



The cold chain in Japan

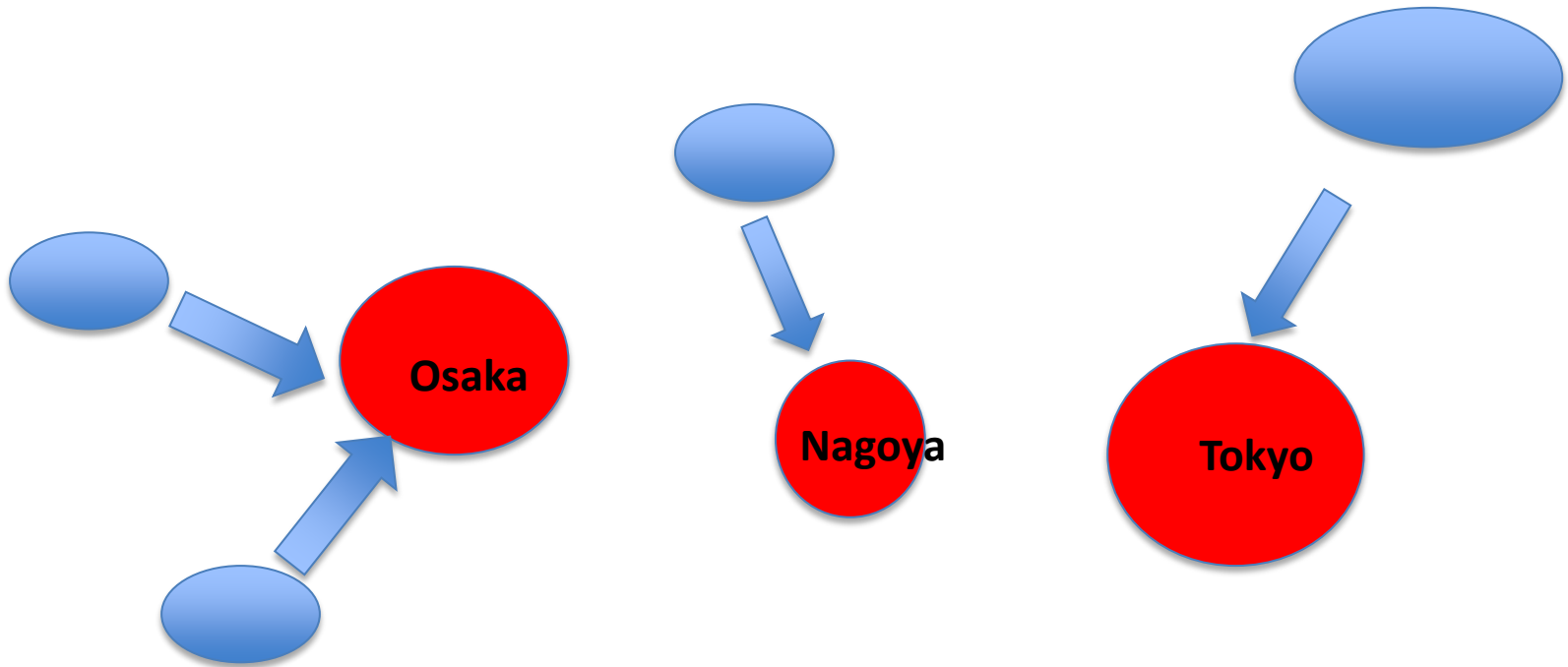
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1960 -1970

- Rapid economic growth begun in 1960.
- Population drifted from country to the three major metropolitan areas – Tokyo, Osaka and Nagoya.



Expansion of cities and government policy

- DID(Densely Inhabited District) had expanded.
- The population of agricultural areas near DID declined. As a result, agricultural supply became unstable and production areas of fruit and vegetables moved to remote location .
- Government decided forming large vegetables production areas in remote areas to stabilize food supply to urban residents.
- In fact, the law came into force in 1966.
- Similarly, meat and fish had long distribution routes.

