QUALITY CONTROL FOR PROCESSED FOODS

Report of the APO Seminar on Quality Control for Processed Food held in the Republic of China, 8-14 May 2002 (02-AG-GE-SEM-02)

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INTRODUCTION

The Seminar on Quality Control for Processed Food that was organized by the Asian Productivity Organization (APO) and hosted by the Government of Republic of China (ROC), was held in Hsinchu, Republic of China from 8 to 14 May 2002. The Food Industry Research and Development Institute (FIRDI) with financial and technical cooperation of the Council of Agriculture, Executive Yuan, and China Productivity Center (CPC) implemented the program. Seventeen participants from 12 member countries and five resources speakers from Japan, India and ROC attended the seminar.

The objectives of the seminar were to: 1) discuss issues and constraints in quality control for processed foods; and 2) identify policies to promote and regulate cost effective quality control systems in the APO member countries.

The seminar consisted of the presentation of resource papers and country papers, workshop (Syndicate Discussion) and field visits to the Golden Harvest Food Enterprise Ltd., and Kuang-Chuan Dairy Co. Ltd. in Tao Yuan county. The topics covered by the resource papers were: 1) Food Quality and Labeling; 2) Present Situation of Processed Food Quality Control in Japan; 3) E-Management for Food Manufacturing and Marketing – Application of E-Management in Un-Ran Food Co.; 4) Policies to Promote and Regulate Cost Effective Food Quality Control Systems; and 5) Technologies on Quality Control of Processed Foods. The country papers focused on current status of quality control for processed foods in the respective member countries.

In the workshop the participants identified the major issues and problems in promoting and regulating cost-effective quality control systems for processed foods in the APO member countries and suggested strategies/solutions and action plans to address such issues.

The seminar highlights are presented below:

HIGHLIGHTS OF RESOURCE PAPERS

Food Quality and Labeling

Consumers worldwide always demand to have their foods of higher standards or better quality. However, the term standard or quality is more often than not unclear. In many cases quality means different things to different people. Food quality may be its sensory property (appearance, taste), nutritional value (nutrient content), health benefit (functional ingredient) or safety (chemical, physical, biological). There is general consensus that food safety is the very basic right of people and various efforts have been devoted by all sectors to ensure that the goal of safer food for all would be attained. As food quality covers a wide range of attributes of which many can be recognized through labelling, this paper thus focuses mainly on those related to labelling issues.

Keeping pace with the global economic development, there has been a dramatic increase in both the quantity and variety of food moving in international trade. In this aspect, the standards, guidelines or recommendations of the Codex Alimentarius Commission (CAC) should be honored. The CAC was established in 1962 by the United Nations Food and Agriculture Organization (FAO) in collaboration with the World Health Organization (WHO) to implement the Joint FAO/WHO Food Standards Programme. The primary objective of the Programme is, and will continue to be, protecting the health of the consumer and ensuring fair practices in the food trade by the elaboration of internationally acceptable standards for food. "Standards" here are meant in the broadest sense – specific standards for commodities; general standards for labelling, additives, hygiene, contaminants, etc.; maximum residue limits (MRLs) for residues of pesticides and veterinary chemicals; and codes of good manufacturing and hygienic practice (GMP and GHP). The Codex commodity standards are selected for further discussion.

Generally the basic components of a Codex commodity standard include: (1) description; (2) essential composition and quality factors; (3) contaminants; (4) food additives; (5) hygiene; (6) weights and measures; (7) marking or labeling; and (8) methods of analysis and sampling. Among these elements, the one regarding essential composition and quality factors is the point of emphasis. In many cases, the compositional and the accompanied product labelling requirement in a Codex commodity standard is so descriptive that it influences the acceptance of these Codex commodity standards by member countries. This situation seemed to become more confused in 1995 when the World Trade Organization (WTO) with dispute settlement authority was established. As the basic obligation of applying international standards set by the CAC was stated in two WTO's agreements, i.e., the Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures and the Agreement on Technical Barriers to Trade (TBT), concerns were raised if Codex standards, especially those related to quality factors should be differentiated and separated according to their potential application. In the report of the 12th session of the Codex Committee on General Principles, it stated that all types of Codex texts when applied to foods in international trade would be covered either by the definitions of "international standards, guidelines and recommendations" under SPS or the definition "technical regulation" or "standard" under TBT, and any qualification proposed to the texts within Codex could not alter their status under the WTO agreements. Finally it was agreed that the development of a set of preambular statements explaining the intent of the different types of Codex texts was unnecessary and also it concluded that how a Codex text would be applied depended on its substantive content rather than on the category of the text.

To what extent a food labelling regulation can be required is another issue between the CAC and the WTO. According to the definition in SPS, SPS measures may include all relevant laws, decrees, regulations, requirements including, *inter alia*, end-product criteria; processes and production methods; testing, inspection, certification and approval procedures; methods of risk assessment; as well as packaging and labelling requirements directly related to food safety. Meanwhile, in TBT, "standard" is defined as document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory and "technical regulation" is defined as document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. Both standard and technical regulation may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to product, process or production method. It is relatively easy to analyze that if a labeling requirement regarding food safety complies with SPS because this can be challenged on its scientific evidences.

A decision made at the 21st session of CAC in 1995 mentioned the importance of labeling in Codex standard. That decision is called "Statements of principle concerning the role of science in the Codex decision-making process and the extent to which other factors are taken into account" which lists four principles as follows: (1) the food standards, guidelines and other recommendations of Codex Alimentarius shall be based on the principle of sound scientific analysis and evidence, involving a thorough review of all relevant information, in order that the standards assure the quality and safety of the food supply; (2) when elaborating and deciding upon food standards Codex Alimentarius will have regard, where appropriate, the other legitimate factors relevant for the health protection of consumers and for the promotion of fair practices in food trade; (3) in this regard it is noted that food labeling plays an important role furthering both of these objectives; and (4) when the situation arises that members of Codex agree in the necessary level of protection of public health but hold differing views about other considerations, members may abstain from acceptance of the relevant standard without necessarily preventing the decision by Codex.

From the above illustration, it is clear that both to protect the health of consumers and to ensure fair practices in the food trade are the common goals of CAC, WTO/TBT and WTO/SPS. The prevention of deceptive practices is only specifically stated in WTO/TBT as a legitimate objective. However, based on the second statement: "the CAC will have regard the other legitimate factors relevant for the health protection of consumers and for the promotion of fair practices in food trade" as well as the third statement: "food labeling plays an important role furthering both of these objectives", it comes the question that whether the use of food labelling "to ensure fair practices in the food trade" correlates to the "prevention of deceptive practices" and whether the "consumer's right to know" also correlated to the "prevention of deceptive practices". Two interesting examples are illustrated.

It is quite clear that food quality is valued differently among consumers and the expected information on the food label is a subjective demand of consumers. Therefore, it is hoped that more sophisticated quality control system shall be installed by all food processors, to provide more substantiated information to meet the consumer demands.

Present Situation of Processed Food Quality Control in Japan

The safety aspect is considered as the most important characteristic of all food products in Japan and because of this, food industry and government are sparing no effort in ensuring food safety in all its products. In the 1950s, the Japanese industry was first introduced to Total Quality Control (TQC), termed Total Quality Management (TQM) in the U.S.A. Since then, the TQC system has progressively spread throughout the industry including food processing.

The Japanese industry introduced the ISO system in the 1980s and about 20,000 factories have been certified with ISO-9000 since then. The number of ISO-certified food manufacturing firms is steadily increasing every year.

Hazard Analysis and Critical Control Point (HACCP) was introduced in Japan in the early 1990s, and the Food Sanitation Law officially adopted the HACCP certification system as a comprehensive sanitation-controlled manufacturing process in 1995. With a view to assist the promotion of HACCP, the Japanese Government had passed a law as a temporary measure for popularizing the control method of food production process and to provide finances to renovate or redesign factories which seek to adopt HACCP. The Law also provides tax exemption to the companies willing to renovate their manufacturing facilities for the certification. Since only five food sectors are assigned to certify the products of HACCP, other food sectors are currently considering other organizations for its issuance. So far, several organizations issued certifications as a part of registration of ISO-9000 or individually for HACCP.

1. ***Actual Quality Control of Food Processing***

To achieve sufficient quality control of the processed food the following are being practiced in Japan as the prerequisite programs:

a. *Importance of the Quality Control*

The most important quality factor of processed food is safety and reliability followed by "deliciousness" and "appropriate price". This can be well understood if we consider the scenario wherein defective products are rejected or at the worst case, recalled, which clearly means more loss than expected profit, and likewise a damaging effect on the company's image and public trust.

For this reason, quality improvement should be a corporate goal, and should stem from the uppermost management level and the PDCA (Plan, Do, Check, Action) cycle should be used when quality control is implemented.

b. *Basic Knowledge to Prevent Hazard*

To execute the quality control by the staff of the company should have the basic knowledge of: (1) microbiology; (2) control of temperature time of production; (3) prevention of secondary contamination; (4) sterilization of worker's hands, tools and wares; and (5) prevention of insects and pests.

c. *Education and Training for Workers and Provision of Manuals and Rules and Criteria*

The quality of food depends on the education and training of workers. Such education and training regarding the type of working wear to enter the factory and 5S action (sorting, shelving, sweeping, sanitation, and self-discipline) should be through a sound and effective process. All basic practices to secure better quality control should be spelled out and provided as manuals while clear rules and criteria should be set.

d. *Basic Policy for Recall of the Defected Products*

The Japan Food Industry Center is disseminating a report to propose the basic policy concerning recall of defected products. The salient points of the report are discussed as follows:

(1) Policy on how to prevent defective products
(2) Provision for dealing with consumers' complaints
(3) Three key issues (cases) related to product recall are as follows:

Class 1: The incident that might result in severe health hazard or death.
Class 2: The incident result in temporary hazard or curable ailments
Class 3: The incident might not result in any health hazard at all.

2. ***Conclusion***

(1) The Japan food industry regards the safety as the most important quality factor.
(2) For achieving this safety the food processing enterprises are trying to obtain ISO-9000 and HACCP certification.
(3) Since the food sectors to be certified under HACCP are limited, ISO certifying agencies have started HACCP certification.
(4) The government has undertaken a program to implement HACCP by extending low interest loans and tax exemptions.
(5) The 5S concept is stressed for adoption by the food manufacturers especially in production area as the most basic quality control action.
(6) Guidelines and recommendations are announced to prevent food-borne disease incidents/crisis and consumer complaints.
(7) The recommendation classified the incidents into three classes as 1, 2 and 3, and suggested mode of recall of defective products.

E-Management for Food Manufacturing and Marketing
– Application of E-Management in Un-Ran Food Co.

Un-Ran Food Co., established in 1997 at Tao Yuan, Lu Chu, is mainly focusing on fresh prepared food business. With successful experience in providing international airline meals, Un-Ran Food Co. now possess skilled technical personnel; good processing practices and high quality of food safety management control. The main goal for Un-Ran Food Co. is to introduce good fresh prepared food into the market in order to provide more diversified and higher quality diet to consumers. Eighteen-degrees fresh prepared food is one of the major trends of the future food markets. Eighteen-degrees fresh food is defined as a product which is manufactured, packed, delivered to the retail store under 18ºC through the selling chain. In order to keep the freshness and safety, the products should be produced with high quality control and be consumed within 24 hours. In addition, the manufacturer has to create different varieties of food products to meet the consumers' needs. For these reasons, it is the most important mission of Un-Ran to manage the whole production line efficiently to provide products just in time.

The design of Un-Ran factory is conforming to CAS and GMP standards with brand new kitchen, FIFO control, automatic cooking ware, and the vacuum freezer system. With auto-packing system in place, it is also useful to produce variety of *sushi* and rice cake. Sanitation and safety are the important components food quality. HACCP system is also implemented for quality control.

Intranet system was set up to transfer information efficiently within the different working departments when Un-Ran was established. The company adopted Enterprise Resource Planning (ERP) system in the year 2000. It is expected that the system will:

1. decrease the processing time, production costs, chances of stock shortage and increase the stock turnover rate.
2. monitor the supply chain to gather information efficiently to meet the customers' needs.
3. decrease the production time with arrangement plan designed by ERP.
4. decrease the communication costs between suppliers and manufacturers.

Two stages have been completed for setting up of ERP system. The first stage is to set up the sales system. After its implementation, processes for goods ordering, merchandise delivery and funds on accounts are highly improved; and no more manpower is wasted on process tracking and confirming. The second stage is to set up the accounts system for stock goods to decrease the turnover rate. The whole working system is designed for online usage is on the verge of completion and will start operation very soon.

In the year 1999, human resource management system was introduced to monitor the workers for their turnout or absence from the duty. In year 2000, intranet monitoring system was set up for department leader for supervision.

In 2001, e-commerce for inventory system was adopted for customer service which resulted in dramatic improvement of services for 840 retail stores. By using ERP system, the time for closing accounts is shortened by 3-5 days. Turnover rate for inventory stock is decreased from eight or nine days to three or four days. Customer service is better performed because of faster information provided by the factory. Warehouse Management Systems (WMS) is used to count the orders and products automatically, improving manpower efficiency by more than 50 percent and decreasing chances of shortage by 50 percent.

Few problems are still remained during the application of e-management system. Training programs are necessary for workers to get used to operate the new system without fear and distrust. It is also necessary for workers to test the system again and again to make sure that the whole system can be operated smoothly.

Policies to Promote and Regulate Cost Effective Food Quality Control Systems

The need for a comprehensive food policy has never been felt so strongly before, as the challenges in the food quality front become evident, with the WTO regime expected to be in place in the near future. Many countries in the Asia-Pacific region with competitive advantage in the labor front are in an ideal position, to tap the global food markets, provided they are willing to meet the stringent quality standards. For too long they have persisted with a policy of protectionism, to safeguard the interests of local enterprises leading to complacency in the quality front. It is time to keep in tune with the global realities and formulate realistic and effective food quality policies, without undue emphasis on self-reliance. It is time for the food enterprises also to wake up to the impending challenges and prepare themselves accordingly without depending on the government for protection.

Legislation-driven policies have dominated the markets in majority of the developing countries of the Asia-Pacific region, resulting in complacency in the quality front. Unless policies are driven by the quality conscious consumers and the modern quality management concepts, it is difficult to achieve the desired momentum to catch up with the developed world. Food enterprises have to play a major role in leading the much sought after quality revolution, by opting for high standards and desist from settling for mediocrity.

Formulating a food quality policy in a developing country is not an easy task because policymakers have to strike a delicate balance between various lobbies. Structure and distribution of food industry, which is largely dominated by the home, cottage and small-scale sectors, make the policy formulation exercise complex. However, the stage has come where policymakers can no longer persist with dual quality policies, but to depend upon one uniform policy to achieve the quality edge in the global markets. It is also equally important to support these policies with an effective legislative framework to achieve the desired results.

Misconceptions about the quality costs have to be removed to propagate quality culture among food enterprises. Lack of understanding of price of poor quality in the market is one important reason for treating quality as a cost rather an investment. The misconception that it costs too much to do things right, should be removed from the entrepreneurs by presenting a cost-benefit analysis, considering all the direct and indirect quality costs involved. The tendency to associate food quality with those working at the factory level must be removed, by integrating it with the entire food chain. Governments should also launch consumer education programs in a big way, to make them more quality conscious and demanding. Quality vision will be incomplete, if we fail to work in tandem with the result-oriented strategies, and decision-making of those responsible for decision-making.

While formulating food quality policies, issues like integrated approach, harmonization, involvement of consumers, legislative support, recognition and rewards and emphasis on ‘zero defect’ should be kept in mind to make them more effective. Needless to add quality must be measured by the price of non-conformance and not by the indices.

Technologies on Quality Control of Processed Foods

Product manufacturers and service industries have realized that competition in a global market require a continual and committed effort towards the improvement of product and service quality. For this purpose they should follow the process improvement cycle (PDCA) comprising **PLAN** (plan improvement), **DO** (implement plan for improvement), **CHECK** (analyze collected data) and **ACT** (take action).

Quality control process consists of raw materials, process, and product and service. Major factors in process that cause variability in quality of finished product are people, equipment and methods or

technologies employed in the process. Use of proper statistical process control methods is vital for assurance of the product quality. Statistical quality control comprises the following procedure:

- Finished product is measured
- Value of quality characteristics is used to provide feedback on how process can be improved
- Sampling occurs for days or weeks
- Lot is either accepted or rejected based on information from sample
- This procedure provided slow feedback of information.

Contrary to statistical quality control, statistical process control methods focus on identifying factors in process that cause variability in finished product, eliminating the effect of these factors before worse product is manufactured, and control charts give on-line feedback of information about process. Graphical tools are used to help quality analysis process in order to see how process may be improved. Seven major graphical tools are check sheets, pareto charts, cause and effect diagrams, defect concentration diagrams, scatter diagrams, control charts, and histograms. These graphical tools are discussed in detail.

To employ statistical process control appropriate experiment designs are used to design experiments used in early phases of product development and to examine factors affecting the production of finished product. Three phases of designed experiment are discussed. Besides application of different experimental designs such as factorial designs, fractional factorial designs, Taguchi designs, response surface modeling and mixture designs is explained.

HIGHLIGHTS OF COUNTRY PAPERS

Republic of China

ROC has made significant progress with respect to quality control for processed food. Foreseeing the shifting trend of the food industry from exports to domestic markets, ROC Government enforced the food quality certification systems in 1989. The Council of Agriculture and the Industrial Development Bureau of the Ministry of Economic Affairs had thus planned and promoted the CAS and Food Good Manufacture Practice (FGMP) high quality food mark systems, respectively. After 13 years' of untiring efforts, CAS and FGMP high quality food marks become popular among food industry and consumers. Currently food enterprises consisting of 25 categories with 302 plants and 3,205 food items have acquired FGMP. Besides there are enterprises consisting of 12 categories with 192 plants and 3,401 food items have acquired CAS high quality mark certification.

Recently HACCP quality certification system is promoted aggressively by the Department of Health and the Bureau of Standards, Metrology and Inspection of the Ministry of Economic Affairs. Though HACCP is still voluntary the government has already assisted 192 food service companies and 45 seafood factories to acquire this high quality control mark.

The success in practicing processed food quality control systems can be due to the endless endeavors by the government to upgrade the quality of the industry, safety consciousness of the consumers, incentives offered by the government, schools and retail markets and the business benefits and profits of acquiring CAS, FGMP and HACCP.

In ROC, quality and management in the food industry has reached an acceptable level, but the processing technology sector needs further improvement. Besides, integration of various food quality control systems needs more cooperation from industry, government, school and the research institute.

Fiji (1)

Food processing industry is a significant contributor to Fiji's economy. It provides direct employment to approximately 6,800 personnel and at least 30,000 farmers and smallholders. The industry is very dynamic in some areas but disappointing in others. Food processing has the potential to play a vital role in the improvement of the economic status of the nation.

Fiji is a member of WTO and is thus bound to abide by all agreements, including the Agreement on Sanitary and Phytosanitary (SPS) Measures and the Agreement on Technical Barriers to Trade (TBT). SPS agreement makes a specific reference to Codex Alimentarius as benchmark measure for food safety in the

international trade of food and TBT makes reference to international standards setting body for technical measures other than those included in the SPS agreement. Ministry of Agriculture, Sugar and Land Resettlement is responsible for ensuring strict compliance with quality standards agreed under international agreements and statutory regulations. The challenge is to strengthen the national food control systems in line with the international recognized Codex standards as reference standards for food quality and safety.

Main constrains in promoting quality control for processed food are: inconsistency of supply; implementation of deregulation; lack of coordination between farmers and extension staff; lack of information on marketing and potential markets; unavailability of credit; high freight costs; and lack of skilled human resource.

Fiji (2)

Fiji Government is well aware of the importance of quality food for its people. According to one government survey (1993), anemia, low birth weight, and obesity are prevalent among the Fijian population due to increasing reliance on cheap imported foods, which are less nutritious than local processed foods. Development of food processing industry is in progress and the main segments of food processing industry are fruit and vegetables, and fish or seafood. Fiji has high potential to export food products. Some of the issues and problems in quality control of processed food are inadequate government commitment to develop domestic rural-based food processing industry, lack of basic infrastructure, inadequate trained manpower, lack of awareness of quality among consumers, and inadequate facilities for testing quality of food. The National and Trade Management Pre-packed Articles Regulations 1989 is the only law of the land that requires the name and address of the manufacturer on the package food items. Government policies that promote and regulate quality control system include concessions for foreign investors, reduction in import duties on related materials/machinery, specific industry concessions, government assistance and incentives and establishment of Tax Free Zone. Application of quality control systems such as ISO-9000, GMP, HACCP, etc. in the domestic food processing industry are still in infancy.

