FOOD SAFETY

- Scientific discipline describing handling, preparation and storage of food in way that prevent food borne diseases.

- Food safety consideration: (origin of food) – food labeling, food hygiene, food additives and pesticide residues

- Policies and guidelines for the management of import and export inspection and certification

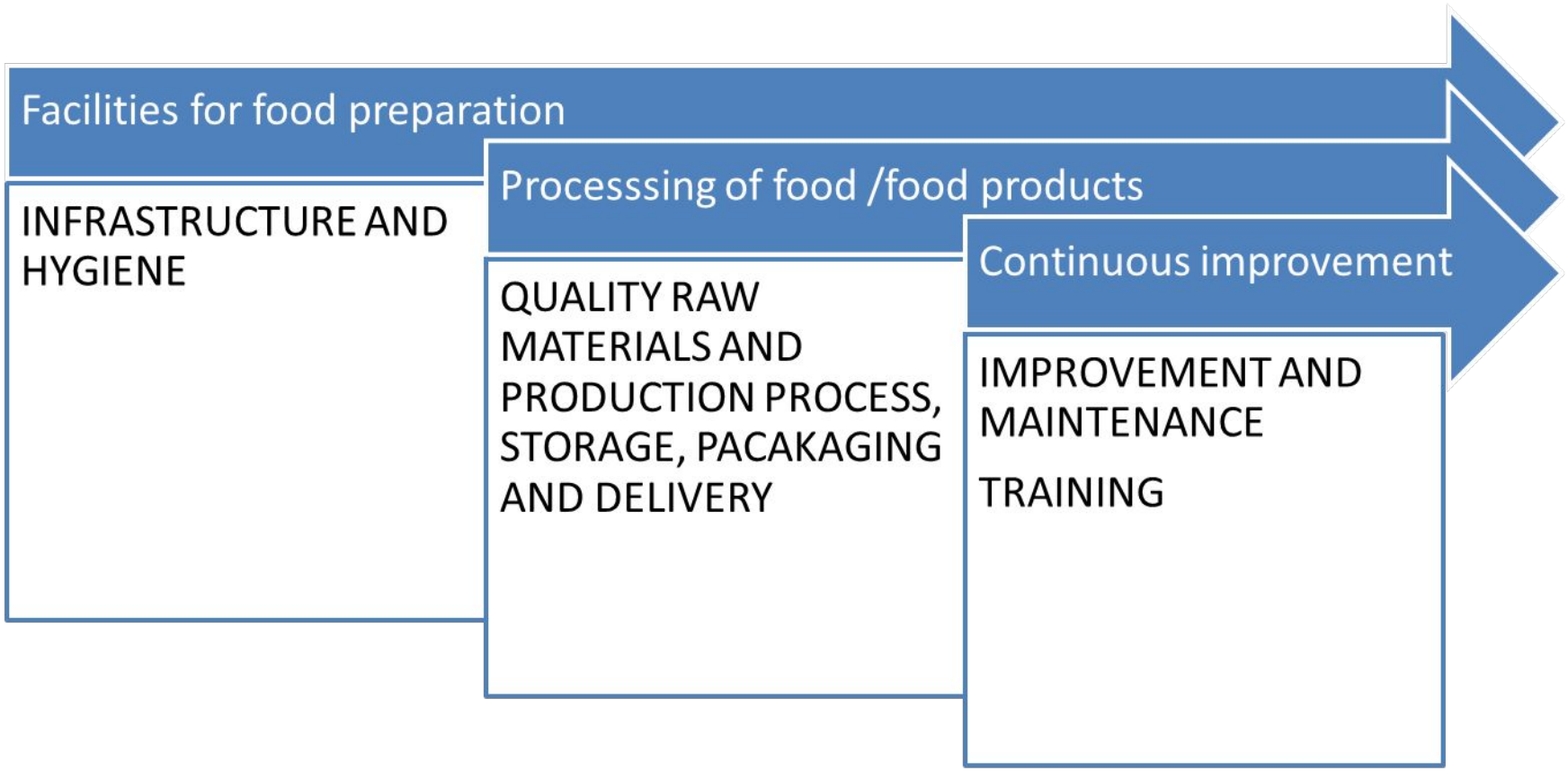
- Food hygiene : principles

I. Prevent contaminating food from pathogens
II. Separate raw and cooked food
III. Cook food at appropriate length of time/temperature
IV. Safe water and materials for food preparation

- Food safety Standards – Codex

I. Food is safe for human consumption
II. Fair trade practices
III. Wide diversity of activities and varying degree of risk
IV. Specific code of food hygiene for each sector