Food consumption at normal temperature

- Consumption of milk, dairy, meat, eggs, fish, vegetables and fruits were less.
- On the other hand, preservable foods such as grain, beans and potatoes were much consumed.
- Moreover, salted foods were much more consumed.
- About 20% of foods shipped were wasted.

Research for improving eating habits

- Domestic and international studies were required.
- The study of food distribution was conducted in the Nordic countries and the United States, etc..
- Effort for improving eating habits was made by the collaboration between government, private companies, producers and consumers.

Recommendation for the promotion of public health

- Development of cold chain
- Establishment of standards and food inspection system
- Development of information system for food distribution
- Establishment of food production and processing system
- Research and development related to food distribution

So-called cold chain recommendation

- In fact, development of the cold chain was recommended in 1965 by the Science and Technology Agency.
- Then the government instructed the development of the cold chain throughout the country.
- The government carried out research and development over three years, and made use of the result for the private sector by publishing it.

Encouragement for facility development

- Refrigeration equipments of retail stores and trucks to deliver were insufficient.
- However, private companies had not enough financial resources to purchase refrigeration equipments.
- Therefore, the government supported them to introduce cold chain facilities by granting subsidies with technical assistance.

Cold chain of high value-added system

- Perishable foods with nutrition need cold chains to be kept and protected under adequate low temperatures.
- Thereby, people are able to eat a lot of perishable foods with nutrition every day.
- Cold chain is a high value-added technology and social system.

Low temperature

Perishable foods with nutrition have to be protected under adequate low temperatures as follows.

Cooling or cold; $10 \sim 2^{\circ}\text{C}$ fruits & vegetables
($50 \sim 35.6^{\circ}\text{F}$)

Chilling ; $2 \sim -2^{\circ}\text{C}$
($35.6 \sim 28.4^{\circ}\text{F}$)

freezing ; -18°C or less
(-0.4°F or less)

special freezing of tuna; -60°C
(-76°F)

fishes & meats



It is very important for cold chain to maintain constant temperature.
Alternating temperature leads to quality deterioration