India (1)

Indian food industry is highly decentralized having mostly cottage/small units ranging from 250 mt/year to some large-scale units processing up to 30 mt/hour raw material. The product quality also varies considerably to meet the requirements of consumers of different income groups of the society. In a weaker economy providing good quality processed food with low level of processing at an affordable price to a vast population is a difficult task. This situation is not expected to be much different in other developing countries. Processing in production catchments is, therefore, encouraged and met with success in case of grapes, etc. It is also being looked at as a source of employment generation for local population.

Large food industry is already in for adoption of HACCP, ISO-9000, GMP, etc. to become competitive in the global food market. However, for domestic markets, food quality is regulated through compulsory legislations and voluntary standards. Many consumers are aware of quality standards and are inclined to purchase quality food products. Salient issues and problems in quality control are non-uniformity of raw materials and non-availability of facilities and backup infrastructure for preservation of raw materials. Realizing this, more attention is being paid by the government on: i) development of sources of good quality raw materials; ii) primary processing in production catchments; iii) development of proper packaging, handling, transport and warehouse system for perishables and specified raw materials; iv) development of referral laboratories for food quality testing/evaluation; v) development of food parks with adequate infrastructure facilities; vi) establishment of food processing industry zones; vii) maintenance of food quality during post-processing preservation and handling to meet the challenges faced by present-day food industry; and viii) educating the cottage and small-scale food processors on standards and regulations for quality control and need to follow those for getting good quality processed foods.

An exclusive Ministry for Food Processing Industries (MFPI) has been established at national level to control quality of processed food and support the growth of food industry in India. The future of Indian food industry is thus considered to be bright on account of supplying good quality processed food and growth of food industry.

India (2)

The food processing industry in India is broadly under two categories: (A) decentralized cottage and small-scale sector; and (B) organized sector covering different areas of processing – primary, secondary and tertiary of all types of foods/food grains, fruits and vegetables, dairy, poultry and meat, sea foods, coffee, tea, spices and condiments. While the small- and cottage-scale industries are meeting the domestic requirements, large-scale industries are geared for exports.

Some of the successful companies with humble beginnings in the cottage sector have grown to become export-oriented companies through built-in quality systems.

The type of quality control in the food processing industries is conventional as well as regulatory. Multinational companies, export-oriented companies and other processing food industries do follow quality control systems up to the mark encompassing all the important parameters related to composition, quality of raw materials, ingredients, processing and preparation procedures and finished product quality. Most of the large industries have secured ISO-9000 including HACCP certification while others are in the process of obtaining the certification.

Before shipment, every commodity meant for export is inspected by the Export Promotion Council, under the Ministry of Commerce and Industry. Agricultural and Processed Foods Export Development Authority (APEDA) and Marine Products Exports Development Authority (MPEDA) work under the Ministry of Commerce and Industry are concerned with the quality of the export of both fresh and processed items.

The food processing sector has a plethora of legislations under National Standardization Systems quality falling into the categories – compulsory legislation by way of acts and orders formulated by the authorities/government and voluntary standards framed by various organizations with the motive of promoting the quality and health aspects. Both Central and State governments enforce the regulations in order to maintain the food quality and safeguard the interests and health of the consumer.

A National Food Processing Policy is on the anvil, which envisages that all acts/legislation related to processed food quality control would be rationalized through a Processed Foods Development Authority (PFDA).

Indonesia

Application of quality control systems for processed food is gaining momentum in Indonesia. Some of the constraints in developing food regulations are: condition and infrastructure of food industry (diverse size of enterprises, different level of technology and knowledge and many other variables); multiplicity of institutions responsible for quality control of food products/food production; inadequate infrastructure for implementation of the mandatory Indonesia National Standards (e.g., lack of equipment for certain food quality testing); and unavailability of experts in certain areas and insufficient finances.

Recognizing the importance of quality control of food products, Government of Indonesia has legalized the Act No. 7 of 1996 on food. The Food Act is intended as a legal basis for the regulations, development, and control on the production activities or process, the circulation, and trade of food. This Act also provides a reference for various legislative regulations related to food, both already in existence and to be established.

Islamic Republic of Iran

To stay competitive in the international market and ensure supply of quality food to the people, Iran is striving hard for development of quality control systems for processed foods. Iran has taken action on application of HACCP and other quality control systems such as GMP and GHP to ensure food quality. A state committee of HACCP consisting of representatives from Ministry of Health, Treatment and Medical Education (MOHT&ME), Ministry of Industry and Mines (MOI&M), Ministry of Agricultural Jihad (MOAJ), Ministry of Commerce (MOC), Food Stuff Research Institute (FSRI), Iranian Industrial Research and Standards Institute (IIR&SI), and professors of the universities has been established. The HACCP committee is headed by the MOHT&ME. Standards for observing health principles in the food manufacturing, standard labor by-laws and a system of HACCP have been developed by the IIR&SI and experts have been trained in the field of food safety throughout the country MOHT&ME, MOAJ, and MOI&M supervise quality control of production, transformation, and distribution of foods.

About 517 companies have received ISO-9000 certification while 35 food manufacturing units are HACCP-certified. Production of about 390 types of goods in Iran complies with Iranian National Standards.

Some of the issues and problems in promoting quality control for processed food are: slow growth of food processing industry due to old machinery; poor management; lack of technical manpower; lack of modern technology and marketing; low productivity of workforce; stagnation of research activities and technological development; acute shortage of skilled technicians and workers; lack of development and coordination off-specialized organizations; weak relations between small- and medium-sized enterprises (SMEs) and large-scale industry; lack of international cooperation and foreign investment; etc.

Malaysia

Quality control of processed foods in Malaysia is in the transformation stage from conventional method where product quality is only inspected at the end of processing line to the quality assurance system where HACCP concept and plan are used. Processed food industry of Malaysia can be classified into three main categories: food industries with large-scale production; small-scale food processing industries; and canteen food stall and restaurants.

The first category industry normally has well developed quality control system, while the second has a minimum and the third category depends on whether there are franchise restaurants or not. The individually small-scale operated food stall, canteen and restaurant have very minimal quality control while the franchise restaurants have proper quality control systems. The big industries normally have well designed plant, automated equipment, trained personnel and developed quality control systems. However, small-scale food processing industry is confronting the issues such as lack of financial resources, lack of modern equipment/ technologies, higher incidence of food contamination due to predominantly manual operations, among others.

The Government of Malaysia is fully committed to ensure food safety and quality for exports and domestic market. The HACCP system is used for this purpose. The HACCP Certification Scheme was established to give official recognition to food industries, which have implemented HACCP system since 1996 to meet the requirements for the export of marine products especially to the European Union and the U.S.A. The HACCP certification for the processed food is controlled by the Ministry of Health while the HACCP certification for the raw material is controlled by the Ministry of Agriculture.

Mongolia

Mongolia is trading food products with more than 60 countries and imports about 70 percent of the necessary food products. Development of food processing industry in Mongolia is in progress. Number of food enterprises have increased from 42 in 1990 to 1,700 in 2001. In addition several private economic units engaged in animal husbandry and agricultural products have been established. But quality control of processed foods is generally far from satisfactory. Issues and problems in quality control include increasing poverty, absence of proper food quality control mechanism suitable to the market situation, lack of modern technology, noncompliance of food processing units to the laws and regulations, poor understanding of food standards and hygienic requirements, lack of trained manpower, multiplicity of agencies responsible for certification of food quality and lack of coordination among them, among others.

The law regarding control of food security and safety was enacted and adopted in 1999. But the provision of the structure for implementation of this law is yet not decided fully. The State health control service of the Health Ministry, the State industry and trade control service of the Industry and Trade Ministry, National Standard and Measurement Center, the labor and social security service of the Labor and Social Security Ministry and the State control service for food security and agriculture of the Food and Agricultural Ministry and their provincial and capital branches are responsible for the control of food safety and security. Customs offices, police offices, natural environment and other law control organizations are also involved in this activity.

The provincial control-specialized services were merged with the professional control services in 1999. These services are responsible for the quality, hygiene and safety control of the food products. However, these control services belong to the different Ministries and departments and their activities are separately carried out and thus lack coordination. Overall application of quality control systems for the processed food products is still in infancy and far from satisfactory.

Nepal (1)

Within the industrial sector of Nepal food industries contribute maximum to the national economy. But food industry is still in the infant stage, and almost all of them fall in import substituting categories. Industries are scattered in the various parts of the country. Small-scale industries with less capital and simpler technology generate employment at local level. Large-scale industries have quality control laboratories. The Department of Food Technology and Quality Control (DFTQC) is the lead agency for enforcement of food and feed laws and regulations thus taking preventive and punitive measures to keep up the quality standards of the industry as well as its products. The mandatory standards are fixed for 92 processed food and seven processed feed items.

Nepal Bureau of Standards and Metrology (NBSM) has given Nepal Standard (NS) quality certification mark to about 31 food industries. Quality control systems such as TQM, HACCP and GMP are yet to be practiced by most of the big establishments. Most of the small-scale industries are still processing foods in the traditional manner as drying, roasting, mixing, grinding and packaging. As Nepal is on its way to become a member of the WTO, the DFTQC has started to harmonize the regulations and the food standards with the international standards fixed by the Codex Alimentarius Commissions.

Nepal (2)

In Nepal number of processed food industries is increasing day by day. Mostly food industries are established in urban areas. Dairy, brewery, meat, biscuits, instant noodles, bakery, fats and oils, confectionery and fruits and vegetables industries are coming up very rapidly. The Food Act 1966 and food regulation were enforced in the year 1970.

Food trade and transaction trend, malpractices like misbranding, adulteration and contamination of food have become very complex problems; requiring a strong control measures to safeguard the health and interests of the consumers. Food quality control systems in Nepal are administered mainly by three different agencies: mandatory quality control by DFTQC; voluntary quality control by NBSM; and self-assurance by the concerned food industry. Basic objective of government policies and programs is to protect consumers against health hazards arising from consumption of food.

The Food Control Agency has the responsibility to deal with planning, programming, monitoring, evaluation of the overall impact of the activities. The three important aspects of food control inspection, laboratory and enforcement services, require coordinated and integrated action plan for better performance. Application of quality control systems in food processing enterprises, especially SMEs is still in infancy.

Philippines

The United States Food and Drug Regulations serve as the reference for the Philippine Bureau of Food and Drug policy guidelines pertaining to food additives, GMPs and suitability of packaging material for food use. Any new program that is implemented in the United States will automatically be implemented in the Philippines so that its products comply with their standards. The HACCP, one of the programs being implemented in the United States is given importance by the government authorities in the Philippines. The Bureau of Food and Drug, Food Development Center, and Bureau of Fisheries and Aquatic Resources have joined hands to form Joint Management Committee that provides assistance in the certification of HACCP and GMP for those who want to avail their services.

Thirty-seven food manufacturers from different categories have been granted a GMP certificate. Only 19 food manufacturers all from seafood industry were given a HACCP certificate thus making them eligible for export to the United States and the EU.

Many organizations cannot comply with programs like GMP and HACCP because of their financial limitations and inability or lack of knowledge of the program. Other problems include lack of adequate action against noncompliance with the food regulations, inability of organizations especially SMEs to implement Quality Assurance System (QAS) on sustained basis, noncompliance of raw and packaging materials with QAS, etc.

Sri Lanka

The food processing industry in Sri Lanka has a wide range of raw materials to work with. The food processing industries catering to the export as well as the local market are well aware of the need for

implementation of quality control. Such awareness is the result of dissemination activities carried out by the institutes such as Industrial Technology Institute (ITI) and the Sri Lanka Standard Institute (SLSI). The ITI works very closely with the industry by having one to one contact with industry and providing them consultancy on quality system management for ISO-9000, HACCP and SLS certification. The SLSI has developed standards on Code of Practices for nine food processing industries and guidelines for HACCP. The SLSI also conducts regular training programs for introduction of these standards to the industry. The Government of Sri Lanka has introduced several food laws and regulations such as the Food Act of Sri Lanka, Consumer Protection Act, control of pesticides and pre-shipment inspection of cashew.

Food industries catering to the export market have implemented certification systems such as HACCP and ISO-9000 and many industries catering to the local market have fulfilled the SLS certification scheme of SLSI. As per the records 72 brands of 26 food and beverage items have obtained the SLS mark. Seven enterprises have HACCP certification while 16 are certified for ISO-9000.

The major constraint faced by the industries for implementation of quality control activities is the unavailability of adequate facilities for monitoring of HACCP plans and retention of trained personnel. Industries having their own testing facilities face the dilemma of monitoring their performance as Sri Lanka does not have any organization providing standard reference material and proficiency testing. They have to depend on the Western world for these activities at a high cost. In general, Sri Lanka has made significant progress in creating awareness about the significance of applying quality control systems as well as implementation of such systems.

Thailand

In Thailand, food products comprise about 13 percent of all exports. To protect the consumers various food control activities are undertaken by several organizations in Thailand. However, the Ministry of Public Health is the main organization and has the power for setting up regulations and carry out other activities. The Food and Drug Administration (FDA) of the Ministry of Public Health and the provincial offices of public health are responsible for legal food control operations. Because of the increasing international competitiveness and strict food safety standards imposed by the international markets on imports, Thai Government has assigned some government services and organizations with the responsibility of promoting quality control of processed foods. Besides the important task is supporting food enterprises to enable to adopt food production quality control systems such as GMP and HACCP.

"Good Manufacturing Practice" provided in the national law has been enforced in four groups (57 types) of food products.

To support food industry, Thailand Industrial Standard Institute has collaborated with organizations such as National Food Institute, Thailand Productivity Institute and the private sector to provide training and consultancy in GMP/HACCP to in-group of companies (10 companies for each group) without charging any fee by launching Training Lead Consulting (TLC) Project.

In order to enhance competitiveness in the international market, Thai Government has established "National Food Authority of Thailand (NFAT)" on priority basis for the food industry and it will start function from 2003.

Vietnam

Majority of the food processing industry in Vietnam is in small- and medium-scale sector. Generally they understand the significance of quality control of processed food. Many companies and enterprises are applying quality control systems such as ISO-9000, ISO-14000, GMP, and HACCP. About 600 companies and enterprises including 200 food processing units in SME sector are ISO-9000 and HACCP certified. Besides there are lot of regulations and requirements according to Vietnam standards on food safety. These food standards have been established under the Vietnam legislative acts on people's heath protection, commodity quality, consumer protection, etc.

Vietnamese Government encourages food processing enterprises to increase their competitiveness by applying modern quality control systems especially for the purpose of exports. There are many government financial support programs for applying HACCP for food processing. Directorate for Standards and Quality, under the Ministry of Science, Technology and Environment (MOSTE), plays an important role in organization of workshops, meetings, training courses, and provide documents to the food processing

industry. There are many well-equipped food testing laboratories and some of them are accredited. HACCP has been accepted as Vietnamese standards – TCVN 5603-1998 (CAC/RCP 1-1998, Rev 3-1997).

Major issues and problems in applying quality control systems for food processing are lack of awareness of quality concepts, lack of adequate and effective food legislation, lack of cooperation on the part of the consumers and processors, etc.

FIELD VISITS

For their field studies in the host country, participants visited the following facilities situated in the Tao Yuan county.

Golden Harvest Food Enterprise Ltd. – Un-Ran Food Co.

Mr. Hung-Tao Cho, Vice President, Golden Harvest Food Enterprise Ltd., welcomed the participants and briefed them on the Company. Mr. Cho pointed out that Un-Ran Food Co. was established in 1997 at Tao Yuan, Lu Chu. Main goal of the company is to introduce good fresh prepared food into the market in order to provide more diversified and higher quality diet to consumers. Total capital investment is NT$200 million while in 2001 turnover was NT$630 million that is expected to be NT$900 million in 2002. The Company has 360 employees. Average wage of a worker is NT$22,000 per month. Distribution area of the Company includes four counties (from Taipei county to Miaoli county) with 870 convenient stores (Seven Eleven) and 18 distribution lines. Present capacity of the company is 120,000 lunch boxes per day.

Design for Un-Ran factory is conforming to CAS and GMP standards with brand new kitchen, FIFO control, automatic cooking ware and vacuum freezer system. The factory is HACCP-certified. All employees and visitors have to comply with the strict hygiene conditions to enter the factory premises.

The factory produces two types of products. Products such as rice ball and sandwich are stored at 4ºC while cold noodles, salads, sauce noodles and Italian noodles are stored at 18ºC. At 18ºC products have different operational conditions for taste control, microbial control and they have shorter expiration date. No preservatives are allowed in food. The Company delivers the products to 870 stores twice a day to ensure freshness of raw materials and products. After 24 hours of delivery all unused products are discarded.

The Company believes in efficiency, flexibility and diversity of products giving due consideration to consumer's preference. For this purpose the Company is employing computer-based human resource management and inventory systems to monitor the workers and inventory systems. The product range is continuously changed based on the customer's requirement. Intensive use of e-management has dramatically increased company's efficiency (50 percent) and has decreased chances of shortage by 50 percent. The participants visited the factory premises and observed the *in situ* operations. They were delighted to observe the practical application of GMP and HACCP.

Kuang-Chuan Dairy Co., Ltd.

As a second field visit, participants visited Kuang-Chuan Dairy Co. Ltd., at Tao Yuan hsien. Mr. Shih-Chieh Lin, Deputy Director of the Company welcomed the participants and briefed them on the history and the present status of the Company.

Kuang-Chuan Dairy Co. Ltd. started as a family business as early as in 1950. Since then they kept on improving their facilities and continuously came out with new products. In 1985 they produced their aseptic soft drink followed by aseptic flower tea drink in 1987. They also established a convenience store Hi-Life. At present they have a total of 730 stores all over the four counties in Taiwan. In 1990 they were able to put up the Chin Yi Plant that complies with the requirements of GMPs. In 1993 they were able to develop the jello and single strength orange juice followed by Habstien high quality milk in 1996. In 1997 they came up with a very sophisticated and efficient quality management system that complies with all the quality standards and is in line with the expectations of the changing world markets.

As of now, they are producing different types of products that are distributed locally. Some of their juice items are being exported to Canada and Hong Kong.

The fully automated milk processing plant is a very sophisticated with all modern technology (equipment such as robots picking up all the materials) which eliminates chances of any possible contamination. The plant processes 1,000 milk bottles per hour. Total processed output (includes all products

of the factory) is 800 mt per month. The total investment on the factory is US$60 million while the annual turnover from both units of the Company is about US$260 billion.

The plant has a minimum number of workers. Workers are trained on a regular basis to make them more reliable and efficient. Average wage of a worker is US$1,000 per month.

Some of the products produced are milk, flavored milk, soybean milk, rice milk, coffee, tea, cereals, wine, juice, etc. packed in polypropylene (PP) and polyethylene (PE) bottle, tetra top, brick aseptic, can and polyethylene terephthalate (PET) bottle; jello in PP cup, yogurt drink, dilute yogurt drink, yogurt in polystyrene (PS) cup, etc.

Participants visited the milk processing plant of the factory and observed the fully automated processing of milk from blending to filling. They also tasted and appreciated the diverse products of the Company.

WORKSHOP OUTPUT

Objectives

A workshop was conducted to: 1) identify the major issues and problems in promoting and regulating cost-effective quality control systems for processed foods in the APO member countries; and 2) suggest strategies/solutions and action plans to address such issues and problems.