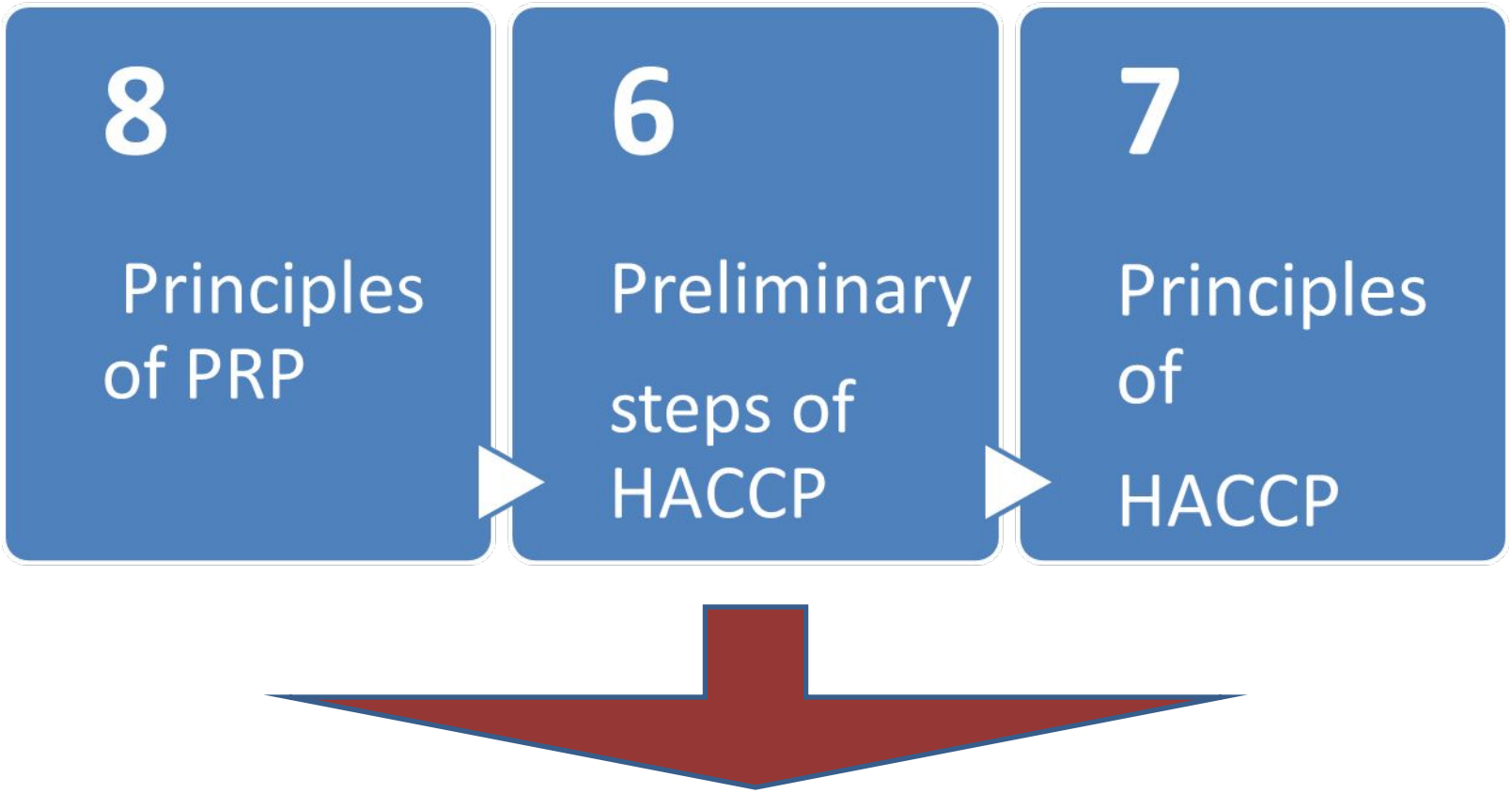
BASIC PRINCIPLES OF FOOD SAFETY



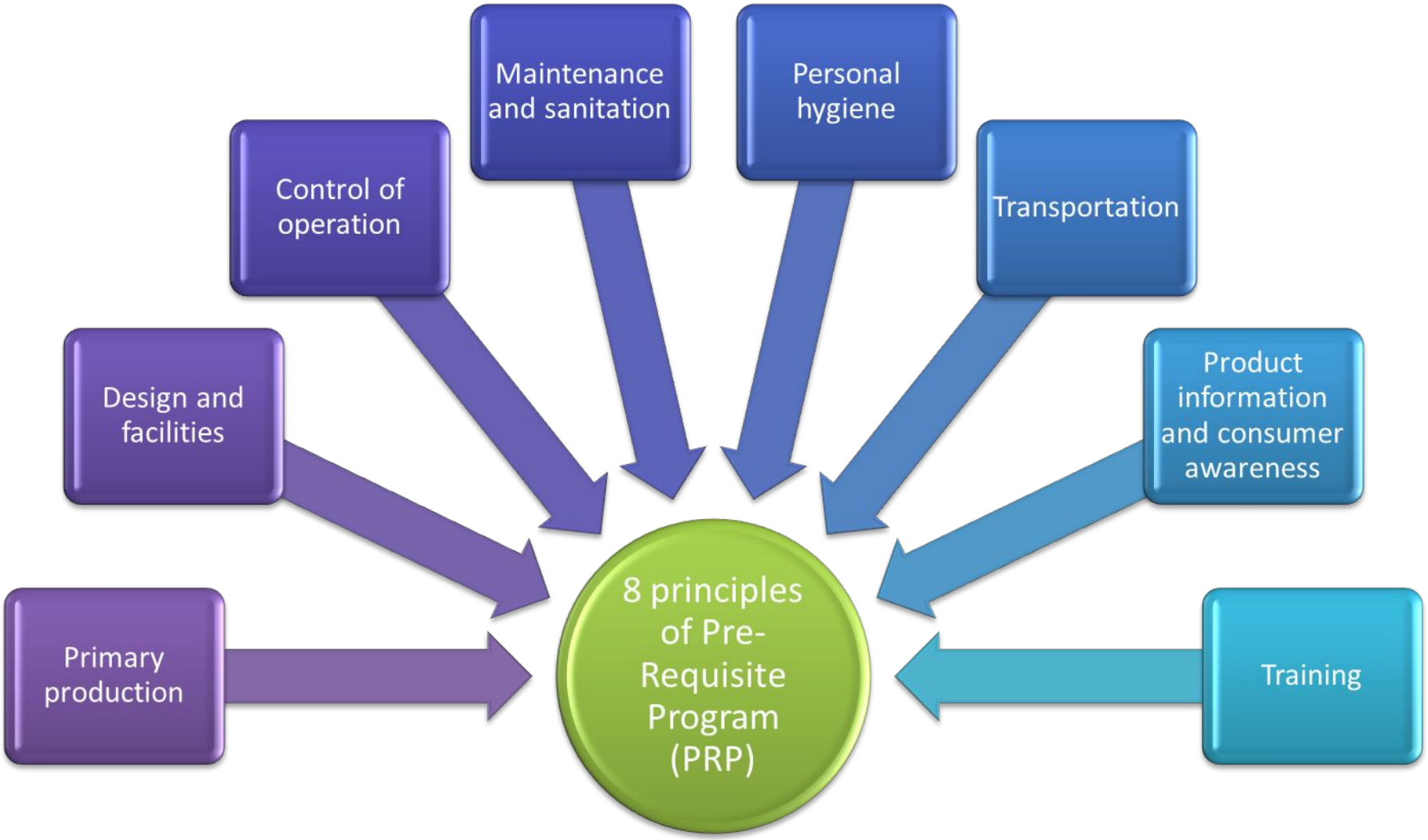
ISO 22000 – Food Safety Management Standards

