

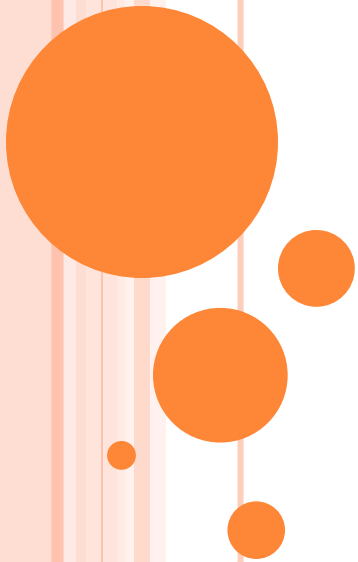
FACTOR AFFECTING THE FROZEN FOOD

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FROZEN FOOD

- Frozen food is mainly used for the preservation and the long term storage, early time the farmer and fishers are stored their food in the un heated building during the winter season.
- This storage inhibit the microbial contamination
- Now the **cryogenic freezing** is the quickest freezing due to -196°C
- In 1861 **Thomas Sutcliffe** establish the freezing work to the world in Australia.
- According to study the consumer on average 80 frozen food in the year and it most of the pre cooked frozen meals.



Parameter	2017	2026
Global Frozen Food Market (US\$ Bn)	252.77	XX
Compound Annual Growth Rate CAGR % (2018 – 2026)	6.6%	
Largest Market Segment, by Product Type (US\$ Bn)	Frozen Ready-to-eat Meals: XX	Frozen Ready-to-eat Meals: XX
Key Growth Market Segment, by Product Type, CAGR % (2018 – 2026)	XX%	
Largest Market Segment, by Distribution Channel (US\$ Bn)	XX	XX
Key Growth Market Segment, by Distribution Channel, CAGR % (2018 – 2026)	XX%	
Largest Market Segment, by Packaging Type (US\$ Bn)	XX	XX
Key Growth Market Segment, by Packaging Type, CAGR % (2018 – 2026)	XX%	
Largest Market Segment, by Geography (US\$ Bn)	XX	XX
Key Growth Market Segment, By Geography CAGR % (2018 – 2026)	XX%	
Key Players	Ajinomoto Co. Inc., Bonduelle Group, ConAgra Foods Inc., General Mills Inc., Kraft- Heinz Company, etc.	



USE LOW TEMPERATURE FOOD PRESERVATION

- Refrigeration or cool storage generally to store at temperature above freezing and frozen storage occur at temperature below freezing.
- Pure water freezes at 0°C.
- Most food do not begin to freeze until -2°C .
- Generally preserve most perishable food for a few days.
- Good frozen storage with proper packaging can preserve the food.
- Frozen storage do not lead to complete destruction.



REFRIGIRATION OF FOOD

It is one of the mildest approach to food preservation.

- Cool storage of food 16°C to -2°C
- Normal refrigeration at 4°C and below
- It inhibit the growth of most disease causing micro organism
- Refrigeration storage temp provide only short term extcusion of food
- Some tIme causing psycotrophic spoilage



OPTIMAL CONDITION

- Storage of meat, fish and dairy product are maximize to at 0°C
- Controlled temperature is important for vegetables and fruits.
(e.g) Banana change the colour yellow in to black.
- Apple become soggy and browning due to store below 1°–2°C.



PACKAGING

- Packaging is the most important for the food storage in the frozen condition.
- This packaging is mainly classified in to 3 types.
- They are;
 - i. Controlled atmosphere package
 - ii. Modified atmosphere package
 - iii. Vaccum package



CONTROLLED ATMOSPHERE PACKAGING

- It refer to condition in which the atmosphere surrounded a food product different from the normal atmosphere.
- Atmosphere storage facilities where the atmosphere(CO_2 , O_2 and N_2)
- Kept low temperature
- Slow rate of respiration and ripening of fresh fruits



MODIFIED ATMOSPHERE PACKAGING(MAP)

- Different from normal atmosphere and food items are placed on the packaging
- The air is removed by the vacuum
- Package is mixed with some desired gas
(eg) MAP packaging
- MAP packed food will change over time and change with metabolic activity



PACKING



VACCUM PACKAGING

- It used processed or cured meat
- This product is much more time to storage at frozen state
- Oxygen removed for the avoiding of aerobic bacterial contamination
- Refrigerated storage is used to maximize the benefit and inhibit the food spoilage



CHANGE IN FOOD REFRIGERATED STORAGE

Long time storage and numerous and un desirable changes.

