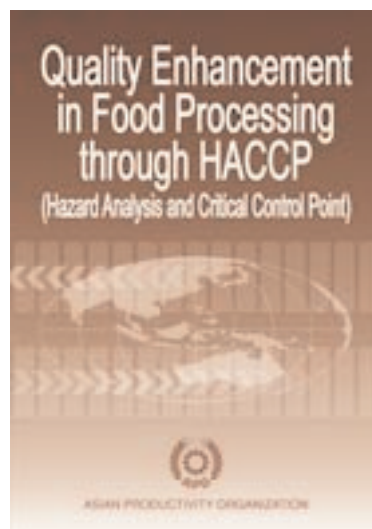

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(Hazard Analysis and Critical Control Point)

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Edited by Ms. Miriam Satin, Maryland, U.S.A.



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Quality Enhancement in Food Processing through HACCP

(Hazard Analysis and Critical Control Point)



ASIAN PRODUCTIVITY ORGANIZATION

**QUALITY ENHANCEMENT
IN FOOD PROCESSING
THROUGH HACCP
(Hazard Analysis and Critical Control Point)**

2005
Asian Productivity Organization
Tokyo

Report of the APO Study Meeting on Quality Enhancement in Small and Medium Food Processing Enterprises through HACCP (Hazard Analysis and Critical Control Point) held in India, 26 February–4 March 2002 (02-AG-GE-STM-01).

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FOREWORD

The food industry in the developing countries of the Asia-Pacific region is expanding rapidly. In view of the liberalization of global trade and increasing demand by consumers in developed countries not only for economical but also for healthy, tasty, and safe food, the industry is confronted with the challenge of remaining competitive in an international, quality-oriented market where commodities, production areas, and brands compete with each other. Many developing countries in the region, however, have only a few food-exporting enterprises with modern quality assurance and improvement systems in place. Thus processed food products from such countries cannot compete well in the international food market due to the lack of quality assurance, and the products have usually been relegated to lower-end markets or abandoned in some cases.

This situation demands immediate attention to improve the quality perception of the food-processing industry, particularly of the small and medium enterprises (SMEs) that constitute a large proportion of the industry in the region. This could be achieved by creating awareness among SMEs of modern quality assurance and improvement concepts such as hazard analysis and critical control point (HACCP), which has become the internationally recognized system for the management of food safety for all companies involved in the production, processing, storage, and distribution of food for human consumption. In the adoption of HACCP, however, SMEs are confronted with many legal, socioeconomic, and technical issues and challenges. Concerted efforts on the part of all stakeholders are needed to overcome those challenges for the widespread adoption of HACCP and other quality assurance systems by food-processing SMEs.

The APO therefore organized a study meeting on Quality Enhancement in Small and Medium Food-processing Enterprises through HACCP. The objectives were to: review the present status of quality control in the food-processing industry, particularly in SMEs in member countries; assess the perception and awareness levels of modern quality concepts with special reference to HACCP; and identify issues and constraints in, and strategies for, the wider adoption of HACCP. This volume is a compilation of the papers and proceedings of the study meeting. I hope that it will serve as a useful reference on the subject in APO member countries and elsewhere.

The APO is grateful to the Government of Japan for financial support of the project, as well as to the Government of India for hosting the meeting, especially the National Productivity Council of India and Ministry of Food Processing Industries for implementing the program. Special thanks are due to Ms. Miriam Satin for editing the present volume.

Shigeo Takenaka
Secretary-General

Tokyo
July 2005

SUMMARY OF FINDINGS

INTRODUCTION

The Study Meeting on Quality Enhancement in Small and Medium Food Processing Enterprises through HACCP (Hazard Analysis and Critical Control Point), which was organized by the Asian Productivity Organization (APO) and hosted by the Government of India, was held in New Delhi from 26 February to 4 March 2002. The National Productivity Council (NPC) of India implemented the program. Seventeen participants from 12 member countries and six resource speakers from India, the Netherlands, Poland and South Africa attended the study meeting. The objectives of the study meeting were to: 1) assess the present quality control situation in the food processing industry, particularly in small- and medium-sized enterprises of APO member countries; and 2) ascertain their perception and awareness levels of modern quality concepts with special reference to HACCP; to identify issues and constraints in the wider adoption of HACCP, and to suggest strategies which would address such issues.

The study meeting consisted of the presentation and discussion of resource papers and country reports, field visits to Mother Dairy Fruits and Vegetables Ltd., Delhi, as well as a workshop. The topics covered by the resource papers were: 1) International Development of Food Safety Systems and Marketing of Processed Foods; 2) Quality Management Systems in Small and Medium Food Processing Enterprises – Experience of South Africa; 3) GMP/GHP and HACCP Systems – Experiences of Small and Medium Enterprises Producing Food Products in Poland; 4) Implementing HACCP in SMEs – Concepts vs. Consumer Participation, Business Culture and Policy Approach; 5) HACCP Certification; and 6) HACCP Implementation – Challenges Facing Developing Countries. On the other hand, the country reports focused on the present quality control situation in small- and medium-sized food processing enterprises and the adoption of comprehensive quality assurance systems, particularly HACCP by small- and medium-sized food processing enterprises in the respective member countries.

HIGHLIGHTS OF RESOURCE PAPERS

International Development of Food Safety Systems and Marketing of Processed Foods

The paper deals with the food safety systems such as HACCP, hygiene codes, BRC (British Retail Consortium), EUREP (Euro-Retailer Produce Working Group) GAP (Good Agricultural Practice), SQF (Safe quality Food) and EHEDG (European Hygienic Equipment Design Group) as follows:

1. HACCP

The HACCP system was introduced in the United States in 1971 by the Pillsbury Company in collaboration with the National Aeronautics and Space Administration (NASA) and the US Army Natick Research and Development Laboratories. These agencies had the initial responsibility for designing and manufacturing food products and hardware which were to provide 100 percent assurance that either the food products would not be

contaminated with pathogens, bacteria or viruses which could cause illness or that the equipment would function with zero defects. The HACCP system has become the internationally recognized system for the management of food safety for all companies involved in the production, transformation, storage and distribution of food for human consumption. It has been adopted by the European Union (EU) for all food processors and the Codex Alimentarius Commission as the principal food safety system (EU Directive 93/43/EEC; Codex Alimentarius – Alinorm 93/131, 1993).

The HACCP concept involves the identification of specific hazards throughout the entire process involved in the production of a food product and focuses on the preventative measures for their control to assure the quality and safety of the food. This includes analysis of raw material sources and usage, processing equipment, operating practices, packaging and storage, together with marketing and conditions for intended use. There is less reliance on the traditional system of end product testing and food safety is built into the product from conception through design and distribution.

2. *Hygiene Codes*

Hygiene codes work with a common HACCP system with predetermined Critical Control Points. Hygiene codes are basically, but not exclusively, established for the small- and medium-sized enterprises (SMEs) or even shops like butcheries and bakeries with limited manpower, where the Critical Control Points have been predetermined. A common HACCP system for a group of products or enterprises as mentioned above (branch) is applied to develop Hazard Analysis and Risk Assessment for that group community and to incorporate standard controls, preventive measures, and corrective actions into the hygiene code. This hygiene code can be applied directly by the operators of the group or branch.

Hygiene codes cover, in a systematic way, those elements which are laid down in the legislation to comply with basic matters on Hygiene and Good Manufacturing Practices and to provide the conditions to ensure the safety of food products.

Hygiene codes assist inspection bodies on their assignment to inspect the relevant items of the implemented system.

3. *BRC (British Retail Consortium)*

The BRC originated in the United Kingdom. Retailer branded products represent over 50 percent of all food sold in the UK. Under the terms of the Food Safety Act, 1990, retailers have an obligation to take all reasonable precautions and exercise all due diligence in the avoidance of failure, whether in the development, manufacture, distribution, advertising or sale of food products to the consumer.

That obligation, in the context of retailer branded products, includes the verification of technical performance at food production sites. Until recently, each retailer undertook this activity separately, verifying food production site performance against their individual, internally developed standards. In some instances, verification is undertaken by the retailer's in-house technologists and in other instances by third party inspection bodies.

Technical inspection of supplying companies' production premises forms only part of the retailers due diligence system, and the acceptance of a company to supply, rests with the individual retailer. Major retailers, like AHOLD in the Netherlands and METRO in Germany are in favor of having BRC as an international standard.

The BRC has developed the Technical Standard (checklist) for those companies supplying retailer-branded food products. The Standard has been developed to assist retailers in their fulfilment of legal obligations and protection of the consumer, by providing a common basis for the inspection of companies supplying retailer-branded food products. It has encompassed the fundamental principles of the retailers' current standards and is intended

to be incorporated into standards used by third party inspection bodies. It is not intended to replace the requirement of any legislation, where this legislation requires a higher standard for a specific industry sector. The Standard will be reviewed on a regular basis by the BRC membership and revised, where considered appropriate.

4. EUREP GAP (Euro-Retailer Produce Working Group - Good Agricultural Practices)

The objective of the EUREP, which is made up of leading European food-retailers, is to raise standards for the production of fresh fruit and vegetables. In November 1997 they agreed on the first draft protocol for GAP. This represented the first step towards integrated production. In September 1998 the EUREP initiated pilot trial projects to verify the implementation of EUREP GAP in the field. They were conducted together with advanced producers in Spain (MARTINAVARRO) and Italy (APO).

The prepared document (checklist) sets out a framework for GAP on farms, which defines essential elements for the development of best-practice for the global production of horticultural products (e.g., fruits, vegetables, potatoes, salads, cut flowers and nursery stock). It defines the minimum standard acceptable to the leading retail groups in Europe, however, standards for some individual retailers and those adopted by some growers may exceed those described. The document does not set out to provide prescriptive guidance on every method of agricultural production.

5. SQF (Safe Quality Food)

SQF 2000 is a HACCP quality code (system) designed in Australia specifically for companies in the agri-food industry. The code is aligned with the Codex Alimentarius Commission Guidelines for the application of HACCP. SQF focuses on food safety and quality issues including GMP, SOPs (Standard Operating Procedures) and HACCP and is compatible with the ISO (International Standard Organization) 9000 standard. The code has been specifically developed for the food industry to include rural producers, processors, transport, storage, catering and hospitality sectors.

6. EHEDG (European Hygienic Equipment Design Group)

The EHEDG is a consortium of equipment manufacturers, food industries, research institutes and public health authorities, founded in 1989 with the aim to promote hygiene during the processing and packing of food products. European legislation requires that handling, preparation, processing, packaging, etc., of food is done hygienically, with hygienic machinery in hygienic premises (EC directives 98/37/EC and 93/43/EEC). How to comply with these requirements, however, is left to the industry. As food safety does not end at the borders of Europe, the EHEDG actively promotes global harmonization of guidelines and standards. The US-based organizations such as National Science Foundation (NSF) and 3-A (Sanitary Standards, Inc.) have agreed to cooperate in the development of EHEDG guidelines and in turn, EHEDG cooperates in the development of 3-A and NSF standards.

Quality Management Systems in Small and Medium Food Processing Enterprises – Experience of South Africa

This paper identifies constraints, progress and status on an operational level of introducing HACCP in a fruit packinghouse and aims to present the exporter's role in this process.

The primary activity of these packinghouses is the packaging of fresh fruit for export. In the light of the food safety requirements in the countries of destination, the South African packinghouses are now under pressure to implement HACCP. Should they fail to comply with these requirements, they lose access to their most lucrative export market, which will ultimately place the packinghouses and consequently the involved jobs at risk.

For a fruit packinghouse the most pertinent system is HACCP, not only because food safety should be a basic standard in all food operations, rather than a competitive edge benefit, but also it will be the only mandatory system in and for exporting to the EU. HACCP is a suitable system to ensure food safety in a packinghouse. It was developed for the food processing industry but it can be readily adapted to the operation in a packinghouse, even though some might consider packing not to be processing in the strict sense of the original definition.

Fruit is delivered from one or several farms for grading, sorting and packaging to a so-called packinghouse. Packinghouses are either owned by single large farms or by communal structures in which several farms participate. There are several projects under way that encourage ownership participation of employees and previously disadvantaged people by means of share plans and similar models. In order to maximize the return on investment some packinghouses will pack different types of fruit throughout the year. A typical example in South Africa is avocados and mangoes that are frequently packed in the same packinghouse. The packing, grading and sorting requirements are similar and allow for the reuse of machinery. The procedures in packinghouses are in fact quite similar for most fruit types, except for table grapes, in which the share of manual labor is far above average.

While resistance to change is a problem in the whole food industry, the fruit producers are particularly reluctant to break from their tradition. This is due partly to their unfamiliarity with the end-consumer who lives in a “different world”. The European end-consumer’s perhaps somewhat idealistic demand for healthy, biological, non-chemical, environment-friendly untreated food is poorly appreciated in these circles that must produce quantities of faultless fruit against dwindling margins. Another reason is the “foreign”, western origin of the systems, including all food safety and quality management systems, which raises fears of foreign interference in people who look back on a long history of proudly defended independence.

Big companies will find resources and technical assistance relatively easily, while small businesses struggle against the lack of appropriate funds, experience and food safety priorities. Generally the cost of fruit production is on the increase, while the oversupply in the world lets prices for horticultural products decrease. Training centers, laboratories, research institutes and suppliers of packaging and chemicals are often not established in the grower’s areas. A common misperception is that HACCP is the magic formula to right all wrongs – ranging from poor personal hygiene, unsuitable facility design, and inadequate cleaning programs to ignorance and illiteracy – preferably overnight and at low or no cost.

The packinghouse is an integral link in the supply chain and thus the cooperation of other links in the chain is essential. Much support is needed from the supplying farm, as well as from the exporter. If the farm does not produce according to EUREP GAP guidelines, the delivered fruit must at all times be accompanied by a record of the production unit and a spray summary giving details of what chemicals have been used during production. More cooperation is needed in terms of the staff hygiene, transport and equipment.

To have a person from the exporter in the HACCP team of each packinghouse not only makes the team bigger, but also adds to input from the exporters’ perspective. The team meetings take on a more formal manner, as this person is not part of the daily workforce. This person, being a member of many teams, can get an overview of the progress in the industry and can instill an element of competition to accelerate the process. Moreover, physical aids like signboards, examples of control sheets and training material can be distributed and financial incentives, such as free pre-inspections or covering certification costs, can be offered to increase motivation.

