

# **Implementation of Food Safety Management in Developing Countries: Is GMP/HACCP confusing?**

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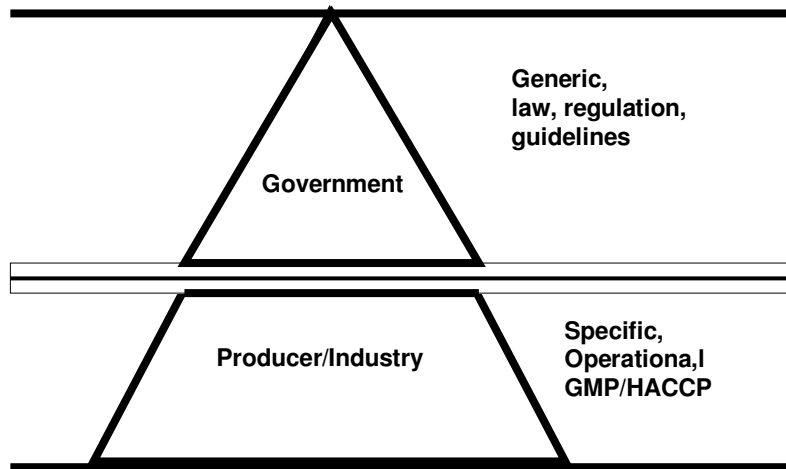


## **Overview**

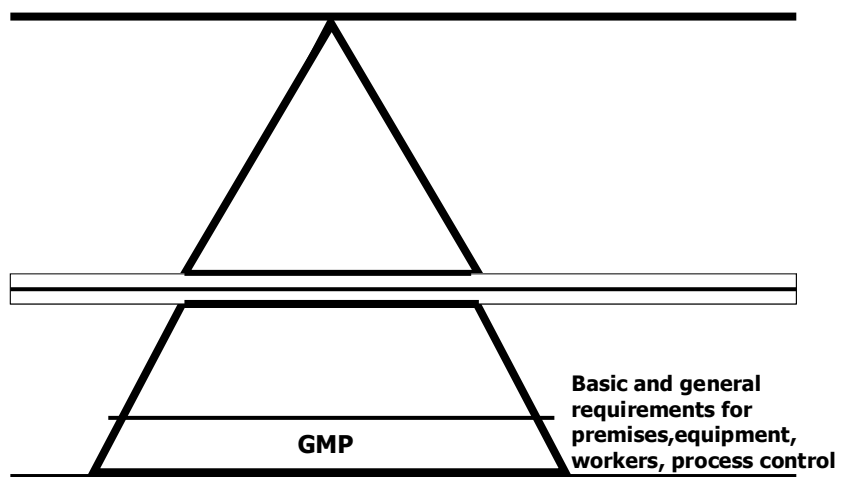
- Food Safety Management
  - Management at Industry Level
- Constraints in Implementing GMP/HACCP in Developing Countries
- Problems and Confusions in Understanding GMP/HACCP
- Problems in HACCP Plan Development
- Case Studies



