Locally Developed Food Processing Equipment for MSMEs

(DOST-PCIEERD supported project)

Presented By:

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An Overview:
Philippine Food Manufacturing Industry

- One of the major contributors to the country's growing economy is the manufacturing sector with food manufacturers as the top sub-sector.

An Overview:
Philippine Food Manufacturing Industry

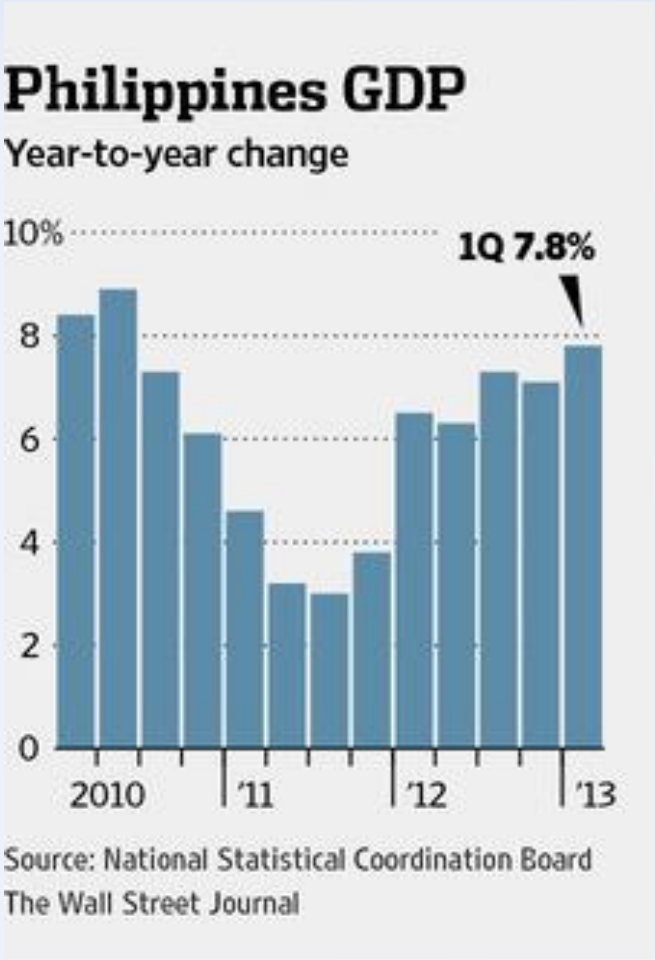
- Major sectors of the food processing industry: fruits and vegetables; fish and marine products; meat and poultry products; flour and bakery products; beverage and confectionery dairy foods; food condiments and seasonings;

  food supplements; bottled water; snack foods and fats and oils.

An Overview:
Philippine Food Manufacturing Industry

- The industry contributes more than 40% of the total manufacturing output and approximately 20% of Gross Domestic Product (GDP) per annum.

An Overview:
Philippine Food Manufacturing Industry



GROSS VALUE ADDED in MANUFACTURING
1st Quarter 2012 and 1st Quarter 2013
AT CURRENT PRICES, IN MILLION PESOS

INDUSTRY/INDUSTRY GROUP	Q1 2012	Q1 2013	Growth Rate (%)
Food manufactures	261,860	300,813	14.9
Beverage industries	14,541	15,058	3.6
Tobacco manufactures	680	633	-6.9
Textile manufactures	10,752	9,511	-11.5
Wearing apparel	16,345	18,165	11.1
Footwear and leather and leather products	1,278	1,691	32.3
Wood, bamboo, cane and rattan articles	3,384	2,747	-18.8
Paper and paper products	3,339	3,037	-9.0
Publishing and printing	3,427	3,101	-9.5
Petroleum and other fuel products	44,066	32,968	-25.2
Chemical & chemical products	24,268	26,485	9.1
Rubber and plastic products	7,478	7,158	-4.3
Non-metallic mineral products	11,011	11,457	4.1

Issues and Challenges:
Philippine Food Manufacturing Industry:

- Food processing industry needs critical attention
- Local food processors are faced with challenges like:
  - maintaining market share
  - wide variety of imported processed foods readily enter the market due to increased trade liberalization
  - innovating or introducing new products

Issues and Challenges:
Philippine Food Manufacturing Industry:

- High capital investment and acquisition of state of the art equipment deprived our local manufacturers of the opportunity to expand product lines in order to meet a diverse range of customer requirements and become **globally competitive**.