While some people may see prerequisites (PRs) as a new concept and think it makes HACCP more difficult, it is in fact the only way to keep the number of Critical Control Points (CCPs) low and the HACCP plan manageable. To keep the system as easy as possible, it is very important to ensure that everybody can understand it. This is particularly relevant in a packinghouse where most staff members have no higher education.

Since HACCP cannot be implemented overnight, the motivation and focus can fade. It is therefore helpful to jointly develop a proper project plan with realistic, measurable milestones that are regularly monitored by the HACCP team. Even though a certification is not mandatory, it is advisable to certify the system once it is implemented. The final audit day will serve as a dead line and the display of the certificate in the office is a reminder to maintain the system.

Prior to 2001 no fruit packinghouse in South Africa was HACCP certified. Over the last two years, the combined efforts of packinghouses and exporters have been focused on getting the PRs in place. As of today (almost) all PRs are in place, the actual HACCP implementation can be approached and thus a rapidly increasing number of HACCP accreditations can be expected in the near future.

South Africa has a national code of practice for the implementation of a HACCP system. A workgroup is drafting a document for fresh fruit and vegetables, which will become a local food safety regulation and will be legally enforceable.

Pressure from European clients and the EU directive mandating HACCP is the major driving force for the whole food processing industry in South Africa. Factories producing for export, including the fruit packinghouses, are ahead of other food processing sectors in terms of awareness, commitment and progress in implementing PRs.

There is little doubt that HACCP has brought numerous benefits to the food safety scenario. For the fresh fruit industry in South Africa it has led to a better understanding of food safety amongst the packinghouse managers and owners, resulting in a general improvement of packing facilities and indicates that national regulations will be brought in line with the European food safety requirements.

GMP/GHP and HACCP Systems – Experience of Small and Medium Food Processing Enterprises in Poland

Modern systems of food health quality assurance are based on the concept of creating production conditions which guarantee optimal quality products. It is necessary to define quality characteristics and potential dangers as well as forecast the quality of a finished product in these systems, as opposed to the traditional systems which were based on controlling finished goods and eliminating products which did not meet defined requirements.

Amongst Polish food companies implementation of quality management methods and systems and quality assurance is becoming more and more popular. In food processing and turnover some of the systems of food health quality assurance already are or soon will be obligatory. Thus, as of 28 February 2000 there was a binding Health Ministry regulation regarding sanitary conditions and hygienic rules for the production and turnover of food products, beverages and additional substances, as well as the additional 22 November 2000 regulation of the Ministry of Health which introduces an obligation of implementing Good Hygienic Practice (GHP) and Good Manufacturing Practice (GMP) in food production and turnover.

There is still a Ministry of Health project being prepared with regards to a regulation concerning the scope and methods of internal quality control of food products, beverages, additional substances or other additions to food products and beverages as well as materials

and products having contact with these articles, and the scope and methods of internal hygienic control. This regulation shall introduce an obligation of implementing the HACCP system.

The basic systems of health quality assurance used in food production are GMP, GHP and HACCP – the system which includes the area of food health quality assurance. It has to be strongly emphasized that the HACCP system is an independent food safety assurance system, specific for the food sector. Implementation of HACCP systems in production plants processing food should be preceded by implementing principles of Good Production Practice (GPP) and GHP. This should settle all the issues referring to plant hygiene and to basic food production conditions. It is essential that all the hygiene-related elements (i.e., applying relevant systems for a given hygienic production process, relevant washing and disinfecting agents) are consistent with sanitary requirements, efficient technical equipment and the efficient use of chemicals, water and time. GHP means performing all the required activities during the production and turnover of food products, and complying with conditions that assure the relevant health quality of the food products. GHP includes: maintenance of hygienic rooms, machines, production personnel, planned training courses and medical examinations as well as registration confirming performed and controlled cleaning and preventing activities (very often done by external services); washing, disinfecting, elimination of rodents; and other means used to maintain hygiene. Every food producing plant in Poland must have an instruction of GHP based on Polish and world regulations and adopted to the plant and production characteristics.

GMP includes the basic areas of a company's activity, the level of which determines whether the food produced meets the relevant quality. Food production should take advantage of GPP experiences. Elaborating GMP principles and following them are a basis for implementing other quality assurance systems. The experience makes us believe that just one GHP/GMP system should be discussed and implemented. The requirements of these systems are connected, interwoven with and dependent on each other.

After elaborating and implementing GHP/GMP, a subsequent, logical step is to elaborate and implement the HACCP system. Special attention should be paid to all the potentially dangerous factors affecting the consumer's health in order to guarantee food health safety. These factors have to be defined and then preventative activities should be elaborated. If necessary, CCPs should also be identified to minimize or completely eliminate any dangers. The HACCP system consists of seven rules and is implemented in 12 stages. This system implements changes to previous habits, forces analysis of the production processes in the plant production areas, including areas which have production problems, and shifts the responsibility to the employees directly connected with the production. The presentation discusses basic rules of GMP, GHP and HACCP systems. Practical aspects of implementing the above mentioned systems are presented together with their advantages for food companies in Poland.

Implementing HACCP in SMEs – Concepts vs. Consumer Participation, Business Culture and Policy Approach

Introducing any new concept or technology in small- and medium-sized enterprises (SMEs) require altogether a new approach, as they distinctly differ from their fortunate cousins, namely; larger enterprises, in terms of size, resources and access to knowledge. Since HACCP is an uncompromising, demanding and exacting quality assurance concept it is unfair to expect SMEs to implement it straight away without actually assessing their ability to do so. In addition SMEs may also be keen to ascertain tangible and immediate returns that

accrue by investing in HACCP. If HACCP needs to be introduced and sustained in the long run in SMEs, especially in the developing countries, it is imperative to thoroughly understand the level of consumer participation, prevailing business culture and the policy support and direction.

All new and promising concepts including HACCP have a greater chance of adoption when the benefits are quantified and presented in monetary terms. As business basically revolves around money no amount of persuasion by harping upon social responsibility, statutory obligation and public health would succeed in convincing the SMEs to implement HACCP. This means HACCP campaigns with a judicious mix of technical and financial advantages can penetrate SMEs at a faster rate than the conventional ones. A coherent and proactive policy is perhaps the most critical factor that separates the success of HACCP from failure. The government's commitment sends the right signals to the food industry about the implementation of HACCP.

Export-focused policy is one of the main reasons for slow adoption of HACCP in SMEs. Since most of them are not involved in food exports directly, they have never felt the need and urgency to implement HACCP. Soft-pedaling by the policymakers has also not contributed to HACCP's cause. Emphasis on voluntary compliance has not paid rich dividends so far and it seems the time has come to look for hard options such as coming out with a definite time frame for compliance. Punitive action for defaulting units may also have the desirable effect in the food industry.

At present, in countries like India, 50 percent of HACCP implementation costs, subject to a maximum of one million rupees, are being offered as a grant for interested food enterprises irrespective of their size. Keeping in view the large number of food processing units operating at home, small and cottage level it is worthwhile to enhance this assistance to 75 percent. However this enhancement will be implemented with a provision of mandatory compliance in the specified time period. Involving banks and other developmental agencies in a big way to extend soft loans for HACCP implementation may also encourage many SMEs to come forward voluntarily.

The multiplicity of agencies and their conflicting interests have resulted in either confusion or lack of action. Since HACCP revolves around a wide spectrum of activities such as health, agriculture, food processing, trade, exports, etc., agencies responsible for these sectors are either claiming complete authority over HACCP or passing the entire buck to others resulting in slow progress of HACCP implementation. An exclusive agency to monitor the implementation of HACCP in the food industry may yield better results rather than cobbling a loose mechanism by drawing people from different agencies. The success story of Thailand is an excellent example for developing countries in the region to follow in order to effectively implement HACCP. It has started working on HACCP since the early 1990s and emerged as one of the leading exporters of seafood to developed countries from the Asia-Pacific region.

Another area that requires immediate policy intervention is food legislation. Many developing countries, especially in the South Asian region, are still grappling with a legislative approach that is predominantly curative. Food legislation in these countries has yet to catch up with the latest developments, with modern quality and safety concepts such as GMP and HACCP missing from them. This situation is not conducive for promoting a preventive approach to food safety. Minimum requirements prescribed in many cases are below Codex standards and arrived at as a compromise for taking shelter under the prevailing manufacturing and technological capabilities. Needless to say proactive food legislation is

essential for the success of HACCP and there is a need for immediate policy reorientation in this regard.

The policy of voluntary compliance without a specific time frame has not yielded desirable results so far in many countries of the region. Keeping in view the rise in food-borne diseases and the subsequent strain on budgetary resources to control them, it is prudent to make HACCP compliance mandatory for SMEs in a phased manner but within a specific time frame. This move, apart from contributing to the overall improvement of food safety and hygiene, helps harmonization with global standards, gradually resulting in trade benefits. This suggestion may sound a little bit harsh in the context of the fragile nature of SMEs operating in the food sector but in the overall interest of consumer health and the beckoning export opportunities, SMEs may have to take this bitter pill sooner or later.

Apart from providing funds for implementing HACCP in SMEs, there is also a need to create mass awareness through different media for the benefit of consumers. A well-informed and demanding consumer in turn would act as a catalyst for increasing the pace of HACCP adoption by the SMEs. Lack of awareness about HACCP and its impending benefits is impeding HACCP propagation and this could only be overcome with adequate budget allocation for innovative publicity campaigns. The ultimate aim of this strategy is to make the food industry use HACCP as a trump card in their marketing campaigns. Hence mass publicity shall form an integral part of any HACCP policy in the developing countries for its success among SMEs.

Recognition and rewards act as great stimuli for entrepreneurs to strive for excellence. Instituting national level awards for promoting and implementing HACCP in an exemplary manner may provide the much-needed momentum for HACCP campaigns in developing countries. Already some member countries like India are implementing similar schemes for promoting productivity in industry, agriculture and service sectors with considerable success. Similar efforts specifically targeting HACCP in SMEs may yield tangible benefits. If launching exclusive recognition schemes is not possible for some reason, HACCP implementation should find a prominent place in the performance appraisal of SMEs operating in the food sector.

Shortage of adequate trained personnel to assist SMEs is also hindering the progress of HACCP implementation in many countries. There is a need to formulate a policy to encourage SMEs to train their personnel in various aspects of HACCP. In addition, institutions involved in producing food technologists and food engineers have to include HACCP in their curricula to meet the shortage of personnel. Engagement of foreign consultants should also be encouraged to keep pace with the latest developments in the west on a selective basis. Since these consultants come with a price tag and usually beyond the reach of SMEs, it is necessary to convince the concerned governments to extend these services under bilateral assistance programs. Attracting international agencies like UNIDO, WHO and FAO in a big way may also help the cause of SMEs in expediting the implementation of HACCP.

Policies can succeed only when they are made after a thorough understanding of the basic realities and as such a reliable database about various aspects of HACCP implementation at national level is essential. Unfortunately enough attention has not been paid towards this issue so far and it is time to concentrate on developing national as well as regional HACCP databases, with emphasis on SMEs. Organizations like APO which have a tradition of conducting periodic surveys on important topics in the member countries can

play a leading role in this regard. This will help not only in conducting objective comparative analysis but also in duplicating success stories among different countries of the region.

To conclude, it is important to note that HACCP policies formulated without proper understanding of business culture and the level of consumer awareness are bound to encounter roadblocks sooner or later. Before launching large-scale HACCP campaigns it is necessary to prepare SMEs mentally by explaining the inevitability of HACCP adoption not only for growth but also for survival. A business plan that justifies the investment on HACCP in clear monetary terms is the best way to convince SMEs to adopt HACCP. Exerting pressure through consumers is another way of increasing the pace of HACCP implementation among SMEs. A dual HACCP approach emphasizing exports may not succeed in the long run, especially in the open market era.

HACCP – Food Certification

The SPS (Sanitary and Phyto-sanitary) Agreement under the WTO Agreement makes it mandatory for all countries to maintain measures to ensure that food is safe for consumers and to prevent the spread of pests and disease among animals and plants. The HACCP system is a food safety management system, recognized by the Codex Alimentarius Commission, which is the internationally recognized standard for world food trade under the WTO Agreement.

The HACCP system, which is a preventive food safety management system, has shifted emphasis from resource-intensive end-product inspection and testing to that of prevention or control of hazards at all stages of food production. Since the focus is on food safety, the intent is to institute preventive mechanisms in the system.

The HACCP system is a proactive food safety management system, with focuses on prevention. It encompasses the key elements of good product management, good hygiene conditions and good manufacturing practices and calls for: a) critical examination of raw materials, processes and products; b) hygienic conditions from origin till it reaches the customer; c) identifying stages/processes where hazards could occur; d) instituting and maintaining controls at identified stages/processes; e) documenting HACCP process and keeping records; and f) ensuring that the system continues to work effectively.

An evaluation or audit of a company's HACCP system is necessary to ensure that it is being implemented effectively and is suitable to achieve the objectives. An audit is defined as a systematic and independent examination to determine where the activities and related results comply with the planned objective. An audit is an effective evaluation of a company's quality and safety management system. It brings out whether the documented system has adequate evidence to demonstrate the effectiveness of its implementation.

The audit paves the way for continuous improvement. The purpose of the audit is: a) establishing adequacy and suitability of the system; b) determining effectiveness of the system; c) providing an opportunity for system analysis; d) aiding problem solving; e) facilitating decision-making; f) aiding employee involvement; g) helping to establish capability of process and equipment; h) ensuring compliance with legal and statutory requirements; and i) providing aid for communications and facilitating training.

The Bureau of Indian Standards (BIS), the officially recognized certification body in India, besides offering product certification also offers system certification schemes to the industry. These include: 1) Quality System Certification (against IS/ISO 9000); 2) Environmental Management System Certification (IS/ISO 14000), and 3) HACCP

Integrated ISO 9000 System Certification against IS/ISO 9000 and IS 15000:1998 Food Hygiene – HACCP System and Guidelines for its application.

BIS operates its certification scheme through its five regional offices and 24 branch offices spread over the country. It has a pool of trained auditors and HACCP experts who are able to provide service to the industry and to provide certification of those units who have a documented, established and transparent quality/safety management system that ensures customer satisfaction through *inter-alia* complaint redress mechanisms. More than 850 units representing a wide spectrum of industrial and infrastructural activities have been certified. Of these, around 53 belong to the food and beverage industries, out of which 26 units have so far also taken HACCP certification. These include 21 dairy units, two spices units, one processed meat export unit and one unit processing tomato puree and fruit-based drinks.