a. Food safety policy and achieve measurable objectives
b. Well established document, implemented and continuous improvement
c. Products/services must be safe
d. Proactive and innovative, risk avoiding and prevention oriented
e. Integrates the Codex Alimentarius Commission's 7 principle of HACCP and Pre-Requisite Program (PRP)
f. PRP refers to Good Hygienic Practice (GHP), Good Agricultural Practice (GAP), Good Manufacturing Practice (GMP), Good Distribution Practices (GDP), and good Trading practices (GTP)
g. PRP has 8 general principles of food hygiene

ISO 22000



REVIEW HACCP PLANS


Maintenance and sanitation
Personal hygiene
Control of operation
Transportation
Design and facilities
Product information and consumer awareness
Primary production
8 principles of Pre-Requisite Program (PRP)
Training

Primary Production

- Environmental hygiene
- Level of hygiene of food sources (from air, water and feedstock, pesticides or contamination)
- Handling and storage of food materials
- Cleaning and maintenance
- Personal hygiene

Development of facilities and design

- Nature of operation, premises, equipment and facilities
- Location of facilities
- Internal design, structure, layout, rooms
- Facilities for water supply, air quality, temperature control, drainage and waste disposal, lighting, protection

Control of operation

- Food hazards through HACCP system
- Hygiene control system (microbial, chemical and physical contamination)
- Materials requirement
- Packaging
- Water supply
- Management and supervision
- Documentation on procedures

Maintenance and sanitation

- Cleaning methods and procedures
- Effectiveness of cleaning programmes
- Pest control systems (prevention, monitoring and detection, eradication)
- Waste management
- Monitoring for effective maintenance and sanitation

Personal Hygiene

- Health status of workers
- Forms of illnesses and diseases
- Injuries
- Clothing
- Behaviour and attitudes of workers
- Visitors (rules and regulation)

Transportation

- Design of containers (prevention of cross contamination)
- Types of packaging for transportation of products
- Maintenance of transportation systems
- Schedules of transport