- Processed products, particularly food manufactured by ASEAN neighbours like Thailand, Malaysia and now Vietnam, are more competitive (price and quality wise) and are continuously being sold and patronized by the local market.

Issues and Challenges:
Philippine Food Manufacturing Industry:

Priority need of the food processors:

- Affordable equipment to increase production efficiency and compliance to standard requirements that will enable our food processors—MSMEs to become more competitive (local and foreign market)

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

- DOST's leadership and drive towards industry development particularly, in the regions; and

- S&T intervention on localized fabrication of food processing equipment – vital in improving MSMEs competitiveness and sustained growth.

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

Design and Development of Process Equipment for Food Processing Firms

Implementation : May 2011 – December 2013

Implementing Agencies:

- DOST- Project Management Engineering Design Service Office (PMEDSO);
- Metals Industry Research Development Center (MIRDC); and
- Industrial Technology Development Institute (ITDI)

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

Design and Development of Process Equipment for Food Processing Firms

GENERAL OBJECTIVE:

- To promote the development of locally fabricated process equipment for the food processing industry sector.

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

Design and Development of Process Equipment for Food Processing Firms

SPECIFIC OBJECTIVES:

- Design and fabricate food processing equipment prototypes to substitute imports that are appropriate and affordable for use by food processors;
- Evaluate the performance of process equipment prototypes; and
- Monitor actual operating performance of equipment prototypes through field testing.

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

SIGNIFICANCE:

- Reduce importation and address issue on high cost of equipment.
- Process equipment will be made available for commercial use at an affordable cost.
- Improve the performance and efficiency of local food processors.
- Project will benefit local equipment fabricators, domestic food processors and indirectly benefit farmers and food growers.

HIGH IMPACT TECHNOLOGY SOLUTIONS (HITS)

Food processing equipment prototypes

1. Water Retort
2. Freeze Dryer
3. Vacuum Fryer
4. Spray Dryer
5. Vacuum Packaging Machine
6. Immersion Freezer
7. Vacuum Evaporator

Roll out of DOST Developed Food Processing Equipment in the Regions…

GOOD NEWS….

- DOST Regional Offices will establish their regional Food Innovation Centers (FICs)

- Locally developed food processing equipment will be showcased and tried out by potential adopters

DOST-PMEDSO ITDI MIRDC

Design & Development of Process Equipment for Food Processing Firms
(May 2011 – Dec 2013)

7 Process Equipment Prototypes
Designed, Fabricated, Tested

Phase 1:

Roll-out of 5 Food Processing Equipment Prototypes in the Regions
(12 months)