Conscious of the requirement for the food industry to be able to demonstrate compliance of food safety requirements through HACCP implementation, BIS is likely to launch the stand alone HACCP certification against IS 15000 shortly, for which policy level work is underway.

An effective implementation of HACCP leads to:

- a) institution of controls at different stages of processing which reduce rejections at the end of the production line;
- b) identifying the critical control points to limit technical resources targeted at the management of food safety program;
- c) encouraging people to recognize and become aware of food hazards that might be a threat and how to take speedy remedial measures; and
- d) disciplined approach for continuous improvement in product safety and quality.

HACCP Implementation – Challenges Facing Developing Countries

HACCP is a science-based analytical tool that enables management to introduce and maintain a cost-effective ongoing food safety program. It involves the systematic assessment of all the many steps involved in a food operation and identification of those steps that are critical to the safety of the product.

HACCP is applicable to the identification of microbiological, chemical and physical hazards affecting product safety. It should only be applied to food safety but the technique can also be used to identify and control hazards associated with microbial spoilage and quality of products. It must be applied to a specific process/product combination, either to an existing process or as part of a development brief and will require the full commitment of senior management and technical staff to provide the resources necessary for successful analysis and subsequent implementation.

The HACCP approach allows management to concentrate resources on those steps that critically affect product safety. A HACCP study will produce a list of Critical Control Points (CCPs), together with controls, critical, limits, monitoring procedures and corrective actions for each CCP. For continuing safety, full records must be kept of each analysis, the efficacy of the study must be verified on a regular basis, and the HACCP plan must be reviewed when aspects of the operation or product change, or when a food-borne pathogen emerges with public health significance.

One of the many advantages of the HACCP concept is that it will enable food manufacturing or catering companies of all sizes to move away from a philosophy of control, based primarily on end-product testing (i.e., testing for product failure), to a preventative

approach whereby potential hazards are identified and controlled in the food processing environment (i.e., prevention of product failure).

HACCP is a logical and cost-effective basis for better decision-making with respect to product safety. It provides food processors with a greater security of control over product safety than is possible with traditional end-product testing and when correctly implemented may be used as part of a defense of 'Due Diligence'. HACCP has both national and international recognition as the most cost-effective means of controlling food-borne disease and is promoted as such by the FAO/WHO Codex Alimentarius Commission.

This technical manual describes the principles of HACCP and is also a practical guide for its application. The manual includes examples of microbiological safety issues, because food contaminated with microbial pathogens is the most common cause of illness but, as mentioned earlier, the principles outlined are also applicable to chemical and physical safety hazards and microbiological spoilage.

Food is a big business. Food production is now scientifically based and it is now possible to transport food over a long distance and have it arrive at its destination in the most wholesome condition. Consumers worldwide have access to a wider variety of high quality foods in greater quantities than ever before. The other two developments in the food trade are the dramatic increase in countries engaged in food production and export and the internationalization of food tastes and habits. The cross-border transfer of processed foods is within an average value of US\$500 billion and is continually growing. Products traded include processed and preserved foods of plant, animal and marine origin as well as fresh fruits and vegetables, grains and beverages.

The fundamental criterion is that food shall be safe and free from adulteration. Governments have enacted standards and regulations that would ensure consumer safety and prevent dishonest practices in the production and sale of foods. The Codex Alimentarius Commission has established the HACCP-based approach to ensure food safety as a benchmark in international food trade.

The HACCP system, which is science-based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing. Any HACCP system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments.

HACCP can be applied throughout the food chain, from primary production to final consumption, and its implementation should be guided by scientific evidence of risks to human health. As well as enhancing food safety, implementation of HACCP can provide other significant benefits. In addition, the application of HACCP systems can aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety.

HIGHLIGHTS OF COUNTRY REPORTS

Bangladesh

Bangladesh has industries belonging to both the public sector (heavy industries, jute, textile, fertilizer, paper, cement and sugar mills, etc) and the private sector (16,633 manufacturing units among which 5,576 are food industries). The Bangladesh Sugar and Food Industries Corporation (BSFIC) manages 16 sugar mills. The Bangladesh Standard Testing Institution (BSTI) is responsible for overseeing the quality of a wide variety of

manufactured goods in Bangladesh, including various food products. The BSTI also maintains contact with other national and international quality control institutes/systems such as ISO 9000 and ISO 14000.

The major constraints in the adoption of an international quality assurance system for food processing plants are: 1) use of old and outdated machinery and technology; 2) lack of working capital; 3) production of raw materials and lack of preservation facilities; 4) management and maintenance problems; 5) absence of skilled manpower; 6) marketing and distribution difficulties; 7) quality control facilities; and 8) improper environmental considerations.

The Bangladesh Government has formulated the “Industrial Policy 1999”. Under this policy, foreign investment is encouraged for export-oriented, processing- and high technology-based industries. This policy also includes provisions for tax exemption on royalties, technical know-how and assistance, capital gains from transfer of shares, and others. The hope is that this industrial policy will encourage foreign investors to establish industries with modern QC departments, ensuring an optimum level of quality for food products, similar to that in developed countries.

To achieve the objective of total QC assurance systems in the country: a) every industrial food unit should have a QC laboratory at plant level, provided with the necessary equipment and well-trained and adequate manpower; b) there should be a government inspection and monitoring laboratory with similar facilities at the national level; and c) the HACCP system should be introduced in small and medium food industries for the identification, assessment and control of food hazards.

Republic of China

In the year 2000, the total number of enterprises in Taiwan amounted to 1,091,245. The number of SMEs was 1,070,310, accounting for 98.08 percent of the total. The SMEs in Taiwan are characterized by innovation, flexibility, efficiency and have an ability to adapt to market changes. They have led the local economic development, creating a large number of employment opportunities, and contributing significantly to improving the quality of life and maintaining the social stability. There are more than 5,500 local food processors employing approximately 100,000 people.

The food industry in Taiwan has been exposed to strong challenges from importers since the late 1970s. The Council of Agriculture initiated the Chinese Agriculture Standard (CAS) quality certification system in order to assist the industry. The Ministry of Economic Affairs enforced food GMP as another quality certification system. CAS has expanded to cover 11 product categories, 182 certified food processing or retailing facilities, and 3,400 products. The major emphasis is on domestic origin, freshness, high quality, and product safety. Food GMP focuses on product quality and hygiene practice in the manufacturing process. By the end of 2001, there were 299 certified food GMP factories with over 3,400 products.

While CAS and GMP evolved as voluntary high performance standards for average food products, the Department of Health later published GHP to set the mandatory minimum sanitation standards for food processors. GHP encompasses the processing premises, construction, equipment, personnel hygiene, standard sanitation operation procedures, as well as water, suppliers, processing, storage, and transportation control, as well as record keeping and personnel training procedures.

HACCP arrived last amongst the certification systems. Certain pilot HACCP programs concerned with seafood and several other food sectors have been undertaken. The lunch box processing industry is a successful example. In the first year of the program (1998), 23 out of 25 participating lunch box processors were granted pilot HACCP certifications. In the second year, the reported number of food-poisoning victims at schools decreased by 30 percent as compared to the previous year. By the end of the third year, a total of 193 lunch box processors and food establishments were certified under the pilot HACCP program which led to further 28 percent reduction in the number of food-poisoning victims that year.

Fiji

The Fiji National Training Council chalked out a national program to improve quality awareness in companies related to the food processing industry in 1998. The program is aimed at promoting quality control programs as a curriculum in schools and providing a package for SMEs in the food processing industry to introduce and implement quality programs compatible with their capacity. However, introduction of quality assurance systems (QAS) in SMEs is still in its infancy. The main issues and constraints in the implementation of QAS include inadequate participation of trade unions, lack of trained manpower, lack of multi-skilled training facilitators, lack of quality programs compatible with the skill level of the workforce, inefficient traditional quality control systems, lack of awareness on food quality among the consumers, lack of consumers' organizations/pressure and the high cost of implementation of QAS, amongst others. The paper also suggests some strategies to address such issues.

India (1)

India is the land of the farmer with approximately 70 percent of the population engaged in agriculture. Livestock rearing is an integral part of farming. Since liberalization in August 1991 the food industry has witnessed rapid growth in most of the segments. India accounts for nearly 16 percent of the world's cattle population, more than half of the world's buffalo population and about 17 percent of world's goat population. The slaughter rate in case of sheep and goats is 33 and 38 percent, respectively. There is a low domestic demand for meat of bovine animals due to consumer preference for sheep and goat meat. Hence enough potential is available for export of buffalo meat.

The prevalence of various livestock diseases and inadequate modern and integrated facilities are the two major constraints in promoting the export of meat. India has achieved the rinderpest-free status and is also free of BSE and scrapie. However, certain other livestock diseases like foot and mouth disease, etc., are still prevalent in the country. The exporters are ready to set up modern and integrated meat production facilities. However, because of the socio-political problems they are finding it difficult to get the necessary approvals from the government for setting up these facilities. India also has the advantage of being price competitive, particularly for buffalo meat.

In the present day global market, quality and food safety have resulted in a competitive edge for enterprises producing foods and providing services. India's major trading partners are USA and European countries. India may lose orders from these countries as they are tightening the quality standards relating to food hygiene and safety. With all these developments on the food product export front it becomes all the more important for Indian exporters to implement ISO 9000/HACCP in order to assure food quality and safety to the

customer. Indian food companies should combine their HACCP and the ISO 9000 systems into one coherent program.

In order to meet the international standards, various governmental agencies, such as the Ministry of Food Processing Industries, Agricultural and Processed Food Products Export Development Authority, Department of Animal Husbandry, Ministry of Commerce, etc., are particularly engaged in the improvement of the meat industry in India by providing grants and financial assistance. Also, the concept of disease-free zones and the concept of an agri-export zone, which will not only ensure hygienic and safe meat but also a clean environment, are in their pilot project stages. They will generate minimum pollution and will also have effective utilization of byproducts. Indians are converting all the challenges posed by various regulations into opportunities in order to expand their business.

India (2)

India has transformed itself from a food deficient country to a food surplus country through the Green Revolution, White Revolution and Economic Reform. Economic liberalization and modernization changed the food consumption habits from home preparation to fast food indicating an enhanced significance of the food processing industry. However, small and medium food processing units work on small working capital and small return margins. They cannot afford to have qualified employees and they carry out production in the traditional way. They are self-supervised by the entrepreneur and do not have laboratory facilities to assure confirmation of quality standards. The medium-sized units which have laboratories restrict their utilization to the minimum requirements mentioned in the Prevention of Food Adulteration Act, Agriculture Produce (Grading and Marketing) (AGMARK) and Indian Standards Institution (ISI).

The main constraints in adoption of quality assurance systems are: lack of awareness; high cost for adoption of quality assurance systems; no legal obligation to adopt the quality assurance system; and lack of time frame for implementation of quality assurance systems. The paper also suggests strategies which address such issues.

Islamic Republic of Iran (1)

Health control of animal products for domestic consumption or export to other countries is the responsibility of the Iranian Veterinary Organization (IVO). There are two coasts in the north and south of Iran. There are many aquaculture farms situated along the coasts with approximately 450 thousand mt of fish catch, 14,000 fishing vessels, 15 freezer vessels and some processing units. All of the vessels and establishments are under direct supervision of IVO which is also responsible for the application and implementation of the HACCP system in these plants.

Efforts for implementation of the HACCP system were initiated in 1994 when the first training courses on HACCP for relevant experts were organized with FAO assistance. Since 1996 the HACCP system has been applied for the fishery industry. All plants which have a sanitary permit from IVO are obliged to perform the execute requirements for HACCP system regarding the sanitary condition of building, establishment, etc. The fish processing plants are also obliged to apply the HACCP system during the various stages of processing. The IVO supports the fish processing industry in HACCP implementation by conducting several training courses and arranging visits of experts to the plants. It has recommended the application of HACCP systems to enterprises that produce the primary materials for large-

scale food processing establishments and consider economic hazards as important as other hazards (biological, chemical and physical).

Islamic Republic of Iran (2)

In recent years globalization of the economy, complexity of markets and enhanced competition among manufacturing enterprises has led to daunting challenges for the small- and medium-sized enterprises (SMEs) to access and maintain both domestic and overseas markets. In this new economic scenario, SMEs are facing many constraints and problems. Fortunately many Iranian SMEs started various activities in order to improve the quality of their products and to obtain certification for quality management systems (QMS) such as ISO 9000, QS 9000, ISO 14000, and HACCP. The numbers of Iranian SMEs certified for such QMS is increasing day by day.

The paper illustrates the trend in quality improvement among Iran's SMEs and discusses the present situation regarding the application of QMS. The trends, growth and progress in implementation of HACCP in Iran's food processing enterprises, as well as constraints and problems in the implementation of HACCP and strategies to alleviate such problems are also reviewed.

Mongolia

Mongolia is in the initial stage of implementation of quality assurance systems such as HACCP in the small- and medium-sized food processing industry. The main constraints include lack of awareness; lack of trained manpower; lack of technology; inadequate policies on quality assurance of food; and inadequate implementation of the recommendations made by the consultants from time to time. The consultants have provided valuable recommendations; however, few of them have been implemented thus far. For instance, since the last consultancy about one and a half years ago, out of six items only half have been implemented.

Both government and international agencies must seek and support an effective mechanism of cooperation to improve the effectiveness of the technical assistance on food safety. Traditional approaches of technical assistance provide valuable recommendations. However, due to unclear resources for implementation, the short duration of training courses during the consultancy, inadequate/inappropriate selection of participants and the government's busy schedule all contribute to the failure of the expert's advice. The support of national institutes and universities and revision of curriculum and training of teachers of food technology and public administration is a key to improving food safety and capacity building in developing countries. It may be time-consuming and expensive, but it is more sustainable and effective. The distance learning approach and a direct relationship between the food institutes in different countries might be a reasonable way to train lecturers of food institutes in developing countries and to strengthen their capacity.

Nepal

Small- and medium-sized food processing industries play an important role in Nepal's industrial development. They account for a very substantial part of the industrial output, employment and even exports. Despite its significant contribution to the national economy, the small- and medium-sized food processing industry has been suffering from a multiplicity of problems as reflected by the wide spread weakness of such enterprises. Most of the small- and medium-sized food processing industries in Nepal are based upon simple technology and

the market for modern processed foods in Nepal is rather low. Although the export potential of processed foods in India and other countries demonstrate a good possibility for the establishment of modern food industries, the lack of domestic raw materials, skills and quality awareness are the constraints for their establishment.