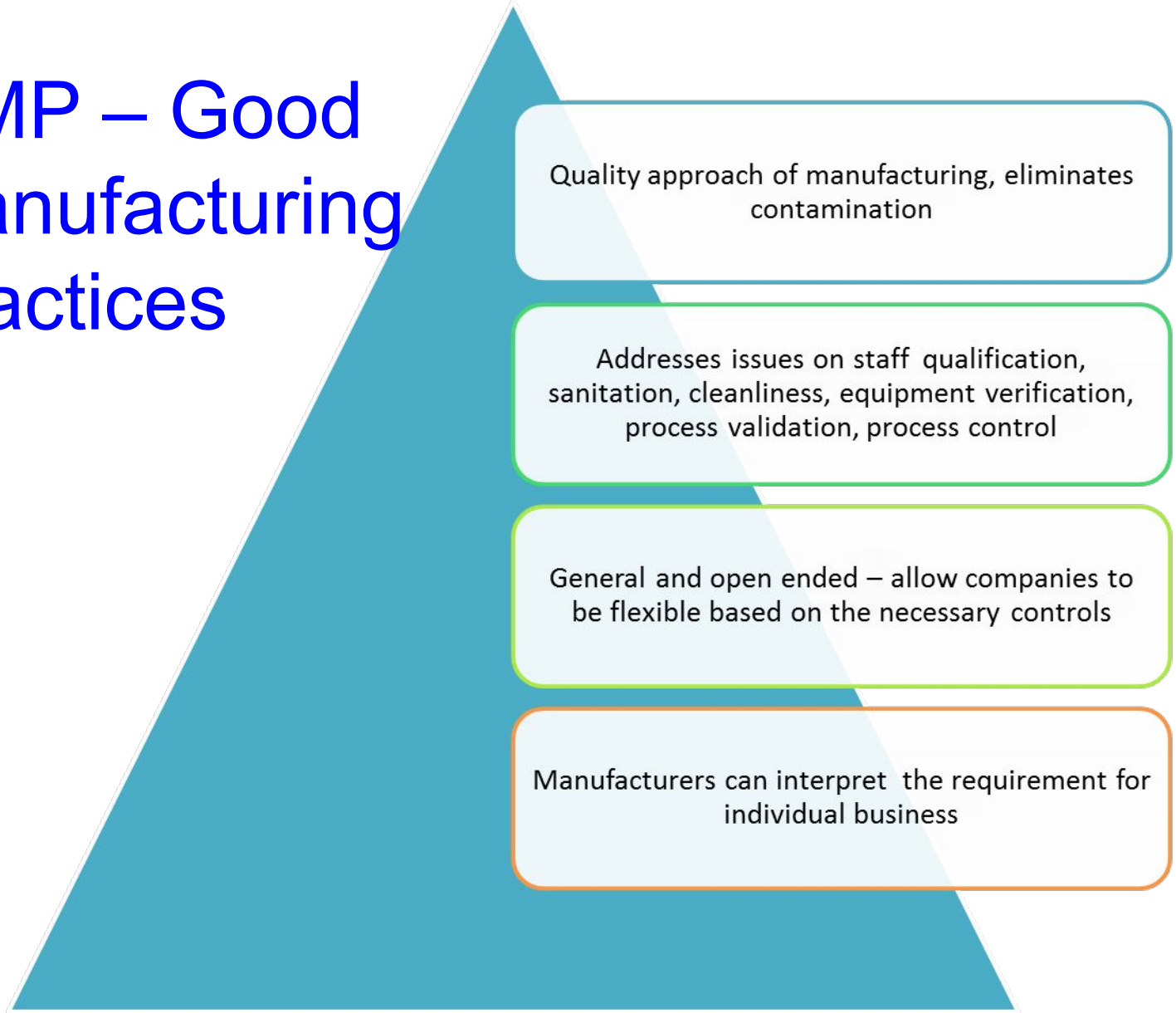
Product information and consumer awareness

- Lot identification
- Information of products (storage and safety, adequate
- Labelling (including instruction for use)
- Consumer education (hygiene, nutrional value)

Training

- Awareness programmes for more responsibility
- Training programmes for skills development (eg microbial contamination, food handling etc)
- Roles of workers and supervisors

GMP – Good manufacturing Practices



HACCP – Hazard Analysis and Critical Control Point

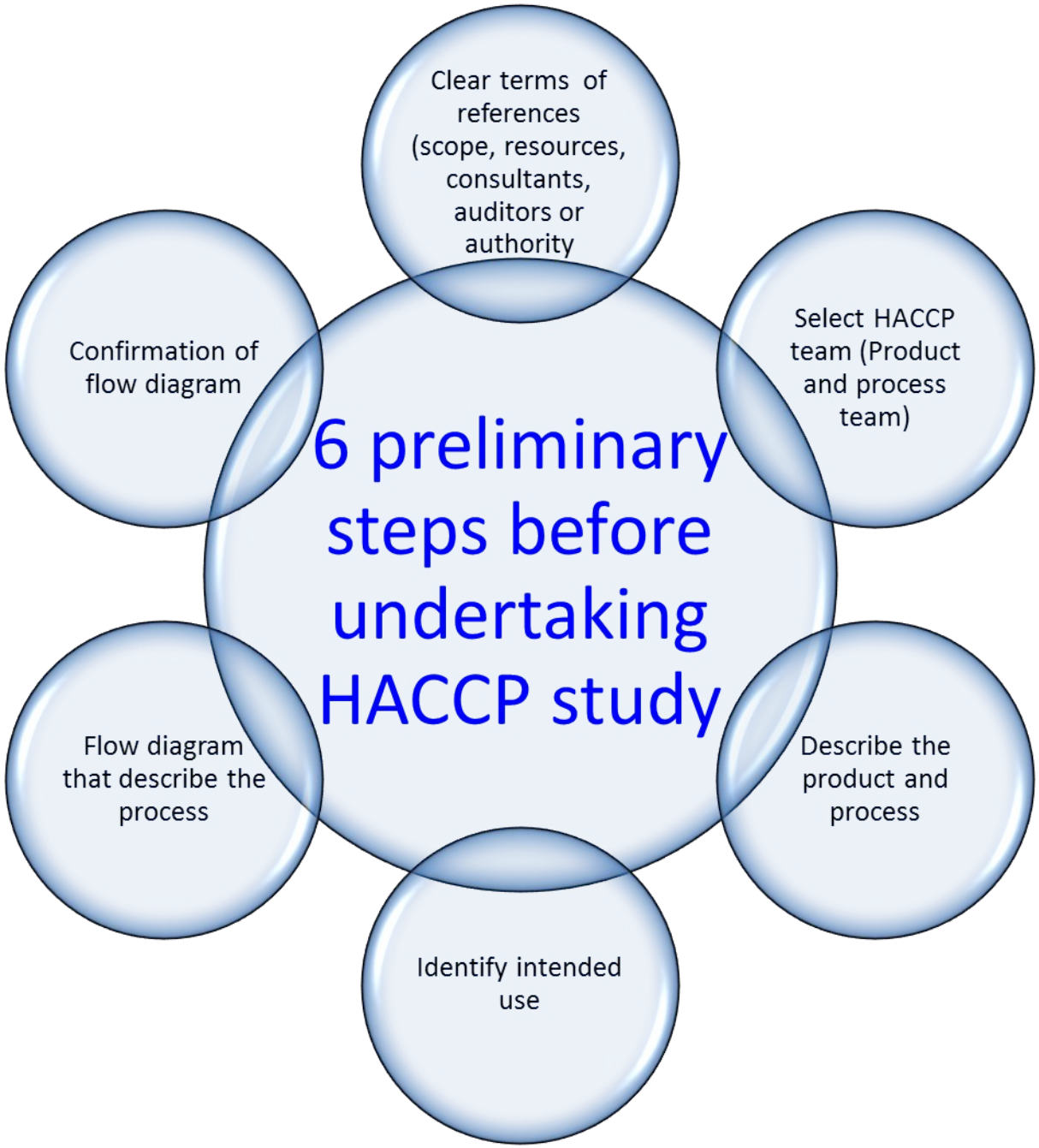
- A systematic preventive approach to food safety and biological, chemical and physical hazards in production processes that may cause the finished product to be unsafe.