Cold chain of Frozen food



Producing area

Refrigerated food



Refrigerated truck



Refrigerated wagon



Roro ship



Wholesaler

Refrigerated warehouse



Household refrigerator



Retail showcase

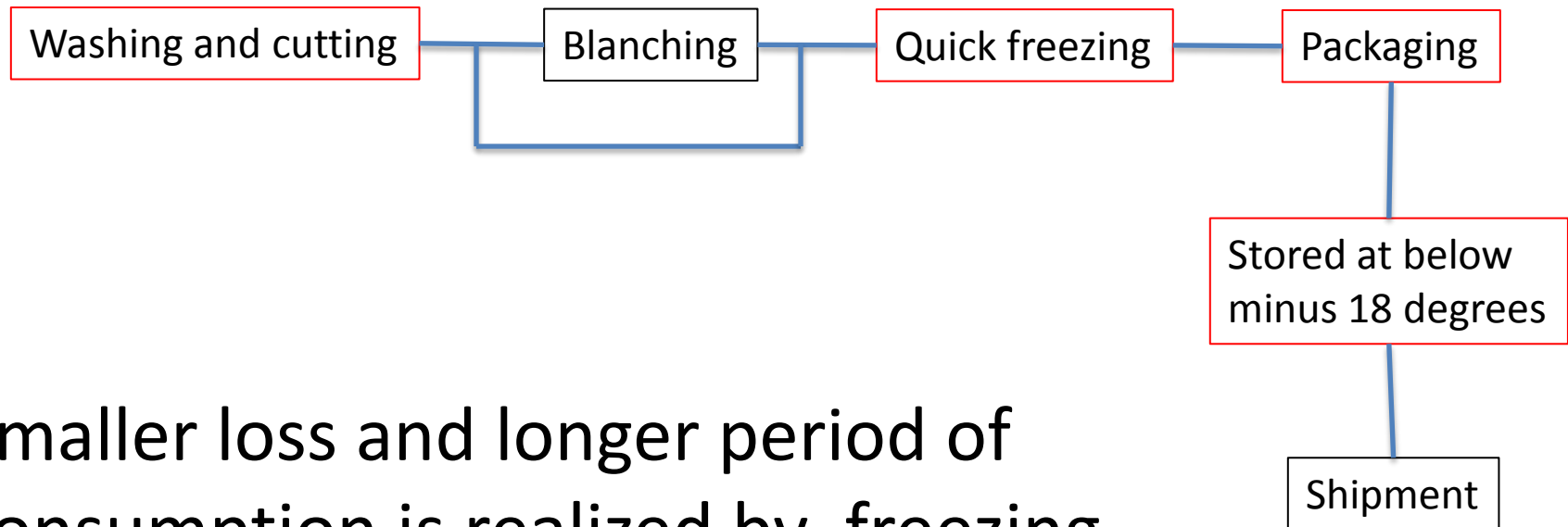


Refrigeration storage depot



Small refrigerated truck

Frozen food



Smaller loss and longer period of consumption is realized by freezing only edible parts.

Cold chain of Fresh food



Producing area

Pre-cooling
Facility

Refrigerated truck



Refrigerated wagon



Roro ship

Wholesale market

Cold storage
facility

Household
refrigerator



Retail showcase



Cold storage
depot

Small refrigerated
truck





Japan Agricultural Cooperative

- Japan agricultural cooperative, so-called JA, was established by the law in 1947.
- JA is a farmers organization and a force to develop agricultural production.
- JA has established pre-cooling facility, sorting and packing house and etc.
- Farmers bring the products to JA facilities.
- JA delivers them mainly to wholesale markets.

Wholesale market

- Wholesale market is placed in major cities for a stable supply of fresh food.
- Local governments operate the market.
- These things are ruled by the law.
- The government subsidized introduction of cold chain by JA and wholesale market.

Cold chain of vegetables & fruits

Small refrigerator
at farm



Packed
in carton

Inspection the carton box

Pre-cooling

Vacuum & water spray cooling
Icing & crushed ice
Air cooling
Forced air cooling
Room cooling

