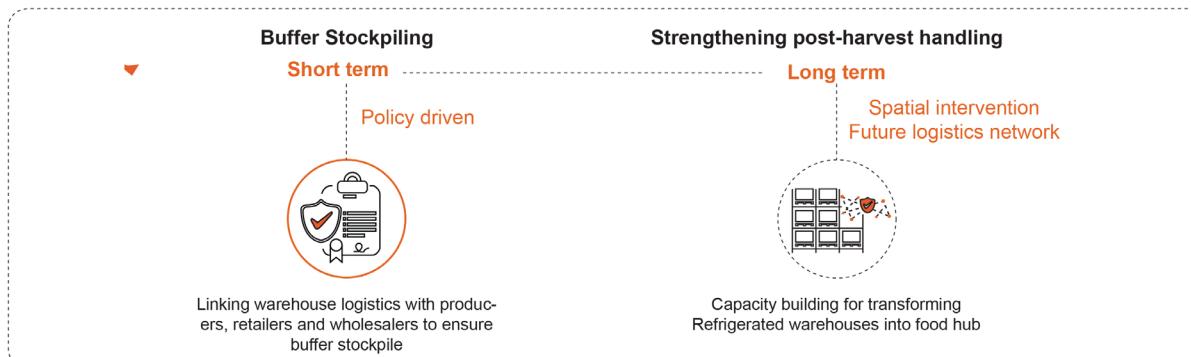
In short term, this will demand efficiently linking stockholder involved in distribution to facilitate timely management of storing surplus eggs at refrigerated facilities.

SHORT TERM

1. BUFFER STOCKPILLING

BUFFERING STOCKPILE - LINKING WAREHOUSE LOGISTICS WITH PRODUCERS, RETAILERS & WHOLESALERS TO ENSURE BUFFER STOCKPILE

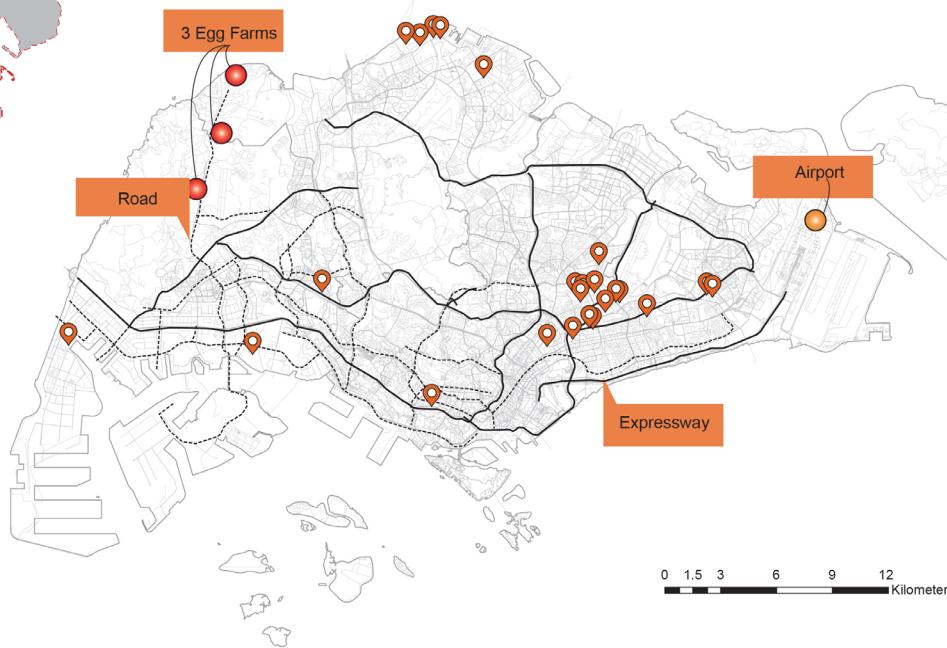
Before pandemic, producer & supplier use to directly sale the product to retailers and wholesalers. If demand from existing food businesses dwindle, it can cause surplus. This will require timely diversion of egg products to the cold storage facilities which can be achieved through policies that helps linking different stockholders under one roof.