To enhance the discussion and achieve a better sharing of views and experiences, the participants were divided into two groups as follows:

Group I: India (2), Islamic Rep. of Iran (2), Mongolia, Nepal (2) and Sri Lanka
Chairperson: Ms. Subadra Jayasinghe
Rapporteur: Dr. S. D. Kulkarni
Facilitator Mr. K. V. R. Raju

Group II: Rep. of China (2), Fiji (2), Indonesia, Malaysia, Philippines, Thailand and Vietnam
Chairperson: Dr. Iau-Min Su
Rapporteur: Ms. Evangeline A. Tayag
Facilitator: Dr. Yoshihisa Onishi

The output of the deliberations of the two groups which were presented in a plenary session are summarized as follows:

Group I

Issue/Problem	Strategy/Solution	Action Plan
1. Policy		
1. Absence of a national food processing policy	1. Policy development	1. Government should develop national policy on food processing
2. Different quality standards	2. Unified quality standards	2. Harmonization of standards
3. Inadequate availability of quality raw material	3. Enhance quality raw material supply chains	3. Government initiatives to establish proper raw material production and supply chains
4. Poor packaging and labeling	4. Code of practice	4. Enforcement
5. Inadequate laboratory facilities for certification of quality	5. Referral laboratory facility for quality analysis	5. Establishment of accreditation/ referral laboratories
6. Lack of application of quality control systems, e.g., HACCP, GMP, GHP, GLP, ISO	6. Encouragement to the food industry	6. Inspection and coordination and rewards and incentives
7. Lack of coordination between ministries	7. Development of effective coordination mechanism	7. Unified agency/single agency arrangement

... To be continued

Continuation

Issue/Problem	Strategy/Solution	Action Plan
1. Policy		
8. Poor implementation of food laws/regulations	8. Strengthening of food law/ regulations and the concerned department	8. Providing more funds and human resource and effective legislative framework
9. Dual standards for export and domestic purpose	9. Unified minimum standards for export and domestic purpose	9. Move in phased manner towards minimum standards for export and domestic purpose
10. Regional and international relations	10. Liberalize trade barriers	10. Develop agreement for free trade
11. Non-availability of food industrial zones and food parks	11. Establishment of industrial zones and food parks	11. Infrastructure development for industrial zones and food parks, feasibility study
12. Ignorance of entrepreneurs on food legislations/regulations	12. Educate entrepreneurs on food legislation/regulation	12. Regular training programs and mass media use to educate entrepreneurs
13. New technology and market information dissemination	13. Dissemination of information on new technology and market	13. Establishment of network for technology and market information dissemination
2. Technological		
1. Need for appropriate machinery/equipment and maintenance	1. Facilitate to improve the availability of machinery/equipment and maintenance facilities	1. Educate entrepreneurs on appropriate machinery and equipment, maintenance systems
2. Inadequate laboratory facilities for monitoring quality	2. Enhance laboratory facilities	2. Laboratory accreditation and enhancement of referral laboratories
3. Inadequate quality management systems	3. Encourage quality management systems	3. Education and facilitation for quality management system
4. Pollution, waste disposal	4. Execute pollution control and waste treatment plans	4. Enhance facilities and human resources for pollution control and waste treatment
5. Inadequate standard testing methods	5. Adoption of standard test methods	5. Document standard test methods, and make them available to food industry
6. Improper packaging, handling, warehousing and transportation	6. Identification of proper systems and making them available to users	6. Finalization of standard systems in consultation with research and development organizations and industry, and users
7. Non-availability of good quality raw material	7. Production and supply of quality raw material and supply chain development	7. Adoption of good production and post-production handling practices and, encouragement to contract farming
8. Inadequate research and development facilities	8. Strengthen and enhance research and development facilities	8. Providing more funds and human resource for research and development facility
9. Insufficient hygiene and sanitation in food industry	9. Regulations and their enforcement	9. Periodic inspection of food industries

... To be continued

Continuation

Issue/Problem	Strategy/Solution	Action Plan
3. Economic		
1. Financial support/investment	1. Soft loan facilities	1. Long-term loan with low interest through different agencies
2. Low salary/poor wages	2. Better pay package	2. Enforce minimum wage law
4. Marketing		
1. Meeting consumer demand and supply	1. Market research, enhancement of purchasing power of consumer, strengthening of distribution network	1. Study food habits, assess employment generation opportunities and issue advertisements
2. Trade agreements	2. Promotion of additional regional trade agreements	2. Continuous interaction within the region
3. Inadequate publicity of quality improvement efforts	3. Encourage entrepreneurs to highlight quality improvement measures undertaken by them	3. Adequate display of adoption of standards on label
5. Social		
1. Lack of awareness on food quality	1. Educate consumers	1. Mass media campaigns for consumer education
2. Safety of consumers	2. Provide safe food products	2. Enforcement of regulations and standards
3. Motivation to workers	3. Incentives	3. Workers safety, award schemes, profit sharing, insurance
4. Trade unions	4. Improve employee-employer understanding	4. Creation of congenial work environment
5. Poor employee-employer relationship	5. Improve employee-employer relationship	5. Participatory management, quality circles
6. Malnutrition of workers	6. Improve health	6. Regular check-up, good nutrition
7. Lack of interaction among large- and small/medium-scale industries	7. Improve interaction between them	7. Formation of associations of food industries organization of national food convention

Group II

Issue/Problem	Strategy/Solution	Action Plan
1. Policy		
1. Noncompliance to the international standards	Ensure strict compliance with the international standards (minimum standard) in relation to WTO	1. Strengthen the system to promote food quality control in the country
2. Difficulty in implementation of some of the food quality control policies		2. Provide concept for the establishment of mutual recognition arrangements among member countries
		3. Dissemination and familiarization on the said international standards and regulations to the related institutions (stakeholders)

... To be continued

Continuation

Issue/Problem	Strategy/Solution	Action Plan
2. Socioeconomic		
2.1 *Financial*		
1. Lack of financial assistance from the government/lending agencies	1. Cut down the bank interest rates	1. Request the government to cut down the interest rates or to establish cooperatives of food industry for providing loans
2. Lack of consumer awareness of quality control of food product	2. Launch consumer awareness program	2. Request the government to provide additional funds for the development of food industry 3. Develop programs on consumer awareness 4. Coordinate with federal/ provincial governments to provide funds for consumer awareness program
2.2 *Marketing*		
1. Little information on consumer preference	1. To provide access to the information related to domestic and international markets and consumers	1. Conduct market research, and establish promotion activities like antenna shops to gather information on consumers 2. Hold seminars and product exhibitions 3. Effective use of e-commerce 4. Approach positively to the related agencies of importing countries
3. Technology		
3.1 Lack of information on food quality requirement	1. Establish and/or strengthen the national information system on quality control	1. Provide timely and accurate information 2. Evolve mechanism for exchange of information among national, regional and international organizations
3.2 Lack of expertise and training		
1. Lack of expertise in food quality control systems like HACCP, GMP	1. Identify those who can be qualified to be a quality control expert to provide training	1. Set up a training establishment for trainers
2. Lack of training for the quality control specialists	2. Provide intensive and extensive training to those involved in the food industry	2. Request technical assistance from more developed countries as well as international/regional organizations such as WTO, FAO, APO to provide the required expertise

... To be continued

Continuation

Issue/Problem	Strategy/Solution	Action Plan
3.4 Lack of suitable equipment and facilities	1. Consider the improvement of the existing equipment and facilities 2. Look for possible financial support	1. Establish a brainstorming/ action team to plan for the improvement of the existing equipment and facilities 2. Request the government to cut down the interest rates or to establish cooperatives of food industry for providing loans 3. Request the government to provide additional funds for the development of food industry

CONCLUSIONS

Recognizing the lack of comprehensive and effective food quality control mechanisms that have led to lack of quality assurance of processed food in many countries of the region and their inability to compete in the international food markets, the participants generally agreed on the following conclusions:

The seminar provided an opportunity to exchange information about the prevailing food quality scenario in the APO member countries and to chalk out strategies for further cooperation to meet the new challenges. Asian region is at the crossroads of global food trade with opportunities knocking at the door because of the impending WTO regime. Conversion of these opportunities into a reality requires lot of commitment and hard work in the form of improving food quality standards. Some of the member countries like Japan, Republic of China and Republic of Korea have already set example by producing world class food products. Now it is the turn of others to learn from their experience and tap the opportunities.

While it may be difficult for many countries of the region to leap-frog to the international standards directly, it is always possible to move towards them step by step using concepts like *Kaizen*. *Kaizen* or continuous improvement is a concept, which emphasizes on setting up realistic goals and start at a point where you can do. Food enterprises should take a leaf out of this highly successful management concept and move towards excellence step by step by opting for international standards.

Effective utilization of scarce resources such as men, money and material is essential to remain competitive in the food trade. This is possible only when the government, industry and the consumers work in tandem to achieve greater coordination. Since consumer is the driving force in any enterprise including the food industry, it is important to educate him and make him more demanding to create the much sought after cascading effect in the food chain.

It is unrealistic to expect large-scale quality improvements in the food enterprises especially in home, cottage- and small-scale sectors overnight. It requires solid foundation in the form of technical infrastructure, management training, workers' education and soft credit facilities. Keeping in view the tremendous business opportunities beckoning in the global food markets, governments should come forward to provide adequate funds to provide the above facilities. Needless to add investment in the food quality improvement efforts has never been optional but always essential because the State has great responsibility towards the well-being of its citizens.

A good policy environment provides the much needed impetus to the food industry. Such policy environment is usually characterized by proactive consumers, forward looking food enterprises, least interfering government and effective food law enforcement agencies. Technology, consumer -and enterprise-driven policies should slowly displace legislation-driven policy environment.

Since majority of the food enterprises in the APO member countries operate at home, cottage- and small-scale level, special efforts are required to meet their specific needs. Otherwise it is virtually impossible to create a positive impact on the nation as a whole in the food quality front. These enterprises should also see the inevitability of competition in the quality front and gear themselves to meet the challenges with a

positive frame of mind. Instead of seeking protection they should fall back on innovation to win over the confidence of consumers and stand up to the challenges posed by the competitors.

While going for improvements the foremost option should always be the effective utilization of existing equipment through minor modifications. Whole scale import of technology may result in more problems than in solutions and may be a drain on the precious monetary resources. Hence, it is important to evaluate the technical options thoroughly before deciding upon the ultimate one.

Regular exchange of information on the latest developments in the global food trade is essential to adapt to the changing needs. As such member countries should embark upon developing information clearing house to take advantage of the knowledge and expertise available not only within the region but also worldwide.

Food quality campaigns should be launched to create awareness among the general public about the food they consume. As explained above a well-informed consumer acts as an engine for the food quality revolution. Mass media tools such as TV, radio, newspapers and the internet should be used effectively to reach maximum number of consumers. Teaching basic food quality issues to the youth by including them in the education curricula may greatly help in inculcating food quality culture in the long run.

A strong networking and close cooperation among different national, regional and international organizations as well as other stakeholders would be inevitable for launching a successful food quality control movement for food quality assurance in the region.

1. FOOD QUALITY AND LABELING

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It is out of question that consumers worldwide always demand to have their foods of higher standards or better quality. However, the term standard or quality is more often than not unclear. In many cases, quality means different things to different people. In the first instance, a food is usually said to be of good quality because it contains a high proportion of a prized ingredient or ingredients. Examples are cream in ice cream, fruit in jam, butter in cake and so on. In this sense, quality refers to richness and usually results in sensory satisfaction. This type of quality may also be evaluated through appearance, taste, smell, texture and feel. Because sensory quality is such a subjective thing that mostly eludes scientific determination, it is thus difficult to describe when setting quality standards. Secondly, nutritional quality of a food is getting more and more emphasized among consumers because of their increased health consciousness. In some situations, however, a food of good sensory quality may be deemed to be of poor nutritional quality, and *vice versa*. The third attribute close to the previous one is the health benefit of a food. Because of many farsighted researches, some food components recently have been reported to have functions which are able to promote health or reduce a disease risk in additional to their traditional nutritional functions. Nevertheless, this type of quality is subject to fierce debate at the current time among academia, industries, regulatory authorities and consumers as well. The last but not the least important quality consumers always care is safety. There already is consensus that food safety is the very basic right of people and various efforts have been devoted by all sectors to ensure that the goal of safer food for all would be attained. As food quality covers a wide range of attributes of which many can be recognized through labeling, this paper thus focuses mainly on those related to labelling issues.

Keeping pace with the global economic development, there has been a dramatic increase in both the quantity and variety of food moving in international trade. In this aspect, the standards, guidelines or recommendations of the Codex Alimentarius Commission (CAC) should be honored. The CAC was established in 1962, by the United Nations Food and Agriculture Organization (FAO), in collaboration with the World Health Organization (WHO) to implement the Joint FAO/WHO Food Standards Programme. The primary objectives of the Programme are, and will continue to be, protecting the health of the consumer and ensuring fair practices in the food trade by the elaboration of internationally acceptable standards for food. "Standards" here are meant in the broadest sense: specific standards for commodities; general standards for labeling, additives, hygiene, contaminants, etc.; maximum residue limits (MRLs) for residues of pesticides and veterinary chemicals; and codes of good manufacturing and hygienic practice. The Codex commodity standards are selected for further discussion.

Generally, the basic components of a Codex commodity standards include: (1) description; (2) essential composition and quality factors; (3) contaminants; (4) food additives; (5) hygiene; (6) weights and measures; (7) marking or labeling; and (8) methods of analysis and sampling. Among these elements, the one regarding essential composition and quality factors is the point of emphasis. For example, the Codex Standards for Milk Powders and Cream Powder (CODEX STAN 207-1999) set detailed compositional standards for whole milk powder and skimmed milk powder, among which the milk fat in whole milk powder should be 42 percent m/m and that in skimmed milk powder should be 1.5 percent m/m. It is rather easy to accept and use these standards. It becomes much complicated when the example of chocolate is concerned. According to the Codex Standard for Chocolate (CODEX STAN 087-1981), there are clear distinctions among different types of chocolate products based on the specific compositional requirements. Further, the issue that if 5

percent vegetable oil other than cocoa butter is permissible to be used has been a subject for serious discussion for several years.

In many cases, the compositional and the accompanied product labeling requirement in a Codex commodity standard is so descriptive that it influences the acceptance of these Codex commodity standards by member countries. This situation seemed to become more confused in 1995 when the World Trade Organization (WTO) with dispute settlement authority was established. As the basic obligation of applying international standards set by the CAC was stated in two WTO agreements, i.e., the Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures and the Agreement on Technical Barriers to Trade (TBT), concerns were raised if Codex standards, especially those related to quality factors should be differentiated and separated according to their potential application. In the report of the 12th session of the Codex Committee on General Principles, it stated that all types of Codex texts when applied to foods in international trade would be covered either by the definitions of "international standards, guidelines and recommendations" under SPS or the definition of "technical regulation" or "standard" under TBT, and any qualification proposed to the texts within Codex could not alter their status under the WTO agreements. In the same report the Committee thus recommended that when quality criteria additional to essential quality factors were included in Codex standards and other texts, this should be indicated as follows: "This text is intended for voluntary application by commercial partners and not for application by government". However, this recommendation raised considerable debate regarding whether the intergovernmental CAC was an appropriate forum for the establishment of standards for voluntary application by commercial partners and whether the so-called "advisory" material should be removed from the annexure to existing standards. After a thorough analysis in its 13th and 14th session, the Committee of General Principles later noted that technical Codex Committees had devoted considerable time and effort in developing this guidance and it would be difficult and time-consuming to review again, all of the standards that contained such annexure. So finally it agreed that the development of a set of preambular statements explaining the intent of the different types of Codex texts was unnecessary and also it concluded that how a Codex text would be applied depended on its substantive content rather than on the category of the text.

To what extent a food labeling regulation can be required is another issue between the CAC and the WTO. According to the definition in SPS, SPS measures may include all relevant laws, decrees, regulations, requirements including, *inter alia*, end-product criteria; processes and production methods; testing, inspection, certification and approval procedures; methods of risk assessment; as well as packaging and labeling requirements directly related to food safety. Meanwhile, in TBT, "standard" is defined as document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory and "technical regulation" is defined as document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. Both standard and technical regulation may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to product, process or production method. It is relatively easy to analyze that if a labeling requirement regarding food safety complies with SPS because this can be challenged on its scientific evidence, while it is much difficult in TBT. According to the text of TBT Article 2.2, it states that WTO members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade, and that technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective. There are clear examples in the same Article 2.2 regarding such legitimate objectives: national security requirements; the prevention of deceptive practices; and protection of human health or safety, animal or plant life or health, or the environment.

On the other hand, a decision made at the 21st session of CAC in 1995 mentioned the importance of labeling in Codex standard. That decision is called "statements of principle concerning the role of science in the Codex decision-making process and the extent to which other factors are taken into account" which lists four principles as follows: (1) the food standards, guidelines and other recommendations of Codex Alimentarius shall be based on the principle of sound scientific analysis and evidence, involving a thorough review of all relevant information, in order that the standards assure the quality and safety of the food supply; (2) when elaborating and deciding upon food standards Codex Alimentarius will have regard, where appropriate, the other legitimate factors relevant for the health protection of consumers and for the promotion

of fair practices in food trade; (3) in this regard it is noted that food labeling plays an important role furthering both of these objectives; and (4) when the situation arises that members of Codex agree in the necessary level of protection of public health but hold differing views about other considerations, members may abstain from acceptance of the relevant standard without necessarily preventing the decision by Codex.

From the above illustration, it is clear that both to protect the health of consumers and to ensure fair practices in the food trade are the common goals of CAC, WTO/TBT and WTO/SPS. The prevention of deceptive practices is only specifically stated in WTO/TBT as a legitimate objective. However, based on the second statement: "the CAC will have regard the other legitimate factors relevant for the health protection of consumers and for the promotion of fair practices in food trade" as well as the third statement: "food labeling plays an important role furthering both of these objectives", it comes the questions that whether the use of food labeling "to ensure fair practices in the food trade" correlates to the "prevention of deceptive practices" and whether the "consumer's right to know" also correlated to the "prevention of deceptive practices".

Two interesting examples are illustrated here. The first one deals with the term "organic" for which Codex guideline exists. The CAC at its 23rd Session in 1999 adopted the "Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods" with the exception of some undetermined parts. At its 24th Session in 2001, the CAC further adopted and included the sections concerning livestock and livestock products and bee-keeping and bee products in the Guidelines. Organic agriculture's increased momentum is due to consumer demand and to positive environmental impact. As "organic" is not a final product specification but a production management system, it is difficult to conduct end-product testing to verify the labelled claim "organic". False claims can only be diminished through responsible production and sound inspection and certification systems.

The second one is the labeling requirement of foods derived from biotechnology, i.e., genetic modification or genetic engineering. Although it relates to production method, which is similar to the situation in "organic", there have been serious debates regarding whether the declaration is necessary and, if needed, what kind of labeling, i.e., voluntary or mandatory shall be required. The CAC even set up an *ad hoc* intergovernmental task force in 2001 to assist the Codex Committee on Food Labeling to solve the issue. There is no consensus at this moment. However, many countries have promulgated their labeling regulations based on their own interest.

It is quite clear that food quality is valued differently among consumers and the information expected on the food label is a subjective demand of consumers. Therefore, it is hoped that more sophisticated quality control system shall be installed by all food processors, and more substantiated information will be provided to meet consumer's demand.

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2. PRESENT SITUATION OF PROCESSED FOOD QUALITY CONTROL IN JAPAN

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Quality Factors of Processed Food

The quality of processed food is a significant requirement in the food industry in Japan. Ishitani of Agricultural Institute of the Ministry of Agriculture, Forestry and Fisheries of Japan shows the quality of processed food in Figure 1. This Figure shows that quality is classified into two characteristics: proper and functional. The proper characteristic consists of nutrition and safety, while the functional characteristic is related to the physiological factors and its sensitivity to humans. Of course, the nutritional aspect of food means its composition in terms of protein, fat, carbohydrates, vitamins and other elements. The safety aspect is considered the most important characteristic of all food products in Japan and because of this, both the food industry and government are exhausting all efforts in ensuring food safety in all its products. Recent world news related to the BSE (bovine spongiform encephalopathy) problem, food-borne diseases such as the O157 and staphylococcal enterotoxin have made consumers aware of the significance of food safety.