Prototype of 5 Process Equipment
by accredited fabricators

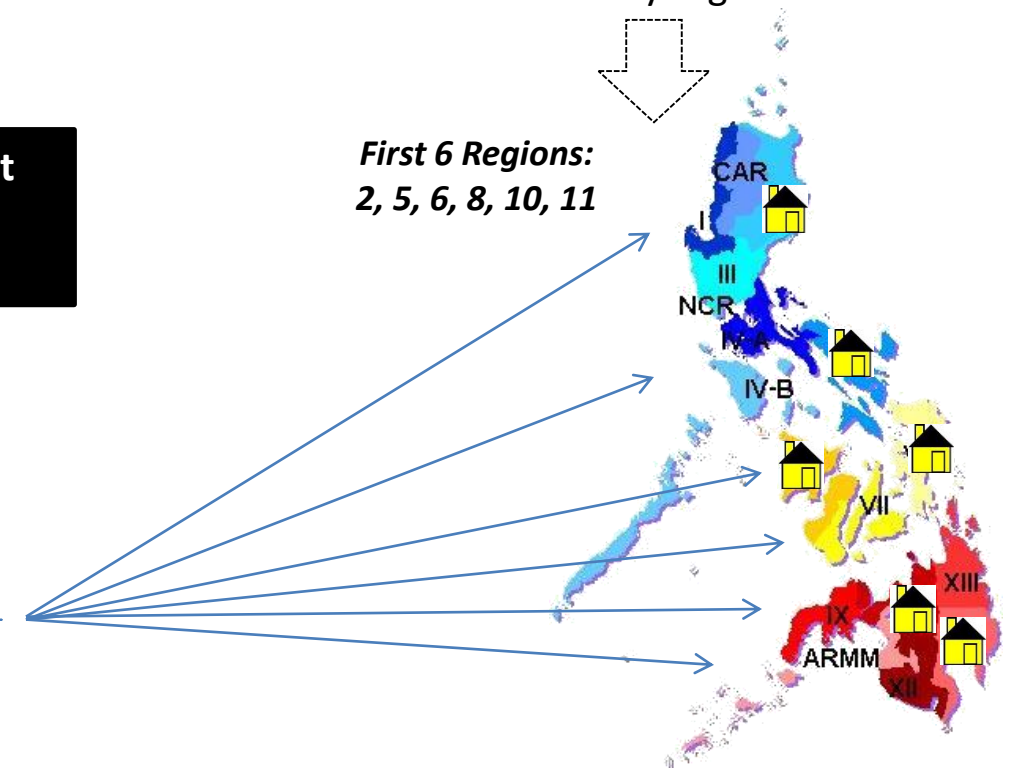
Vacuum Packaging Machine
Water Retort
Vacuum Fryer
Spray Dryer
Freeze Dryer

DOST Regional Offices
(Lead: DOST 8)

DOST Food Innovation Centers
(2013-2016)

Food Innovation Center (FIC)
in every region

First 6 Regions:
2, 5, 6, 8, 10, 11



DOST-Developed Food Processing Equipment

Water Retort

Locally Developed Food Processing Equipment

DESCRIPTION:

- A cooking and sterilization vessel capable of withstanding extreme pressures
- Designed to destroy all microbes to prolong shelf-life and make products safe for consumption
- Utilizes water as a heating medium
- Sterilization applicable for various types of containers: metal, cans, glass , bottles, retortable pouches/plastics

Water Retort

Locally Developed Food Processing Equipment

BENEFITS/ADVANTAGES:

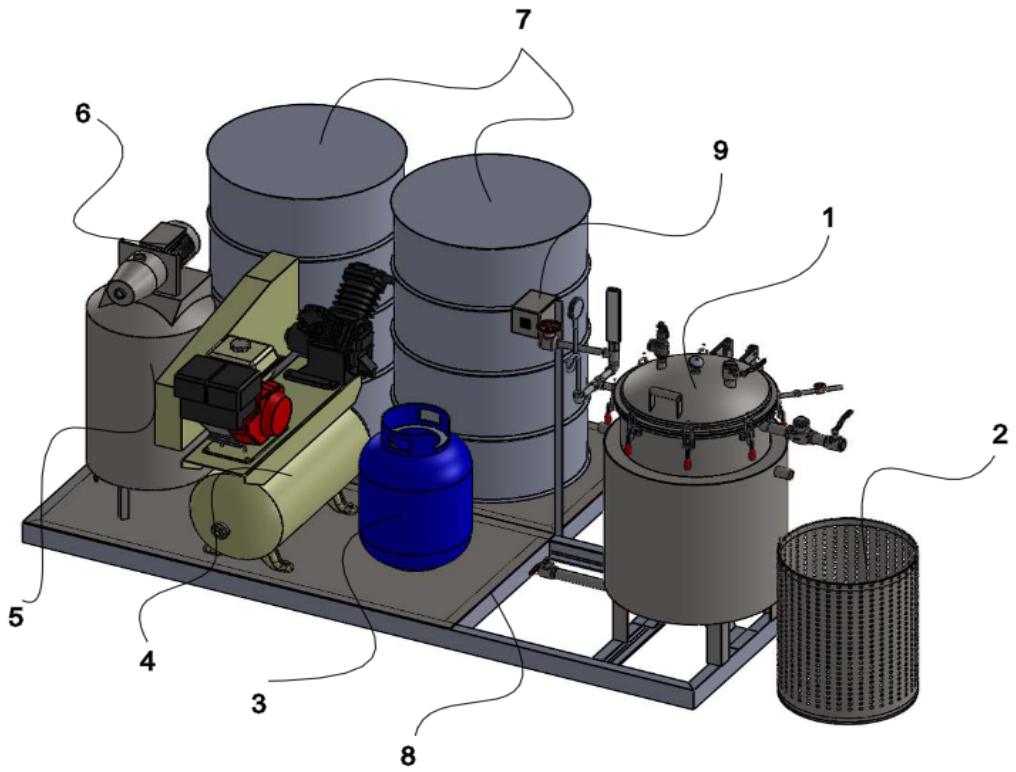
- Reduced process time translating to savings in cost of utilities, storage space, transportation costs;
- Provides an opportunity for food processors to shift to using retort pouch as alternative packaging for thermally-processed products at lower cost; the use of retort pouches provides other advantages like:
  - Enables conformity to regulations for thermally processed foods
  - Increased convenience for consumers: packages are light-weight and easy to open
  - Better package presentation
  - Readily available local expertise and technical support