- HACCP is the prevention of hazards rather than finished product inspection. HACCP can be used at all stages of a food chain from production to distribution

- HACCP has been recognised internationally as tool for adapting traditional inspection methods to modern approaches

- Focuses on health safety issues of a product and not the quality

- Carry out **6** preliminary steps before undertaking a HACCP study


6 preliminary steps before undertaking HACCP study
Clear terms of references (scope, resources, consultants, auditors or authority
Select HACCP team (Product and process team)
Describe the product and process
Identify intended use
Flow diagram that describe the process
Confirmation of flow diagram

7 PRINCIPLES OF HACCP SYSTEM

1. Conduct Hazard analysis (for PRP and flow diagram of the selected product or process)

- Risk assessment of biological, chemical and physical
- Determine food safety hazards and identify preventive measures
- Contamination levels
- Control measures for hazards

2. Identify critical control points (CCPs)

- CCP is a point, step or procedure in a food manufacturing process at which control can be applied and as result a food safety hazard can be prevented
- Egs, thermal process, retention time, environmental factors, chilling, ingredient, end product testing or product formulation
- CCP decision tree – is the control eliminate or reduce risk of hazard

3. Establish critical limits for each CCP

- The critical limit must be met – maximum (cannot be exceeded) or minimum (amount required for safe effect) value to which the hazard must be controlled at a CCP to prevent, eliminate or reduce hazard
- Differentiate safe and unsafe (not operational limits)
- Eg of critical limit for: temperature, humidity, time, concentration, preservative, additive or chemicals
- Know regulatory requirements apply to process or product

4. Establish Monitoring Procedures (planned sequence of observation or measurement)

- To ensure the process is under control at each CCP
- Responsible and well trained personnel must be assigned
- Rapid and real time processes
- Proper frequency, well planned, effective
- Accurate and precise reporting

5. Establish corrective action plans

- Determine and correct the deviation from an established critical limit
- Corrective actions are intended to ensure that no product injurious to health
- Record the corrective actions that have been taken
- Devise a standardised set of actions
- Assign specific responsibilities for implementing the corrective actions
- Has the cause of deviation been identified and eliminated?

6. Establish procedures for ensuring the HACCP system is working

- Validation ensures the plant does what it is designed for, verification ensure HACCP plan is adequate
- The plan is scientifically and technically sound
- 3 types of verifications – based on scientific expertise and knowledge, on going verification, and reassessment
- Verification include validation – find evidence for accuracy for the HACCP system