Food Factory Zone in Singapore



Refrigerated Warehouses in Singapore



Warehouses Categories

Category	Example of Products in this category
I (High Risk Products)	Cheese, butter, ice cream and infant/baby food
II (Chilled & Frozen Products)	Juices, pastries, desserts, fruits and vegetables and soups
III (Food requiring cool storage environment)	Spices, dried goods, chocolates, chocolate confectionery, sauces, cereals, jams, spreads, coffee beans, tea leaves, shelled eggs, egg products and alcoholic beverages (e.g. beer, wine etc)
III (Food usually stored at ambient temperature)	Instant noodles, snacks, nuts, canned food products, rice, edible fats and oils, food ingredients and bakery products

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NON-DURABLE GOODS, EGGS

SCENARIO 2

Long term Interventions

Eka Rakholiya / Han Cong / Mamiko Tanaka

Before the pandemic began, demand for cold room facilities in Singapore had been lukewarm. The efficient distribution channels that brought food straight from ports of ingress to final customers' storage facilities reduced the need for such infrastructure.

Post-pandemic, to minimise any disruption to their supply chains in the event of future contagions, manufacturers may wish to keep the supply chain vertically integrated with as small a cross-border footprint as is possible. For this, Singaporean industrial and warehousing space may not benefit because Singapore lacks depth and breadth in manufacturing.

In Long term, this will demand need of refrigerated warehousing likely rise, it will need major transformation through linking diverse stakeholders to the space of logistics.

MEDIUM TO LONG TERM

2. STRENGTHENING POST-HARVEST HANDLING

CAPACITY BUILDING FOR TRANSFORMING REFRIGERATED WAREHOUSES INTO FOOD HUB

With the need to buffer Just-in-Case inventories, demand for Singapore's existing cold chain storage stepped up and greater capacity will be expected in future. The cost of operating a refrigerated warehouse makes the focus on efficiencies even more critical.

In order to balance the trade-offs between trend and uncertainty, two major shifts can be anticipated:

1. Incentivise refrigerated warehousing
2. Potential need of manufacturing units as add-ons located in close proximity to existing refrigerated warehouses - e.g. Packaging service, Value-added service