Large-scale industry established in collaboration with foreign investors is fully equipped with quality assurance systems (QAS). However, implementation of QAS such as GMP, HACCP, etc., in the small- and medium-sized food processing industry is virtually non-existent. The inconsistent quality of Nepal's products is attributed to lack of food quality-related training facilities, lack of modern management practices, misconceptions and outdated beliefs, among others.

The Government of Nepal is trying to improve the situation of quality in small- and medium-sized food processing industry by introducing new policies and programs. The government institutions responsible for development regulation, quality and promotional activities on the Nepal's food industry are the Industrial Development Board, Industrial Manpower and Productivity Council, Monitoring and Follow-up Unit, Bureau of Nepal Standards and the Central Food Research Laboratory (CFRL). The activities of these institutions are limited mainly to quality control of the marketed food products. The CFRL is the authority which receives complaints and decides on the food quality. However the Chief District Officer (CDO) office, which is the final authority, often takes a very long time to make decisions. The strategies to address the above issues include: designation of one of the national organizations such as the National Productivity and Economic Center (NPEDC) to provide institutional support and to promote awareness about the significance of implementation of various QAS such as HACCP in small- and medium-sized food processing industry for all the stakeholders; establishment of well-equipped and staffed food testing laboratories; formation of effective consumer societies; and effective government policies and programs implementation of QAS in small- and medium-sized food processing industry.

Pakistan

In Pakistan, the agriculture sector contributes to about 25 percent of the national GDP. Processing of agricultural products for diversification, value addition and quality assurance can further enhance the contribution of agriculture to the national economy through minimizing wastage of agricultural/food products, promoting export of such products, etc. The main sub-sectors of the food processing and packaging industries in Pakistan are dairy processing (milk, powder milk), seafood, fruit and vegetable processing, grain processing, sugar processing, vegetable oil processing, beverage production, packaging (metal, polyethylene, plastic, paper and paperboard). Although Pakistan possesses a fairly developed manufacturing base, food processing has not kept pace with overall industrial development. The major reasons for the developmental lag of the processed food industry are: short supply of meat and dairy products; the perishable nature of fruits and vegetables; lack of adequate refrigeration and transportation facilities; shortage of packaging and storing facilities; and lack of incentives to encourage the processing of foods and their exports.

Awareness of comprehensive quality assurance systems in the small- and medium-sized food processing enterprises is low. It is only the exporting organizations that are aware of the international standards of ISO 9000 and are following them. In Pakistan around 2,000 organizations are already ISO 9000 certified. There are about 400 food processing companies and about 30 percent are ISO certified. Many other companies, especially those in the export business, are moving to get ISO certification. Presently the HACCP is implemented in 18

approved establishments/plants which are processing and packaging seafood for export. HACCP is mandatory according to the Pakistan Fish Inspection and Quality Control Act, 1997, and Rules, 1998. There is a need for increasing awareness about quality standards as these standards are becoming mandatory for exports.

Environmental management systems, laboratory management, product certifications, standards regarding food and health safety and other quality areas are still in their infancy and need immediate attention. The government is taking concrete steps to create awareness and is facilitating organizations to apply for and implement international quality standards. To develop and promote adoption of international standards in the country, and to facilitate the provision of necessary quality assurance services, the Pakistan Standard and Quality Control Authority (PSQCA) was created in 1996 while the National Accreditation Council (NAC) was established in 1998.

The following actions need to be taken to promote the adoption of comprehensive quality assurance systems: training programs should be started for creating awareness and providing training in quality management to personnel; national campaigns should be launched to raise awareness among exporters, industries, suppliers of services with regard to the trade policy and regulation being framed by the World Trade Organization (WTO); create understanding about the importance and benefits of HACCP, ISO 9000, Total Quality Management and Productivity (TQM&P) and their application in manufacturing and service industries. Moreover resource constraints related to human, physical and quality assurance systems should be identified and assistance from international development organizations should be sought. Educational programs targeting education on quality assurance systems for food technologists should be undertaken. Quality assurance systems should be enforced. Incentive program needs to be started for those enterprises that are planning to adopt the HACCP.

Philippines (1)

The food processing industry in the Philippines accounts for a large portion of the industrial activity, contributing 37 percent to the gross value-added of total manufacturing and providing employment to about 335,000 people. There are a total of 4,914 food processing establishments, of which 90 percent are small and medium enterprises. The food processing industry contributes about 3.4-7.5 percent annually to total Philippine export. The most common quality control (QC) problems encountered by the small and medium enterprises are: their inability to produce products that maintain their quality during marketing; inability to monitor product quality during the production process; failure to understand sources of quality loss in production; product contamination due to poor sanitation; and improper application of food additives and other technological inputs. About 56 percent of the industry, comprised mostly of medium enterprises, are aware of and apply QC by testing both raw materials and/or finished products, while about 24 percent mostly small enterprises do not apply QC. The reasons for not practicing QC are: 1) tests are not required; 2) tests are expensive; 3) stakeholders are unaware of the fact that tests are beneficial to them; and 4) no testing facilities are available in the area.

HACCP awareness and application is relatively high among medium enterprises producing export products, but low among processors of domestic products. An increasing number of plants and plant personnel are becoming aware of HACCP. The Food Development Center (FDC) of the National Food Authority and 10 other government and private agencies are providing technical assistance and creating awareness on HACCP.

The Quality Assurance (QA) systems adopted by the industry are: hygienic safety through GMP; QC of raw materials and or finished products; and/or QA system based on HACCP principles that covers both the safety and quality of the products. The Food Control System is implemented by the Bureau of Food and Drugs and by the various regulatory bureaus of the Department of Agriculture. These agencies are mandated to ensure safe and good quality food and to regulate food production, sale and distribution to protect the health of the consumers.

The issues and constraints in the adoption of HACCP are: low level of HACCP awareness and adoption by the industry; non-sustainable application of HACCP; little attention given to HACCP prerequisite programs due to high cost involved; limited number of technical personnel with good understanding of HACCP; and limited dissemination of HACCP information. The suggestions to address such issues are: government initiative and support in disseminating HACCP information through HACCP seminars/workshops nationwide; hands-on technical assistance during HACCP implementation and provision of generic HACCP plans or guides; provision of funding assistance to the industry and organization of food processors to provide easier access for technical and financial assistance from the government.

Government policies and programs aimed to promote adoption of comprehensive QA system are: the Agriculture and Fisheries Modernization Act; the Consumer Act of the Philippines; the Export Development Act; the Accreditation Program for Food Exporters; and the Program on the Improvement of Capability in Small and Medium Food Processors to Meet Quality, Especially Sanitary Requirements of Potential and Current Buyers.

Philippines (2)

The small and medium food processing enterprises in the Philippines constitute the largest manufacturing sector in the Philippines. They are almost always family-owned employing technologies developed at home or through the various livelihood-training seminars conducted by various agencies in the government or non-government sectors. The food processing enterprises are dominated by ethnic Filipino food preparation. The markets for products of these small and medium food processing enterprises are: community markets in the towns and regions; export market to USA, Japan, EU, the Middle East and Hong Kong; and catering mostly to the overseas Filipino workers there.

The Department of Agriculture-commissioned Product Quality System Study demonstrated the reasons for lack of competitiveness of Philippine food products in the world market. Special emphasis was given on the causes of product detention because this has a bearing on safety. The field study showed the low compliance of small and medium food processing establishments to the world standards of Good Manufacturing Practices (GMP), a HACCP prerequisite.

Various quality systems including HACCP have been introduced in the Philippines since the 1980s. Compliance has been deterred by cost considerations. Suppliers to multinationals and exporters implement HACCP because of market pressure. This is not the case with those who supply to the local community market.

Government has several strategies for HACCP compliance: regulatory through the Agriculture Modernization Act which mandates HACCP for agriculture and fishery products; training and industry assistance implemented by various agencies; a GMP-HACCP certification program; upgrading government laboratory facilities for testing and accrediting privately-owned laboratories; and liaison with industry association.

Sri Lanka (1)

The food industries in Sri Lanka can be divided into the tea industry, coconut industry, fruit and vegetable industry, cereal industry, milk industry, spice industry, and fish and meat industry. Each industry has small- and medium-scale units. Now all these industries are equipped with new technology except the tea industry. The tea industry is the main foreign exchange source in Sri Lanka. From the beginning, the tea industry had a quality assurance system (QAS) because it produces mainly for the export market. At present two small- and medium-sized tea companies have implemented the HACCP system and five others have ISO 9002 certification. In the coconut oil industry, there are presently three ISO 9002 certified factories and one HACCP system implemented factory. Most of the medium-sized fruit enterprises are Sri Lanka Standard (SLS) certified, while some of the fruit processing factories are certified by the international certifying bodies like Skal Netherlands, NASA Australia and Institute for Marketecology Organization (IMO), Switzerland.

In Sri Lanka, one of the organized fruit processing factories is Kelani Valley Canneries (KVC). The KVC is certified by SLS organic certification from National Association for Sustainable Agriculture Australia (NASA) and IMO ensures that the highest standard of quality is maintained. The KVC is also planning to implement the HACCP system in the near future. Overall, medium-scale organizations are keen in getting ISO 9002 certification and implementing the HACCP system in their processing lines to enable them to compete in the international market. However, the small-sized fruit industry is reluctant to adopt the QAS.

The Institute of Post-Harvest Technology in Sri Lanka is responsible for training the agro/food processing enterprises to produce high quality food products by introducing modern technical procedures, knowledge, good manufacturing practices (GMP) and finally SLS certification and the HACCP system.

There are about 20 organizations in Sri Lanka certified by the various international organic certification bodies. HACCP certification is compulsory for all meat exporters. The HACCP certificate is given by Sri Lanka Standard Institution (SLSI) with a veterinary surgeon and a scientist, which is actually a joint certification. Presently they have imposed a rule that all exporters must comply with HACCP certification before December 2003.

Overall SMEs have a poor perception and awareness of the QAS because they have less educated and unskilled employees and inadequate financial resources; lack of awareness among consumers, etc. The paper suggests measures to address such problems.

Sri Lanka (2)

Sri Lanka is a country of 18.6 million people. Although the country has a limited industrial base, the manufacturing industry has grown significantly over the past few years. The following small- and medium-sized food processing enterprises are basically targeted for implementation of quality improvement systems: tea industry, fruit industry, cereal industry, milk industry, spices industry and fish industry. The quality assurance systems (QAS)/ concepts adopted by the food processing industry include the HACCP system, ISO 9000 standard, SLS standards, Organic Certification Systems and SQF 2000 standard. The government has made it obligatory to implement and maintain HACCP to enter the export market. Financial and technical assistance is given to SMEs by the National Development Bank in Sri Lanka and the SLSI to assist them in ISO 9000 certification. ISO 9000 consultants' training programs are conducted by the SLSI. Training programs and seminars on modern quality concepts are conducted and national quality awards are presented by the SLSI.

Issues and constraints in the adoption of QAS in Sri Lanka's food industry are: inadequate financial resources; poor design of factories constructed in the past; lack of awareness of SMEs on QAS; lack of awareness on food quality among consumers; inability of the fruit processing industry to explore export potential, etc. Measures to promote adoption of comprehensive QAS are: introduction of proper financial facilitating schemes for implementing ISO 9000/HACCP; promotion of ISO 9000/HACCP-owned industries in international markets; creation of awareness on these standards and their benefits among the local consumers; expansion of export markets; and initiating education programs for small-scale industries on HACCP.

Thailand (1)

Export of food contributes substantially to the economy of Thailand. Income from food export has been amongst the top 10 ranking for the last 10 years. Moreover, customers' awareness on the safety and hygiene of food is increasing. To satisfy their clients, entrepreneurs in the food industry should develop and improve the quality of their products. HACCP is one of the quality management systems emphasizing food hygiene and safety. The Government of Thailand is fully aware of the importance of the application of quality assurance systems (QAS) in the food processing industry. The Ministry of Industry (MOI) is assigned to motivate, promote and support the small- and medium-sized food processing enterprises to apply different QAS to their processes. During the 1980s and 1990s, application of GMP/HACCP was promoted among food industries. Since July 2001 GMP has become mandatory for all new food processing plants. In 2003, the standard will be enforced for all factories concerned, and in the near future HACCP will be mandatory as well.

Two important factors compelling food processing entrepreneurs to apply QAS for food quality and safety are: 1) behavior of consumers has changed in the last two decades – they are more concerned about health and safety than the price of food; and 2) enhanced competition among industries due to trade liberalization under the WTO.

In order to provide consultancies on GMP and HACCP in small- and medium-sized food processing enterprise in Thailand and to promote their adoption, the assigned organization, the MOI has incorporated with leading organizations such as the National Food Institute, Food and Drug Administration, Thailand Industrial Standard Institute and Thailand Productivity Institute. So far (up to October 2001) 339 factories are GMP/HACCP-certified. After the certification is achieved, the companies may move on towards other management systems such as ISO 9000, ISO 14000, or Thailand Quality Award through subsidies from the MOI.

Thailand (2)

Thailand is renowned for agricultural and food export. There are about 12,000 food processing industries in the country, but only about one-fifth of them have already adopted HACCP as a quality assurance system. Since the country's economic slump in 1997, most agricultural and food-related businesses have survived or did not suffer a very strong impact from the crisis. This situation creates the driving force for this kind of business to look forward to getting into new market segments or export markets. HACCP is therefore recognized by these entrepreneurs as an important tool to be used in preventing trade barriers.

The success in applying these systems, however, could not be achieved easily without obstacles or constraints. In Thailand, the prime concerns that hinder small- and medium-scale food enterprises from investing in the HACCP system are high costs; poor understanding by

all involved persons; lack of readiness; and apparent lack of clear advantages of having this system. The Thai Government has already launched new strategies to facilitate HACCP adoption by assigning eight government agencies and one private agency as the certifying bodies, but this initiative alone is not enough. The measures to increase the number of HACCP-certified entrepreneurs include, amongst others: making HACCP implementation obligatory; a 200-percent tax deduction campaign; provision of credit for HACCP adoption at low interest; and a stronger media campaign to create awareness among people on the benefits of HACCP for all stakeholders.