Quality Management in Food Processing Industry

In the 1950s, the Japanese industry was introduced to a new quality control (QC) system adopted from USA, coinciding with the founding of the Union of Japanese Scientists and Engineers. It is called TQC (termed TQM [Total Quality Management] in USA). And in 1970s this system especially QC circle, QC action has been promoted to related divisions in the manufacturing sector in every industry, including the food processing industry. Since then, the food processing industry has adopted the TQC system. Under this system, the 5S (sorting, shelving, sweeping, sanitation, and self-discipline) and other prerequisite procedures are introduced. Even the small- and medium-scale factories (about 84.2 percent of food manufacturers belong to this class in Japan) are recommended to implement these systems. On the other hand, the Food Sanitation Law regulates the standard of provision of the food manufacturing facility and the regulation of the management measures of the standard. This Law further supplements the QC standards.

Registration of ISO 9000 System

Since the introduction of the ISO system in the 1980s to Japanese industries, about 20,000 factories have been ISO 9000-certified. With the onset of WTO/Technical Barriers to Trade (TBT) in the mid-1990s, wherein the international markets require ISO certifications from the food industry, many manufacturing firms complied with such requirements, including ISO 14000. Figure 2 presents the current statistics wherein the number of ISO-certified manufacturing firms steadily increasing, with a total of 653 factories by February 2002 (Reference: 223 in February 2000; and 426 in February 2001.)

While the food processing sector manages to conform to these international standards in relation to the production of quality food products, the industry likewise apply quality measures in other operational areas. These include human resources, management, production, sales and other similar areas in the company.

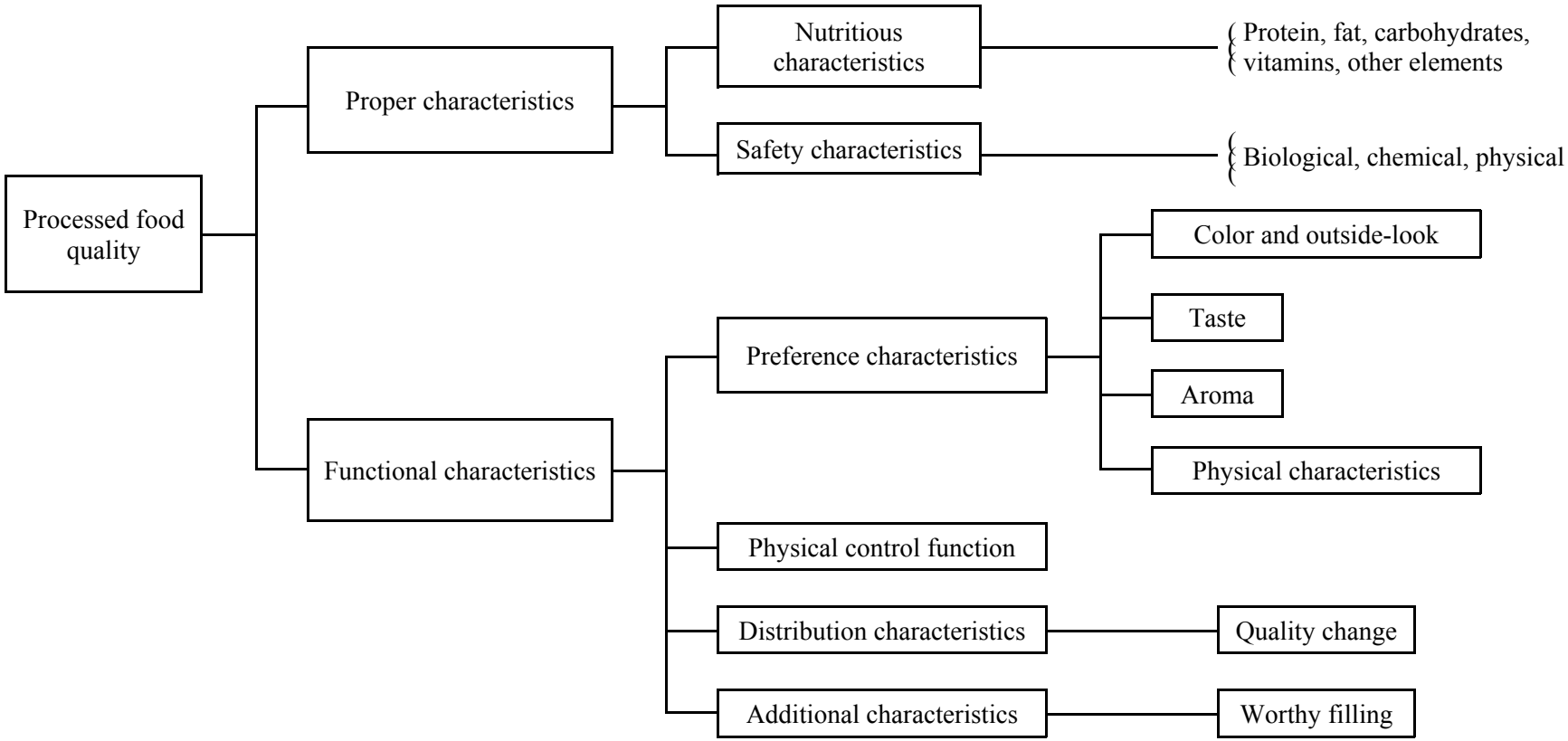
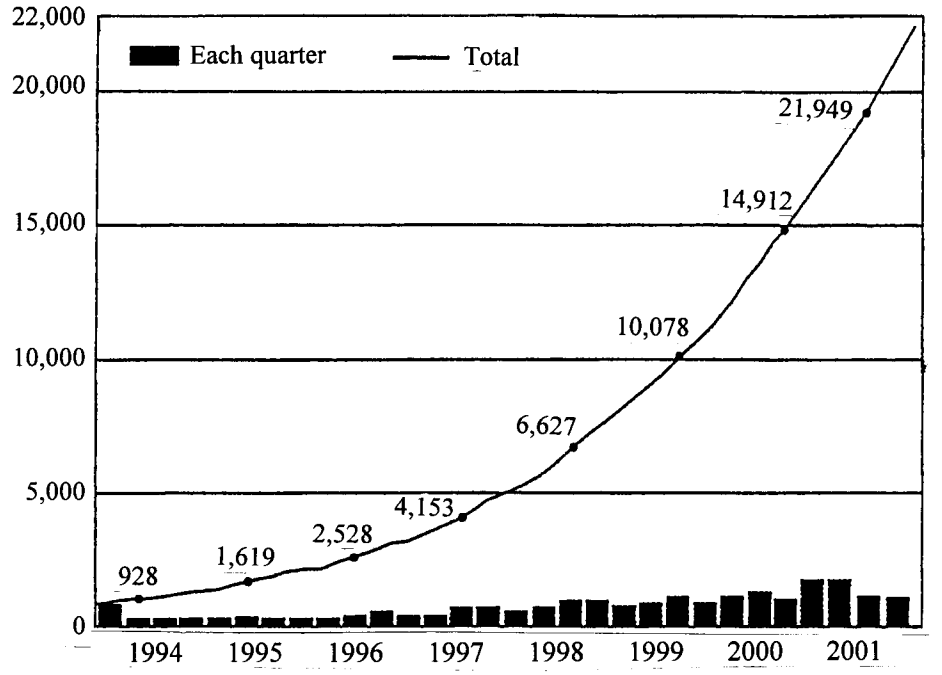


Figure 1. Quality Factors of Processed Food

A. Certification of ISO 9000



B. Certification of ISO 14000

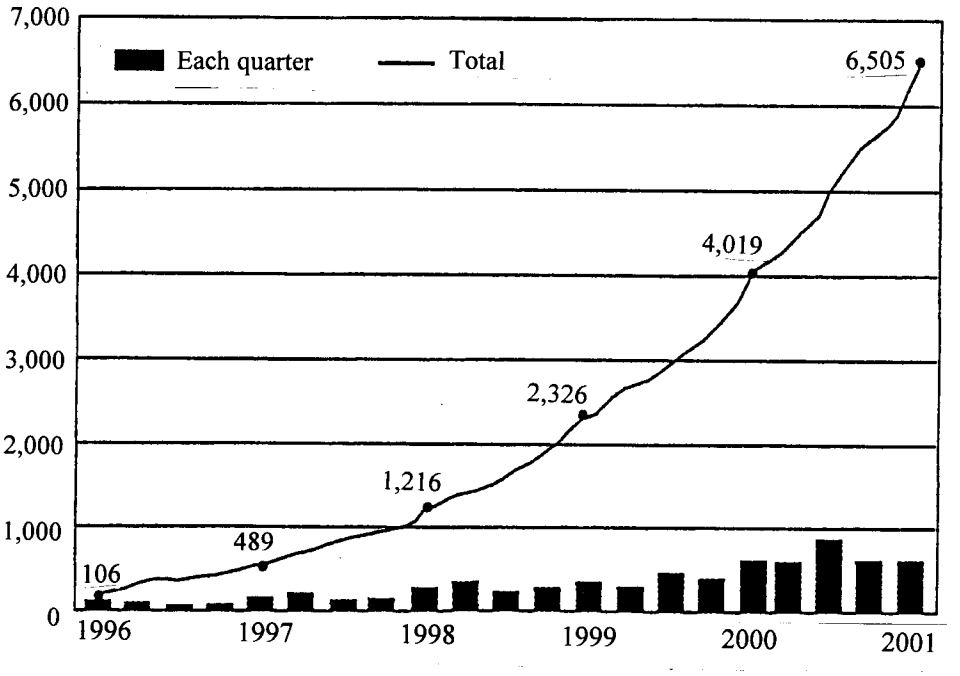


Figure 2. Certification of ISO 9000s and 14000

Promotion and Certifying HACCP

1. ***Promotion of HACCP***

Hazard Analysis and Critical Control Point (HACCP) was introduced in Japan in early 1990s, and the Food Sanitation Law officially adopted the HACCP certification system as a Comprehensive Sanitation-controlled Manufacturing Process in 1995. So far five food groups, namely; milk and milk products, processed meat products, fish paste products, retorted food and soft drinks are recommended for certification. At present, about 900 factories are HACCP-certified by the government.

With the objective of assisting the promotion of HACCP, the Japanese Government passed a law (Temporary Measure) for popularizing the control method of food production process and to provide finances to renovate or redesign factories which seek to adopt HACCP. The same law also provides tax exemption to such companies who are willing to renovate its manufacturing facilities for the certification. This system does not limit any group of food ITEMS to be certified. So far 18 food manufacturing firms have been identified to issue the certification for renovation or renewal plans.

Further, the government provides subsidy to these organizations, including Japan Fisheries Information Service Center (JAFIC), to promote food safety and HACCP for providing HACCP manuals to member companies and associations. Japan Food Industry Center has distributed 25 manuals to our members so far.

2. ***Challenges Faced by Companies Seeking HACCP Certification***

As stated earlier at present only five food sectors are advised to get their products HACCP certified. However, other food sectors are also showing keen interest for certification and approaching concerned agencies. So far several organizations issue certification as a part of registration of ISO 9000 or individually for HACCP. Companies also adopted the foreign countries' system standards such as HACCP-9000 of NSF International, SQF2000 of Australia, as the investigation criteria of HACCP. Of late the local governments are contemplating to issue the certification by themselves by authorizing an organization to oversee and investigate its certification procedures.

ACTUAL QUALITY CONTROL OF FOOD PROCESSING

As previously stressed, the quality of processed food can be termed as "safety". To be able to achieve food safety, the QC procedure should be the basis of the HACCP system. To achieve adequate QC of the processed food the following are practiced in Japan as the prerequisite procedures.

Importance of the Quality Control

1. ***What is Quality of Processed Food***

There are three qualities of food products, which the consumers seek: "Safety and Reliability"; "Deliciousness"; and "Appropriate Price". Of these three, the most important is that of safety. By this it simply means free from any biological, chemical and physical hazards. Secondly, deliciousness means the general public acceptance of its taste and texture and lastly, the food is reasonably priced. These are the factors, which a food manufacturer should have in mind while seeking consumer acceptance of his products.

2. ***Principles of Quality Control***

The PDCA (Plan, Do, Check, Action) cycle should be used when QC is implemented. This system enables the QC program to revise any part of the plan to avoid any possibility of hazards or difficulties. The following actions should be carried out in principle to realize effective QC:

* Analyze the present situation and identify the problem;
* Make a plan to address the problem;
* Implement the plan to eliminate the problem; and
* Review these sets of action to complete the QC.

3. ***How to Implement Quality Improvement Measures***

Quality improvement is a corporate goal and as such it should stem from the top most management level. And as previously stated, this goal should be communicated to all corporate divisions. In order to achieve optimum level of quality improvement, the following steps should be considered: first is the

identification of the existing problem; second is the drawing up of an action plan to address the problem; and lastly, the implementation of the action plan. As a corollary one should prioritize problems as the ones, which require least time needed and others, which require longer time to tackle. Such procedures yield better results and command the respect of each and every individual.

4. ***The Cost of Quality Control***

Many people consider spending on QC systems as added cost. On the contrary, not investing on a QC system might mean more cost to the manufacturer in the long run. Consider the scenario wherein defective products are rejected or at the worst case, recalled. This clearly means more loss than expected profit, and likewise a damaging effect on the company's image and public trust. These are indeed very devastating to any company. On the other hand, if one invests in systems within the facility to constantly improve products and services, increase productivity and sales, then such investment would be very worthy in future.

5. ***How to Implement the Quality Control***

i) The QC policy and target level of the company should be clearly identified and communicated to all concerned divisions of the company.
ii) The organization and system for the quality assurance should be completed, so that the QC work is smoothly implemented.
iii) The organization and system completed should be reviewed periodically, and then revised when necessary.

Basic Knowledge to Prevent Hazards

To implement the QC operations the staff of the company shall have the basic knowledge of the following.

1. ***What is Microbiology***

i) Temperature, moisture and nutrition are the three factors of microbial survival. Therefore, the removal of these three factors controls the multiplication of microorganisms.
ii) The pathogenic microbiology is classified into two groups: infectious pathogen and toxic pathogen.
iii) In order to avoid contamination and prevent food-borne disease, microbes should be sterilized or should cease to multiply.

2. ***Control of Temperature and Time of Production***

Achieving the right temperature of food is instrumental in maintaining its freshness. Keeping the temperature over 65ºC will result in killing microbes; at 10-60ºC, microbes multiply; while below 5ºC, microbes cease to multiply but are not killed.

3. ***Storage of the Ingredients***

The FIFO principle should apply, that is, first in first out. This is largely dependent on the ingredients' shelf life.

4. ***Heat Sterilization***

In heat sterilization, the temperature and heating time should be kept at least 75ºC and over one minute.

5. ***Cooling after Heat Sterilization***

After the heat sterilization the products should be cooled down as soon as possible. If the products are kept in 30-40ºC, microbes can multiply rapidly.

6. ***Record Keeping of Temperature and Time***

A record of temperature and time should be done regularly for reference purposes.

7. ***Prevention of Secondary Contamination***

Regular washing and sterilizing of human hands and tools such as cutting boards and similar wares can prevent secondary contamination. Also, segregating tools and wares before and after usage likewise prevent secondary contamination.

8. ***Sterilization of Worker's Hands, Tools and Wares***

When sterilizing hands and other production tools, the following should be observed: washing with water; washing with detergent; rinsing detergent with running water; soak in sterilizer; rinsing sterilizer with running water; and drying.

9. ***Prevention of Insects and Pests***

Insects and pests normally are borne in the manufacturing site and multiply within. Other pests could enter from the sewer and through the building drainage system.

In order to curb this, regular fumigation of the site is recommended. An effective pest control system such as rat-traps, poison and other similar measures should likewise be carried out.

To further prevent insect/pest infestation, sealing of all building clearances, and provision of appropriate entrance doors with 20-mesh insect net, or station ultra high sonic attacker in strategic areas is recommended. It is also recommended to keep the surrounding areas of the factory clean and clear of any medium that may breed insects or pests.

Education and Training of Workers

It is said that the best quality worker makes the best quality food. Therefore, educating and training the worker is the most important factor in producing best quality food.

1. ***Working Gear***

Primarily, the workers should be trained to wear their proper working gear prior to entering the factory. These points are highlighted in Figure 3.

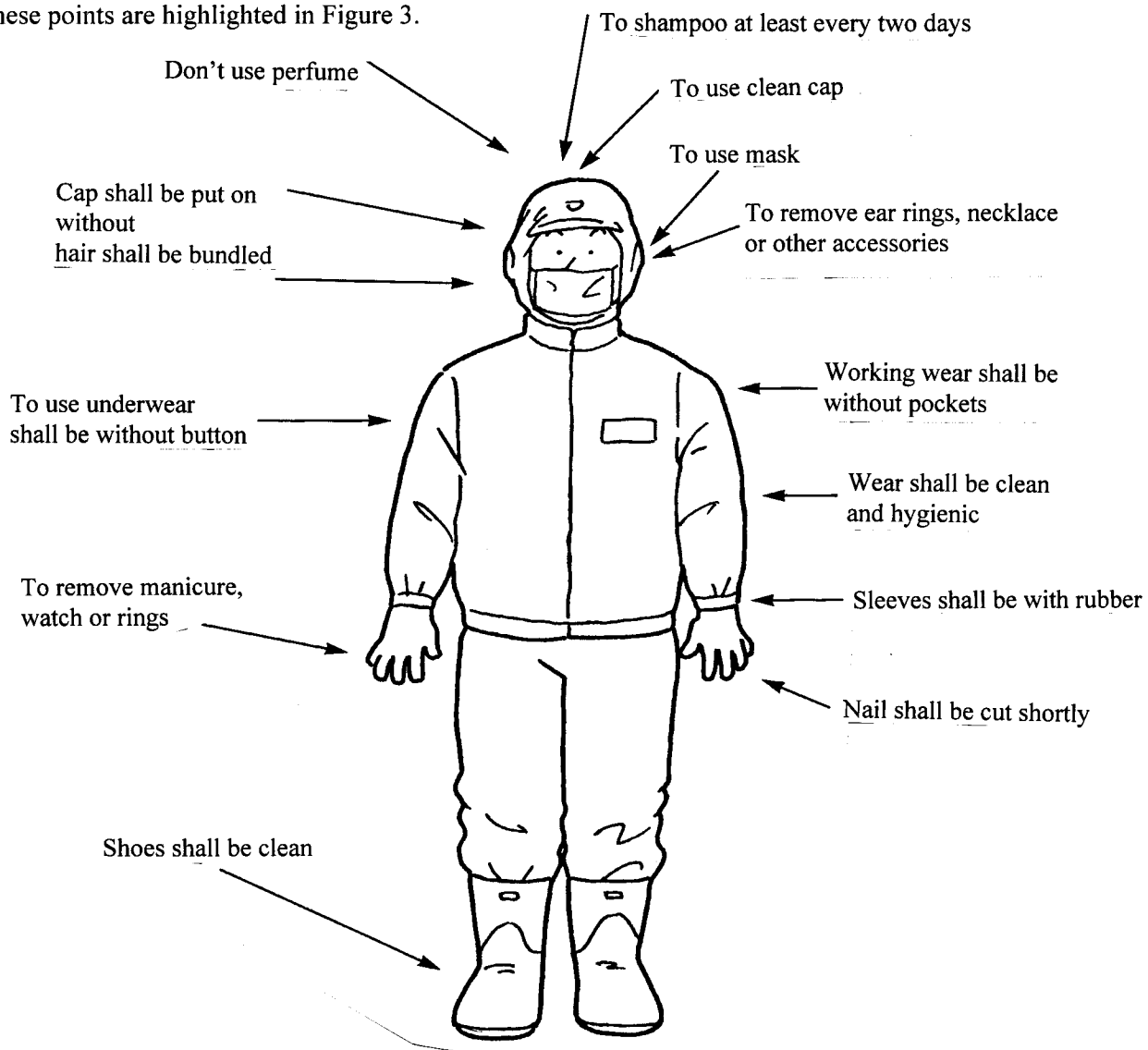


Figure 3. Shall Be Confirmed Before Entering Factory

The worker should observe the following procedure when putting on their working gear: when worker put on their working wear the order shall be followed.

The worker should observe the following procedure when putting on their working gear: when worker put on their working wear the order shall be followed.

Brush hair → Put on inner net → Put on cap → Put on working gear → Final check of any impurity → Change outside shoes → Wash working shoes → Remove any impurity such as hair → Wash hands → Enter into the working area.

Hand washing is one of most important procedure to prevent contamination. Figure 4 illustrates the proper way to wash hands.