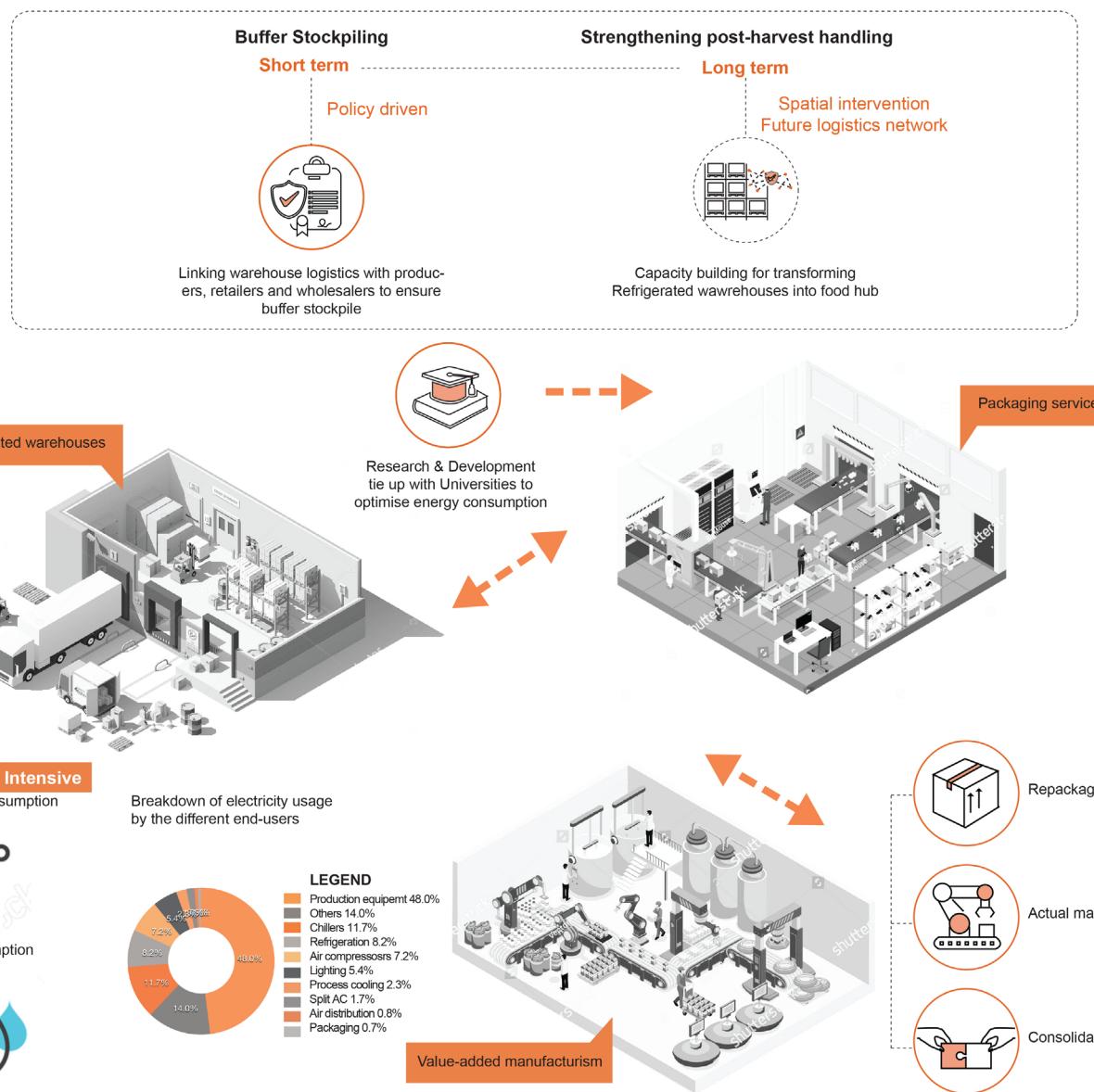
Unlike dry warehouse, refrigerated warehouses are highly energy intensive. To optimise energy consumption, R&D tie ups with university must be incentivised.

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Use Chicago Manual Style
Surname, First name. Year. Title. Publisher. Website.

LEGEND

LEGEND TEXT—SAME AS ANNOTATIONS



NON-DURABLE GOODS, EGGS

SCENARIO 3

Short term Interventions

Ekta Rakholiya / Han Cong / Mamiko Tanaka

Retail shops and F&B industries are the two major bulk buyer of Hen shell eggs. Due to circuit breaker measures, both experienced drastic shifts in demand. During circuit breaker, e-commerce expanded rapidly as online grocery orders and home delivery trend shot up.

Before pandemic, producer & supplier use to directly sale the product to retailers and wholesalers. If demand from existing food businesses dwindle, it can cause surplus. This will require timely diversion of egg products to the cold storage facilities which can be achieved through policies that helps linking different stakeholders under one roof.

SHORT TERM

1. EMMERGING E-COMMERCE LANDSCAPE

Due to nature of the pandemic, it will become important for retailers, wholesalers and F&B industry to quickly re-organise themselves to the shifting needs with the help of e-commerce.

In short term, this will demand new typology of food logistics consolidated as synergic operation between refrigerated warehousing and central kitchen operations by food delivery companies.