Vietnam

Vietnam, as an agricultural country, has a large potential for exporting processed food products. As part of its effort to become a member of the WTO, Vietnam is introducing various reforms aimed at opening and integrating its economy to the regional and the global economy. In order to do that, Vietnamese companies must increase their quality and technical level as fast as possible. Nowadays, many Vietnamese small- and medium-sized food processing enterprises consider quality control systems (QCS) as a key to competition in the internal and global markets. Some of them are already applying QCS such as ISO 9000, ISO 14000, and HACCP.

ISO 9000 has been popular in Vietnam since 1996. Up to now about 600 enterprises including 200 food processing industries are ISO-certified. For ISO 14000, only 20 companies are certified. As regards HACCP, only the seafood enterprises are implementing this system. Four food processing enterprises have already received HACCP certification while Viet Tien Food Processing Joint Venture Company plans to get HACCP certification in October 2002.

The present Government of Vietnam encourages small- and medium-sized food processing industry to increase their competitiveness by applying modern quality assurance systems. There are many programs such as financial support for implementation of ISO and HACCP. Since HACCP implementation demands large investments on infrastructure, presently, small- and medium-sized enterprises concentrate on ISO certification.

The government must give stronger financial support to small- and medium-sized food processing industry, support the advance of high-quality products to global markets, create customer awareness on food safety and have strict quality control measures in food processing industry.

FIELD STUDIES

For field studies, the participants visited the Mother Dairy, Fruit and Vegetable Ltd., Delhi Unit in the host country (India). Dr. P. N. Reddy welcomed the participants.

The brand name of the above enterprise is the Mother Dairy. Mother Dairy is the largest liquid milk plant in Asia. It started its operations in 1974 under the Operation Flood Program of the National Development Board. Operation Flood is one of the largest dairy development projects in the world. Mother Dairy, Delhi is an IS/ISO 9002- and IS 15000 (HACCP)-certified operation. The annual turnover of the Mother Dairy is Rs.730 million (US\$1 = Rs.48.80).

The Operation Flood Program helps both farmers as well as city consumers. Mother Dairy purchases only high quality cow and buffalo milk from the union dairies, who obtain milk from the cooperative societies being run by farmer members. Dr. Reddy explained the

procedures for checking the quality of milk, processing of milk, fortification of milk with vitamin A, homogenization, dispatching of milk, making it available on time, consumer information, etc. Mother Dairy also has an effluent treatment plant where all effluents are treated before disposal to protect the environment.

In addition to toned milk (defined as the addition of the constituted skim milk to whole milk to reduce the fat content) through bulk vending, Mother Dairy also markets full cream milk, standardized milk, double-toned milk (prepared by mixing cow's milk or buffalo milk with skim milk so that the fat content is not less than 1.5 percent), skimmed milk, flavored milk, etc. To diversify its products, in 1994 Mother Dairy started marketing ice cream through its milk shops, fruit and vegetable shops, selected retail outlets and push carts. Other products include Amul butter, processed cheese, selected frozen vegetables and Dhara oil, etc.

The participants were able to see some of the operations in milk processing and ice cream making. They also visited the Information Center of Mother Dairy. The participants showed keen interest in various facilities at the Mother Dairy Unit. At the end participants thanked Dr. Reddy and his colleagues for their hospitality and guided tour of the Unit facilities.

WORKSHOP OUTPUT

- Objective:
- 1) To identify issues and constraints in implementation of HACCP in SMEs in the food processing industry, and to suggest strategies and action plan to address such issues; and
 - 2) To enhance the participants' confidence level in HACCP application to SMEs in the food processing industry.

The participants were divided into the following three groups to encourage the discussions:

Group I (Bangladesh, Fiji, Mongolia, Nepal, Sri Lanka)

Chairperson: Ms. Renu Sthapit
Reporter: Mr. Punchi B. Abeykoon
Facilitator: Mr. Cornelis Sonneveld

Group II (India, Iran, Pakistan)

Chairperson: Allahverdi T. Alidash, Ph.D.
Reporter: Mr. Naresh K. Chandwani
Facilitator: Ms. Sandra G. F. Keller

Group III (Republic of China, Philippines, Thailand, Vietnam)

Chairperson: Dr. Swi-Bea Wu
Reporter: Ms. Fe R. Vito
Facilitator: Ms. Maria Rozpendowska

The output of the discussions of each group was presented in a plenary session. Subsequently, the results of the three groups were amalgamated and discussed in the summing-up session. Final results are summarized as follows:

Constraints/Problems	Strategies/Solutions	Action Plans
<p>Social</p> <ul style="list-style-type: none"> - Low level of hygiene and GMPs in SMEs. - Unwillingness to change the staff's mindset due to cultural background. - Low level of consumer awareness and lack of consumer education. - Low level of awareness of hygiene among suppliers, traders, distributors and retailers. - Lack of capacity building in food technology at universities and vocational institutes. - Limited capacity/scope of SMEs associations. - High turnover of employees. 	<ul style="list-style-type: none"> - Create awareness through seminars and training (on the principles of "Train the Trainer") at national and factory levels, for the relevant stakeholders and government institutes. - Create awareness among consumers through campaigns with the assistance of the Regional Food Safety Strategy Programs (WHO) in Asia. - Create consumer awareness through demonstration plants having high levels of hygiene (Mother Dairy in India). - Increase awareness through seminars and training (on the principles of "Train the Trainer") at national and factory levels, including relevant stakeholders and government institutes. - Improve curriculum of food technology education at various levels through IHRD (Integrated Human Resources Development Programs). - Assistance in capacity building of these organizations. - Establish system of certification. 	<ul style="list-style-type: none"> - SMEs associations to conduct seminars, prepare proposals to seek financial and technical assistance from donor agencies, FAO and WHO. - SMEs and consumer associations should initiate awareness among consumers. - Consumer associations should seek assistance from the national and international donor agencies to prepare project proposals to create awareness among consumers through campaigns. - Recognize good performance in quality and productivity through national quality awards. - The industry and consumer associations work together to publicize these demonstration plants. - SMEs associations to conduct seminars, prepare proposals to seek financial and technical assistance from donor agencies. - Educational institutes and SMEs associations should seek assistance of UNIDO and other relevant agencies. - Involving agencies like UNIDO/FAO/WHO and APO. - Establish system of certification through SME authority.

... To be continued

Continuation

Constraints/Problems	Strategies/Solutions	Action Plans
<p>Technical</p> <ul style="list-style-type: none"> - Lack of awareness of benefits of HACCP and other modern food quality systems among top management. - Low level of quality and safety of food products. - Lack of local expertise on HACCP - Lack of hygiene guides and generic documents. 	<ul style="list-style-type: none"> - Conduct seminars involving relevant stakeholders and government institutes to create awareness with emphasis on economical benefits of HACCP. - Create an exclusive HACCP information/database center at the national level. - Improve quality and safety of products. - Capacity building with the assistance of international bodies. - Develop these documents at national level. 	<ul style="list-style-type: none"> - SMEs associations to prepare project proposals to seek assistance from donor agencies, NGOs or through bilateral agreement to train the management of SMEs in HACCP. - Prepare project proposal for getting the assistance of FAO and other international organizations to achieve better overall performance. - Precise project proposal to request assistance from the international agencies through SMEs associations. - Conduct training on HACCP. - Prepare necessary project proposals.
<p>Economical</p> <ul style="list-style-type: none"> - Lack of financial resources to upgrade facilities and equipment to meet national and international standards and requirements. - Lack of incentives for efforts put into HACCP-MSS (Ministry of Standard Syndrome). 	<ul style="list-style-type: none"> - Incentives to be provided by the governments and banks in the form of subsidies, tax deductions, loans. - Formulate award schemes to recognize and reward organizations excelling in HACCP implementation. 	<ul style="list-style-type: none"> - Review the potential options in liaison with the respective stakeholders through the initiative of the SMEs associations. - Industry associations, government and other promotional bodies like NPOs shall initiate action in this regard.
<p>Legal</p> <ul style="list-style-type: none"> - Gap between company standards, and national/international standards. 	<ul style="list-style-type: none"> - Adoption of national/international standards like Codex and ISO. 	<ul style="list-style-type: none"> - Formalize procedures in SMEs and make adjustments to get in line with the relevant regulations.

... To be continued

Continuation

Constraints/Problems	Strategies/Solutions	Action Plans
<p>Legal</p> <ul style="list-style-type: none"> - National legislation concerning GHP and GMP (laws and regulations) not in compliance with inter-national legislation and requirements. - Inadequate number/lack of competence of Food Inspectors for HACCP implementation. 	<ul style="list-style-type: none"> - Adaptation of EU and other international legislation to local conditions and requirements. - Increase number of Food Inspectors in each country. - Increase the level of competence of Food Inspectors through integrated training approach of HACCP implementation. 	<ul style="list-style-type: none"> - Food industry associations, government, FAO and EU work together to harmonize standards. - Include Food Inspectors in HACCP training programs. - Establish relation with WHO/other concerned agencies. - Increase number of Food Inspectors up to reasonable level in each country.

CONCLUSIONS

Since the last 10 years HACCP implementation has taken place in industrialized countries. In many newly industrialized and developing countries HACCP implementation has taken place particularly in the fish processing industries due to EU requirements and import regulations of the USA.

The EU and other developed countries have included HACCP principles in their legislation. Demanding wholesalers and retailers have contributed to a high level of HACCP implementation in developed countries. However, enforced legislation and demanding wholesale companies should not be the single motivation for adopting and implementing HACCP. HACCP is foremost a management tool to ensure safety of the product.

Many managers of SMEs in developing countries are not aware of the economic benefits of the HACCP system. For instance, reduction of waste and re-work, improved productivity, safety of the product and increased local and international competitiveness are some of the major benefits of the HACCP.

SMEs in developing countries have organized themselves into associations. These associations will have to play a key role in leadership, initiative and communication to facilitate HACCP implementation in the small- and medium-scale enterprises. Limited scope and capacity is affecting the efficiency of these associations. Through support of UNIDO and other relevant international and national concerned agencies the situation could be improved.

Prerequisite measures like hygiene and GMP are lacking in the SMEs. Awareness through seminars will have to be created not only among the management of SMEs but also amongst suppliers, retailers and transport companies. Awareness programs have to be conducted with the contribution of demonstration plants like “Mother Dairy” in India and other fish processing companies. The seminars should be organized by the SME associations and resource speakers should be able to demonstrate the benefits of HACCP implementation with adequate relevant and reliable data to motivate the management. The outcome of such

seminars will have to lead to the preparation of sound project proposals on training on Hygiene, GMP and/or HACCP depending on the requirements of the respective countries.

Hygiene codes for branches and generic documents need to be prepared locally after thorough understanding of HACCP. Provisions in the legislation are required to allow the enforcement of these hygiene codes.

Low levels of awareness among consumers should be discussed among consumer associations and WHO in order to prepare appropriate programs. Standards of education at universities and vocational institutes should be upgraded through the assistance of the IHRD program of UNIDO and other relevant agencies.

With regards to the legal aspect, SME associations should seek the assistance of the concerned ministries to reduce the gap between companies, national and international standards and adoption of the necessary legislation. Eventually the governments should provide the legal framework and platform to facilitate the implementation of HACCP. The knowledge of Food Inspectors must be updated to enable them to carry out their assignments effectively, according to modern inspection techniques, and to provide advisory service to the industry.

The establishment of a service, documentation, training and information center on business enterprise is the need of the hour.

Lack of financial resources to upgrade the factories, equipment and facilities to comply with the necessary legal requirements will have to be considered and assistance in the form of loans, tax deductions and/or subsidies should be extended to the SMEs.

The study meeting agreed that adoption of modern quality assurance systems/concepts such as HACCP by the small- and medium-sized food processing enterprises would be inevitable in order for them to be competitive in the international market, especially in view of trade liberalization under initiatives of the WTO. Besides, implementation of such quality assurance systems would enable the SMEs to further contribute to improving the public health and strengthening the national economies in the region. For this purpose, however, concerted efforts on the part of all the stakeholders such as relevant government institutes, NGOs, SMEs, SME organizations, consumer organizations and international organizations (FAO, UNIDO, APO, etc.) would be required to alleviate the above mentioned as well as other constraints/problems in adoption of quality assurance systems like HACCP by the small- and medium-sized food processing enterprises in the region.

1. INTERNATIONAL DEVELOPMENT OF FOOD SAFETY SYSTEMS AND MARKETING OF PROCESSED FOODS

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INTRODUCTION

This paper provides general information on Food Safety Systems presently applied worldwide. The HACCP system is discussed thoroughly and special attention is paid in this paper to HACCP hygiene guides for the small- and medium-sized enterprises (SMEs). The food safety systems in food processing enterprises are not stand alone activities; the success of the manufacturing of safe food products is highly dependant on the safety and quality of the raw material. In this paper food safety systems in primary production are also discussed.

To ensure the application of hygienic equipment in processing, the paper addresses hygienic design of the equipment. Of course some elements of legislation cannot be omitted in the paper. As well, useful websites are added at the relevant points and at the very end.

HACCP

History of HACCP

The HACCP system was introduced in the United States in 1971 by the Pillsbury Company in collaboration with the National Aeronautics and Space Administration (NASA) and the US Army Natick Research and Development Laboratories. These agencies had the initial responsibility of designing and manufacturing food products and hardware which were to provide 100 percent assurance that either the food products would not be contaminated with pathogens, bacteria or viruses which could cause illness or that the equipment would function with zero defects.

After extensive evaluation, it was decided that the only way success could be achieved was by controlling the process and the personnel as early as possible in the production system. This preventative system was perceived to offer the highest degree of assurance that the products manufactured were safe as it eliminated the need for any further end-product testing and emphasis was placed on monitoring. The HACCP concept for food safety was developed based on this approach.

Internationalization of HACCP

The HACCP system has become the internationally recognized system for the management of food safety for all companies involved in the production, transformation, storage and distribution of food for human consumption. It has been adopted by the European

Union (EU) for all food processors and the Codex Alimentarius Commission as the principal food safety system (EU Directive 93/43/EEC; Codex Alimentarius – Alinorm 93/131, 1993).

The EU directive mandated the implementation of HACCP in all local legislation by December 1995. All European companies involved in the food chain from the primary producer to the final consumer are now legally bound to have a HACCP plan or system. The European directive also advises that all countries which are desirous of exporting food products to the EU must “critically examine their production processes in the same thorough way by making a HACCP plan and/or system of operation”.