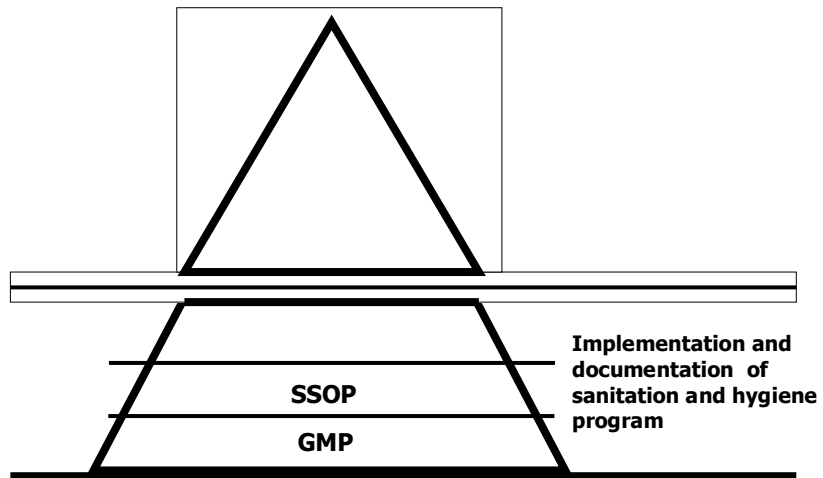
## Food Safety Management



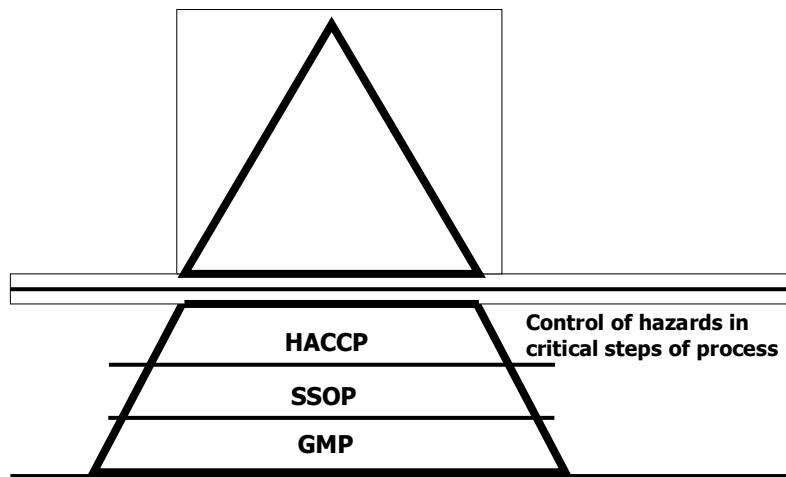
## Food Safety Management at Industry Level



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## Food Safety Management at Industry Level



## Constraints in Implementing GMP/HACCP in Developing Countries :

- Infrastructures
- Size of food industry
  - Finance

- Language
- Foods of Tradition
  - Attitude



### Infrastructures

- **Lack of Potable water**

- Drinking water is not always available in some area
- Tap water in some area does not meet drinking water requirement
- Is clean water sufficient?
- Sometimes water quantity is not adequate
- Big industries have water treatment installation, small industries don't



## Infrastructures

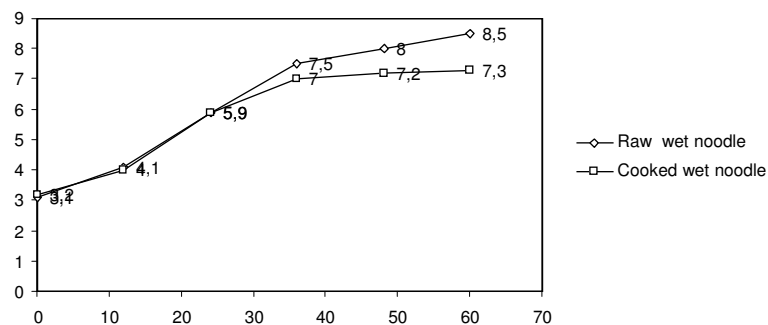
- **Lack of Cold Chain**

- cause product to spoil rapidly
- support pathogen growth
- has prompted some irresponsible producer to abuse illegal chemicals a preservatives, e.g. use of formalin for food preservation (wet noodle cases in 2006)
  - ironically efforts made were geared toward looking for "magic bullets", not to take care of the roots of the problem : GMP not implemented. GMP is hampered by use of chemicals such as formalin



## Infrastructures

- **Lack of Cold Chain : wet noodle**



**Growth of bacteria in wet noodle made in a small industry implementing GMP during room temperature storage (DFS, 2005)**



## Infrastructures

- **Lack of Cold Chain :**

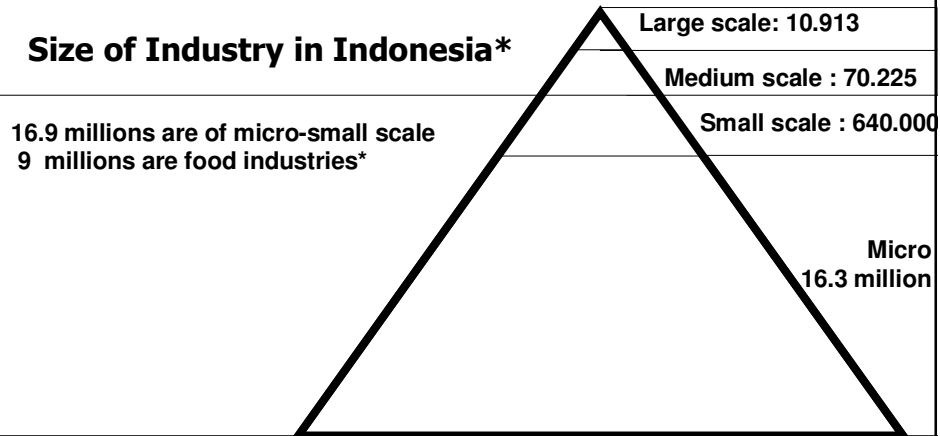
Wet-noodle type	Total Plate Count (Log CFU/g) at producer's level	Laboratory	Small industry applying GMP (no. trial)
	Small industry (no of industry)		
Raw	3.65 - 5.95 (n=8)	1.6	3.69 (n=2)
Cooked	1 - 7.2 (n=5)	1.0	ND