7. Establish record keeping and documentation

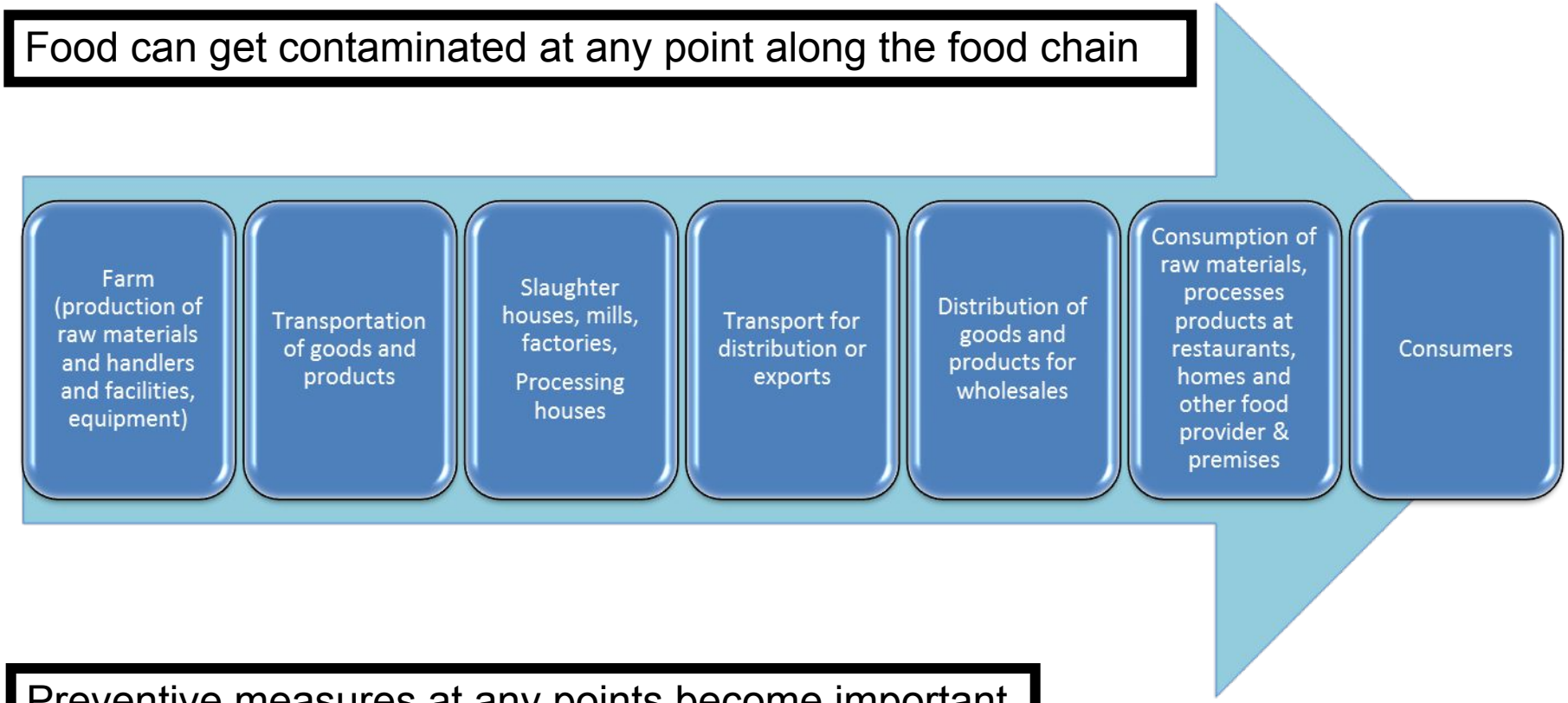
- HACCP regulation requires maintain certain document, HACCP plan, monitoring of CCP, verification activities and handling of deviations
- Packaging records compliances
- Finished products
- Deviation and corrective actions records
- Workers training programmes or health status
- Documents of HACCP procedures

Significance of HACCP system

- Identification of all current hazards included those predicted to occur
- Cost effective control for food borne hazards
- Technical resources transform into critical parts of the process
- Reduce product losses
- Complementary to other management systems
- Compliance to the legal requirements
- Structured approach to the control of hazards comapred to the traditional inspection procedures
- Preventive quality assurance approach
- Systematic approach covering all aspects of food safety
- FAO/WHO Codex Alimentarius commission promote HACCP as the system for ensuring food safety