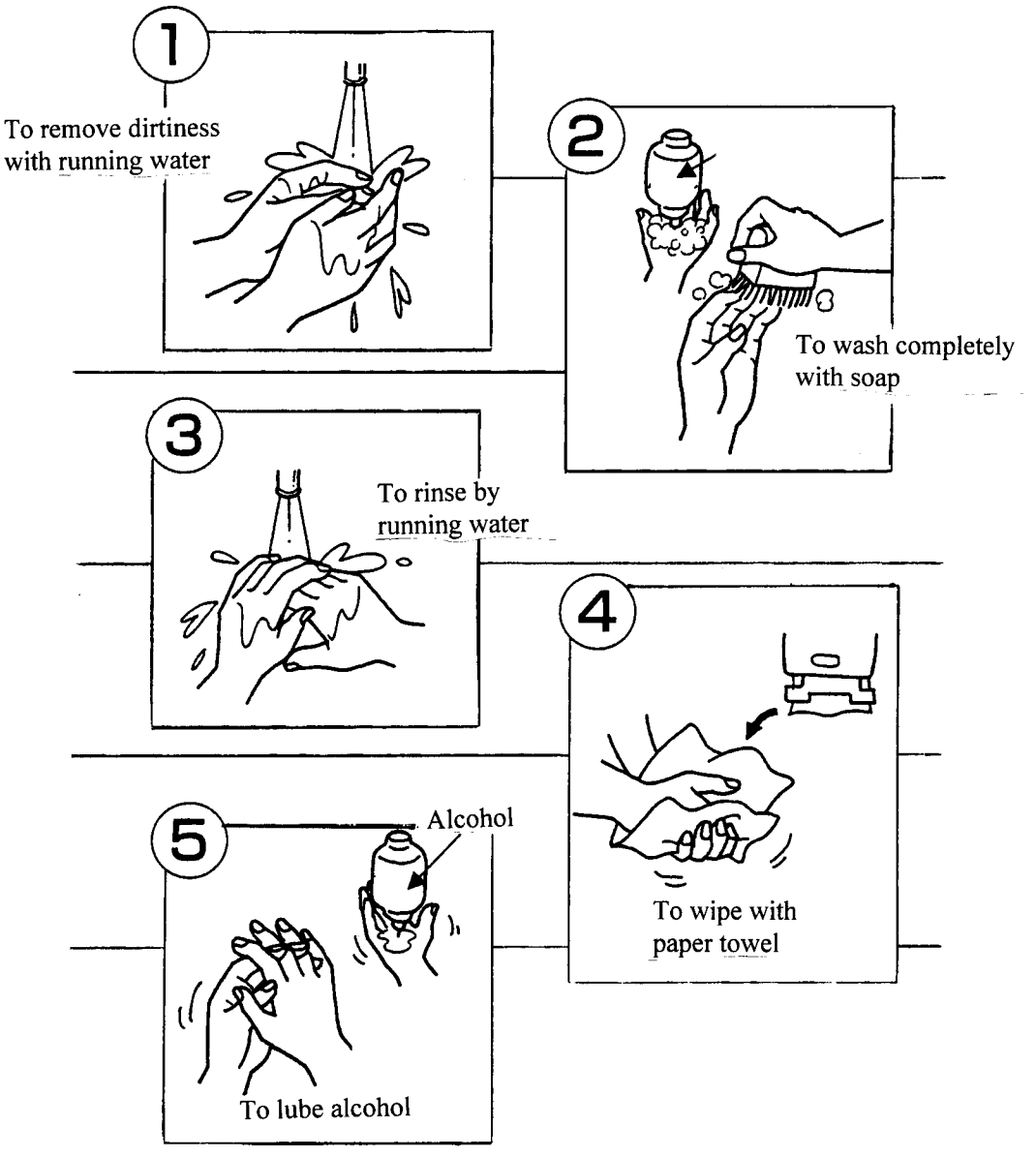


Figure 4. How to Wash Your Hands

2. ***5S Action***

The QC shall start from the 5S. Figure 5 presents this system:

i) Sorting: This means segregating things to be used and not to be used in the factory.

ii) Shelving: This means putting things to be used in the production area in shelves or hanging board.

iii) Sweeping: After sorting and shelving, sweeping away all other dirt and garbage from the production area.

iv) Sanitation: This means that the production area should be kept clean and hygienic.

v) Self-discipline: This last principle means that the worker should incorporate the above-stated 4S and make them his everyday habit.

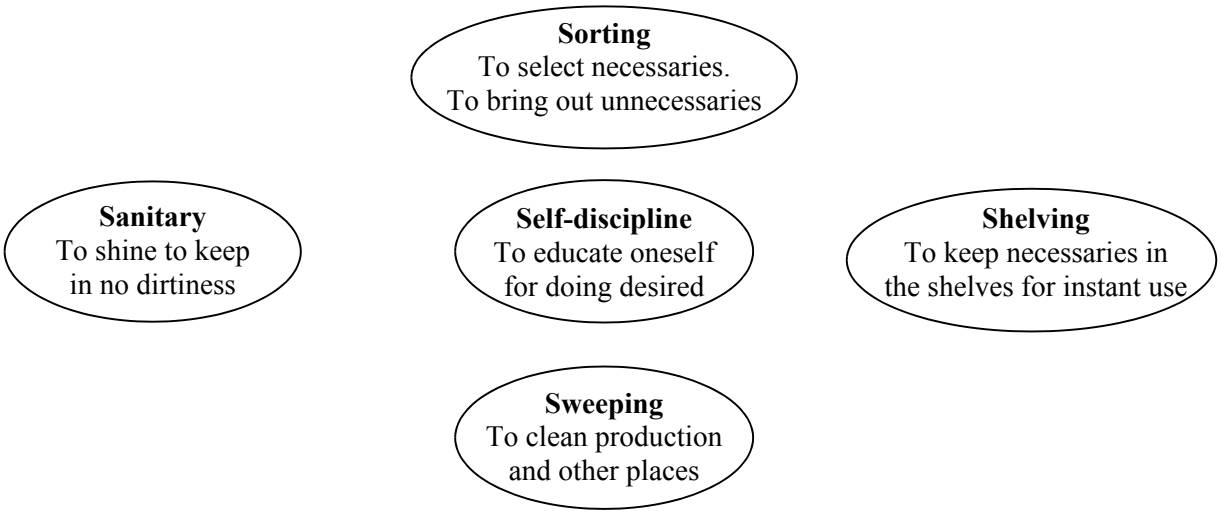


Figure 5. 5S as Foundation of Quality Control

3. ***How to Educate and Train***

All of the above-mentioned tools are instrumental in keeping QC. However, management should continue to train and educate the workers in order to maintain its QC procedures.

The training and education of the workers may be done in the following steps:

Step 1: Provide the incentive: Show them the reason behind the necessity of the action.

↓

Step 2: Show and explain the work; Demonstrate and explain how to do the work.

↓

Step 3: Let them do the actual work; This is for them to realize the work.

↓

Step 4: Follow up training; This is done to assess their work and appreciate their work.

Provision of Manuals and Rules and Criteria

1. ***Necessity of Rules and Criteria***

As a general rule, all manufacturing firms should provide employees and workers an operating manual that should include clear-cut set of rules and criteria within the workplace. These are essential items that would serve as reference material to ensure the consistency of QC procedures. These are likewise to be used to standardize procedures as well as to ensure quality products.

The following points should be considered while creation of these rules and criteria:

i) These should be easily understandable;
ii) These should define standard and as well as substandard procedures and differentiate both;
iii) These should be clear and presented in a logical sequence;
iv) These should be written in a manner and language that is easy to understand by all; and
v) These should be supported with sufficient data for confirmation.

2. ***Corresponding Measures to handle Accidents***

Upon the discovery of anything irregular or at the worst case, an accident in the production line, the 5 W 1 H rule applies: When, Who, Where, What, Why and How.

The procedure to this is as follows:

i) The worker informs the line supervisor of the irregularity.
ii) The chief of production line instructs emergency measures to the line workers and simultaneously informs the production manager of the situation.
iii) The production manager consults with the workers and all other supervisors in the production line. From there the factory manager will give the final instructions to the production manager on the action to be taken.
iv) From the production manager, instructions will be forwarded to the line supervisor as well as to other divisions of the company, such as sales and administration.
v) Lastly the line supervisor gives the final instructions to the line workers.

Basic Policy for Recall of the Defective Products

The Japan Food Industry Center is disseminating a report to propose the basic policy of recall of defective products.

1. ***Policy on How to Prevent the Defective Products***

The report proposes that a company should have a distinct prerequisite procedure to prevent defective products. This is to ensure QC all through the production and management levels of the company. As earlier stressed, top-level management must effectively communicate these policies and make them corporate goals. The prerequisite procedure should help:

– to identify the company policy and target of QC.
– to review the system of the QC of the company.
– to implement the periodic training and education programs for the company workers for QC.

2. ***Provision for Consumer's Complaints***

It is also recommended to include a section in the manual related to consumer complaints. Persons should be able to understand the proper procedures in dealing with this and therefore should be provided with the steps in order to address the issue. Basically, it should indicate procedures under "normal conditions", "initial actions to the complaint", "crisis management" and "action taken to address the complaint".

3. ***In Case of Recall***

The report identifies three key issues related to product recall, as follows:

Class 1: The incident might result in severe health hazard or death.
Class 2: The incident might result in temporary hazard or curable ailments.
Class 3: The incident might not result in any health hazard at all.

In most cases of the Class 1 the products must be recalled. A wide array of food contamination borne of pathogenic microbes belongs to Class 1. In Class 2, product recall may not be considered but a thorough investigation of specific cases must be done and rectified, if possible. Under Class 3, a product recall may not be necessary.

The decision of a total product recall is solely the decision of the top management. However, should government requires so, company is compelled to comply with its decision.

CONCLUSION

1. The Japan food industry regards the safety as the most important quality factor.
2. For achieving safety the food processing manufacturers try to obtain ISO 9000 and HACCP certification.

3. Since the food sectors to be certified under HACCP are limited, the agencies certifying ISO started HACCP certification using the criteria introduced from outside of Japan.
4. Government provides assistance to implement HACCP by extending low interest loans and tax exemptions.
5. QC in Japanese food industry is carried out on the basis of a prerequisite procedure, which is regulated by Food Sanitation Law.
6. 5S concept is stressed for implementation by the food manufacturers especially in the production area as the most basic QC action.
7. Recommendations are given on how to avoid food-borne disease crisis and how to handle the consumer complaints or food borne disease related incidents.
8. The recommendations have classified the incidents into three classes, i.e., 1, 2 and 3, and suggested manner of recall of defective products.

3. E-MANAGEMENT FOR FOOD MANUFACTURE AND MARKETING – Application of E-Management in Un-Ran Food Co.

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During the past, running the business is just like driving a car at 100 km per hour. The only thing you need may be excellent driving skills. At present, business management is highly dynamic like driving a car at 1,000 km per hour. Only with the ability to predict, the business can make the right decision to turn. The restrictions for global business are getting smaller because of the flourishing of high technology like Internet. Any information can be gathered or reached in a very short period of time. Speed and elasticity are important for a business to compete in this vast market. In the recent years, a lot of standard electronic software is designed to help business to elevate the speed and elasticity. Before adopting this multiprocessing electronic information system, it is important for a business to standardize their production procedures and schedules for better visibility. By using this system, processes can be made easier; materials and goods can be controlled better; products can be delivered before time; waste can be avoided; and costs can be dramatically decreased. Furthermore, by faster information feedback with the system, the time for decision-making is shorter and the decision is better than before. Using electronic system efficiently is obviously important for a business to compete in the marketplace nowadays.

Fresh prepared food is a new category in the food industry. Almost 10 years of efforts by manufacturer, customer is accepting fresh prepared food for the past two years. This food provides product freshness, cleanness, diversification, quickness and convenience. By adopting the electronic system, the business for fresh prepared food can be more dynamic and efficient because of shorten processing, manpower saving, and quicken information passing.

Development History and Organization of Un-Ran

With the economic boom, more and more people are choosing to eat outside. On the other hand, the safety issue of eating outside is getting more important than ever before. Bearing the concept of providing good and healthy food to customers, Mrs. Chun-May Lin, Chief Manager of Transasia Airways, began to map out Un-Ran Food Company. After three years' of efforts, Un-Ran was established in 1997 at Tao Yuan, Lu Chu. With successful experience in providing international airline meals, Un-Ran Food Co. is not only having those skilled technical workers, but also recruited experienced personnel from the related fields. In order to provide customers high quality products comparable to international standards, the Company laid emphasis on new product research and development, and on efficient computerized management.

Un-Ran has special recipes for making fresh prepared food, such as *sushi*, rice ball, hand roll stored at 18ºC; salads, cakes, cold noodles, Chinese dishes stored at 4ºC; and hot instant meals. The Company has a capital of NT$300 million and 300 workers.

Development and Distinguish Feature of Fresh Prepared Food

Eighteen-degree fresh food is defined as products that are manufactured, packed, delivered to the retail store under 18ºC through the convenience store selling chain. According to the data available with the Ministry of Economic Affairs, the eat-out market in 1989 was worth about NT$66.1 billion. The market increased four times to NT$230.4 billion in 1999 at an average growth rate of 11 percent.

People in Taiwan are not used to eat out except for special occasions such as wedding ceremony with delicate meal and fancy decoration. During the 1970s, McDonalds invaded the Taiwan's market and fast food became a revolution for its convenience and cleanliness. Health-conscious nowadays, consumers begin to worry whether fast foods are healthy enough. The idea of fresh prepared foods such as cold rice and noodle, originated from Japan, is getting popular in Taiwan eat-out markets. These kinds of meals are called fresh meal or Ready to Eat (RTE). The only difference between fresh meal and RTE is the selling place. Fresh meal is mainly delivered to sell in convenience store, department store or supermarket while RTE is sold in n fast food chain stores.

Products such as rice ball and sandwich are stored in 4ºC and cold noodles, salads, sauce noodles and Italian noodles are stored in 18ºC. Eighteen-degree fresh meals have different operational conditions for taste control, microbial control and have shorter expiration date. No preservatives are allowed in food. Product should be consumed within 24 hours. Because of the short expiration period, it is very important for the company to control the processing carefully and efficiently. Manufacturer has to produce and deliver products twice a day in order to keep the raw materials and products as fresh and safe as possible. Delivery for three times per day may be needed in the near future. For these conditions material control is very important for the manufacturer. Failure to control inventory will lead to wastage of raw materials or semi-finished products, and results in higher costs. Consolidation of management is another key issue for fresh prepared food industry. Thousands of orders are coming from retail stores each day. It needs effective process to efficiently dispatch the orders to production lines and deliver the products just in time.

Manufacturing Process and Quality Management for Fresh Prepared Food

Normally, the longest cycle for fresh prepared food manufacturing is about one day. Un-Ran Food Co. could reduce the cycle by few hours because of the adoption of e-management system. Under one-day cycle, for instance, the highest sales volume for fresh prepared food is in the morning. Products are sold vastly during this time. At the same time, retail stores are begin to predict the sales volume and send orders to the manufacturer for the next day. Orders collected by the manufacturer from retail store by using point of sale (POS) are transferred to information center before the deadline. Different orders are sorted out and sent to factory for production. The production lines are adjusted for different types of products or different ordering volumes. Raw materials are prepared in short time in case there is any shortage. During the afternoon, products are produced and dispatched by quota system for verification for different ordering stores. Warehouse Management System (WMS) with e-labeling on the products is used to check and count the varieties and numbers of the products for different stores. The system cannot only decrease the human errors in delivery but also the cost for manpower.

The design for Un-Ran factory is conforming to Chinese Agriculture Standard (CAS) and Good Manufacturing Practice (GMP) standards with brand new kitchen, FIFO control, automatic cooking ware, and vacuum freezer system. Working with auto-packing system, it is also equipped to produce variety of *sushi* and rice cake. Sanitation and safety are the most important concerns of food quality. Hazard Analysis and Critical Control Point (HACCP) system is set up for quality control.

Ordering and delivery records are saved for sales reference. POS e-ordering system is used for placing the order. When the orders come in, the products should be delivered within few hours. It is important for a carrier truck to deliver goods fast and safe.

The research and development for new products is now heading towards localization. Taste trials are performed to provide new business opportunities. Self-inspection of quality control for the factory in Un-Ran is performed everyday. Product inspection from retail stores by the subjective party is also carried out occasionally. If there is any unusual product found, follow-up action is taken immediately.

Establishment and Execution of E-management

With the arrival of e-generation, traditional working models are changed. It is important for a business to grab the market by using modern technology. E-management, the modern technology, helps a business to reorganize the information transmission, material circulation, and cash flow. It also helps to decrease the manpower and resource wastage. Human resource management system is set up in 1999 to monitor the workers for their turn out or absence from the duty. The Company adopts Enterprise Resource Planning (ERP) system and it is expected that the system can:

1. decrease the processing time, production cost, chances of stock shortage and increase the stock turnover rate.
2. monitor the supply chain to gather information efficiently to meet the customers' needs.
3. decrease the production time with arrangement plan designed by ERP.
4. decrease the communication cost between suppliers and manufacturers.

Problem Analysis and Efficacy Improvement

By using ERP system, the time for closing accounts are shorter by 3-5 days. Turnover rate for inventory stock is decreased from eight or nine days to three or four days. Customer service is better performed because of faster information provided by the factory.

WMS is finished to count the orders and products automatically. Manpower utilization is improved by more than 50 percent.

Conclusion

Few problems are still remained during the application of e-management system. Training programs are necessary for workers to get used to operate the new system without fear and distrust. It is also necessary for workers to test the system again and again to make sure that the whole system can be operated smoothly. It is concluded that Un-Ran has successfully adopted the e-management to help the management more efficiently.

4. POLICIES TO PROMOTE AND REGULATE COST EFFECTIVE FOOD QUALITY CONTROL SYSTEMS

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INTRODUCTION

With the establishment of World Trade Organization (WTO) and the expected disappearance of trade barriers in the near future, issues of food safety and quality have acquired greater significance for consumers, enterprises and the policymakers worldwide. Global food trade would likely to increase due to expected spurt in income levels, improved transportation networks and growing population requiring greater quantities of nutritious and safe food. With the free movement of foods from country to country, there is a concern that foods produced in one country must meet the standards and quality and safety of the importing country. So, it is imperative that we should ensure consumers receive food products that are of minimum acceptable quality, risk-free and not hazardous to public health.

Increase in food production and changing life style of the population especially women folk, characterized by spending more time at work than at home, necessitates the need for processed foods in a big way. Further, value addition to farmers would result only when their produce is processed and distributed in the market. Delivering safe food to the consumer's dining table is the culmination of the efforts put up by the producers, transporters, processors, distributors, handlers and numerous others who perform actions every day that may affect the quality and safety of food. It is everybody's challenge and responsibility to perform these individual actions with utmost care to ensure that the high quality food products are delivered to the consumers. Since time immemorial it has always been the endeavor of mankind to process foods to extend their shelf life, improve their nutritional characteristics and supply them in safe form. Great emperor Napoleon in his quest for supplying safe food to his soldiers fighting in the far flung battlefronts has funded the research which ultimately resulted in canning technology.

The real challenge lies in formulating and effectively implementing an appropriate food quality policy in small, medium, home and cottage food processing units. They constitute a major chunk of food processing industry in many developing countries and characterized by lack of access to critical resources such as knowledge and money. So, we need innovative policies to stimulate quality culture among them and take advantage of the new opportunities arising in the global food markets.

NEED FOR A QUALITY POLICY

Why do we need a quality policy in the processed food sector? Is it really that important like defense and foreign policy of a nation or the marketing strategy of an enterprise? The answer is an unambiguous "yes" because a country's capability and credibility is often judged by the quality and safety of the products it sell in the global markets. Food being an item which directly affects the life and limb of the consumer, it is much more essential to have a food safety and quality policy and follow it both in letter and spirit. Though reaching a consensus on universal food quality standards is still a far cry, adoption of a food quality policy both at national and enterprise level is the first step to instill confidence in the minds of the consumers. Countries like Japan by adopting a policy which strives to make "quality a way life" could dramatically change the image of their products in the postwar period.