**magnifies problems when initial load is high**



## Industry Size

### Size of Industry in Indonesia\*

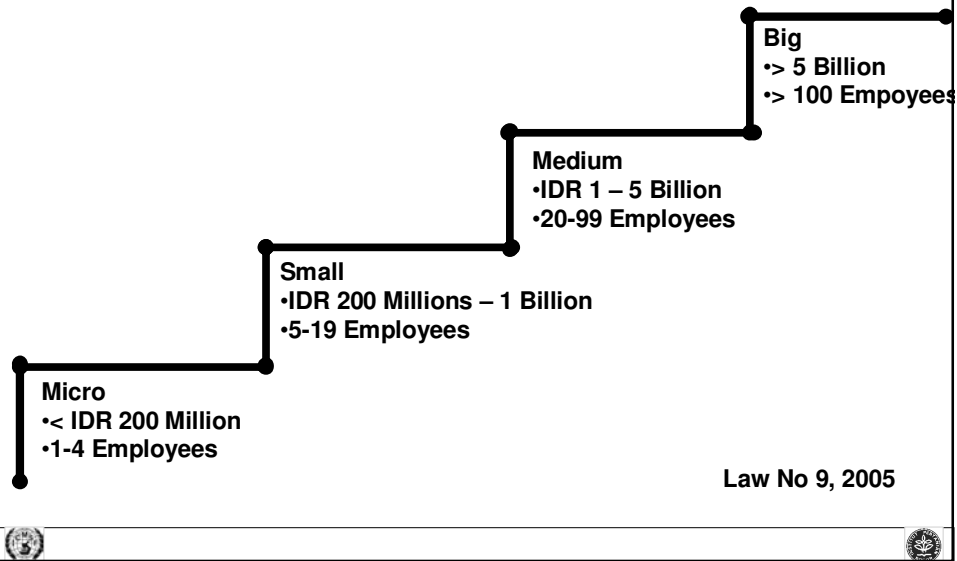


16.9 millions are of micro-small scale  
9 millions are food industries\*

\*54% is food industry (National Statistics Bureau)



## Classification of Enterprises



## Industry Size

### Consequences of small industries

- Inadequate facility
- Inadequate equipment
- Lack of resources
- Lack of technical skills
- Lack of money

### Indonesia "Food Star Program"(Piagam Bintang)\*

- Star 1 : 677 units (752 granted, 75 revoked) (2008)
- Star 2 : 40 units (2009)
- Star 3 : 7 units (2007)