Some European countries conformed and introduced the necessary legislation within the stipulated deadline. The Netherlands complied and established the requirement for the introduction of HACCP as Article 30 of the “Directive on the Hygiene of Foodstuffs”. The Dutch Government also included an additional clause which specifies which records must be maintained, as follows: “*The documentation of both the analysis and the actual control has to be complete and easy to access*”.

HACCP Concept, Purpose, Implementation and Benefits

The HACCP **concept** involves the identification of specific hazards throughout the entire process involved in the production of a food product and focuses on the preventative measures for their control to assure the quality and safety of the food. This includes analysis of raw material sources and usage, processing equipment, operating practices, packaging and storage, together with marketing and conditions for intended use. There is less reliance on the traditional system of end-product testing and food safety is built into the product from conception through design and distribution. The **purpose** of HACCP can therefore be summarized thus: “to identify potential problems which could occur in an operation, consider each and establish controls to minimize or prevent its occurrence”.

Implementation of an HACCP System

The HACCP concept is based on seven principles and 14 steps.

The CODEX Alimentarius speaks about 12 steps; however two steps have been added in the European approach:

1. Define the Terms of Reference and the Scope of the Plan
2. Assemble the HACCP team
3. Describe the product
4. Identify the intended use
5. Construct flow charts
6. On-site verification of flow chart
7. List all hazards associated with each step and list preventive measures
8. Apply HACCP decision on each hazard
9. Establish target levels and tolerances for each Critical Control Point (CCP)
10. Establish a monitoring system for each CCP
11. Establish corrective actions
12. Verification of the system
13. Establish record keeping and documentation
14. Review the HACCP plan.

<Remark> – Points 7-13, inclusive, are the so-called seven principles of the HACCP process.

Benefits of an HACCP System

Some benefits of the HACCP concept in general and for food inspection:

- The system is preventive, proactive, systematic, scientific and cost-effective;
- It is a management tool;
- The system is internationally acknowledged (FAO/WHO);
- The system is applicable throughout the food chain;
- The system leads to increased awareness and subsequent higher involvement and commitment of the employees;
- The official control based on HACCP programs is more efficient than a traditional inspection or end-product testing alone. Hence, health protection of consumers is enhanced;
- Harmonization of food inspection practices on an international level;
- Facilitation of regulatory/customer inspection;
- It leads to greater confidence in product safety; and
- The system has a preventive approach; reduction of rework and losses are achieved. Subsequently cost reduction is achieved.

Implementation of HACCP in a processing factory will require the commitment of all involved and has a deep impact on the entire chain (see Appendix).

New Developments: Integration ISO 9001 and HACCP

ISO has developed a new standard: ISO 15161:2001, guidelines on the application of ISO 9001:2000 for the food and drink industry. Quality and food safety systems are based on ISO 9001:2000 and HACCP in an integrated approach.

Certification of HACCP

Eventually the HACCP system can be certified based on the criteria laid down in the document: “Criteria for the Assessment of an Operational HACCP System” compiled by the Dutch National Board of Experts HACCP, September 1998. The certification will be carried out by a company accredited by the Board of Accreditation. A successful audit will result in a certificate. The certificate is not permanent and repeat audits will be carried out within a period of three years by the same certifying body. If certification is not achieved during this period the company will have to start all over again with the procedure of certification. Certification is not a legal requirement; it can be company policy or requested by the wholesale company.

Different countries have different criteria to audit and assess implemented HACCP systems:

- India uses the Indian Standard: food hygiene – HACCP system and guidelines for its application: IS 15000: 1998;
- South Africa uses South African Bureau of Standards (SABS) 0330: Code of Practice for the implementation of a HACCP system;
- The FAO and WHO have also published a guideline: Guidance on Regulatory Assessment of HACCP as a result of a joint FAO/WHO Consultation on the Role of Government Agencies in Assessing HACCP in Geneva, June 1998; and
- Differences in the criteria lead to differences in the level of HACCP systems.

Presently ISO is working on an international standard: ISO 22000 Food Safety Management Systems: Requirements. This document will further contribute to the standardization and harmonization of systems worldwide.

<Useful Websites>

- Council directive: 93/43/EEC of 14 June 1993 Hygiene of Foodstuffs: http://europa.eu.int/eur-lex/en/lif/dat/1993/en_393L0043.html.
- Information on ISO the International Organization for Standardization: <http://www.iso.ch/iso/en>.

IMPLEMENTATION OF HYGIENE GUIDES OR CODES

The application of HACCP is laid down in the EU Council Directive 93/43/EEC of 14 June 1993 which relates to the hygiene of foodstuffs. The general rules of hygiene are laid down in 17 articles. Article 3 specifically elaborates on HACCP and Article 5 elaborates on hygiene guides; “Member states shall encourage the development of guides to Good Hygiene Practices, which may be used voluntarily by food businesses as a guide to compliance with the provisions in Article 3”.

There is no clear connection between the implementation of a complete HACCP system and a hygiene guideline. The information below, however, provides further explanation.

Objective of a Hygiene Code

To implement hygiene guides the first question, which arises is: What are the objectives of a hygiene guide? They are as follow:

- In general hygiene codes work with a common HACCP system with predetermined CCPs.
- Hygiene guides are basically, but not exclusively, established for the SMEs or even shops like butcheries and bakeries with limited manpower, where the CCPs have been predetermined. A common HACCP system for a group of products or enterprises as mentioned above (branch) is applied whereby the Hazard Analysis and Risk Assessment is developed for that group community and whereby the standard control and preventive measures and corrective actions are laid down in the hygiene guide. This hygiene guide can be directly applied by the operators of the group or branch.
- Hygiene guides cover in a systematic way those elements which are laid down in the legislation to comply with the basic matters on Hygiene and Good Manufacturing Practices and to provide the conditions to ensure the safety of food products.
- Hygiene guides facilitate inspection bodies on their assignment to inspect the relevant items of the implemented system.

Therefore it is recommended that the standard hygiene guides should at least contain the following aspects, which are actually the so called prerequisite measures of a HACCP system:

1) Aspects of personnel hygiene:

- Clothing
- Being healthy

- Jewelry
- Rules of conduct
- 2) Requirements for the elements of building infrastructure such as:
 - aspects on the location and environment
 - requirements for the construction and design of buildings
 - a plan or procedure for cleaning and sanitation
 - a pest control system
 - a procedure for water quality
 - requirements for processing equipment
- 3) HACCP:
 - Type of hazards (microbiological, physical and chemical)
 - Standard control and preventive measures
 - Predetermined CCPs
 - Monitoring system
 - Registration forms or checklists
 - Standard Operating Procedures (SOPs) for consumer complaints, non-conformities and calibration
 - Training.

Some Examples of Hygiene Guides from the Netherlands

- 1) Hygiene Guide for Uncut Fresh Fruit and Vegetables
- 2) Hygiene Guide for Bread and Pastries
- 3) Guide for Hygienic Transport, Storage and Distribution of Foodstuffs
- 4) Hygiene Guide for Butchers.

Hygiene guides are generally prepared by the stakeholders or branches and are approved by the Ministry of Health prior to implementation.

Hygiene guides used in European countries are laid down in the FLEP (Food Law Enhancement Practitioners) report:

Guides to Hygiene Practice, March 2000
 Inspectorate for Health Protection, Commodities and Veterinary Public Health
 P. O. Box 16108
 2500 BC The Hague
 The Netherlands

The Codex Commission on Food Hygiene has prepared a draft Code of Hygienic Practice for Fresh Fruits and Vegetables to be established for growers and handlers and, of course, eventually applied by food processors. The code addresses Good Agricultural Practices (GAP) and Good Manufacturing Practices that will help control microbiological, chemical and physical hazards associated with all stages of the production of fresh fruits and vegetables from primary production to packing. The document makes reference to annex: Ready-to-Eat Fresh Precut Fruits and Vegetables and an annex for Sprout Production.

The Code is in its final stage of approval (2003) and will then provide worldwide access to recommendations with regard to the prevention and control of hazards in fresh fruits and vegetables.

<Useful Websites>

Council directive: 93/43/EEC of 14 June 1993, Hygiene of foodstuffs:
http://europa.eu.int/eur-lex/en/lif/dat/1993/en_393L0043.html

BRC (BRITISH RETAIL CONSORTIUM)

Background

The BRC originates from the United Kingdom where retailer branded products represent over 50 percent of all food sold in the UK. Under the terms of the Food Safety Act 1990, retailers have an obligation to take all reasonable precautions and exercise all due diligence in the avoidance of failure, whether it be in the development, manufacture, distribution, advertising or sale of food products to the consumer.

That obligation, in the context of retailer branded products, includes the verification of technical performance at food production sites. Until recently, each retailer undertook this activity independently, verifying food production site performance against their individual, internally developed standards. In some instances verification is undertaken by the retailers in-house technologists and in other instances by third party inspection bodies.

Technical inspection of the supplying companies' production premises forms only part of the retailers due diligence system, and the acceptance for a company to supply, rests with the individual retailer. Major retailers, like AHOLD in the Netherlands and METRO in Germany, are in favor of having BRC as an international standard.

The Technical Standard

The BRC has developed the Technical Standard for those companies supplying retailer branded food products. The Standard has been developed to assist retailers in their fulfillment of legal obligations and protection of the consumer, by providing a common basis for the inspection of companies supplying retailer-branded food products. It has encompassed the fundamental principles of the retailers' current standards and is intended to be incorporated into standards used by third party inspection bodies. It is not intended to replace the requirement of any legislation, where this legislation requires a higher standard for a specific industry sector.

The Standard will be reviewed on a regular basis by the BRC membership and revised, where considered appropriate.

The Standard requires:

- the adoption of HACCP;
- a documented Quality Management System;
- control of factory environment standards; and
- control of product, process and personnel standards.

Benefits of the BRC Technical Standard

There are a number of benefits arising from the introduction of the BRC Technical Standard:

- A single standard and associated protocol, allowing inspection to be carried out by inspection bodies, who are accredited against a European standard;

- Single verification commissioned by the supplier, in line with an agreed inspection frequency, will allow suppliers to report upon status to those customers recognizing the Standard;
- The Standard is comprehensive in scope, covering all areas of product safety and legality;
- The Standard addresses part of the due diligence requirements of both the supplier and the retailer;
- Within the associated inspection protocol, there is a requirement for ongoing surveillance and confirmation of follow-up of corrective actions on non-conformance; and
- As inspection bodies are accredited against a European standard, there will be future recognition of inspection bodies in countries where the product is sourced.

Certification

The certification is based on the criteria laid down in the “Technical Standard and Protocol for Companies Supplying Retailer Branded Food Products” prepared by the BRC in June 2000, issue nr.2.

The Standard provides for a Certificate of Inspection to be awarded at one of two levels: foundation level and higher level.

The Format of the Technical Standard

Each section of the Technical Standard begins with a paragraph, which is the statement of intent that all suppliers must comply with in order to gain a certificate of inspection.

Below the statement of intent, there are three columns of specific criteria:

1. *Foundation Level*

All criteria specified in column 1 must be complied with to gain a Certificate of Inspection at the Foundation Level. In addition to these criteria, it is desirable to aspire to those criteria specified in column 2 for the Higher Level Certificate of Inspection and column 3, Recommendations on Good Practice.

2. *Higher Level*

All requirements for the Certificate of Inspection at the Foundation Level must be met. In addition, all criteria in column 2 must be complied with to gain a Certificate of Inspection at the Higher Level. In addition to these criteria, it is desirable to aspire to those criteria specified in column 3, Recommendations on Good Practice.

3. *Recommendations on Good Practice*

These criteria are recommended to all suppliers as being industry best-practice, to which they should aspire. Where any of these recommendations are not met, it is still a requirement of the scheme that this is recorded within the Inspection Report.

It is envisaged that companies will progress through the two levels of the Standard and ultimately comply with all criteria of the Standard. To this end, it is a requirement of the Standard that the Inspection Report, at both Foundation and Higher Level, will record non-conformity against any criteria in columns 1, 2 or 3. This will identify specific shortfalls, where improvement can be achieved.

The accompanying Inspection Protocol provides the specific requirements for those companies seeking inspection against the Standard.

Certification Audit

The certification audit can be carried out by an inspection body accredited by the Dutch National Board of Experts HACCP. A successful audit will result in a **Certificate of Inspection**. The certificate is not permanent and repeat audits will be carried out. The frequency of repeat audits will depend on the level of inspection (Foundation or Higher).

Food safety in the processing industry is not a stand alone activity. Food safety covers the whole chain. In this document attention is also paid to the international food safety systems in primary production.

Source: Technical Standard and Protocol of British Retail Consortium.

EUREP – EURO-RETAILER PRODUCE WORKING GROUP

Objective and Background Information

The objective of the EUREP, which is made up of leading European food retailers, is to raise standards for the production of fresh fruit and vegetables. In November 1997 they agreed on the first draft protocol for GAP. This represented the first step towards integrated production. In September 1998 the EUREP initiated pilot trial projects to verify the implementation of EUREP GAP in the field. They were conducted together with advanced producers in Spain (MARTINAVARRO) and Italy (APO).

Scope

The prepared document sets out a framework for GAP on farms, which defines essential elements for the development of best-practice for the global production of horticultural products (e.g., fruits, vegetables, potatoes, salads, cut flowers and nursery stock). It defines the minimum standard acceptable to the leading retail groups in Europe, however, standards for some individual retailers and those adopted by some growers may exceed those described. The document does not set out to provide prescriptive guidance on every method of agricultural production.

EUREP members wish to recognize the significant progress already made by many growers, grower groups, grower organizations, and local and national schemes in developing and implementing best-practice agricultural systems with the aim of minimizing adverse impact on the environment.

EUREP members also wish to encourage further work to improve the growers' capability in this area. In this respect the GAP framework, which defines the key elements of current agricultural best-practice, should be used as a benchmark to assess current practice and provide guidance for further development.

GAP is a means of incorporating Integrated Pest Management (IPM) and Integrated Crop Management (ICM) practices within the framework of commercial agricultural production. Adoption of IPM/ICM is regarded by EUREP members as essential for the long-term improvement and sustainability of agricultural production.

HACCP

EUREP supports the principles and encourages the use of HACCP.

Commitment

It is essential that all organizations involved in the food production chain accept their share of the tasks and responsibilities to ensure that GAP is fully implemented and supported.

If consumer confidence in fresh produce is to be maintained, such standards of GAP must be adopted, and examples of poor practice must be eliminated from the industry. All growers must demonstrate their compliance with national or international law.