- Staling of bread
- Loss of chirspness in fruits and vegetables
- Change in colour of fresh water
- Loss of flavour and nutrient value(eg)vitamins
- Oxidative change



FROZEN STORAGE OF FOODS

- Provide longer shelf life of food
- Kept temperature below 0°C
- commercial freezing require minimum of -18°C
- 1) Low temperature
- 2) Lower water activity
- These both slow down chemical and enzymatic reactioning
- Freeing slow the microbial activity
- Frozen food cannot kill all microbes some cause diseases(eg)Listeria monocytogenes.



- It can preserve the quality of food without causing major change in appearance
- Frozen food are generally higher nutritional and aesthetic quality than thermal processed food
- Faster than the rate of freezing



FACTOR AFFECTING THE QUALITY OF FROZEN FOOD

- Frozen storage and thawing directly related to quality of the frozen food
- It affect many factors
 1. Rate of freezing
 2. Final storage value
 3. Storage temp stability
 4. Rate of thawing



FREEZING METHODS

- Air Freezing
 - ❖ Still air sharp freezer
 - ❖ Air blast freezer
 - ❖ Fluidized bed freezer
- Indirect contact freezing
 - ❖ Single plate
 - ❖ Double plate
 - ❖ Pressure plate
 - ❖ Slush freezer
- Immersion and cryogenic freezing
 - ❖ Heat exchange
 - ❖ Refrigerant spray
 - ❖ Compressed gas



FACTOR AFFECTING QUALITY OF FOOD

Freezer burn

- ✓ It caused by sublimation of ice on the surface region of food product when the water pressure of the ice is higher than vapour pressure in the environment.
- ✓ Freezer burn produce changes in the colour and texture of the product

Dehydration

- ✓ The temperature air losses the capacity to moisture
- ✓ Water vapour convert in to frozt
- ✓ Un packed food more susceptiple to freez burn



CHANGE OF FOOD COLOUR

- ✓ Freezing cause the colour changes in the natural food
- ✓ Due to different light distraction
- ✓ Improper freezing cause the colour changes
- ✓ Protein are pigmented complex they get denatured by cooking
- ✓ Change pH either due to frozen



FROZEN FOOD QUALITY

- Pre –freezing
- Freezing
- Packaging
- Storage
- Transport
- Retail
- Consuming(thawing)



DEFECT IN FROZEN FOOD

- Freezer burn-flautuation in temperture
- Recrystalization
- Drips loss
- Loss of functionality
- Chemical reaction
- Colour changes
- Texture and consistency



BIO CHEMICAL REACTION

PROTEIN

- Protein may change during frozen and freezing storage because denaturation
- Denaturation cause a loss of function and change in protein structure
- Frozen food cause chemical bond changes in the structure

LIPIDS

- Lipid can degrade the frozen food and chemical process hydrolysis and oxidation
- These changes cause the undesirable changes in the nutritional value



➤ CARBOHYDRATES

- Carbohydrate is hydrolysis during frozen storage (eg) frozen pappaya
- Depressing the freezing temperature

COLOUR PIGMENT;

- colour pigment during frozen storage affect the prior process
- And the storage condition were changges (light,oxygen ,heavy metal,temp,pH,reducing agent,water activity)



- **FLAVOUR COMPOUNDS;**
- Flavour compounds are aroma and taste compounds
- These organic compounds are already processed and if kept in the frozen state they are causing a side effect and carcinogen
- This flavour compound in frozen cause variable taste and aroma
- It mainly affect the enzymatic activity and lipid oxydation.



ADVANTAGES

- ❑ Easy storage
- ❑ Extern self life
- ❑ Long term storage
- ❑ Cost effectiveness

❑ DIS ADVANTAGES

- ❑ It affect the nutritional value
- ❑ It change the colour and texture of the food
- ❑ It change the food chemical bond structure
- ❑ Frozen food change the taste and aroma
- ❑ Some time causing the carsinogen.



THANKING YOU