The public has become more concerned about the risk from food hazards in recent years. Increase in public concern regarding food hazards and decline in public trust in food risk regulations suggests the need

for a policy to address these concerns and develop specific risk communication. Food quality and safety are of concern to every individual, industry and the government. Consumers expect their food to be enjoyable, nutritious and more importantly safe. The responsibility for ensuring that this expectation is consistently and continuously met rests with the policymakers, entrepreneurs and the consumer themselves. The basic need for a policy is to ensure that food quality and safety requirements are met and adequately supported within the framework of national and international food quality legislations and regulations.

From a regulatory or consumer point of view quality refers to the basic objective requirements under the existing laws to assure that foods are safe, not contaminated or adulterated or fraudulently represented. Food quality and safety requirements are neither optional nor negotiable. Furthermore, recent international agreements emphasize the need for food safety measures to be based on risk analysis following principles and procedures elaborated by the concerned international organizations. There is a popular perception that processed food industry is well placed to make decisions concerning quality based on the market demands. However, in reality situation is quite different especially in the developing countries. So a policy which not only spell out the mandatory and optional quality standards, but also the long-term direction and vision is essential for the healthy growth of the industry.

Food product quality is a prime criterion in gaining access to competitive markets. Most marketers will agree that besides everything else commercial markets require a stable supply and consistent quality. Most industries especially small and medium ones do not like to be pioneers and it takes considerable efforts to interest markets unless the quality assurance criteria is assured with confidence in the form of a policy. Food products which cannot reach equivalent levels of quality, functionality or reliability will not survive in the competitive global markets. There is only so much that a more equitable environment can offer. The rest depend upon the food quality polices of the enterprises and the nations.

Apart from meeting the market requirements and world trade obligations food quality policies are also required to identify the current needs in food safety, keep pace with the technological developments and assuring the future safety of our food supply and the health of the consumers. A comprehensive food quality policy is also essential for describing actions and resources necessary to achieve the goals of reduced food-borne illness. Food safety and quality have emerged as important global issues with international trade and public health implications. How countries perceive and handle food risks is complicated and partly based on their access to and use of science, detection technology and mitigation methods. Highly publicized food safety incidents affect consumer perceptions, leading to changes in food purchasing and consumption patterns.

Food quality policies also gain credence because countries may perceive and handle risks differently. Assessment of risks and remedial measures may vary due to differences in access to resources such as knowledge, which include basic science, detection techniques and mitigation methods. While advanced countries like USA has ‘zero tolerance policy’ for some microorganisms, others view it as a trade barrier. Even within a country acceptance and willingness to pay that little extra for quality varies among different social segments. So each country has its own unique set of health concerns and priorities and as such appropriate food quality policies both at enterprise and national level are imperative to tackle these issues. Differences in what food products countries want and what they will accept in imported food ultimately affect patterns of food demand and global trade and complicate the development of workable trade rules that are acceptable to different trading partners. Countries also vary in consumer behavior, enterprise behavior and policies to deal with food safety risks and new risk management technologies.

TYPES OF FOOD QUALITY POLICIES

Food quality policies can be classified in several ways adopting different criteria for classification. However, technology, legislation, consumer and enterprise are some of the widely used parameters for classification of policies. Accordingly food quality policies can be categorized as:

* technology-driven policies
* legislation-driven policies
* consumer/market-driven policies
* enterprise-driven policies.

Technology-driven Policies

As the name suggests technology plays a key role in the formulation and implementation of a food quality policy. It acts as a driving force in convincing or compelling planners and policymakers to formulate a quality policy to take advantage of the benefits of the technology. Many a times absence of a reliable and affordable technology or food safety management system acts as a stumbling block in improving food safety. Technology-driven policies are usually a function of perception of science and risk assessments, current ability to avoid or control different food safety risks, knowledge and acceptance of food technologies and willingness to pay for the costs of technology.

In order to reduce contamination of food and prevent food-borne diseases and reach a higher level of consumer protection, application of technology is essential. While many technologies are available for the consideration of policymakers, differences in effectiveness, ease of use, reliability and most importantly cost make the task of selecting an appropriate one more difficult. Technology-driven policies flourish in an environment where strong and functioning research-industry network exists. The Netherlands, New Zealand, Australia and the USA are some of the countries, which reaped benefits through technology-driven policies. In contrast countries which lack vibrant industry-research linkage, have suffered a great deal both in terms of public health and the global trade. South Asia and parts of South-East Asia have suffered because of this phenomenon and it is time to initiate remedial measures.

One of the widely acclaimed technology-driven initiatives in Asia in the recent times has come from India in the form of Information Technology (IT). With little support or intervention from the government a new breed of entrepreneurs could tap the vast potential of software talent in the country taking advantage of the fast paced IT. In that process they have not only tapped export markets but also created jobs and wealth. The major motivating force behind this revolution is IT and its potential applications in every walk of life ranging from small business to space science.

However, Indian food industry is yet to take advantage of modern food safety and quality management concepts available such as Hazard Analysis and Critical Control Point (HACCP) in a big way to reap the benefits. Situation is expected to change when the WTO regime is finally put in place exposing domestic food markets to severe competition with high quality food items. Use of biotechnology may also result in increasing food quality, once debate over the side effects and ethics comes to an end. Efforts to inform the public about the benefits of new technologies can promote consumer acceptance and demand for them and make using these tools more attractive to producers and processors. Thus policies based on sound technology and science is the best bet to ensure food quality and safety.

Legislation-driven Policies

Quality environment in food processing sector especially in developing economies, basically revolves around compulsory legislation which specifies minimum standards for various food articles and voluntary standards and certification systems. While countries have succeeded in putting food legislation in place many could not ensure their effectiveness due to lacunae in implementation. Legislation-driven quality scenario is usually an indicator of less mature or developed food industry. It is characterized by an industry plagued with Minimum Standard Syndrome (MSS) keen on taking advantage of the loopholes present in the legislation.

When the economy ultimately reaches the 'developed' stage industry's dependence on legislation gradually decreases as they tend to set high standards. Food processing enterprises which formulate their quality policies in consonance with the minimum standards of the legislation are bound to suffer sooner or latter when they are exposed to real competition. So it is essential for a legislation to keep pace with the worldwide developments in the technology and trade to avoid the danger of becoming obsolete and ineffective. Unfortunately food laws in many countries lay more emphasis on prevention of fraud than on public health and safety. As a result enforcement officials use legislation to harass and gain pecuniary advantages rather than using them as tools for facilitation and guidance to the industry.

An effective food regulatory framework is also vital to the competitiveness and survival of the food industry. This has added significance for countries whose major export earnings come from the food industry and for those who intend to penetrate global food markets. Progressive governments resort to a policy of least intervention leaving the job of food safety planning to the industry itself. When implemented with sincerity this policy would help countries to move from legislation-driven environment to enterprise-driven environment conducive to a vibrant food processing sector.

While food legislation is an integral part of food quality management system, it must be sparingly used as a weapon to enforce the food quality and safety standards. Food legislation should also facilitate achieving excellence rather than breeding mediocrity. Industry should also chart its own course of quality management path, instead of lobbying with the policymakers for a soft legislation under one excuse or the other.

Consumer/Market-driven Policies

Consumer is the cornerstone of any industry and the food processing industry is no exception to this golden rule. A well informed, organized and demanding consumer provide the ideal environment for adopting the highest possible food quality standards. In contrast an ill-informed and disorganized consumer, provide an ideal situation for the industry to take advantage of the ignorance of the market in the quality front and settle for sloppy quality standards. Marketing managers always prefer segmentation of markets to respond to its needs effectively and deploy resources accordingly. However food industry is an honorable exception to this conventional theory, as the life of people consuming food is precious and the less demanding markets should not be an excuse for adopting dual food quality policies.

Consumer-driven policies are more prevalent in countries or markets where consumer awareness about food safety issues is very high and consulted regularly both by the government and the food industry. Consumer can have a big influence on the sales of the firms. In fact leaders of firms in these countries are prepared to undertake more actions to satisfy consumers. Countries which enjoy higher per capita income and standards of living, need not necessarily be front runners in setting high standards in the quality front. Consumer-driven policies also find place in countries which profess open market and trade theories and provide ample opportunity for consumers, to compare the quality of their own food items with the imported ones. Here the governments and the industry formulate policies with the conviction that average or ignorant consumer does not exist.

In contrast, it is common to find consumers who are less vocal and demanding in protected markets. Consultation process is also less frequent and less effective in this environment. Since consumers are not only influenced by the private environment but also by the purchasing environment, it is the responsibility of the government and the industry to create it characterized by quality. Consumer choice for food products not only depend upon the social, cultural, economic and the political environment but also on his professional knowledge and the influence and effectiveness of consumer and environment groups. It must be realized that the consumer has something to do with the quality of his existence and his own and other's needs and wishes in his private environment. Consumer functions in a social environment and for that he purchases a certain product quality in a certain purchasing environment.

The government can control the behavior of the consumer to some extent, by creating conditions which make it attractive for the industry to produce food products of highest quality and convince consumers to pay that little bit extra for it. Depending upon the food quality goals the government set, it can put appropriate policy instruments in place for achieving the same. In the coming years the policymakers may have to toil to achieve the twin objectives of processed food export promotion and the stimulation of better technical and social environment to create quality awareness among consumers. Government itself as an important consumer in the market can set example, by opting for the highest quality food products by paying those additional costs involved in achieving that quality, rather than settling for the lowest bidder offering minimum prescribed quality.

Access to information, involvement and the time and money at disposal usually influences the behavior of consumer towards product quality. On one hand there are discerning idealistic consumers looking for the best quality food products, and on the other hand there are who are just satisfied with the food items offered by the industry. Needless to add quality breeds fast in a market dominated by the former and as such it is essential to increase their number through consumer education programs. A food quality system driven by the high expectations of the consumers and built on the enterprise and innovative capacities of those who produce and market is the key for making a lasting impression in the global markets.

Consumer perceptions are the result of a complex function of factors such as differences in each country's baseline food safety risk levels; food safety risks from internationally imported food; access to and extent and nature of information about food safety, risk levels and related topics; trust in the different sources of information; and experience with major food safety incidents. There may even be basic differences in how people view outbreak of food-borne diseases. Worldwide, consumer perceptions and knowledge about risk

reducing technologies vary, and as a result not all countries are equally accepting of the different technologies. Consumer acceptance about innovative food technologies such as irradiation is the result of a complex decision-making process involving their assessments of the perceived benefits and risk of new technology and its new alternatives.

Highly publicized and sensationalized food safety incidents may lead to lasting changes in consumer perceptions about food safety and their food purchasing patterns. In some instances where the public outcry has been more vocal, there have been changes in government regulations affecting domestic or imported food products. In several such cases it was observed that, the consumer perceptions about the implicated food product and the exporting country's ability is slow to change, and thus have a lasting influence on global food demand and trade. A timely and appropriate response to food safety crisis clearly plays a role in shaping food safety perceptions of the consumers.

Enterprise-driven Policies

Apart from technology, legislation and the consumer food enterprises have also a role to perform in shaping and implementing quality policies. It is after all the survival and growth of the enterprises at stake and as such they are expected to chart an appropriate quality policy to meet their needs. Type of management, attitude towards quality, access to resources, market in which they operate and the legislative environment are some of the critical factors that influence the quality policies of enterprises. It is not uncommon to find the same company adopting different quality parameters in different markets.

There are also instances where some forward-looking companies have redefined the quality concepts to set high standards in the market. Competitive pressures have forced the others to follow the suit and improve overall quality environment. However, these instances are rare to find in developing countries as the majority of the food enterprises are in home, cottage and small-scale sectors. Most of them are off the view that the modern food quality management systems are beyond them as they are complex and costly to implement. So large and well established food enterprises are required to provide the initial momentum to the food quality campaigns. Multinational food chains operating in upcoming processed food markets, with access to latest technology and resources are still in a better position to create an ideal quality environment.

Most of the enterprise-driven policies are dependent upon the outlook of the management. When it is progressive, companies even in cooperative sector have achieved commendable progress in the quality front. For example, M/s Mother Diary Fruits and Vegetables Ltd., one of the largest diaries operating in Asia and serving the consumers of Delhi (India), has implemented HACCP though it is not under any legislative or competitive compulsion to do so. This has forced some of the big players in private sector in the market including multinationals to follow the suit. It is normal to find many enterprises to tailor their food quality policies taking advantage of less demanding consumers coupled with a soft legislative environment. This view especially holds good for countries which have protected markets and set standards through consensus.

So it is not sufficient to educate consumers alone to improve the food quality scenario but it is equally important to remind the enterprises to aim for the best rather than settling for mediocrity.

QUALITY POLICY IN A DEVELOPING COUNTRY

The need for improving quality in processed food sector is connected to a large extent with the social and economic level of the nation as a whole. The situation in developing countries is characterized by low professional quality and consumer awareness. With the increased economic and technological development of a nation the factor of food quality grows in significance in accordance with the public demand for goods of better grade.

To some extent developing countries themselves have to share the blame for the not so encouraging quality scenario in the processed food sector. Many countries in the Asian region after attaining independence have gone overboard with the policy of self-reliance. Anything foreign is treated with contempt and the proponents of open market theory were branded as agents of multinationals. Quality became a victim in this process as some vested domestic interests have pleaded successfully for protected markets with the policymakers. Policymakers were made to believe that the quality is a small price the domestic consumers have to pay to achieve the goal of self-reliance. Food markets with acute shortages in the initial stages of development were the worst victims of this policy.

Unfortunately the protectionism, which is expected to last for a while prolonged forever, because of the political compulsions of the policymakers. The issue became so sensitive and volatile to deal with and only the trade and economic compulsions have forced the policymakers to open markets that too as a last resort. South Asian region is the classic example of this self-reliance syndrome, which lasted nearly for four decades till they woke up to the global market realities in the early 1990s of the last century. The point here is not to belittle the policy of self-reliance but to drive home the point that self-reliance without quality consciousness will succeed only in protected economic environment and offer very little scope to assert in global food trade. Probably Japan is the only country which could successfully protect its food markets and still maintain high quality standards. This was made possible because of the obsession of Japanese society with quality and the willingness of the industry meet those expectations.

All said and done, it is not an easy task to formulate an effective quality policy for processed food sector in developing economies. Policymakers have to balance the interests of several lobbies such as the industry, scientists, consumer and the importers. Usually the powerful and vocal among these succeed in shaping up the policy. Policymakers should realize that there is no point in improving quality for export alone without first achieving a level of quality suitable for local, internal competition, which will itself be based, among other things on the intrinsic quality of country's products. In the competition for the consumer's preference, the quality should play a vital role and it should be placed at a higher level keeping in view the future demands.

The structure and distribution of food processing units also influence the quality policies. It is relatively easier to formulate and implement quality policies for markets served by few large companies with few products. However, in an environment dominated by large number of units operating in home, cottage and small-scale sectors with low volumes, the task of formulation of an appropriate quality policy become complex. Majority of the developing countries have to cope up with this type of environment, while formulating quality policies for processed foods. So to create a real impact on the overall quality scenario it is essential for the developing countries to concentrate on small- and medium-sized enterprises (SMEs).

It is time for the developing countries in the Asia-Pacific region which are serious in tapping the emerging opportunities in the global food markets, to shun dualism and opt for one integrated food quality policy through harmonization. Though it is painful in the initial stages, it is the only way to acquire the necessary competitive edge in terms of quality and meet the future challenges in the global markets. It must also be remembered that the best of the food quality policies, without an effective legislation for speedy disposal of quality-related complaints are bound to fail sooner than latter. So it is essential to evolve a legislative mechanism to reap the benefits of quality policies and prevent enterprises from taking advantage of legal loop holes.

COST EFFECTIVENESS OF QUALITY

Cost of quality is the tool that many have called the missing link between the quality process and strategic results, particularly the financial goals and objectives of the firm. For years managers treated quality as a cost probably due to lack of understanding of the quality losses in the market. A mysterious calculation by name "economics of quality" used to show that it costs too much to do things right. It is based on the same erroneous assumption of the inevitability of error. Quality has always been considered negotiable among schedule, cost and quality. Fortunately Japanese have exploded that myth with their quality philosophy by treating quality as a competitive tool in the market.

The lack of a clear understanding of the cause and effect relationship between quality improvement and company's performance is the primary reason that common misconceptions about quality's benefits continue to exist. Most misconceptions are based on limited knowledge of quality costs and benefits, often supported by obscure or irrelevant examples. Naturally this environment is beneficial neither for the consumer nor for the enterprise. Some of the misconceptions associated with quality and cost are that they are directly proportional, no relation exists between customer satisfaction and the value, schedule adherence and on-time delivery are not related to quality and finally quality is the responsibility of the people in the shop floor.

Many companies in the food processing sector in developing countries are still suffering from the above syndrome and protected markets have aggravated the situation further. The food markets have never been demanding because of which the quality managers had not felt the need to precisely assess the quality

costs in terms of prevention, appraisal, internal and external. Progressive companies are those which are in a position to quantify the cost of poor quality and formulate appropriate quality improvement programs.

Ensuring cost effective quality in food sector is a real challenge because, there is very little elbowroom for maneuvering. Life of consumers is priceless and as such there is very little margin for error or compromise as in other goods like consumer durables. Food companies face a difficult challenge competing in a marketplace where quality is judged in relation to price. In a world where consumers can now demand and get products and services that provide both higher quality and lower costs, survival will require companies to adapt their strategies and priorities to meet this new challenge. Success will require companies to align the priorities and objectives of the quality process with the priorities and objectives of the business to compete on the basis of superior value. The most difficult and complex aspect of this alignment is shifting the focus from meeting the minimum requirements to delivering higher standards and reducing costs.

The traditional quality strategy of conformance to the minimum standards is no longer an adequate competitive strategy in today's value-driven global food markets because they emphasize tools, techniques and processes over observable results such as lower costs and increased profits. Quality vision improvement is incomplete if it does not work in tandem with the result-oriented strategies and decision-making of those responsible for running the business, and cannot provide the competitive edge. Many quality initiatives could not deliver meaningful results because of lack of breadth and depth in their management approach to meet the challenges of fast changing food business scenario.

Today's global market leaders in processed foods recognized early in their growth cycle that the success in a fast changing competitive world would require updated quality strategies and structured management practices. Their quality philosophy evolved beyond traditional quality concepts and practices to develop an enterprise wide approach that focuses quality efforts on improved profitability and sustained competitive advantage. The emphasis is on elimination non-value-added activities and waste driven by poor quality as the means to improve productivity and customer satisfaction. Thus elimination of poor quality costs using quality-based cost management, which is a just now beginning to be understood in the developing economies has to be widely popularized and embraced and any reluctance in this regard is a recipe for disaster especially for enterprises in the processed food industry.

Finally the expense of achieving quality and the benefits arising out of those efforts is of primary economic importance. Since businesses revolve around profits, money is the best language to explain them the benefits of quality improvement. According to a study conducted in Israel in the initial stages of its development, a conservative estimate has put the quality improvement costs around 15 percent of the gross turnover. Assuming that partial savings and new market opportunities alone amount to a sum between 25-30 percent of the above estimate every year, returns are attractive and worth consideration of the policymakers and the food industry.

APPROPRIATE QUALITY POLICY

Deciding an appropriate quality policy or strategy is not an easy task as the conditions vary from country to country. However, the expected globalization of food trade in the near future has at least brought one common element before the developing countries in the form of exports. Size and homogeneity of the domestic food market, level of market liberalization, consumer awareness and the preparedness of the food industry are some of the factors that may ultimately influence the quality policies. However, the following elements shall form an integral part any quality policy to achieve its ultimate goals.

* No market segmentation on the basis of quality.
* Harmonization through upward revision of food quality standards. Active involvement of consumers/ consumer organizations in the policymaking exercise.
* Effective legislative support to deal with quality-related complaints.
* Recognition and rewards for efforts in quality improvement in the food industry.
* Consumer education programs to raise quality awareness and level of expectations from the food industry.
* Modern concept of quality costing through cost-benefit analysis (present expenditure on quality improvement as an investment).
* Long-term perspective with due consideration for future demands.