All growers should be able to demonstrate their commitment to:

1. maintaining consumer confidence in food quality and safety;
2. minimizing detrimental impact on the environment, whilst conserving nature and wildlife;
3. reducing the use of agrochemicals;
4. improving the efficiency of natural resource use; and
5. ensuring a responsible attitude towards worker health and safety.

The EUREP GAP contains the following:

1. Introduction
2. Record keeping
3. Varieties and rootstocks
4. Site history and site management
5. Soil and substrate management
6. Fertilizer usage
7. Irrigation
8. Crop protection
9. Harvesting
10. Postharvest treatments
11. Waste and pollution management, recycling and reuse
12. Worker health, safety and welfare
13. Environmental issues.

Certification of EUREP GAP

Growers receive their EUREP GAP certificate through independent auditing from a certification body that is approved by EUREP. The certifications will be based on the criteria laid down in the EUREP GAP Document “Control Points and Compliance Criteria” dated September 2000.

<Useful website>: www.eurep.org

Safe Quality Food (SQF)

1. SQF Background

The SQF system originates from Western Australia. Agricultural Western Australia recognized the need for Australia to adopt a quality assurance system as an important means of maintaining and increasing market access.

2. SQF 2000cm

The SQF 2000cm Quality Code was developed and launched in 1995 in response to the demand for a user-friendly quality assurance system, tailored specifically to meet the needs of the food business. All companies and parties within the food sector can use the

standard. It is a full quality management system based on HACCP and ISO 9000 including both food safety and quality aspects.

3. **SQF 1000cm**

The SQF 1000cm Quality Code was developed in 1999 in response to the demand for a simple HACCP-based and -approved supplier food safety system for primary producers. It has been specially developed for the primary sector as a food safety and quality standard.

Agriculture Western Australia has signed an agreement with the Swiss-based SQF institute for the worldwide right to commercialize the SQF quality system. On 1 July 2001, AGWEST handed over the management and operation of the SQF1000 and SQF 2000 programs to the SQF institute, an organization committed to the promotion and development of SQF globally.

SQF management systems goals are:

- to raise standards of food safety and quality across the food chain, from primary produce to consumer through increased awareness, understanding and adoption of SQF management systems;
- to continuously improve and deliver high standards of customer service and support to SQF clients;
- to continue to pursue increased recognition of SQF management systems by customers and clients in new and existing markets; and
- to maintain and protect the high level of integrity of SQF Quality Codes.

The SQF code contents are:

- Preface
- Contents
- Introduction
 1. Scope
 2. References
 3. Definitions
 4. System requirements
 - 4.1 Commitment
 - 4.2 Suppliers
 - 4.3 Control of production
 - 4.4 Verification
 - 4.5 Document control and records
 - 4.6 Product identification, trace and recall
- Appendix 1 Implementing SQF systems
- Appendix 2 Principles and application of HACCP
- Appendix 3 Certifying SQF systems
- Appendix 4 Certification Trade Mark.

<Websites>: <http://www.sqf.wa.gov.au>
<http://www.sqfi.com>

EUROPEAN HYGIENIC EQUIPMENT DESIGN GROUP (EHEDG)

The EHEDG is a consortium of equipment manufacturers, food industries, research institutes and public health authorities, founded in 1989 with the aim to promote hygiene during the processing and packaging of food products.

European legislation requires that handling, preparation, processing, packaging, etc. of food is done hygienically, with hygienic machinery in hygienic premises (EC directives 98/37/EC and 93/43/EEC). How to comply with these requirements, however, is left to the industry. To assist in the design of safe and hygienic machinery, the EU has mandated the European federation of standardization institutes, the CEN (Comité Européen de Coordination des Normes [European Committee of the Coordination of Standards]), to produce standards. The EHEDG has been providing significant data and information during the preparation of these standards. In addition, the EHEDG has developed criteria for hygienic design of equipment and methods to test whether equipment complies with these criteria. Responding to requests from the industry, the EHEDG has also developed guidelines for the use of equipment for processing of food products to render them safe, such as for pasteurization, sterilization and packaging. Being recognized internationally as an organization specialized in producing guidelines for the design of hygienic food plants, the EHEDG now also covers subjects such as building design, electrical installations, slaughterhouses, air handling and process water.

As food safety does not end at the borders of Europe, the EHEDG actively promotes global harmonization of guidelines and standards. The US-based organizations such as National Science Foundation (NSF) and 3-A (Sanitary Standards, Inc.) have agreed to cooperate in the development of EHEDG guidelines and in turn, EHEDG cooperates in the development of 3-A and NSF standards. Renowned food research institutes are accredited (by authorized bodies) to test the compliance of equipment with hygienic design criteria using the EHEDG test methods.

EHEDG guidelines are produced in English and translations in other languages are available. Extended summaries of the guidelines are published in '*Trends in Food Science and Technology*'.

The following guidelines/documents have been produced:

- Document 1 – Microbiologically safe continuous pasteurization of liquid foods, 1992.
- Document 2 – A method for assessing the in-place cleanability of food processing equipment, 2000.
- Document 3 – Microbiologically safe aseptic packing of food products, 1993.
- Document 4 – A method for the assessment of in-line pasteurization of food processing equipment, 1993.
- Document 5 – A method for the assessment of in-line pasteurization of food processing equipment, 1993.
- Document 6 – The microbiologically safe continuous flow thermal sterilization of liquid food, 1993.
- Document 7 – A method for the assessment of in-line pasteurization of food processing equipment, 1993.
- Document 8 – Hygienic equipment design criteria, 1993.
- Document 9 – Welding stainless steel to meet hygienic requirements, 1993.
- Document 10 – Hygienic design of closed equipment for the processing of liquid food 1993.
- Document 11 – Hygiene packing of food products, 1993.
- Document 12 – The continuous or semi-continuous flow thermal treatment of particulate foods, 1994.
- Document 13 – Hygienic design of equipment for open processing, 1996.
- Document 14 – Hygienic design of valves for food processing, 1996.

- Document 15 – A method for the assessment of in-place cleanability of moderately-sized food processing equipment, 1997.
- Document 16 – Hygienic pipe couplings, 1997.
- Document 17 – Hygienic design of pumps, homogenizers and dampening devices, 1998.
- Document 18 – Passivation of stainless steel, 1998.
- Document 19 – A method for assessing bacterial impermeability of hydrophobic membrane filters, 2000.
- Document 20 – Hygienic design and safe use of double-seat mix proof valves, 2000.
- Document 21 – Challenge tests for the evaluation of the hygienic characteristics of packing machines, 2000.

In Preparation

- Design of hygienic cooling and chilling equipment
- General hygienic design for the safe processing of dry materials
- Materials of construction of equipment in contact with food
- Design of mechanical seals for hygienic and aseptic applications
- Design of hygienic slaughterhouses
- Guideline for the production and use of food grade lubricants.

<How to Order>

Individual documents (English originals): www.campden.co.uk/publ/pubfiles/ehedg.htm

CONCLUSIONS

No doubt that the HACCP system is the ultimate system to ensure the safety of a product. Likewise, the ISO standards are internationally acknowledged and are recommended for following. To decide whether or not to implement or to achieve certificates of SQF or BRC depends highly on the region and the customer.

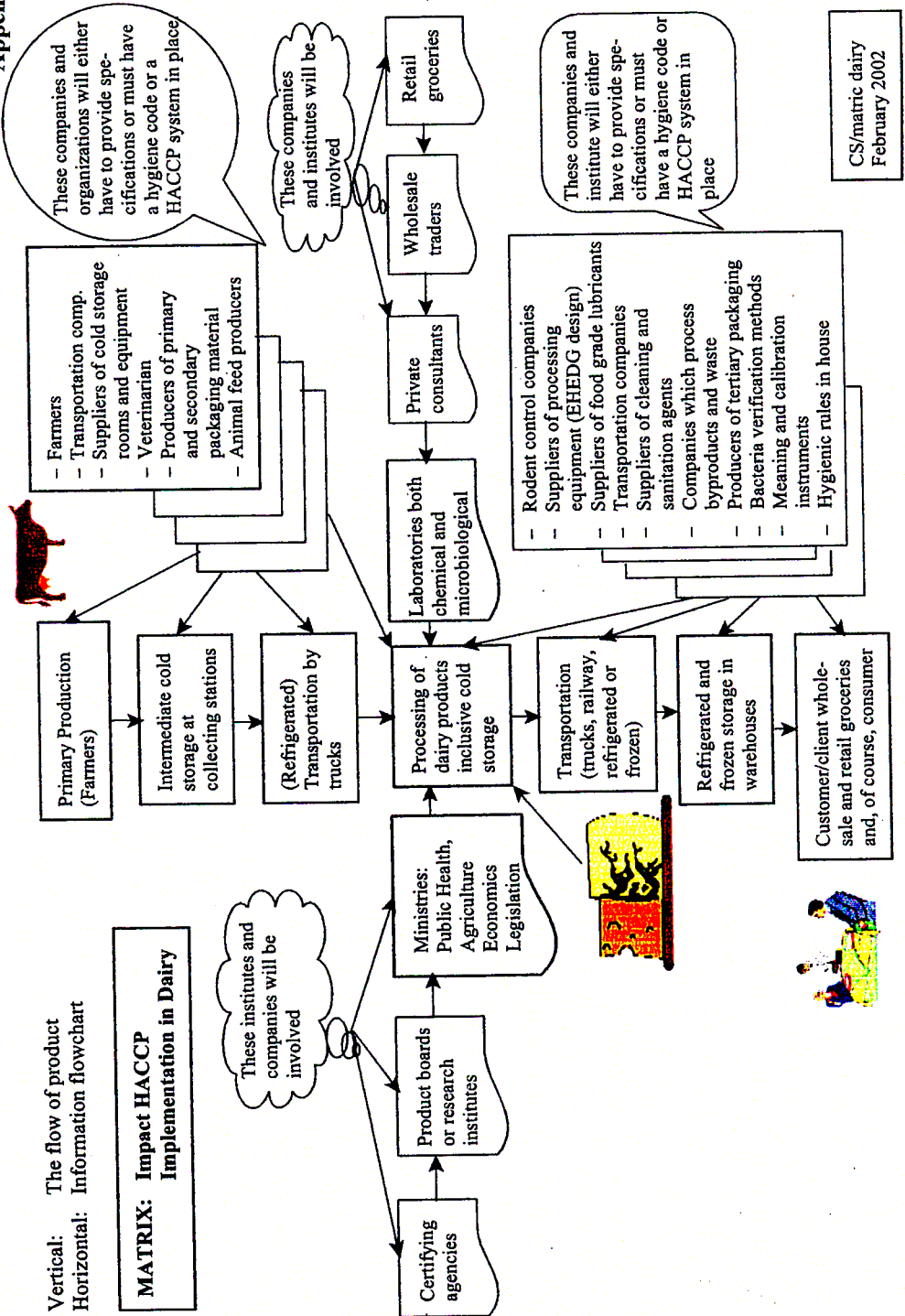
The new norm to be developed shortly: ISO 22000 “Food Safety Management Systems/Requirements”, combines HACCP and ISO and is expected to be available in 2004. This standard will further contribute to the standardization and harmonization of systems worldwide. Food safety and quality systems like EUREP GAP and SQF 1000 are distinctly connected with the food safety systems in the processing industries.

Hygiene requirements for processing equipment are laid down in the EHEDG guidelines.

Appendix

Vertical: The flow of product
Horizontal: Information flowchart

MATRIX: Impact HACCP Implementation in Dairy



CS/matrix dairy
February 2002

2. QUALITY MANAGEMENT SYSTEMS IN SMALL AND MEDIUM FOOD PROCESSING ENTERPRISES – EXPERIENCE OF SOUTH AFRICA

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INTRODUCTION

The informal sector, consisting mainly of small and medium enterprises (SMEs) has been the biggest source of job creation in South Africa over the last five years. Jobs are urgently needed in a country where the unemployment rate is estimated to be around 40 percent (Department of Trade and Industry [DTI]). Most of the SMEs in the informal sector are unrecorded in any table of statistics produced at national level, thus it is difficult to assess that sector (Bannock and Daly, 1990).

This paper's focus is on established and registered fruit packinghouses, which form a small segment of SMEs. The packinghouses are situated on or close to farms and are an important employer in the rural areas. The presence of these packinghouses plays a contributing role in preventing migration to large cities in the (frequently vain) hope of better income. The primary activity of these packinghouses is the packaging of fresh fruit for export. In the light of the food safety requirements in the countries of destination, the South African packinghouses are now under pressure to implement HACCP.¹ Should they fail to comply with these requirements, they lose access to their most lucrative export market, which will ultimately place the packinghouses and, consequently, the involved jobs at risk.

All quality management systems are aimed at the formalization of procedures, but with different focus areas and benefits. While a system like ISO² 9000 can be introduced to any business, HACCP – the most common food safety system – is only applicable to the food industry. Other systems have an even more restricted target sector, such as EUREP GAP (European Retailer Group, Good Agricultural Practice)³ and Safe Quality Food (SQF)⁴ that aim purely at farming operations. For a fruit packinghouse the most pertinent system is HACCP, not only because food safety should be a basic standard in all food operations rather than a competitive edge benefit, but it will also be the only mandatory system in and for exporting to the European Union (EU).

¹ It is a preventative management system to ensure food safety in a processing enterprise.

² International Standard Organization. It is the abbreviation for an international management system ensuring a continuous quality and supply.

³ It includes most major supermarkets in Europe (Tesco, Ahold, Coop, Spar, Waitrose, Sommerfield, Marks & Spencer, and more), and EUREP GAP was published by Foodplus, the legal body of EUREP.

⁴ A quality management system developed as a food safety initiative of the Australian National Department of Agriculture, combining aspects of ISO and HACCP.

HACCP affects the whole food supply chain. From an exporter's perspective the challenge is to source products from HACCP accredited suppliers. In the South African fresh fruit industry, there are very few packinghouses that are currently certified for HACCP. The focus is very much on ensuring that the suppliers achieve HACCP in due time to maintain the supply. The exporters are not only the messengers conveying the new requirements, they have to actively assist the packinghouses in making the necessary changes to adopt the HACCP concept.

This paper identifies constraints, progress and status on an operational level of introducing HACCP in a fruit packinghouse and aims to present the exporter's role in this process.