Wash and Hydrocooling



Cold chain of vegetables & fruits

Tomato fruit



Packing house
grading and packing

Air cooling
Forced air cooling
Room cooling

Fig fruit

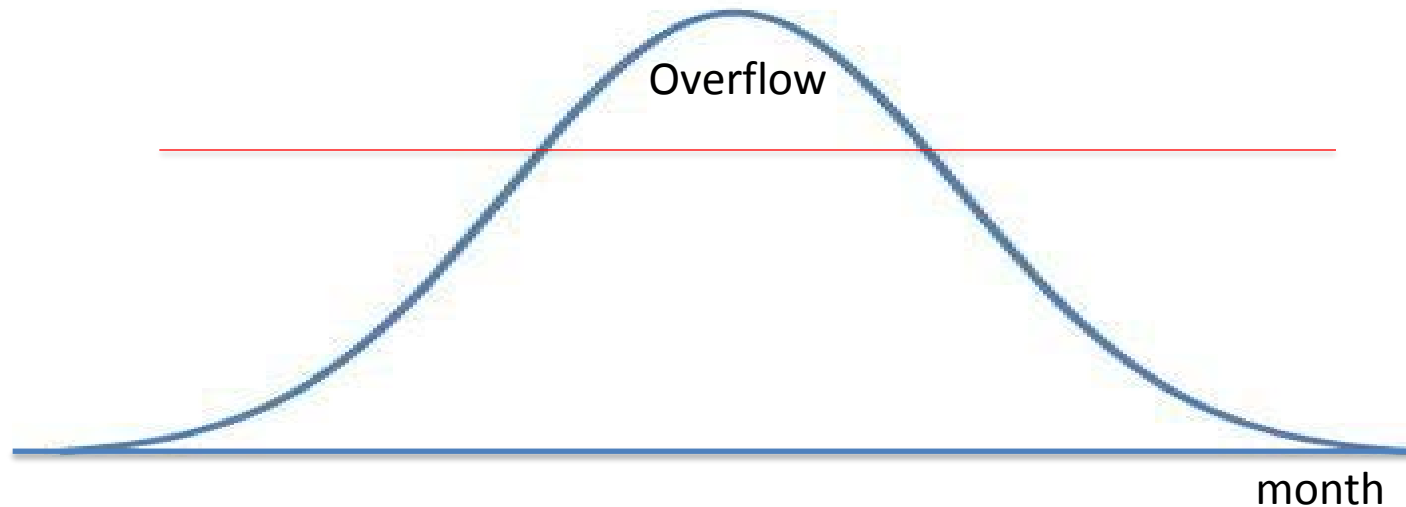


Packed
in carton

Inspection the carton box

Sizing of the pre-cooling facility

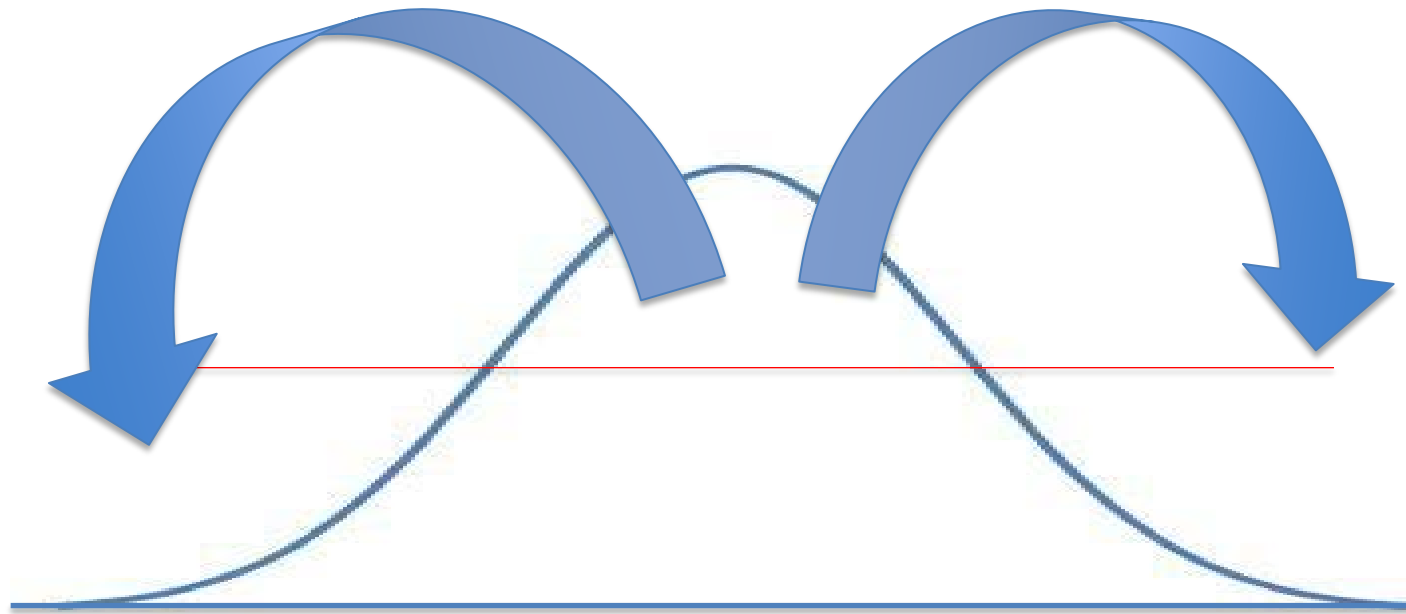
Sizing of equipment is 80 percents of maximum utilization.