**NADFC, 2009. Directory of Food Safety (in printing)**



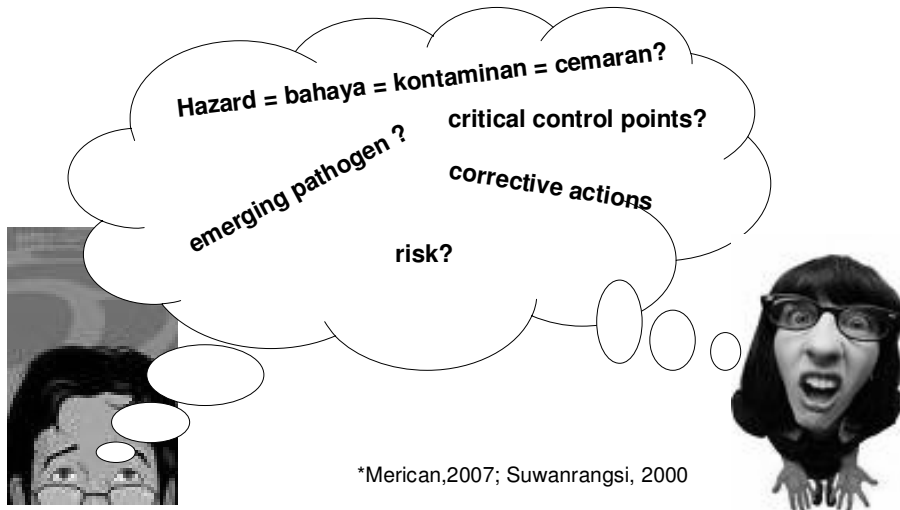
## Finacial Constraints

<b>Cost for GMP/HACCP in Turkey*</b>	<b>€</b>	<b>%</b>
<b>Building, ground and planning of the surrounding</b>	<b>12,176</b>	<b>42.17</b>
<b>Hygiene and sanitation</b>	<b>5,162</b>	<b>17.88</b>
<b>Insect control</b>	<b>3,400</b>	<b>11.78</b>
<b>Personal training</b>	<b>2,057</b>	<b>7,13</b>
<b>Calibration, maintenance and repairing</b>	<b>6,076</b>	<b>21,05</b>

\*Mutlu et al., 2005



# Language Barrier



\*Merican,2007; Suwanrangsi, 2000



# Foods of Tradition

- Use of “now-known to be hazardous” materials in certain foods
  - borax in *gendar*, *lontong*
- Use of illegal colorant to replace plant extracts due to industrialization
  - certain types of kerupuk, tofu, snacks
- Known (toxic), illegal, but considered as specialty, local tradition



## Attitude/Behavior

- Prevention is generally not internalized, not part of life style, perceived as costly : may not happen anyway! (i.e.bulb cover)
- GMP and HACCP will need time to be fully adopted in developing countries, just like any other preventive measures for safety



## 7 Problems and Confusions in Understanding GMP/HACCP

1. GMP/HACCP is a preventive approach to produce safe foods, external pressures (importers, need for certification) should not be the only reason to implement the system\*
2. HACCP sometimes conflicts standards and or inspectors demand on (end product) testing
3. GMP is a Prerequisite Program for HACCP. HACCP plan will not be effective without GMP

\*Franco, 2009

## 7 Problems and Confusions in Understanding GMP/HACCP

4. GMP is a **generic** requirement for food industry not for a product :  
A GMP specific for a product can be made as a guideline, but it is not necessary
5. HACCP is **specific** for each product, factory, processing line :  
A generic HACCP plan is only good as a reference, not to be used directly



## 7 Problems and Confusions in Understanding GMP/HACCP

6. Several standards (SQF, ISO 22000:2005 etc) integrate HACCP while introducing more (confusing) terms
7. The new metrics FSO/PO are not a replacement of GMP/HACCP , they should be built on a sound GMP/HACCP



## Problems in HACCP Development

### • Hazard Analysis

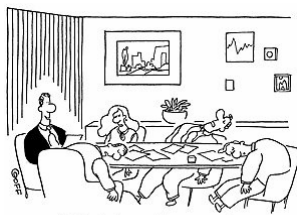


- Not all materials or ingredients are included
- Insufficient knowledge of hazard, degree of severity, isolation frequency, risk or significance
- Control measures do not address why hazards occur because source of hazard is not well defined



## Problems in HACCP Development

### • CCP determination

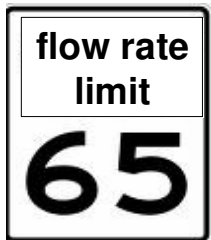


- CCP is only applied at steps in which a control can be done to eliminate/reduce hazard to an acceptable level
- While a decision tree is helpful, CCP can be determined without it
- No specific numbers for a product or food industry is present
- "Too many CCPs" indicate poor compliance of PRP (GMP)



## Problems in HACCP Development

- **CL establishment**



CL should be easy to check/test for the specific product

Do not use other's (i.e importing countries) CL

A microbiological limit for a CL is only applicable when rapid test is available

- CL should be justified and validated
- When new metrics of food safety management are available, FSO,PO,PC can be used to determine CL



## Problems in HACCP Development

- **Monitoring Procedures**

- Monitoring shall be planned for all CCPs
- Monitoring does not comprise all the necessary components :

what

who

how

where

when



carf132 www.2006searcl.com



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## Problems in HACCP Development

- **Corrective actions**



Corrective actions shall consist of

- preventive aspects (*corrective action* in ISO 22000 : 2005) and
- steps to correct the source of deviation (*correction* in ISO 22000 : 2005)