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LEGEND

- AREAS DESIGNATED BY JTC FOR FOOD USE
- TERRACE FACTORY
- FLATTED FACTORY

Emmerging e-commerce landscape

Short term

Spatial Intervention



E-commerce foodhub to reduce food loss

Sustainable Farm Landscape in Lim Chu Kang

Long term

Spatial Intervention



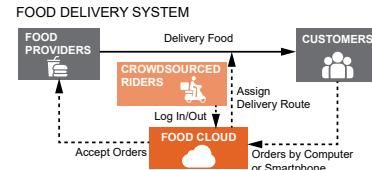
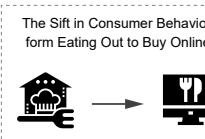
Consumer education



Reducing environmental footprint utilizing manure

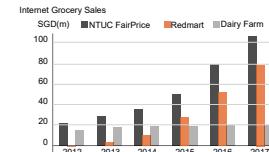
CHANGING EATING AND BUYING HABITS

COVID-19 leads to drastic growth in food delivery service industry. In Singapore, there are some platforms for food delivery, such as Grab Food, foodpanda, and deliveroo.

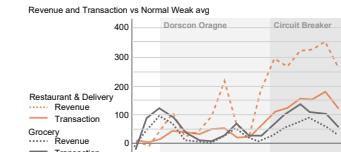


E-COMMERCE RISE FOR NON-DURABLE EDIBLE GOODS

RECENT TREND

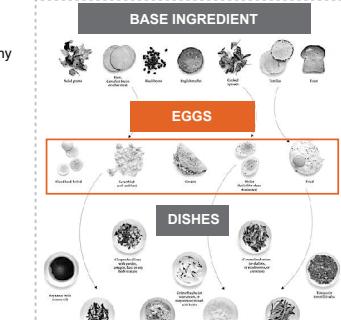
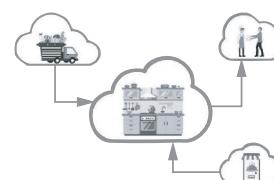


COVID-19 EFFECT



CENTRAL KITCHEN MANAGED BY FOOD DELIVERY COMPANY

A Central kitchen combining with a food warehouse managed by food delivery company would contribute to reducing food loss with efficiency.



FOOD XCHANGE @ ADMIRALTY

(60 Years Leasehold, left 41 years)

FOOD AXIS @ SENOKO

(30 Years Leasehold, left 29 years)

BLK 15 WOODLANDS LOOP

(30 Years Leasehold, left 8 years)

2 SENOKO SOUTH ROAD

JTC FOOD HUB @ SENOKO

MANDAI FOODLINK

(30 Years Leasehold, left 28 years)

WESTVIEW BUILDING

JURONG FOOD HUB

Food Concept @Pandan

(Freehold)

200 PANDAN LOOP

(64 Years Leasehold, new launch)

ENTERPRISE CENTRE (ONLY LEVELS 11&13)

KA FOODLINK

LIREA INDUSTRIAL BUILDING

YAN XIAN BUILDING

MACTAGGART FOOD LINK

(Freehold)

TEE YIH JIA FOOD BUILDING

HARPER POINT

(Freehold)

BLK 3020 UBI AVENUE 2

EUNOS TECHNOLINK

(ONLY LEVEL 5 OF BLOCKS 3, 5, 7, 9, 11 AND 13)

ENTERPRISE ONE (ONLY LEVEL 5)

SHIMEI EAST KITCHEN

GOURMET EAST KITCHEN

WAH YANG (FOOD INDUSTRY) BUILDING

VICTORIA WHOLESALE CENTRE

0 1.5 3 6 9 12 Kilometers

LICENSED FOOD
REPACKING/MANUFACTURING/SOTRAGE ESTABLISHMENTS
INTERVENTION IN THESE POTENTIAL THREE ZONES

NON-DURABLE GOODS, EGGS

SCENARIO 3

Short term Interventions

Ekta Rakholiya / Han Cong / Mamiko Tanaka

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LEGEND

- REDEVELOPMENT AREA
- HEN EGG FARM
- FISH FARM
- LIVESTOCK FARM
- VEGETABLE FARM
- BEAN SPROUT PRODUCTION FARM
- AGRI-BIO PARK
- NURSERY
- NURSERY (AQUATIC PLANT)
- RECYCLING PARK
- ELECTRICAL SUBSTATION