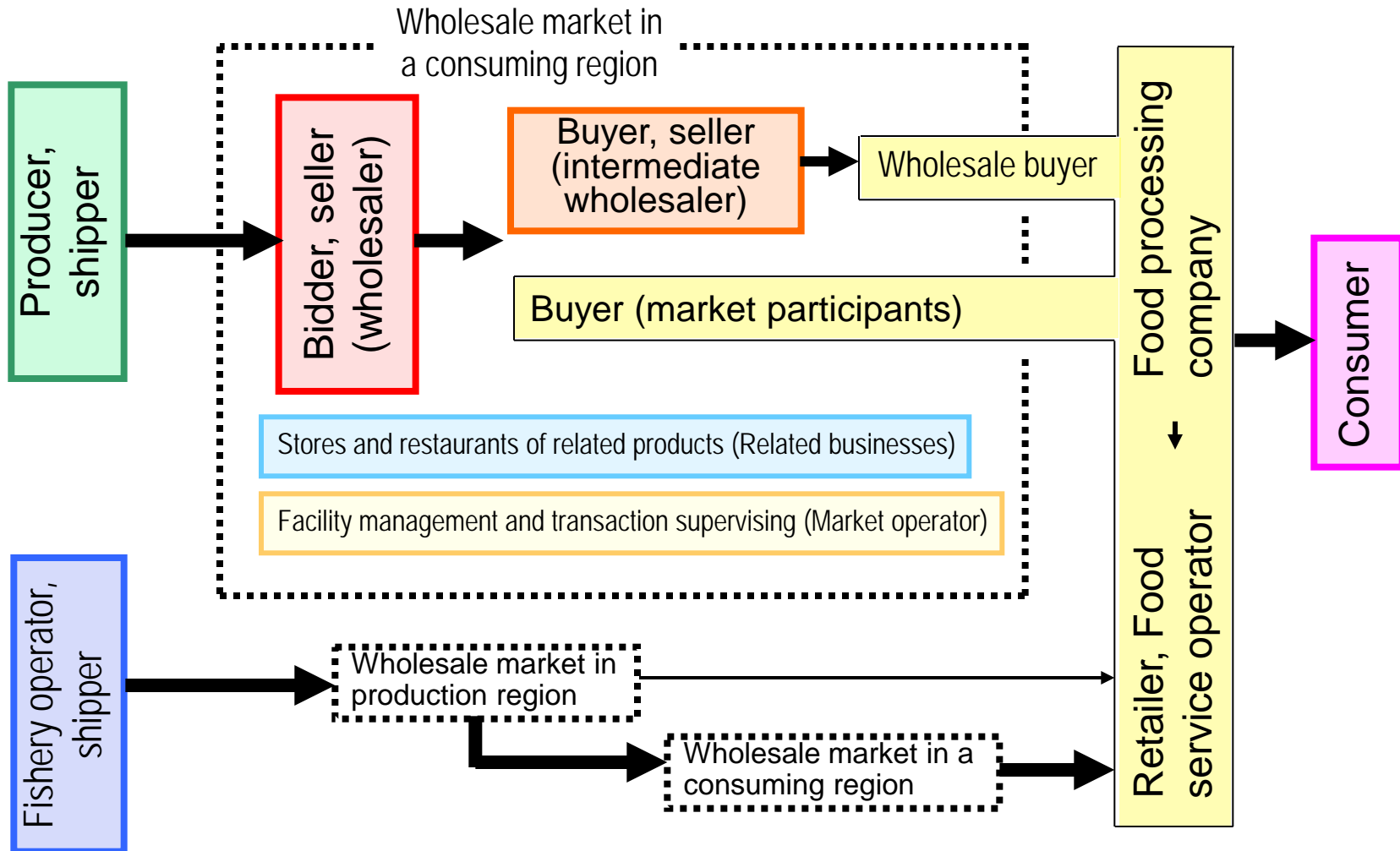
Overflowing products cannot be stored in pre-cooling room.

To avoid overflowing

- Fresh vegetables should be harvested both before and after the harvest time.