## Problems in HACCP Development

- **Verification**

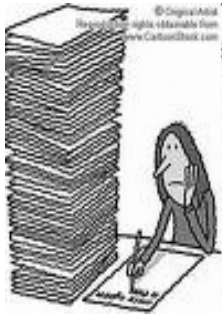


- Verification should be made to check whether all HACCP principles have been applied appropriately
- All critical limits have to be validated
- Audit has to be regularly carried out to check whether implementation has been done correctly



# Problems in HACCP Development

- **Documentation**



- Documentation shall be planned and maintained
- Documents are reviewed routinely for improvement
- Documentation should be used to pin point trends and problems in product processing



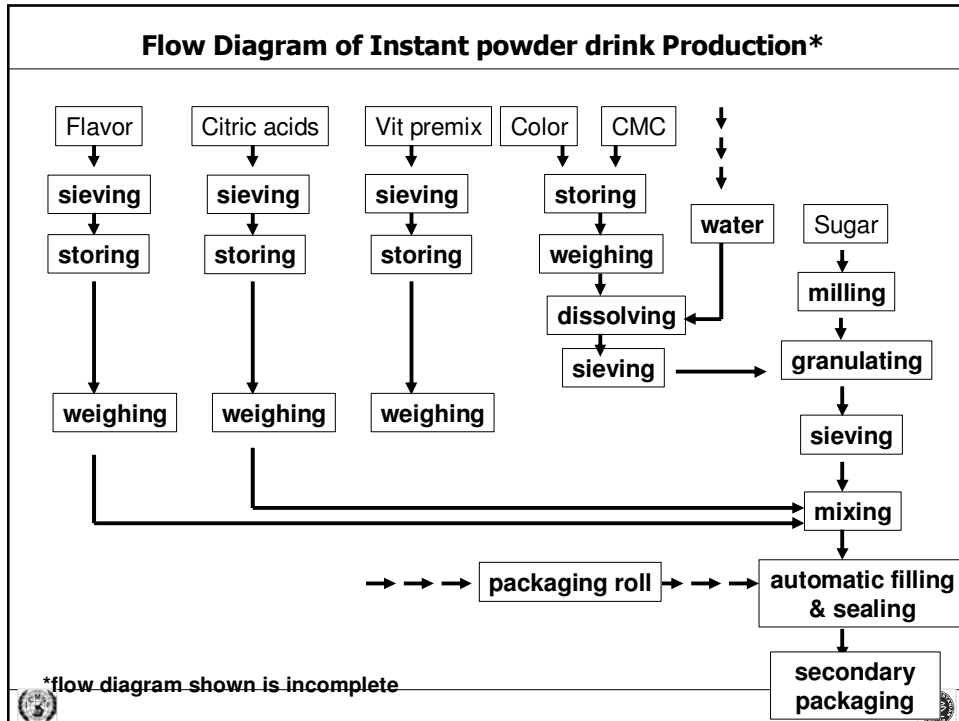
## Case Study 1

### ***Development of a HACCP plan for Instant drink powder\*, a popular schoolchildren beverage***

- Scope of work : GMP review, HACCP plan development
- HACCP plan development found CCPs related to physical hazards
- Product has low aw, high sugar, low risk for microbiological hazard
- Physical hazards from grinding was the main concern

*\*EC-ASEAN, 2005 (not all info shown here was published)*





## Development and Implementation of HACCP plan for Instant Powder Drink

- Hazard analysis suggested that physical hazards from grinding had to be controlled
- Best way was to install a metal detector post filling to assure absence of unwanted metal
- Suggestion was made to the management for a successful HACCP implementation