Water Retort

Locally Developed Food Processing Equipment

Water Retort

Locally Developed Food Processing Equipment



ITEM NO.	DESCRIPTION
1	WATER RETORT
2	PRODUCT BASKET
3	LPG TANK
4	AIR COMPRSSOR
5	PRESSURISED WATER PUMP STORAGE TANK
6	WATER PUMP
7	COOLING WATER STORAGE
8	MOBILE FRAME
9	TEMPEARATURE CONTROLLER

Water Retort

Locally Developed Food Processing Equipment

FEATURES:

- Batch type, non-agitating, vertical pressure
- Water used as heating medium
- All stainless steel construction
- Simple to operate
- Cheaper than comparable-sized retort
- Modular set up is ideal for micro-scale processors

Water Retort

Locally Developed Food Processing Equipment

Ready to eat meals

Ready to eat meals

Vacuum Fryer

Locally Developed Food Processing Equipment

DESCRIPTION:

- Used for deep-fat frying; Designed to fry under reduced pressure and in a closed system that lowers the boiling point of both oil and water in food.
- Food dehydrates at a lower temperature thus, its natural color and flavor are retained
- The product is crunchier in texture and absorbs less amount of oil in the process

Vacuum Fryer

Locally Developed Food Processing Equipment

BENEFITS/ADVANAGES:

- Simple and easy to operate
- Local fruits and vegetables like banana, mango, pineapple, durian, jackfruit, papaya, okra and carrot can be vacuum fried.
- Final products are crunchy, low in fat and high in fiber content.
- Process results in minimal changes in color and flavor
- Longer shelf-life, requiring no preservatives