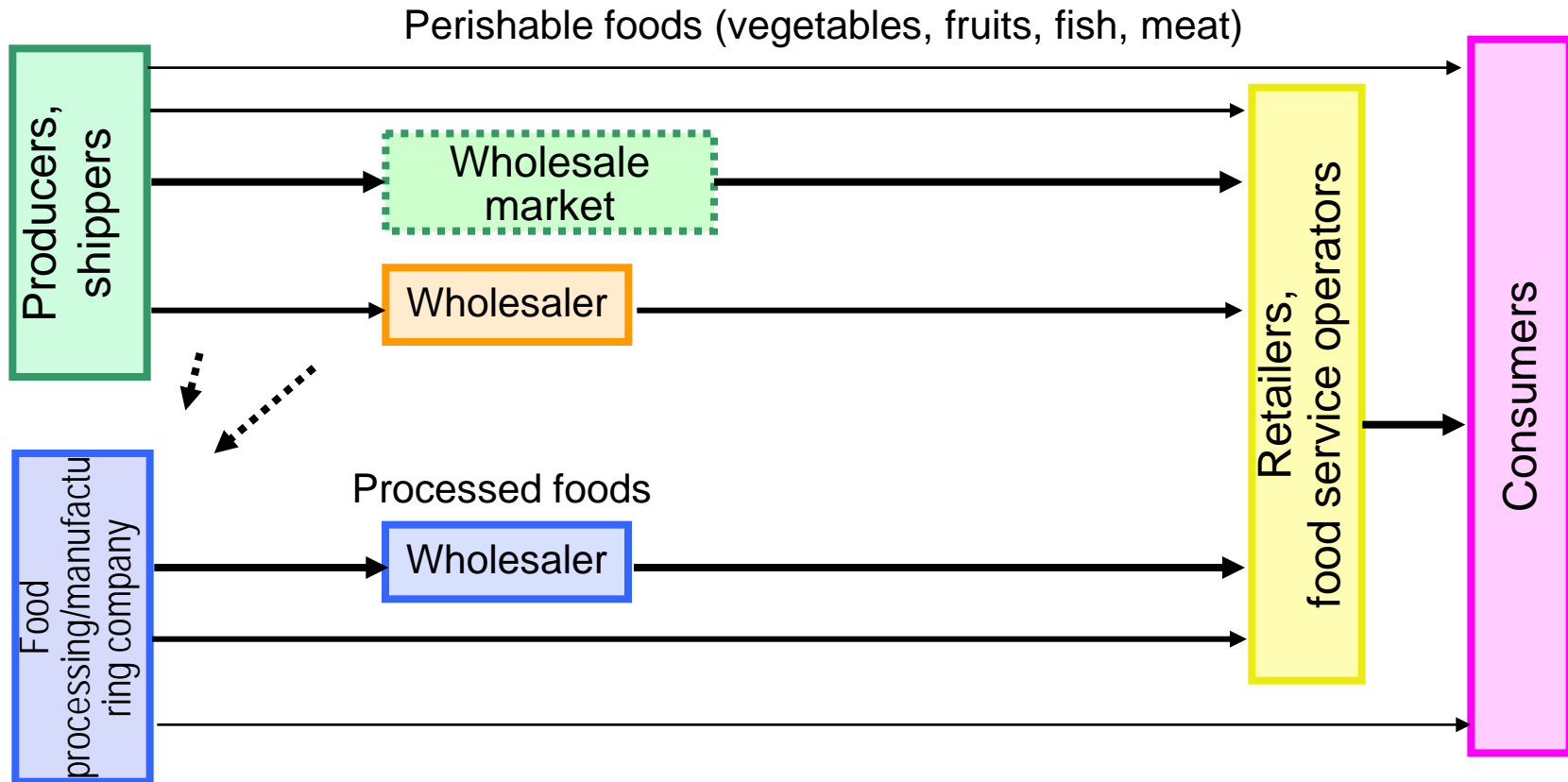


Perishable food (vegetables and fruits, fish and meat) distribution in wholesale market



Note: "Meat wholesale market" is annexed with a "slaughterhouse" for butchery.

Food Distribution Channel



Note: Meat is butchered at a slaughterhouse or a meat treatment center before distribution.