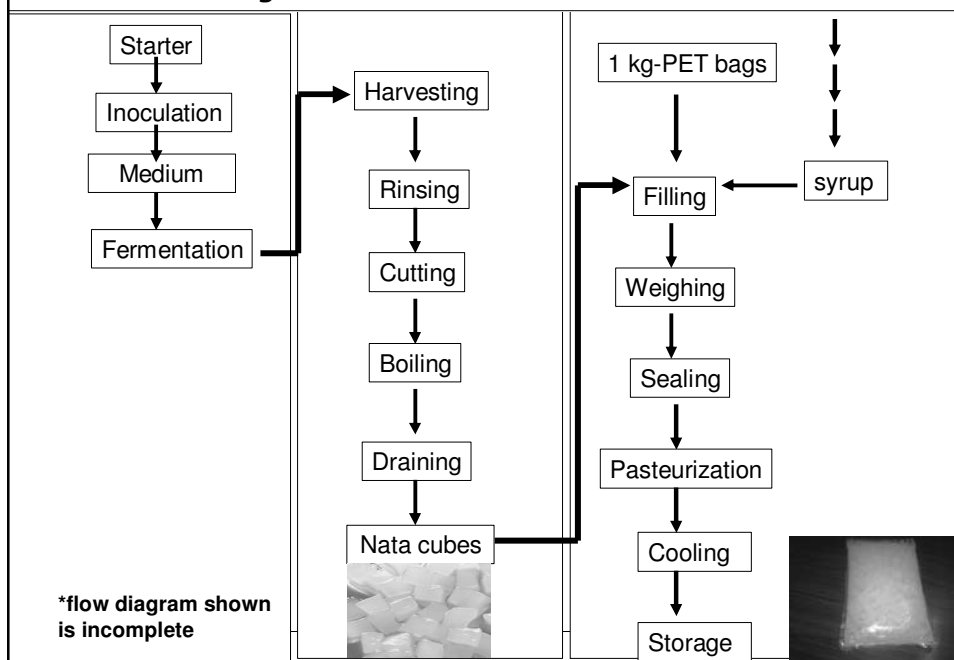
## Case Study 2

***Development of a HACCP plan for nata de coco\*, a popular RTE dessert, made from cellulose produced by A. xylinum***

- Scope of work : GMP review, HACCP development and implementation
- HACCP plan development found CCPs related to physical and biological (quality) hazards
- Product has low pH, high sugar content, pasteurized :not likely to have surviving vegetative pathogens
- Spoilage and physical hazards (from employees) are the main concerns

*\*EC-ASEAN, 2005 (not all info shown here was published)*

**Flow Diagram of Nata de Coco Production\***



## Development and Implementation of HACCP in nata de coco production

- **September 2004 - June 2005**

Implementation of GMP/ HACCP decrease the amount of rejected products due to physical hazard (product loss) from 14,43% to 5,32% (9,11%), equal to US\$ 43.000

[http://ec.europa.eu/food/training/haccp\\_en.pdf](http://ec.europa.eu/food/training/haccp_en.pdf)



### Case Study 3

- Evaluation of results of two independent studies in frozen shrimp production in industry A and B
- Evaluation was based on :
  - (1) study on " profile of human pathogens in shrimp obtain from Java" – industry A (2001-2005)\*
  - (2) "application of technology and food safety management for frozen shrimp – industry B" (2006)\*\*

\*Dewanti-Hariyadi, et al., 2005

\*\* Dewanti-Hariyadi, et al., 2006



<b>Case Study 3</b>		
	<b>Industry A</b>	<b>Industry B</b>
<b>GMP Implementation</b>		
- facilities	yes	yes
- equipment	yes	yes
- workers	yes	yes
- process control	control of raw material from middlemen not implemented	yes
<b>HACCP</b>		
- plan	available	available
- implementation	ND*	yes
<b>Salmonella findings</b>		
- in raw materials	high**	low***
- in products	20% reduction of raw materials	low***

ND=no observation made  
 \*\*up to 5/5 samples taken  
 \*\*\*no analysis was made

<b>Case Study 3 : Import Refusal*</b>		
No	Food Manufacturer	Number of cases
1	Industry A	20
2	PT. BPA	20
3	PT. SGF	15
4	PT.ABS	15
5	PT. GGW	9
6	PT. WAP	8
7	PT. MMA	8
8	PT.STP	7
9	PT. SDFI	6
10	PT. KM	6
11	PT. ASFSE	6
12	PT. K	6
13	PT. MIS	5
14	PT. LMP	4
15	PT.SKA	4
16	PT. AP	4
17	PT. MMP	3
18	PT. BMI	2
19	Industry B	2
20	PT.DLM	2
21	PT.MMI	2
22	PT.SAT	2
23	PT. PMM	1
24	PT. PK	1
25	PT. CTS	1
26	PT.MCFI	1
27	PT.SBT	1
28	PT. RC	1
29	PT. KT	1
30	PT.SS	1
<b>Total</b>		<b>164</b>

\*Nov 2004 – April 2005  
<http://www.fda.gov/ora/oasis>

## **Conclusions**

- Several constraints for implementing GMP/HACCP can not be solved by industry only : lack of potable water-cold chain-finance
- Continuous food safety education to overcome personal/community/cultural problems
- Problems of GMP/HACCP needs to be addressed during HACCP plan development and disseminated to top management, operators and officials/inspectors



## **Thank You**