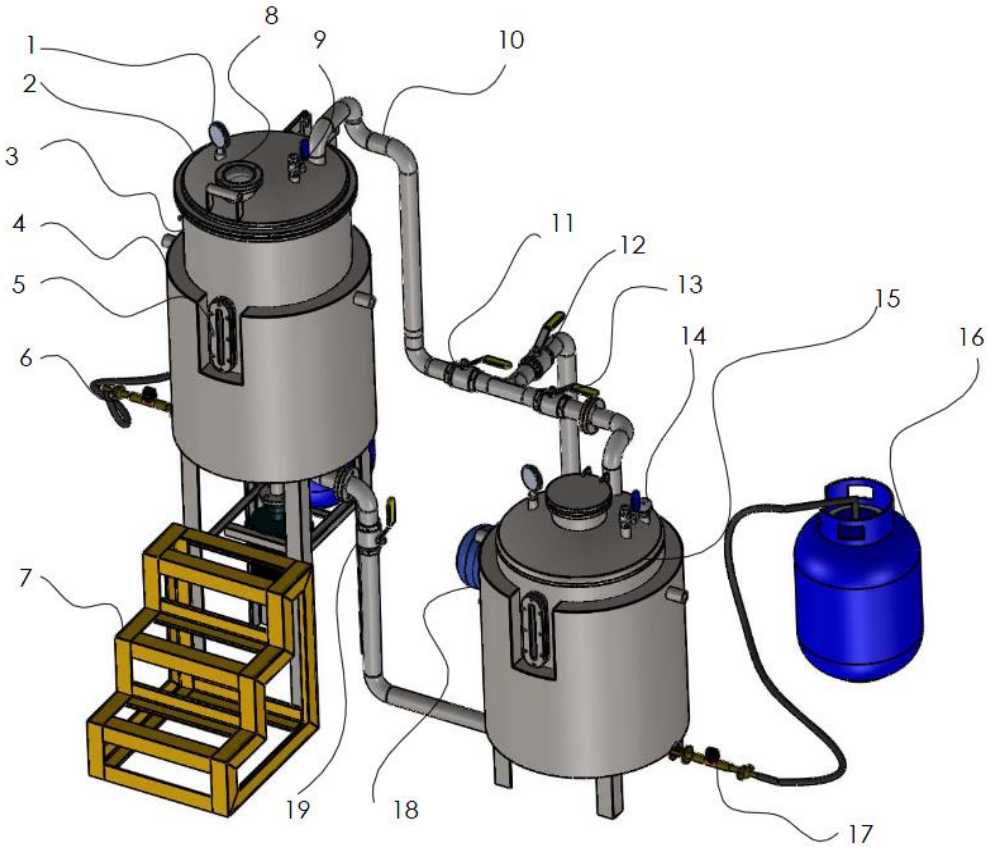
Vacuum Fryer

Locally Developed Food Processing Equipment

Vacuum Fryer

Locally Developed Food Processing Equipment

ITEM NO.	DESCRIPTION
1	PRESSURE GAUGE
2	FRYING VESSEL COVER
3	FRYING VESSEL
4	FRYING VESSEL FLUE GAS JACKET
5	SIGHT GLASS
6	FRYING VESSEL BURNER
7	LADDER
8	COVER SIGHT GLASS
9	VACUUM REGULATOR
10	SMIVEL JOINT
11	FRYING VESSEL ACUUM CONTROL VALVE
12	MAIN CONTROL VALVE
13	OIL PREHEATMENT TANK VACUUM CONTROL VALVE
14	TEMPERATURE SENSOR
15	OIL PREHEATMENT TANK
16	LPA TANK
17	PREHEATMENT TANK BURNER
18	5 HP LIQUID RING VACUUM PUMP
19	OIL TRANSFER CONTROL VALVE



Vacuum Fryer

Locally Developed Food Processing Equipment

FEATURES:

- LPG fuelled
- Equipped with digital temperature controller
- All stainless steel construction

Vacuum Fryer

Locally Developed Food Processing Equipment

jackfruit

papaya

tahong (mussels)

Vacuum Packing Machine

Locally-developed Food Processing Equipment

DESCRIPTION:

- Vacuum packaging is a method of removing air (oxygen) from the container, thereby prolonging food shelf life.
- Stores the food in minimum-air environment, preventing the growth of microorganisms and protecting the food from spoiling thereby extending the shelf-life of food significantly.
- Usually applied for long term storage of dry foods such as cereals, nuts, cured meats, cheese, smoked fish, coffee and potato chips (crisps)

Vacuum Packing Machine

Locally-developed Food Processing Equipment

BENEFITS AND ADVANTAGES:

- Enhances product quality
- Maintains the freshness and flavor of food
- Vacuum packing results to savings in the food industry (in terms of minimized storage and ease of transport)
- Can be used for a wide range of plastic bags like tri-laminates, retortable bags and PPE
- Can be used for products that require nitrogen flushing

Vacuum Packing Machine

Locally-developed Food Processing Equipment

Vacuum Packing Machine

Locally-developed Food Processing Equipment

FEATURES:

- A table-type unit that can be widely used in vacuum sealing of food products such as seafood, meat and dried fruits/vegetables – in flexible pouches

- Can be used for products that require nitrogen flushing

Vacuum Packing Machine

Locally-developed Food Processing Equipment

rice

corn

tinapa

crispy pata

Spray Dryer

Locally-developed Food Processing Equipment

DESCRIPTION:

- Used in converting liquids into dry powder
- The system subjects atomized liquid raw material to heated gas in a drying chamber, causing instantaneous evaporation
- Powder is discharged continuously from the drying chamber and collected in a cyclone-type dust collector

Spray Dryer

Locally-developed Food Processing Equipment

BENEFITS/ADVANTAGES:

- Preferred method of drying thermally-sensitive materials such as foods and pharmaceuticals
- Efficient and rapid methods of drying most liquid materials/food solutions or suspensions
- Can be used for heat-resistant and heat-sensitive products
- Offers better control of powder quality in terms of particle size and bulk density

Spray Dryer

Locally-developed Food Processing Equipment

Spray Dryer

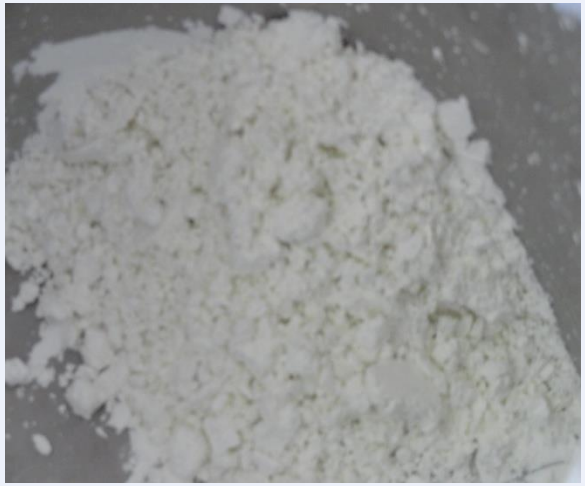
Locally-developed Food Processing Equipment

FEATURES:

- High pressure pump/plunger pump
- Evaporation capacity : 5-6 kg of water/hour

Spray Dryer

Locally-developed Food Processing Equipment



Carabao's milk

Cow's milk

Mango

Freeze Dryer

Locally-developed Food Processing Equipment

DESCRIPTION:

- Used to dehydrate heat-sensitive materials via process involving the sublimation of water content under vacuum conditions
- Used to preserve a perishable material or make the material more convenient for transport
- Freeze dried products may be stored at room temperature without refrigeration
- Enables retention of most of the quality characteristics of the unprocessed food material

Freeze Dryer

Locally-developed Food Processing Equipment

BENEFITS/ADVANTAGES:

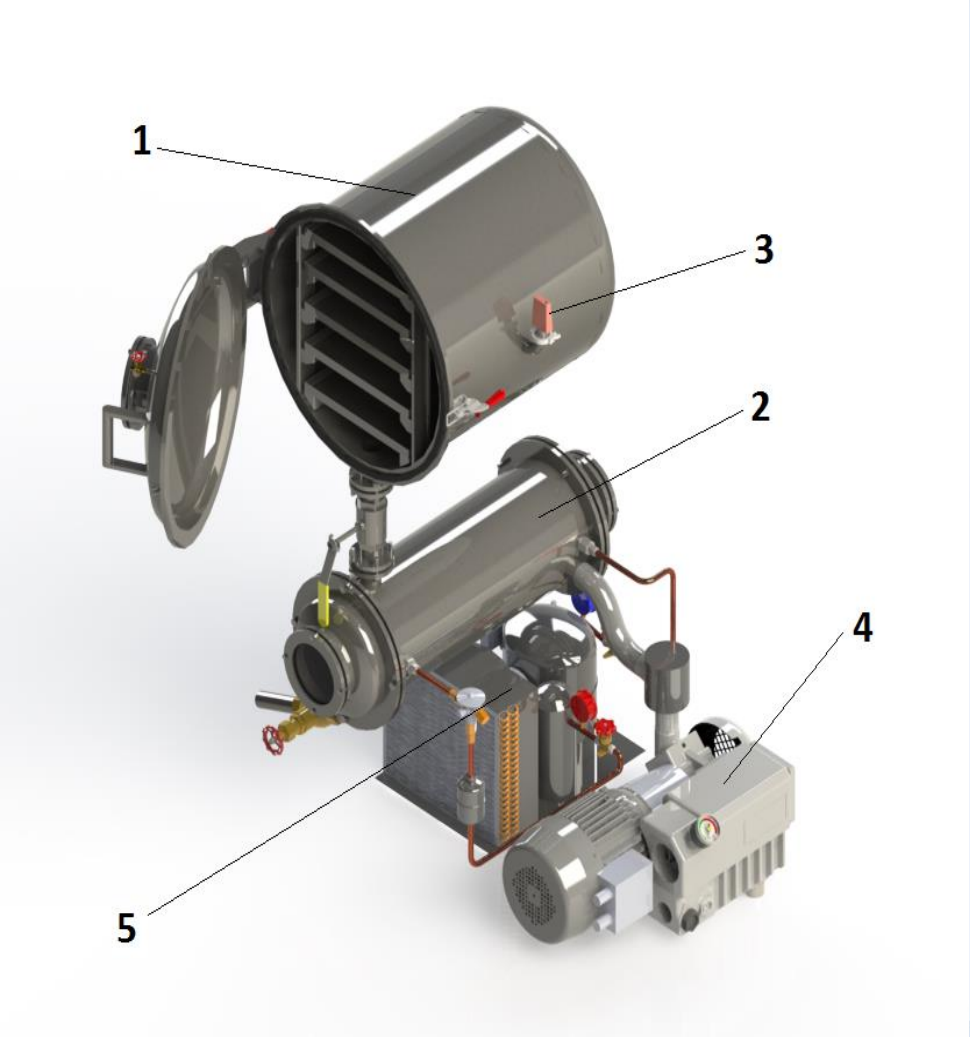
- Can dry food materials below 40°C
- Dried material retains its shape & color
- Flavors, smells and nutritional content generally remain unchanged.
- Preserves temperature–sensitive products (e.g. enzymes, blood plasma, vaccines)
- Provides solution to certain delivery problems
- Freeze dried products can be rehydrated quickly

Freeze Dryer

Locally-developed Food Processing Equipment

Freeze Dryer

Locally-developed Food Processing Equipment



1	Vacuum Chamber Assembly
2	Ice Condensing Chamber Assembly
3	Pirani Gauge
4	Vacuum Pump
5	Condensing Unit

Freeze Dryer

Locally-developed Food Processing Equipment

FEATURES:

- Consists of vacuum chamber with five adjustable trays
- Condensing capacity of up to 4L/24 hours

Freeze Dryer

Locally-developed Food Processing Equipment

Before	During	After
		
		
		

Freeze Dryer

Locally-developed Food Processing Equipment

durian

avocado

tahong

EQUIPMENT PROTOTYPE	SPECIFICATION OF PROTOTYPE	APPLICATIONS	PRODUCTS TESTED	EQUIPMENT COSTING
1. Vacuum packaging (sealing machine)	Sealing Length: 450mm Sealing Element: Nichrome Avg Cycle Time: 20-30secs Vacuum Pressure: 90kPa	Sealing of foods in flexible packages under vacuum condition	1. Rice 2. Monggo, corn 3. Fish (dried) 4. Crispy Pata	Php 110,000
2. Spray dryer	1 to 5 kg/hour	Drying of food and herb extract, Fruit juice, Dairy product into powder form	1. Maltodextrin 2. Milk (Carabao)	Php 850,000
3. Water retort	Capacity: (by batch) 250 sardines cans, 500 pouches (250ml)	Retorting of products packed in pouches	1. Suman sa lihiya 2. Ready-to-eat meals	Php 135,000
4. Vacuum fryer	Capacity : 10 kg per process (using tahong) Vacuum pump capacity : 2 hp Oil volume : 80L	For vacuum frying of fruits, vegetables, root crops, shellfish and other marine	1. Banana chips 2. Potato 3. jackfruit 4. Tahong (mussels)	Php 650,000
5. Freeze dryer	Capacity: 4trays (300mmx500mm) Condensing Rate: 3L/24hrs Ice condenser temp: App. -20 ℃	For freeze drying high value food products and pharmaceutical products	1. Carrots 2. Potato 3. Langka (jackfruit) 4. Durian	Php 600,000

END OF THE PRESENTATION

THANK YOU