The Concept of Food Chain and HACCP

Food can get contaminated at any point along the food chain

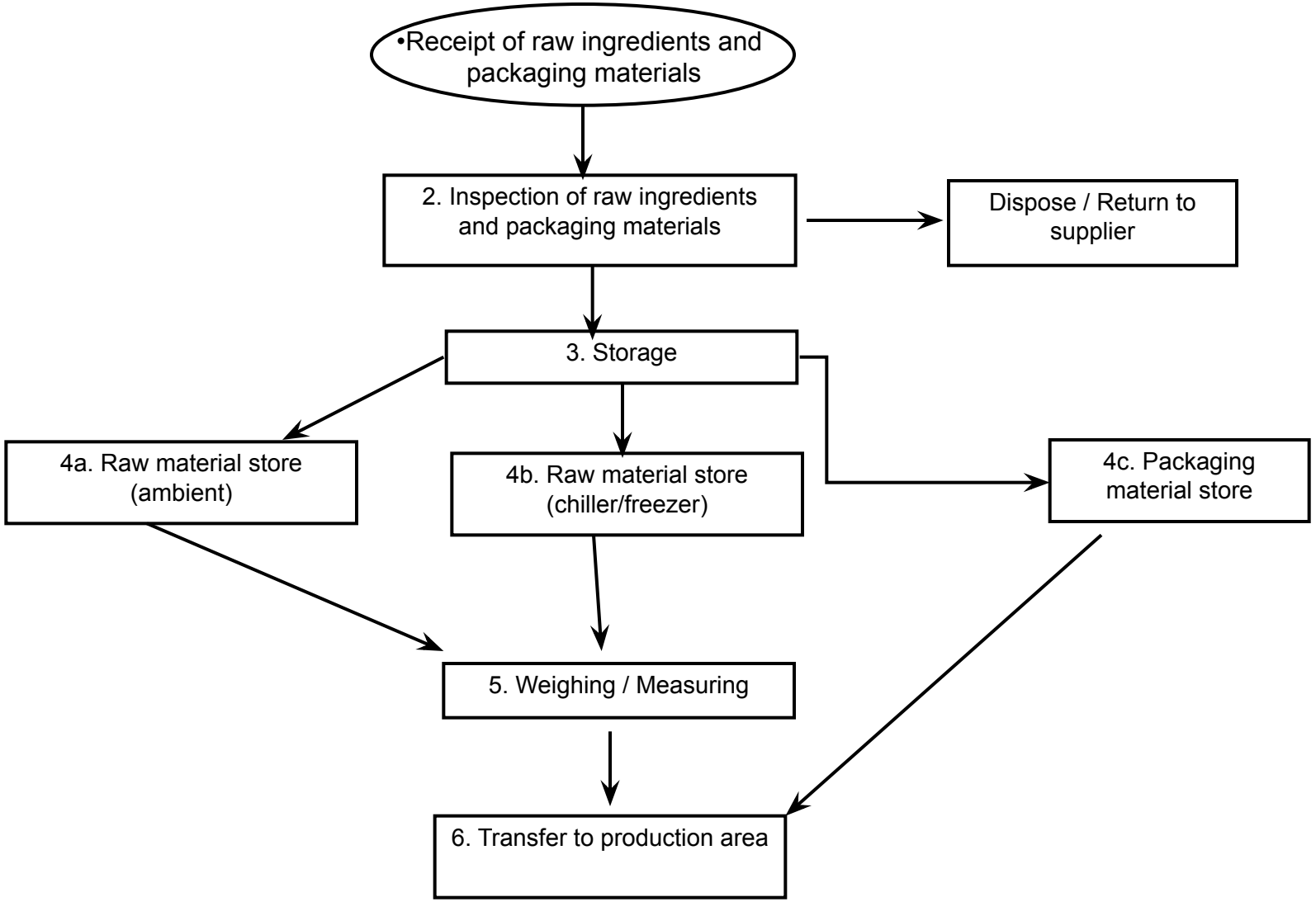


Preventive measures at any points become important

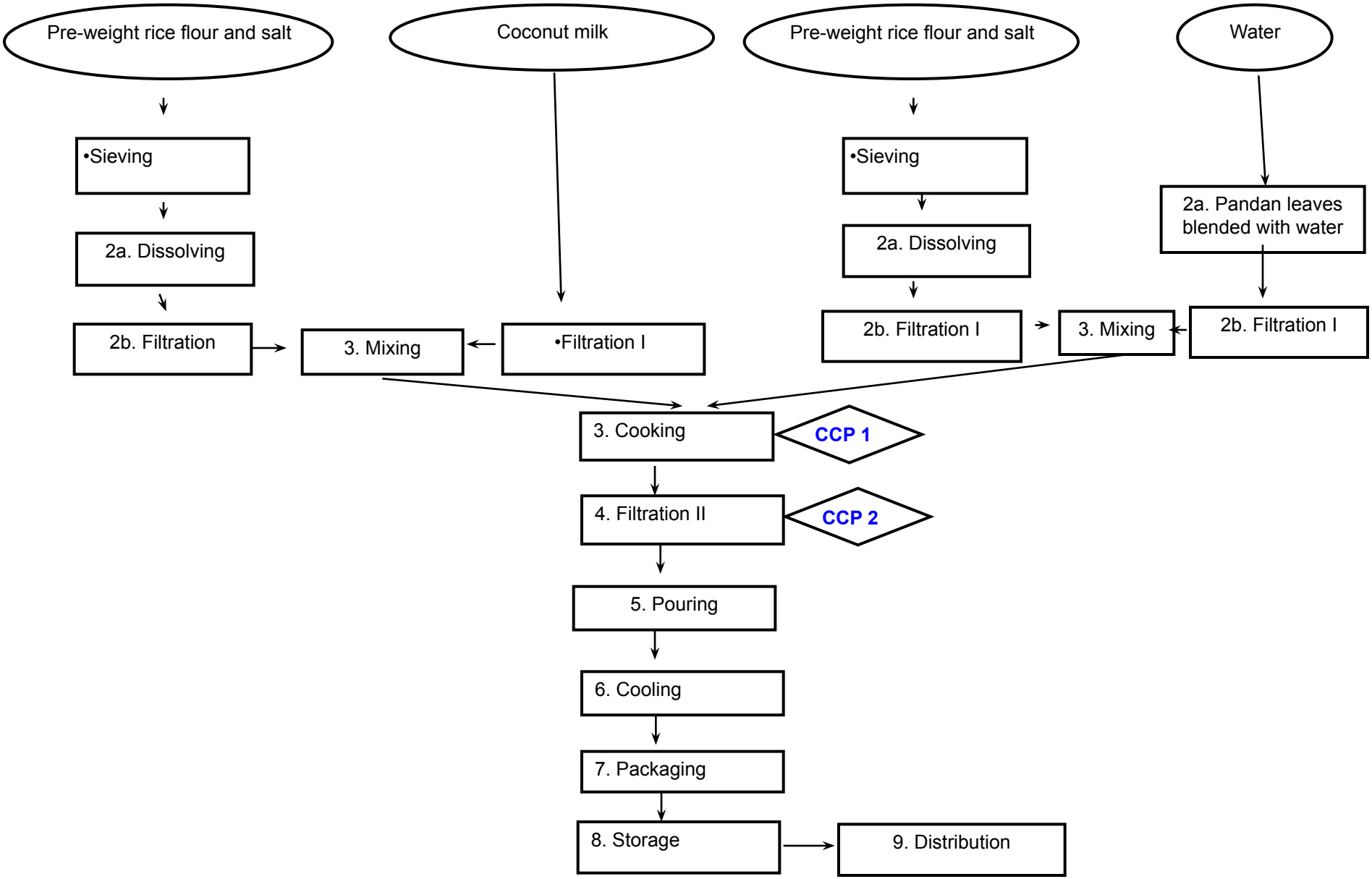
Product description

Product Name	Tepung Pelita
Product Type	Ready to Eat
Packing Size	350 ml
Raw materials / Ingredients	Rice flour, coconut milk, pandan leaves, water, sugar and salt
Process type	Blending, mixing, filtering, heating (cooking and steaming, pouring, packing
Product characteristics Appearance Taste Aroma	Two layers – whitish top layer and greenish bottom layer Normal coconut milk and pandan taste No off flavour
Packaging system	Primary packaging: 350 ml disposable plastic cup Secondary packaging Carton
Shelf-life	Best consume on production date
Storage condition	Store in refrigerator below 4°C
Distribution control	Distribute in cool and ambient temperature
Intended use	Consume as desserts either hot or chilled
Intended consumer	General public
Distribution	Kelantan
Labelling instruction for consumers	N/A
Mishandling possibilities	Do not expose under direct sunlight