* Treat quality as an integral part of the entire food chain, rather than considering it as a separate entity in the production process of the processed food item at the factory level.
* Basic quality education for all employees facilitated and administered by the company.
* Focus should be on achieving quality through prevention not on appraisal.
* To achieve excellence, quality performance standards should move towards 'zero defects' and not towards acceptable quality levels.
* Quality must be measured by the price of nonconformance and not by the indices.
* Quality is never an accident. There must be will to produce superior quality food products.

CONCLUSION

Food quality policies have assumed greater significance in the light of recent developments in the global trade scenario. Achieving the twin objectives of improving quality and reducing costs become imperative to remain competitive in the market. Developing countries in the Asia-Pacific region have reached a point where they have to radically reorient their food quality policies to meet the emerging needs. Consumer- and technology-driven food quality policies are expected to play a major role in the policy formulation exercise in the near future.

To keep the quality control and improvement systems cost effective there is a need to understand the price of poor quality in the market. Presenting a cost-benefit analysis clearly identifying the quality losses and the impending benefits of investments on quality improvement is the need of the hour. Harmonization through upward revision of food quality standards and raising consumer expectations through education are some of the tools available to make food quality improvement exercise a cost effective mass movement. Treating quality as an integral part of the entire food chain and responsibility of all employees of the enterprise is essential for creating and sustaining cost effective quality culture in the food industry.

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CURRENT STATUS OF PROCESSED FOOD QUALITY CONTROL SYSTEMS

The quality of food is affected and determined by raw materials, processing, storage, transportation and selling practices. The purpose of promoting food quality certification systems is to upgrade the level of the food industry, increase the self-management and quality control capabilities of the food enterprises, providing safeguards to the food hygiene of the consumers, and cultivating competition among the processed foods in the domestic and international markets. The competitive ability in the marketplace is extremely important in the context of Republic of China becoming a member of World Trade Organization (WTO).

A legal food processing plant should fully comply to the plant standards and other relevant rules governed and regulated by the law governing food sanitation and administered by the Department of Health, Executive Yuan. Currently, most of the food enterprises have the ability to enforce Quality Inspection (QI) which implied that they possess basic analytical instruments and skills (such as chemical analysis and microbiological analysis). Small- and medium-scale food enterprises have the ability to enforce Quality Control (QC), and they have independent QC departments in charge of total food quality practices. Besides, enterprises that have acquired certain quality accreditations (such as Food Good Manufacture Practice [FGMP], Chinese Agriculture Standards [CAS], Hazard Analysis and Critical Control Point [HACCP], ISO 9000, etc.) have the ability to enforce Quality Assurance (QA), implying that not only the QC department is responsible to the food quality, but also other related departments such as production, plant administration and sale departments are equally responsible for the maintenance of quality in the entire food enterprise. At present, almost all the medium- and large-scale enterprises have acquired more than one quality accreditation system, and some small- and medium-scale and home-based units have expressed their strong desire to apply for quality accreditation in order to upgrade factory management standards.

Sensing the trend from exports to domestic markets in the food industry, ROC Government had enforced the food quality certification systems in 1989. The Council of Agriculture and the Industrial Development Bureau of the Ministry of Economic Affairs had thus planned and promoted the CAS and FGMP high-quality food mark systems, respectively. CAS and FGMP high-quality food marks become popular among food industry and consumers after 13 years of perseverance by the concerned agencies.

The Industrial Development Bureau of the Ministry of Economic Affairs had been enforcing FGMP system since July 1989. This system is based on the Good Manufacturing Practices designated by US Food and Drug Administration (FDA), and focuses on the sanitary safety, quality stability and the establishment of a good QA system for the food industry. The food industry should have a self-management system, so as to upgrade the quality and hygiene of the food products. Currently food plants are divided into 25 categories and 302 plants and 3,205 food items have acquired FGMP (Attachment 1).

The advantages of FGMP are its applicability to all kinds of food enterprises, equal importance to facilities and management, and acknowledgement among food industry and consumers. The disadvantages of FGMP are its strict requirements which make its applicability to some small and medium food enterprises such as tea, pickled vegetables and fruits difficult.

After reviewing various agricultural processing and food quality standards of European countries, the United States and Japan, the CAS high-quality food mark system was formulated and applied to the processed food industry using domestic agricultural, fishery, poultry, and livestock produces as raw materials, and producing under strict QC standards so as to increase the utilization of domestic produces and increase the competition (Attachment 2).

The CAS high-quality food mark system was first applied to meat products in 1989 and frozen food, fruit and vegetable juice, rice, preserved fruit, prepared rice products, chilled prepared food, fresh edible mushroom, fermented food, snacks, fresh egg products and sliced vegetable and fruit products were included under its purview gradually (Attachment 3). Currently there are 12 categories, 192 plants and 3,401 food items which have acquired CAS high-quality mark certification (Attachment 4). While meat products, frozen food, and ready-to-serve meal products dominated CAS high-quality products system in terms of number of plants and items, beverages, dairy foods, canned foods and baked foods dominated FGMP system.

HACCP self-management system is another quality certification system promoted aggressively by the Department of Health and the Bureau of Standards, Metrology and Inspection of the Ministry of Economic Affairs recently. HACCP emphasize the superiority of monitoring process stages than final product inspection. Proper implementation of HACCP not only safeguard the quality and safety of the food products, but also lower the management costs and upgrade the international competitiveness of the food industry. The units exporting seafood products to the United States had been urged to adopt HACCP system by USFDA since 1997 and this is expected to have a positive impact on the food industry especially in the context of ROC becoming a member of WTO.

HACCP has been recognized worldwide as the best food safety control self-management method. In ROC, HACCP is still voluntary and the government has already assisted 192 food service companies and 45 seafood enterprises to acquire this high QC mark as a preliminary step.

DETAILED OPERATION OF FGMP

Application

The applicants for FGMP certification should:

a) have the license or certificate as a registered profit organization.
b) have the factory license from the Economic Department with the certifying products enlisted.
c) comply with contemporary governmental food laws, food factory GMP general rules, and related provisions.

Procedure

1. ***Application***

Documents needed for application to the Promotion Organization.

a) Application form.
b) Copy of the company license or certificate as a registered profit organization.
c) Copy of the factory license.
d) Copies of the certificates for related technicians who have completed the special training.
e) Various standard forms of certifying products which are determined by FGMP general rules and specific provisions pertaining to certification.

The Promotion Organization should categorize cases and transfer all documents to the contracted executive institute for assessment after cases are accepted.

2. ***Assessment of the Documents***

a) The assessment should be completed within two weeks immediately after the documents are received by the executive institute. The result will be informed to the applying factories and a copy is sent to the Promotion Organization.
b) The executive institute should send letters to those who fail the assessment due to insufficient information to provide necessary papers.

c) The executive institute reports to the Promotion Organization for the on-site evaluation for those who pass the document assessment.

3. ***On-site Evaluation***

A. *The on-site evaluation is conducted by the "Evaluation Committee Members" of the Promotion Organization*.

This committee consists of:

i) the executive secretary from GMP Promotion Organization of the Economic Department as the leader.
ii) the curator from FGMP team of the executive institute as the other leader.
iii) one representative from the Industrial Office of the Economic Department as the member.
iv) one representative from the Bureau of Food Sanitation, Department of Health of Executive Yuan as the member.
v) one representative from the Bureau of Standards, Metrology and Inspection of the Ministry of Economic Affairs.
vi) one represent from GMP team of the executive institute as the member.
vii) one to two specialists as members (depends on need).

B. *Methods*

a) Time for on-site evaluation: one day for each factory generally.
b) Table of procedures for on-site evaluation: Attachment 5.
c) Proceedings of on-site evaluation:
i) After document assessment and on-site assessment, the leaders of the Evaluation Committee call on a meeting to discuss the result without the participation of factory staff.
ii) Flaws proposed by committee members are discussed item by item and listed on the "Record of Imperfections for On-site Evaluation". Anonymous vote is conducted by the leaders in case of disagreement.
iii) Once the Record has been identified, committee members reexamine the items listed on the records. Again an anonymous vote is performed in case of disagreement.
iv) The result is determined by calculating subtractive scores of imperfections on the Record.
d) The Promotion Organization sends formal notification of the outcome to the factories and those which fail to pass the evaluation can reapply after improvement.
e) Factories which fail the second evaluation will have to wait for three months for next reapplication and undergo the process from the beginning.
f) The executive institute then samples products for inspection on the same day for those who pass the evaluation.
g) Factories reapplication, applicants need to start from the first step of the whole process.

4. ***Product Inspection***

A. Sampling is done by the executive institute members inside the factory.
B. The executive institute informs factories which do not pass the sampling inspection for betterment by letter. Reapplication for inspection is allowed only once three months later.
C. Failure on re-inspection will result in a six-month suspension for reapplication and the unit has to undergo the complete process from the beginning.
D. Expenses towards inspection are paid by factories according to the prescribed rates of the executive institute.
E. Amount of sampling:

The ratio of sampling is based on the net weight of each packaged unit of the certifying products: 10 bags (boxes) for products under 200 g; seven bags (boxes) for products between 201-500 g; and five bags (boxes) for products over 500 g is the norm for sampling.

F. Items for inspection:

a) All products that are regulated under contemporary hygiene standard.
b) Random selection of general products under the applying factories' standard.

5. ***Recognition***

Applicants of FGMP certification are verified and recognized by the Promotion Organization after the passing of on-site evaluation and products inspection.

6. ***Contracting***

A. Upon receiving the letter of recognition, applicants should sign a contract with the executive institute no later than two weeks. The Promotion Organization files cases through the executive institute.

B. Applicants are responsible for sending draft of package labels of the certifying products to the executive institute.

7. ***Certification***

The Promotion Organization awards "Food GMP Contract" to qualified factories when certain cases are collected.

8. ***Follow-up Management***

Starting from the effective date of the contract, certified food factories should arrange for follow-up inspections under the "Guidelines for Food Good Manufacture Practice Authorization Systematic Follow-Up Management". Reducing frequency of inspection is considered as reward to those who perform well and this is implemented by the executive institute according to the guidelines.

Criteria of Evaluation for FGMP Certification System

1. ***On-site Evaluation***

A. Should comply with contemporary governmental food regulations, Food Factory GMP General Rules, and related specific provisions.

B. Imperfections are classified as minor flaw, major flaw, and serious flaw. Three minor flaws are documented as one major flaw, three major flaws are recorded as one serious flaw. When accumulated flaws equal to one serious flaw, the factory fails the evaluation.

2. ***Product Inspection***

A. Should comply with contemporary legitimate hygiene standard.

B. Should comply with end-product format of the applying factories.

SUCCESSFUL EXAMPLES OF PRACTICING PROCESSED FOOD QUALITY CONTROL SYSTEMS

The followings are the successful examples of practicing these high quality food mark systems:

1. Most of the frozen food, seafood, prepared food, vegetable and fruit factories had acquired CAS and FGMP high-quality food mark systems, and gained recognition from customers locally and overseas.
2. The frozen prepared eel factories had acquired FGMP food mark system during 1992-93, and this effort had made Taiwan eel products taking a prominent position in Japan and Southeast Asian markets.
3. The bottled water industry was used to be home business. However, by practicing the FGMP system during the recent years, the quality of the bottled water has increased significantly and also gained recognition from the customers.
4. Due to the foot-and-mouth disease (FMD) infection of the pig several years ago, the processed meat and frozen meat industry had suffered severe damage. However, the CAS food mark products had played an important role to restore the confidence of customers in buying the meat products.
5. For years, the Council of Agriculture had promoted the rice products intensively, and the prepared rice products have already become popular items in the convenient stores.
6. Other specific institutional channels such schools in Taipei city and Armed Forces restaurants had already purchased CAS or FGMP food products.
7. Forty-five seafood factories had acquired HACCP quality system which will help the export of seafood products to the United States and European markets.
8. Food service and lunch box meal sector accounted for large number of food poisoning incidents in Taiwan during the past years, especially in terms of bacterial food poisoning. Bacteria such as *Vibrio parahaemolyticus, Staphylococcus aureus*, pathogenic *Escherichia coli*, and *Bacillus cereus* cause discomfort to human body. These pathogens usually contaminate the food after heat treatment, and

might come from polluted water, insects contamination, abused operation, and employees; during the cooling, hot storage, reheat processes, the hazards of these pathogens become more significant in the lunch box meal. HACCP designed to prevent and control the hazards related to the food safety, upgrading the management level of the factories, helped in reducing food poisoning incidents from 3.19 to 3.14 percent, from 1997 to 2001.

The factors for success can be classified as follows: 1) the endless endeavors to upgrade the quality of the industry by the government; 2) the safety and quality consciousness of the consumers; 3) the incentives offered by the government, schools and retail market had forced the industry to pursue the recognition of CAS and FGMP systems; and 4) the business benefits and profits of acquiring CAS and FGMP had accelerated the product quality improvement efforts.

STRATEGIES FOR THE DEVELOPMENT OF PROCESSED FOOD QUALITY CONTROL SYSTEMS

With limited land and other natural resources in the Republic of China, only those high quality and value-added agricultural products can survive in highly competitive world markets. On the other hand, the food industry brings added value to farm products, lengthens product shelf life, and widens the product distribution area. Through innovative processing, the product value may increase 10 times. To boost the competitiveness of the agriculture and food industry sector, the Republic of China now undertakes the following strategic approaches:

Establishing the Strategic Alliances among Farmers' Associations and Food Manufacturers

The strategic alliances formed among farmers' associations and manufacturing companies is to integrate the processes of raw material production, processing and marketing of value-added products, thus to maximize the efficiency and profits.

Developing Unique Local Processed Products

Along with the emerging development of agro-tourism in ROC, there is a niche market for unique local processed food products, including preserves of fruits and vegetables, wineries, etc., which require technical guidance on the packaging techniques and sanitary processing practices from the government.

Strengthening Research and Development in Food Industry

Research and development in the food industry should focus on developing unique points of difference, such as tasty local foods are differentiated from the imported ones. Moreover, special efforts are made on the blending of Chinese cuisine and herb medicine, development of functional food as well as cooked and ready-to-eat frozen foods, etc., in order to create the niche market for boosting the value of agricultural products.

CONCLUSION

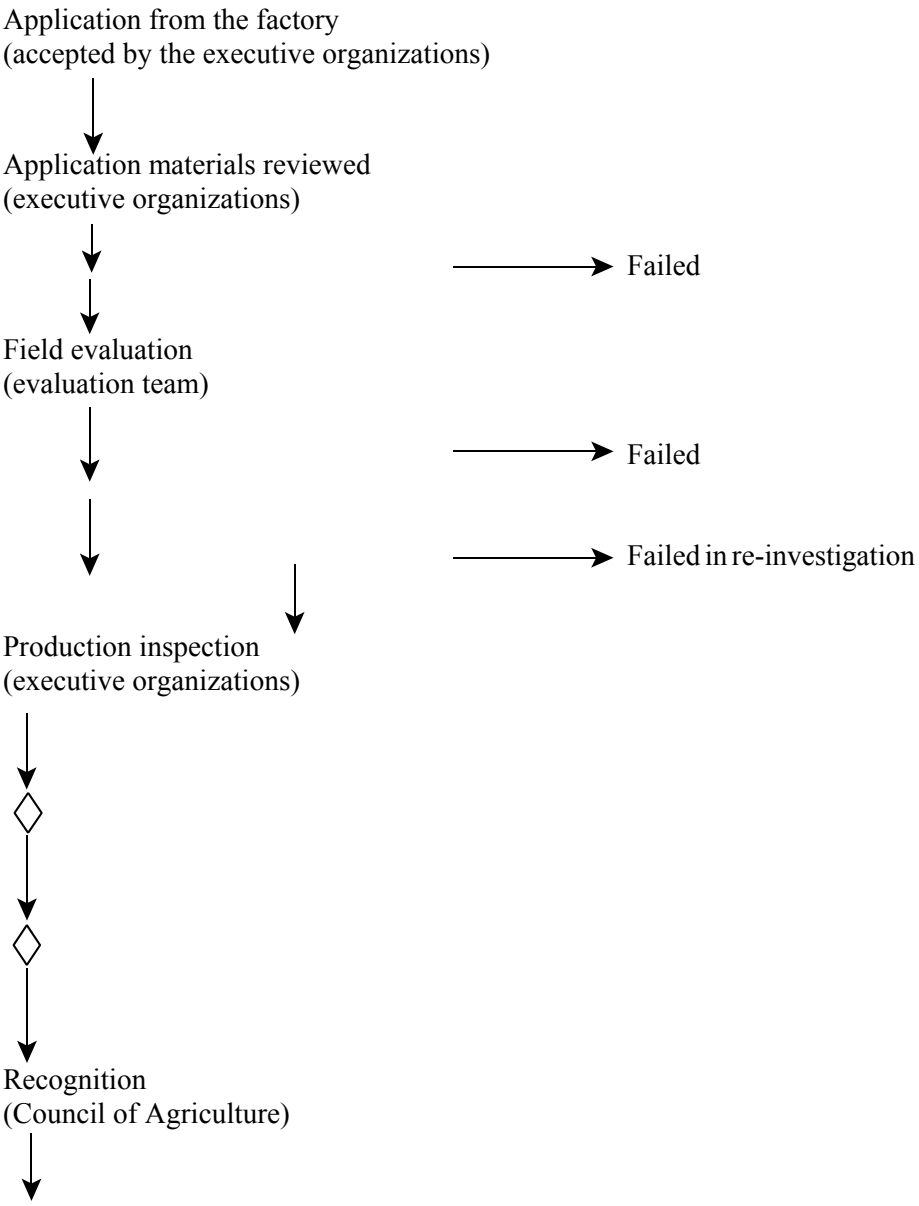
The benefits of practicing food QC systems include image promotion, improvement of working environment, strengthening of self-management abilities, sales growth, and customer satisfaction. Currently in the Republic of China, the quality and management of the food industry has reached an acceptable level, though the processing technology sector needs more improvement. Besides, the integration of these various food QC systems needs more cooperation from industry, government, schools and the research institutes.

Attachment 1: List of FGMP Accredited Plants and Products

Code	Industry Category	Plant (number)	Product (number)
1	Beverages	99	1,008
2	Baked foods	23	218
3	Edible oil	15	135
4	Dairy foods	28	487
5	Powdered infant formulate foods	2	4
6	Soy sauces	5	160
7	Edible ice	5	85
8	Noodle	10	158
9	Candy	8	60
10	Ready-to-serve meals	0	0
11	Monosodium glutamate	0	0
12	Pickled vegetables and fruits	0	0
13	Soybean processed foods	4	42
14	Fishery processed foods	6	24
15	Frozen foods	23	110
16	Canned foods	44	458
17	Seasoning sauces	6	68
18	Meat processed foods	2	29
19	Chilled prepared foods	1	12
20	Dehydrated foods	1	10
21	Tea	0	0
22	Wheat flour	5	37
23	Refined sugar	2	11
24	Starch sugar	3	13
25	Wines	2	8
99	Other foods	8	68
Total		302	3,205

Note: As on 30 April 2002.

Attachment 2: Operation Procedure of CAS High-Quality Agricultural Products



Attachment 3: Implementation Processes of CAS High Quality Food Mark

Period of Implementation	Food Categories	Steps of Promotion
1986 1988 1990	High-quality meats High-quality frozen foods High-quality fruit and vegetable juices	Test-run period
1989 1991 1992	CAS high-quality meats. CAS high-quality frozen foods. CAS high-quality fruit and vegetable juices CAS special grade superior quality rice. CAS high-quality preserved fruits.	Dual logos promotion period
	CAS high-quality meats. CAS high-quality frozen foods. CAS high-quality fruit and vegetable juices. CAS special grade superior quality rice. CAS high-quality pickled vegetables and fruits.*	Integration mature period
1994 1995 1996 1998 2002	CAS high-quality instant meals.* CAS high-quality chilled prepared foods. CAS high-quality fresh edible mushroom. CAS high-quality fermented foods. CAS high-quality snacks. CAS high-quality fresh egg products. CAS high-quality fresh sliced vegetables and fruits.	

Note: * In order to extend the coverage of the industries, CAS high-quality preserved fruits and CAS high-quality rice prepared products had been renamed as CAS high-quality pickled vegetables and fruits and CAS high-quality instant meals, respectively in the year 2000.