Emmerging e-commerce landscape

Short term

Spatial Intervention



E-commerce foodhub to reduce food loss

Sustainable Farm Landscape in Lim Chu Kang

Long term

Spatial Intervention



Consumer education



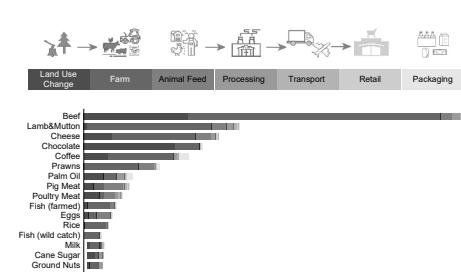
Reducing environmental footprint utilizing manure

THE NEED FOR WASTE MANAGEMENT AND CONSUMER EDUCATION

CONSUMER EDUCATION

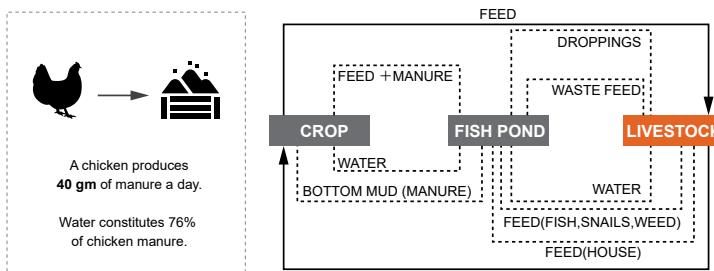


FOOD: GREENHOUSE GAS EMISSIONS ACROSS THE SUPPLY CHAIN

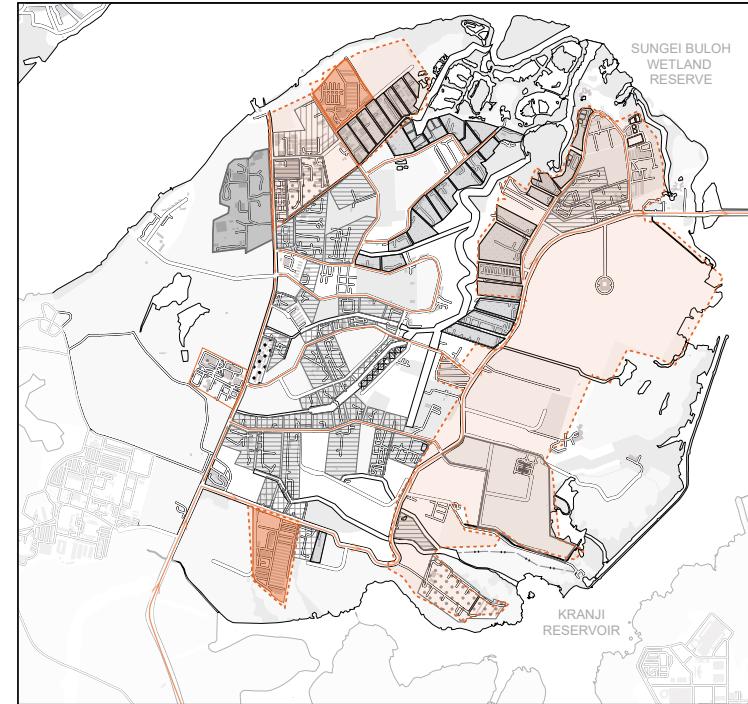


CREATE INTEGRATION NETWORK IN LIM CHU KANG AREA

A framework for the integration of poultry and fish production in the tropics and sub-tropics is proposed. Both poultry production and processing wastes have value as nutrient inputs to fish and the water used for fish culture can be used for evaporative cooling of poultry and fertilization of crops.



Aeromec had a contract with Chew's Agriculture Pte Ltd for a waste-to-energy power plant that uses chicken manure as fuel. The plant converts the manure into biogas which is used to run the engine that generates electricity. We propose to operate the power plant in the area.



LIM CHU KANG AREA

Lim Chu Kang is a planning area located in the northwestern part adjacent to nature reserve. The area is still undeveloped, so there are some agricultural farms including 2 egg farms which are N and N Agriculture Pte Ltd and Seng Choon Farm Pte Ltd. The redevelopment plan is announced by SFA.