Process Flow Chart



Process Flow Diagram: Preparation of coconut milk (top layer) and rice flour (bottom layer)



Process flow of *Tepung Pelita*

•Weighing

2a. Mixing

2b. Cooking

•Cooking

4b. Pouring top layer

4a. Pouring bottom layer

•Cooling

Hazard Analysis: Receipt of raw ingredients and packaging materials

Process Step	Potential Hazards	Rational for inclusion or exclusion as hazard	Is this a significant hazard? (Yes / No)
Receiving raw ingredients	B – Microorganism growth in raw material	Microbe growth on raw material if no proper storage condition in delivery truck	No
	P – Damage on raw materials	Due to mishandling during transfer	No
	C- None identified	Not applicable	N/A
Unloading	B – None identified	Not applicable	N/A
	P – Foreign matter	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Raw material storage	B – None identified	Not applicable	N/A
	P – Damage on items; contamination from pest, dust and sand	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Raw material – storage in freezer and chiller	B – Microbial growth	Microbial growth when not stored at appropriate temperature	Yes
	P – Contamination from pest infestation, sand and dust	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Weighing	B – Microbial contamination	Due to unhygienic handling and cross contamination from workers and utensils; Controlled by pre-requisite programmes	No
	P – Contamination from pest infestation and foreign materials such as dirt, hair and debris	Due to improper personal hygiene practice by workers and cross contamination from utensils and environment; Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Transfer to production area	B – None identified	Not applicable	N/A
	P – None identified	Not applicable	N/A
	C – None identified	Not applicable	N/A

Hazard analysis - Processing

Process Step	Potential Hazards	Rational for inclusion or exclusion as hazard	Is this a significant hazard? (Yes / No)
Sieving **-Rice flour** **-Pandan juice** **-Coconut milk**	B – None identified	Not applicable	No
	P – Plastics rope, physical impurities	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Dissolving	B – None identified	Not applicable	N/A
	P – Foreign matter	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Filtration I	B – None identified	Not applicable	N/A
	P – Foreign matter	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Mixing	B – None identified	Not applicable	N/A
	P – Foreign matter	Controlled by pre-requisite programmes	No
	C- None identified	Not applicable	N/A
Cooking / Heating	B – Pathogen survival (Staphylococcus aureus, E. coli, Salmonella)	Pathogens that survive the cooking process will not be eliminated at subsequent processing step. Processing time and temperature may not be sufficient to kill vegetative pathogens	Yes

	P – None identified	Not applicable	N/A
	C- None identified	Not applicable	N/A
1. Filtration II	B – None identified	Not applicable	N/A
	P – Foreign matter	If filter is broken or torn, foreign matter will not be filtered. This is the last filtration step before product is poured into container	Yes
	C – None identified	Not applicable	N/A
1. Pouring	B – None identified	Not applicable	N/A
	P – None identified	Not applicable	N/A
	C – None identified	Not applicable	N/A
1. Cooling	B – Post process contamination with pathogens	Controlled by pre-requisite programmes	No
	P – Foreign matter	Controlled by pre-requisite programmes	No
	C – Household chemicals	Controlled by pre-requisite programmes	No
1. Storage	B – Potential for materials to become contaminate during cold storage	Not reasonably likely to occur, controlled by SOP	No
	P – Potential for materials to become contaminate during cold storage	Not reasonably likely to occur, controlled by SOP	No
	C – Potential for materials to become contaminate during cold storage	Not reasonably likely to occur, controlled by SOP	No

CCP Determination

Process / Step	Hazard	Question 1	Question 2	Question 3	Question 4	CCP (Yes / No)
1. Raw material storage (Freezer or chiller)	B – Microbial growth	Yes	No	Yes	Yes	No
1. Cooking	B – Pathogen survival (*Staphylococcus aureus, E. coli, Salmonella*)	Yes	Yes	-	-	Yes
1. Filtration II	P – Foreign matter	Yes	Yes	-	-	Yes

HACCP Data Sheet

Process Step	Critical Limit	Monitoring				Corrective action	Verification	Record keeping
		What	How	When	Who			
CCP 1 Cooking	15 minutes with internal temperature of 82C	Temperature of cooker Cooking period	Thermometer probe	Continuous	Operator	Segregate affected product and evaluate for safety Determine source of problem and take measures to prevent recurrence	Quality control staff to observe cooking process and compare date with those obtained by cooker operator Verification of the cooking process Calibration of thermometer probe	Recorder chart
CCP 2 Filtration II	Filter intact and not torn	Condition of filter (200 mesh sieve size – 0.07 mm)	Visual inspection of filter	After every CIP (Cleaning in Place)	Machine operator	• Stop production and change if filter is torn • Inform Production Manager • Quarantine product since the last check of filter until further assessment from Quality Control department	Review records by Production Manager Verification by Quality Manager on product appearance every hour to ensure there is no foreign particles in product	Recorder chart for filtration