The effect of cold chain

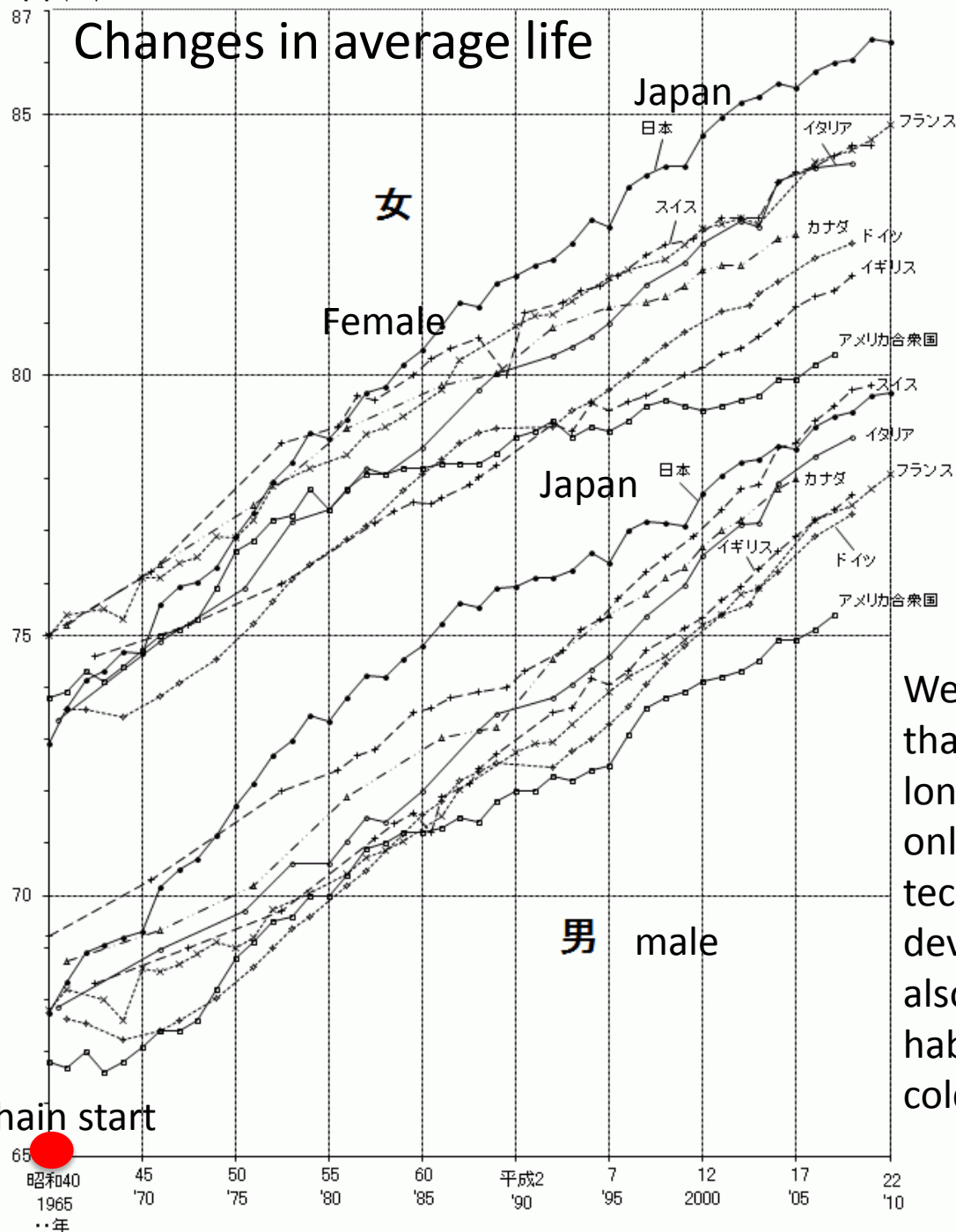
- To provide a stable and efficient supply of various foods with nutrition to consumers.
- It is possible to supply fresh vegetables to the public.
- As a result, Japanese eating habit has become healthy and rich.
- Recently, the average life span of the Japanese has lengthened to the top class of the world.

平均寿命(年)

Changes in average life

Average life span
Female 86.83
Male 80.50
Healthy life span
Female 75.56
Male 71.11

Cold chain start



We should not forget that the reason of long life span is not only a medical technology development but also a good eating habit provided by cold chain

At the end

- Cold chain is a system. Therefore, its management is very important.
- Successful cold chain system is likely to lead to affluence of the people.
- Japanese hope to contribute to the happiness of Asian people.
- Let's develop together.