Attachment 4: Current Status of CAS High-Quality Food Mark

Since there are considerable differences among the characteristics of various CAS high-quality foods, the Council of Agriculture has appointed several professional organizations to handle the issues related to them. Well-known scholars, experts and representatives from high-quality food companies are invited to constitute the Technology and Promotion Committee to plan accreditation and consumer promotional activities.

Among the 12 CAS product categories, National Animal Industry Foundation is responsible for CAS high-quality meat and egg products. The Second Office of the Council of Agriculture is responsible for CAS special grade superior quality rice. Food Industry Research and Development Institute is responsible for the rest of the nine CAS high-quality food products, whereas the Chinese Frozen Food Institute is responsible for the consumer education and promotional affairs of the entire CAS high-quality food mark systems.

Categories of CAS High-quality Foods	Number of Accredited Companies	Number of Accredited Food Items
Meat products	54*	2,333
Frozen foods	40	521
Fruit and vegetables juices	13	27
Special grade superior quality rice	11	16
Pickled vegetables and fruits	6	63
Instant meals	21	224
Chilled prepared foods	9	43
Fresh edible mushroom	5	7
Fermented foods	4	76
Snack foods	13	77
Fresh egg products	16	14
Sliced vegetable and fruit products	0	0
Total	192	3,401

Note: * Includes four supermarkets.
As on 30 April 2002.

Attachment 5: Procedures for On-site Evaluation of FGMP

Order	Time (min.)	Item	Content
1	10	Address of the company	Welcome speech by the president of the company and introduction of important staff members.
2	10	Address of the evaluation committee	Speech by the leader of the committee and introduction of the members.
3	10	Introduction of the company	Brief introduction about the situation of the company by the president.
4	30	Explanation of the production process and equipment	Curators of each department explain manufacturing process of various products and distribution of working areas and equipment.
5	30	Explanation of the GMP system	Curators of each department explain the operation of GMP system.
6	60	Document assessment	Assessing all documents which include company's operation, standards, production, and records concerning GMP.
7	90	On-site evaluation	In companion with the curators, committee members conduct the on-the-spot evaluation of the practices.
8	60	Discussion	Chaired by the leaders of the committee without the participation of factory staff.
9	10	Results of the evaluation	The results of the evaluation is orally reported by the leaders.
10	5	Recognition	Errors in the records are verified by the committee and acknowledged and signed by the president of the company.

2. FIJI (1)

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INTRODUCTION

The food processing industry is a significant contributor to the Fijian economy. Not only it accounts for significant proportion of GDP, but also provides direct employment to approximately 6,800 personnel (and at least 30,000 farmers and smallholders). It is responsible for the generation of significant direct income. The industry is very dynamic in some areas, but disappointingly static in others.

Unlike most Western countries, Fiji has a large informal food sector, which is subsistent to a considerable extent. This sector encompasses a range of traditional preserved foods, many of which have extended shelf life. Foods such as *palusami*, and *bila* are the local equivalent of convenience foods since they are ready to eat and shelf lives are usually longer than that of the raw materials. The unit operations used in their preparation are based on the same principles as those used by modern food processors. There is merely a difference in the degree of sophistication of the technology used.

Food processing has the potential to play a pivotal role in the improvement of the economic status of the nation. A recent review by UNIDO suggested that one method of stimulating greater activity in agriculture is food processing and adding value to indigenous foods. Carefully designed added value products have increased shelf life and importantly overcome many problems encountered in meeting overseas quarantine requirements.

PROCESSING OF AGRICULTURAL PRODUCTS

Agricultural processing is important for Fiji to extending the shelf life of food for household food security and disaster mitigation and stimulate local markets, tourist markets and exports. In fact there is a long history of traditional agricultural processing in the Pacific.

Processing offers opportunities to utilize agricultural commodities. Processing for the local market has the possibility to substitute for imports. Seasonal oversupply in fruits, vegetables and root crops could be processed rather than left to rot or fetching very low prices. Processing can help overcome quarantine barriers to trade and utilize less costly sea freight rather than airfreight for exports. Pacific islanders living overseas are one important market for processed products from the PICTs. Developing 'world class' products means the right processing and marketing for wider export markets that captures the imagination of consumers.

CURRENT STATUS AND POTENTIAL

The Fiji Government has made a significant investment in agriculture particularly through the Commodity Development Framework. However, food imports have continued to increase thus costing valuable foreign exchange. The Strategic Plan for the New Century has reported that the value of imports has risen by 48 percent between 1992 to 1998 while the value of exported food items rose by 21 percent in the same period (Tables 1 and 2). Annual import of processed fruits and vegetables is worth more than $2 million. Some of these products are available locally and could be processed to supply to the local market.

Table 1. Exports

(Unit: F$ millions)

	1992	1995	1996
Sugar	221.3	276.1	220.6
Fish	41.0	69.8	63.0
Dalo	2.0	8.0	10.8
Cassava	0.1	0.1	17.1
Other	50.3	63.4	70.9
Total	314.7	417.4	382.4

Source: Bureau of Statistics.

Table 2. Broad Overview of Sectorial Imports

(Unit: F$ millions)

	1992	1995	1998
Food	136.2	182.3	204.3
Edible oils/fats	11.3	16.5	14.0
Total	147.5	198.8	218.3

Source: Bureau of Statistics.

Food Canning

There are eight canneries in Fiji canning meat, coconut cream, fish, sauces and vegetables. A wide spectrum of sophisticated technology is found in the canning industry. Canned products are similar in outward appearances but there is a significant difference in quality parameters.

Food Processors (Fiji) Ltd. is one of the major processors of agricultural commodities utilizing the canning technology for canning of coconut cream, breadfruit, *palusami, ivi* and *duruka*. Other products produced by the Company include tomato and soy sauce, which are manufactured using of imported raw materials.

<***Potential for Food Canning***>

Potential for canning of local agricultural fruit and vegetable commodities is significant. However, there is no database on food technology to support such a program. Smaller canneries require technological improvement to support programs of product diversification.

There is very little profit in canned foods. Thus, it is important to run factories at maximum throughput rate with as little overheads as possible with costs for such waste disposal, energy usage and labor kept to a minimum. Successful companies are constantly undergoing product portfolio evaluations in order to increase factory usage. These organizations have the economic capacity to engage in their own technological diversification.

Food Freezing and Vacuum-packing

There are six companies in Fiji producing frozen foods and two companies producing vacuum-packaged products. Frozen fish, chicken, ice cream and frozen confections, vegetable and small goods are all frozen commercially. A company has recently started of freezing root crops and breadfruit for the overseas market. Root crops as dalo, tapioca, fruits that include pineapples, guava, *ivi, vuta, Kavika* and vegetables can be vacuum-packed and sent for the overseas markets.

Rapid freezing technology is therefore required for manufacturers of frozen food products intended for discerning markets in Canada, the USA and Europe. Thus these exporters are required by the market to include blast freezers in their inventory of essential technology.

<***Potential for Freezing and Vacuum-packing***>

Fiji has a comparative advantage in freezing and vacuum-packaging local root crops such as cassava, dalo, *ivi* and more recent breadfruit. Export of frozen and vacuum-packed vegetables is an industry that did

not exist in 1996 but has risen to 80 mt per month now. Cassava, dalo and more recently breadfruit has been well received in Auckland and Sydney and market demand currently exceed supply. These industries are not well supported with technology but have a very bright future in international trade. Quarantine and other regulatory requirements are much easier to meet and product does not deteriorate in the event of shipping, quarantine or customs delays.

The profit margins on these products are, however, slim and sustainability of the industry depends very much on the throughput rates of production. Currently technology is very basic. Most exporters are preparing vegetables by hand and there is only one company that is using a blast freezer. Opportunities to increase market share are flowing to these producers and trial shipments of bele, coconut slurry, yam, and kumala have been produced for market evaluation. Such product diversification has the potential to increase throughput rate and profitability.

Food Drying

There are three organizations that are drying foods in Fiji. Herbs, Morinda citrifolia (noni, nonu, kura) and fruit slices are dried and cocoa and vanilla are dried and cured.

With one exception, all products are sun-dried in Fji. The essential technology is thus a solar dryer – traditionally a cover rack – that is exposed to capture the maximum radiant heat from the sun. They are usually inclined to induce passive convection currents so that moist air is replaced.

Cocoa and vanilla are traditionally sun-dried and cured simultaneously. This is a traditional process and the products are traded in bulk for on-processing overseas.

<***Potential for Dried Products***>

Technology upgrades are not a priority for these industries since the volumes produced in Fiji are very small. On-processing into other product lines such as dried fruits, this would create a demand for further technology involvement and innovation. However, with the adoption of new technology there is a significant opportunity for most of the locally available fruits and vegetables to be processed through drying.

Confectionery

There is a significant confectionery industry in Fiji. Crystallized ginger, toffees, 'hard boiling' (candy), chews and jellies are manufactured in Fiji.

Most confectionery manufacturing is undertaken by Fiji subsidiaries of multinational companies. Exceptions are three crystallized ginger factories in Fiji. Until recently, all processing plants were Fiji-owned. The essential technology is relatively simple – requiring soak tanks mixers and heat exchangers. Non-essential technology has been automatic packaging equipment. One of the manufacturers has been taken over by an overseas company and there has been significant inflow of non-essential technology as a result.

< ***Potential for Confectionery***>

There is enormous potential to use ingredients to a much greater extent. Sugar is commonly imported for the confectionery industry since locally produced sugar does not have the appropriate quality. Crystallized ginger is a significant export commodity but the industry has been slow to diversify into other crystallized and glace fruits. Product development programs do not appear to have been directed at greater use of local foods.

Snacks

Two large multinational companies are engaged in extrusion technology for the production of puffed snack foods with one involved in noodle manufacturing. This technology is very expensive. Since the profit margin is very much associated with the quantity of extruded snacks, very high throughput rates are required order to maintain profitability.

<***Potential for Snacks***>

There are very few companies in Fiji that have the economic size to invest in such technology. The market is competitive and there is currently greater production capacity than market volume.

There is one multinational company that is producing noodles. Mixers, extruders, dyers and packaging equipment are essential technology for this product. Profit margins on noodle product are extremely low and it would be difficult for a new investor to recover the investment in such a competitive market.

Flour is an essential ingredient, which is used domestically or industrially for the production of consumable items such as bread, biscuits and other confectionery. Downstream processing into biscuits and noodles has been the development strategy adopted by the existing processors but other options include the milling of other starch sources such as cassava, dalo, maize and rice starches are also available. These could be used to produce noodles and puffed snacks such as bongos.

CONSTRAINTS LIMITING DEVELOPMENT OF THE COMMODITY TO INDUSTRY

The industry faces significant constraints:

1. ***Inconsistent Supply***

With the smallholder nature of production, inconsistencies in the supply of raw materials to processing facilities remain a significant problem.

2. ***Deregulation***

The implementation of deregulation has brought about an influx of poor quality imports resulting in increasing competition for local processors.

3. ***Lack of Coordination***

Because of lack of coordination between extension staff and farmers information related the market opportunities available and offered by the food processors is not reaching them effectively. Food processors have to incur substantial costs to collect raw materials from individual farmers.

4. ***Marketing and Market Information***

There is a need to source information on markets for locally processed food products particularly organically-grown processed products.

5. ***Credit***

Unavailability of credit remains to be a significant constraint for processors who wish to expand current product lines and those who need to acquire new technologies.

6. ***High Freight Costs***

There are market opportunities for processed products in lucrative markets abroad particularly in the US where there is a significant number of island communities. However, high freight costs has made exports uncompetitive to enable them to take initiative to break into the US market.

7. ***Skilled Human Resources***

The industry is constrained by the lack of skilled food technologists and other technicians to assist the private sector in product development and acquiring new technology. There are no training programs conducted specifically for the food technologists.

STRATEGIES

The following strategies would be adopted to promote the food processing industry:

1. ***Appraisal of the Market and Demand for the Processed Products That Could Be Processed Using Local Raw Material***

A marketing study has to be undertaken to determine the type of products that could be processed locally and the markets available overseas to market these processed products.

2. ***Ensuring An Integration of the Stakeholders in the Chain of Production in order to Ensure An Availability of Local Production of Raw Materials Suitable for Processing***

Close coordination of food processors, extension officers and farmers is vital to ensure that there is consistency in the supply of raw materials suitable for processing. Market information on demand for raw materials should be disseminated as widely as possible to farmers.

3. ***Research on and Development of the Processed Products as well as the Processing and Preserving Technologies Most Suitable for the Socioeconomic Environment***

Research and development on product development, quality control and technological choice are critical for the future development of the industry.

4. ***To Support the Local Cottage Industry Through the Provision of Technical Assistance and Support for Processing and Preservation Activities***

To address poverty in rural areas, technical assistance and support should be targeted towards vulnerable groups to establish cottage processing industries that would sustain their livelihood.

5. ***Establishment of Collection Centers in Strategic Locations***

Collection centers located in strategic locations would ensure that processors are adequately supplied with raw materials and farmers have reliable markets for their products.

6. ***Harmonization of Local Quality Standards with International Standards Recognized Internationally***

Local standards have to be developed for locally processed food products to ensure conform with internationally recognized standards as required by the World Trade Organization.

RECOMMENDATION

Ministry of Agriculture, Sugar and Land Resettlement (MASLR) management is requested to note the status and potential for food processing industry for their information.

3. FIJI (2)

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Samabula

Issues and Constraints in Quality Control of Processed Foods

Lack of government commitment in providing funds, for the development of infrastructure for small, rural-based industries is one of the constraints faced by the processed food sector in Fiji. The opening up of free trade zone in urban areas and other free trade investment to attract overseas investors is implemented to improve the economy. All this contributed to a very small budget allocation to the rural sector.

Quality is everyone's business in an organization – its structure, a reporting system and open communication are necessary for progress. A successful quality control program needs the involvement of people. It is important that the food operational personnel function as a team and openly communicate to identify problems, issues or opportunities. Once the key elements of a quality control program are in place (management, people's commitment, quality awareness, a team effort and open communication) the additional tools are developed. The basic tools of quality control are: ingredient specifications; approved supplier test; product formulae; product standards; manufacturing procedure; critical control procedures points; in-process analysis, records and reporting; label specification; cleaning and sanitizing program; good manufacturing practice requirements; recall programs; warehousing, shipping and receiving programs; and laboratory analysis (tests).

For example, some issues of concern in Twisties production include ingredients, moisture content of its ingredients and its freshness. Also there are other hazards known as PCBS, which stand for Physical, Chemical and Biological.

An example of physical hazard could be the discovery of a piece of metal or stone in a packet of Twisties. If the consumer ingests the substance the manufacturer can be sued. A chemical hazard has a possibility of occurring by an accident. For example, cleaning agent spilled accidentally on the raw material can pose serious threat to health. Biological hazards may arise with bacterial growth found in the food. Fiji imports raw materials and that is another drawback to check each and every raw material for moisture, its purity, etc. during transit. During manufacture, the product is checked at random (every fifth packet is weighed) and in a batch approximately 210,000 packets are processed.

What Quality standards and Labeling Systems Are Used?

The National and Trade Management Pre-packed Articles Regulations 1989 require that the name and address of the manufacturer be marked on the package. It is the only law in Fiji.

However, the Fair Trading Decree requires all perishable and non-perishable items to be marked with the pull date of the item. The pull date is the last date on which the article must be sold, e.g., use by dates, best before dates (all food products are included in this Act). Regarding Twisties, the packet has marked on it:

– a best before date
– the ingredients
– the nutritional content
– (as required by law) the manufacturers name and address.

Labeling is important. People must know what it is made from and which company made it. It must give the customers the information about the product. Specifically labeling protects and guides the customer in purchasing a product. Protection involves health consideration and is provided by listing of the ingredients, instructions, indicating meat items and informing that the product has been inspected for wholesomeness as

a food item. Information regarding the contents of the package, grade or quality, uses and ingredients guide the customer in purchasing at the store level and use of the product in the home.

Food Safety Regulation in Fiji

Every package containing food shall, unless otherwise provided in these regulations bare a label containing:

a) the common name of the food or a description sufficient to indicate the true nature of the food.
b) in the case of food locally manufactured or packed or the agent or any of them should have their names and complete address.
c) the names of the ingredients used in the product in descending order of their composition by weight or volume as the case may be.
d) where the food contains edible fat or edible oil or both, a standard statement as to the presence in that food of such edible fat or edible oil or both together with the common name of animals or vegetable, as the case may be from which such fat or oil is derived.
e) where the food contains food additives, a statement as to the presence in that food of such food additive in the form contains permitted food additive stating the type of the relevant food additives. Such an antioxidant, and anticaking agents, flour improvers, buttering agents, bleaching agents, emulsifying and stabilizing agents, antifoaming agents, preservatives, colors, flavors/flavor enhances edible gums, enzymes, artificial sweetening substances, thickness, acidity, regulators.
f) a distinctive batch numbers or lot number or code number either in numerical or alphabets or in combination being preceded by the words batch number or lot number or any distinguishing prefixes provided that in case of packages weighing not more than 60 g.

Total Quality Control Regarding the Manufacture of the Food

Maintaining quality during the manufacture of food item is achieved by the following:

– Effective training of workers
– Use of photographic aids – pictures give a fair idea of the final product
– Use of standard descriptions
– System quality assurance
– Putting to use "Good Manufacturing Practice" – this includes proper sanitation, use of protective clothing (the factory area is not allowed to be entered without protective shoes, safety cloves, hair nets and jewelry is not allowed).

Regardless of whether quality is to be maintained on agricultural raw materials or on manufactured food products, a systematic quality control program is essential. This program begins with customer's specifications and market demand. What level of quality is demanded and can be produced for the price the customers can afford to pay. Additionally, what legal requirements must be met? With these specifications agreed upon, appropriate testing methods and control station could be set up. Nearly all food-manufacturing facilities have a formal quality control or quality assurance department.

The functions of the quality control department are diverse and far-reaching. Such a department is not only is charged with quality control which implies detection and correction of defects, but also with the broader concept of quality assurance, which encompasses anticipation on prevention of potential defects. In a food processing or manufacturing plant, quality control testing must start with the raw materials. Sampling and testing of the raw materials will provide the basis for accepting or rejecting these raw materials and will give useful information on how to handle the material in order to obtain a finished product of the desired quality and shelf life. Quality control tests on the processed products through manufacturing, packaging, and warehousing operators are essential to ensure that customer's demands and legal requirements are satisfied.

The diversity of testing is further complicated by the variations that maybe excepted between units or batches of raw materials, as well as the fluctuation that occur when any processing condition is repeatedly measured over time. Repeated measurement will provide data for determining of the mean, range and normal frequency distribution of the variable under consideration. Such data can then be used to develop quality control charts. Statistical quality control charts are of many kinds and can be devised to monitor specific

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2. PROGRAM OF ACTIVITIES

(8-14 May 2002)

Date/Time	Activity
Wed., 8 May	
Forenoon	Opening Ceremony Presentation and Discussion on Topic I: *Food Quality and Labeling* by Dr. Shu-Kong Chen Presentation of Country Paper by Participant
Afternoon	Presentation of Country Papers by Participants
Thurs., 9 May	
Forenoon	Presentation and Discussion on Topic II: *Present Situation of Processed Food Quality Control in Japan* by Dr. Yoshihisa Onishi Presentation and Discussion on Topic III: *E-Management for Food Manufacture and Marketing – Application of E-Management in Un-Ran Food Co.* by Mr. Hung-Tao Chu Presentation of Country Papers by Participants
Afternoon	Presentation of Country Papers by Participants
Fri., 10 May	
Forenoon	Presentation and Discussion on Topic IV: *Policies to Promote and Regulate Cost Effective Food Quality Control Systems* by Mr. K. V. R. Raju Presentation and Discussion on Topic V: *Technologies on Quality Control of Processed Foods* by Mr. Michael D. Ma Presentation of Country Paper by Participant
Afternoon	Presentation of Country Papers by Participants
Sat., 11 May	
Forenoon	Syndicate Discussion
Afternoon	Continuation of Syndicate Discussion
Sun., 12 May	Sightseeing
Mon., 13 May	Field trip to Golden Harvest Food Enterprise Ltd. – Un-Ran Food Co., and Kuan Chuah Dairy Co., Ltd.
Tues., 14 May	
Forenoon	Summing-up Session Closing Session