OVERVIEW

Quality Management Systems in the Agriculture Sector

Quality management systems have typically been developed to address a specific set of issues inherent to a specific commodity or product. An agricultural code of practice like EUREP GAP was created for farms and cannot be used to manage quality in, for instance, a retail company, chip manufacturing plant or aircraft maintenance facility. On the other hand, ISO is widely applicable to almost any business. Some systems overlap with parts of others, i.e., the EUREP GAP packaging section partly covers HACCP; HACCP in turn is part of British Retail Consortium (BRC);⁵ while BRC and ISO have many common themes.

Table 1. Quality Management Systems and Areas of Application

System	Strategic Purpose	Target Sector
GAP (EUREP)	Farm management including principles of integrated production	Primary agriculture
ISO 9000	Continuity of production and quality	Agriculture, industry and service
ISO 14000	Contribution to global sustainability	Agriculture, industry and service
HACCP	Food safety	Food industry
BRC	Food safety, document control and traceability	Food processing and food handlers
SQF	Food safety, quality improvement	Primary and secondary agriculture
SCM ^a	Harmonization in supply chain	Supply chain of goods
ECR ^b	Time efficiency	Retailers and suppliers

Notes: ^a Supply Chain Management; and ^b Efficient Consumer Response – a system to manage faster supply; more frequently and in smaller units.

HACCP is the most appropriate system to ensure food safety in a packinghouse. It was developed for the food processing industry but it can be readily adapted to the operation in a packinghouse, even though some might consider packing not to be processing in the strict sense of the original definition. Packinghouses do include a washing step and application of postharvest chemicals for which HACCP concepts are well suited.

⁵ A prescriptive outline for food processors against which a third party can audit a supplier.

The Country and Its Agriculture

South Africa has fertile soils, ranging from clay to sand, with a climate that is mostly semiarid in the interior, subtropical along the coast and Mediterranean at the southern tip. South Africa's cultivated land is mostly irrigated due to a lack of rainfall in the growing season. Fifty percent of South Africa's water is channeled into irrigation systems (DTI) and allow horticulture in almost the whole country. However, different types of fruit are grown in specific regions.

Farming became prevalent with the early settlement of the "Boers", who arrived from Europe in large numbers around 1,800. The detection of natural mineral resources (mainly gold and diamonds) soon dwarfed the economical importance of agricultural goods. Nevertheless, non-perishable agricultural goods were exported until the imposition of international sanctions prevented South Africa from trading with member countries of the UN.

Export of Fresh Fruit from South Africa

South Africa is a traditional exporter of wool, skins, grain and fruit. After the successful first trial shipment of fresh grapes to England in 1890, several vessels were fitted with special fruit chambers. The development of commercial fruit growing in South Africa was encouraged by improved transport and marketing conditions and increased by a factor of 100, between 1907 and 1939, to over eight million cases per annum.

When the embargo against South Africa was lifted in 1994 after the election of Nelson Mandela, imports and exports increased rapidly. At present fruit and vegetables account for about 5 percent of the total export value. For fresh produce the main export market is Europe, due to its geographical proximity and the price levels achievable on its markets. For example, 99 percent of the export avocado crop and 87 percent of the exportable mangoes are sold to European countries.

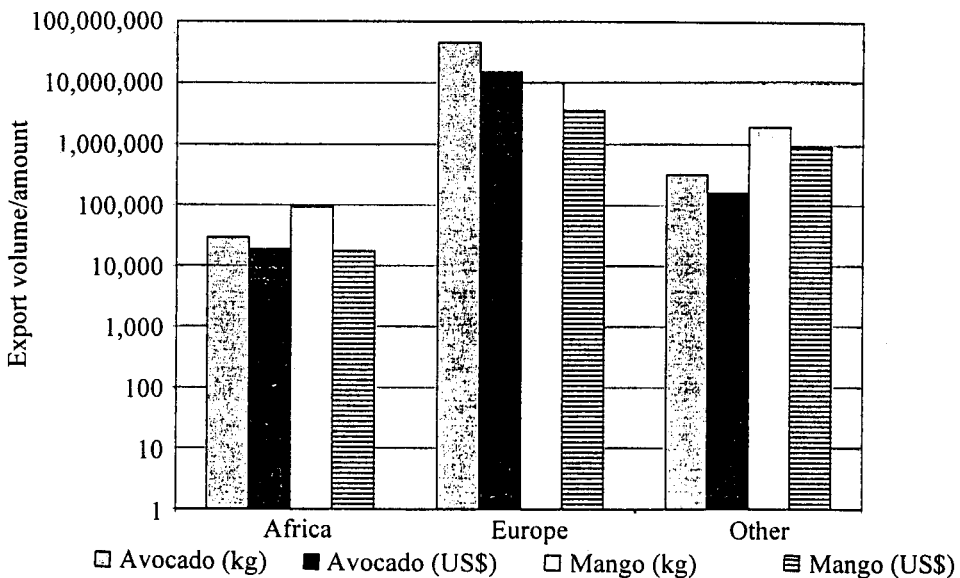


Figure 1. Export Volumes of Avocados and Mangos from South Africa in 2000

Source: Southern Africa Custom Union (SACU) Fruit Export Statistics.

Packing Operations in South Africa

Fruit is delivered from one or several farms for grading, sorting and packaging to a so-called packinghouse. Packinghouses are either owned by single large farms or by communal structures in which several farms participate. There are several projects under way that encourage ownership participation of employees and previously disadvantaged people by means of share plans and similar models.

In order to maximize the return on investment some packinghouses will pack different types of fruit throughout the year. A typical example in South Africa is avocados and mangoes that are frequently packed in the same packinghouse. The packing, grading and sorting requirements are similar and allow for the reuse of machinery. The procedures in packinghouses are in fact quite similar for most fruit types, except for table grapes, for which the share of manual labor is far above average.

After delivery of the fruit and the incoming quality control step (which measures the maturity, scope of defects and volume), the fruits are transferred from the harvest crates into a chlorine water bath to wash off dust, bacteria and mold spores. An optional chemical dip follows and the fruits are dried with hot air. Wax, sometimes mixed with a fungicide, is sprayed evenly onto the surface of the fruits, which are dried again with a hot air blower. The wax coating changes the appearance of the fruits from dull (due to dust and natural wax on the skin) to shiny and reduces moisture loss during transport. A conveyor belt facility allows damaged fruits to be manually removed. The good fruits are then separated into different quality classes in the "Grading" step. The criteria to grade fruit into different classes are mostly based on cosmetic criteria, such as malformation or skin blemishes. The next step is "Sorting". Typically an automatic weight sorter follows the grading conveyor and sorts according to the weight of the individual fruit. Then the fruits are packed into cartons by hand, labeled with the variety (type), packing date, commercial information and the count. The count indicates how many fruits are in a box and gives an indication of the weight of the fruits, as a box of mangoes or avocados commonly weighs 4 kg (example: "Count 10" means 10 fruits are in the 4-kg box and one average fruit weighs 400 g). Other tropical fruit is often packed in smaller units while citrus and deciduous fruits are packed in bigger boxes. Pallets with the same count are formed with 200-260 boxes. A pallet carries roughly 1 mt of fruit. Each pallet is also labeled and the fruit is cooled to a specific postharvest temperature, ranging from -0.5°C for grapes up to 12°C for some tropical cultivars. The pallets are stored at the packinghouse in a refrigerated room until dispatch takes place in cooled trucks to the port or airport.

CONSTRAINTS IN IMPLEMENTATION

Resistance to Change

While resistance to change is a problem in the whole food industry, we face a particular group with the fruit producers. Partly this is due to their unfamiliarity with the end-consumer who lives in a "different world". The European end-consumer's perhaps somewhat idealistic demand for healthy, biological, non-chemical, environmentally friendly untreated food is poorly appreciated in these circles that must produce quantities of faultless fruit against dwindling margins. Another reason is the "foreign", western origin of the systems, including all food safety and quality management systems, which raises fears of foreign interference in people who look back on a long history of proudly defended independence. It appears to be an all too convenient excuse to claim that HACCP is not appropriate to a third world country or an emerging market.

Company Size

A survey in the United Kingdom has shown that small food processing companies are less likely to have a HACCP system in place (Gormley, 1995). Big companies will find resources and technical assistance relatively easily, while small businesses struggle against the lack of appropriate funds, experience and food safety priorities (Panisello and Quantick, 2000). Particularly, packinghouses tend to employ people lacking higher education as workers. They often report directly to the manager. A supervisor or middle management layer is usually absent, which makes the formation of an internal HACCP team impractical and works against meticulous record keeping. A small business can operate without formal procedures, but big companies cannot operate without these procedures, which paves the ground for the implementation of a documented management system.

Prerequisites

A common misperception is that HACCP is the magic formula to right all wrongs – ranging from poor personal hygiene, unsuitable facility design, and inadequate cleaning programs to ignorance and illiteracy – to be instituted preferably overnight and at low or no cost (Holy and Marais, 2001). This leads to attempts at implementing the Critical Control Points (CCPs)⁶ before managing the prerequisites (PRs). If done in this manner the HACCP system will lack the PR-foundation and result in a short-term solution.

Time Frame and Budget

PRs and HACCP can neither be implemented overnight nor be given to a processing plant as a gift. Like any other change, they require persistence and motivation to implement and maintain.

Generally the cost of fruit production is on the increase, while the oversupply in the world lets prices for horticultural products decrease (in 1999, for example, prices dropped by 8 percent [DTI]). This puts commercial farmers in a difficult situation when deciding on the economical viability of implementing a quality management system. Packinghouses may additionally have other desirable projects to pursue with tight budgets that may improve the quality or quantity rather than the safety of the packed fruit. A formal budget item for the training of a largely illiterate staff is unusual. Without adequate literacy a paper-based quality procedure system becomes a “White Elephant”. Moreover, the requirements for HACCP and associated costly changes to the facilities coincided with the major floods of 2000. The floods not only destroyed vast amounts of crops but also resulted in a smaller yield and poor quality of South African fruit, which resulted in disappointing returns for the fresh fruit industry.

Lack of Appropriate Services and Technology

Training centers, laboratories, research institutes and suppliers of packaging and chemicals are often not established in the grower’s areas. Those that do exist frequently provide unsatisfactory service. The packinghouse is left with no choice but to either accept unprofessional service or doing as much as possible in-house, where there is no segregation of duties. The fact that they operate in rural areas makes it more difficult to access services and supporting technology. New technology is not a prerequisite for HACCP but it simplifies the implementation vastly.

⁶ A point in the production or process step, where a food safety hazard could appear.

SUGGESTIONS

For successful HACCP implementation in a packinghouse, experience has shown that the steps to take are those in the order described in Figure 2.

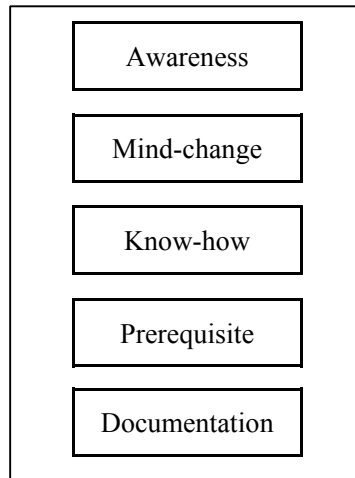


Figure 2. Steps Towards HACCP Implementation in a Packinghouse

The packinghouse is an integral link in the supply chain and thus the cooperation of other links in the chain is essential (Figure 3). Much support is needed from the supplying farm, as well as from the exporter. If the farm does not produce according to EUREP GAP guidelines, the delivered fruit must at all times be accompanied by a record of the production unit and a spray summary giving details of what chemicals have been used during production. More cooperation is needed in terms of the staff hygiene, transport and equipment.

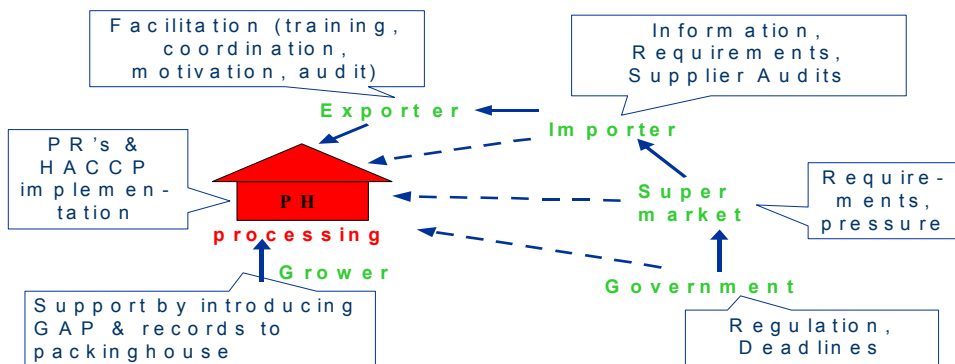


Figure 3. HACCP in the Supply Chain from Farm to Supermarket in Export Country

Since food safety for fresh fruit cannot be added later in the supply chain, if the necessary steps are not taken at production level, the exporters depend very much on the successful implementation of HACCP in the packinghouse. The exporter can help in terms of resistance to change, small company size and lack of appropriate services, as the example of initiative to implement HACCP in packinghouses shows.

Last but not least the prerequisites have to be implemented as a first step.

Exporters Initiative to Implement HACCP in Packinghouses

For most small companies the adoption of HACCP requires owners/managers to embark on a completely new system of managing food safety. They have little motivation for such change largely due to their firm belief that they already produce safe food (Taylor, 2001) and because of their angst about anything unknown. One of the main exporters in the fresh fruit industry has taken the initiative to support the supplying packinghouses and organized workshops in the area of their operations. The education of owners/managers through presentations and consulting by exporters in conjunction with the pressure from clients eventually convinces them.

The exporters' offices are situated in cities and they thus have far better access to services and technology. By intensifying the cooperation with the packinghouse, services like lab analysis, training and pest control can be arranged and coordinated.

To have a person from the exporter in the HACCP team of each packinghouse not only makes the team bigger, but also adds input from the exporters' perspective. The team meetings take on a more formalized form, as this person is not part of the daily workforce. This person being a member of many teams, she/he can get an overview of the progress in the industry and can instill an element of competition to accelerate the process.

Moreover, physical aids like signboards, examples of control sheets and training material can be distributed and financial incentives, such as free pre-inspections or covering certification costs, can be offered to increase motivation.

Prerequisites

The World Health Organization has published a definition of prerequisites stating that PRs are needed prior to and during the implementation of HACCP (WHO, 1999). In a survey of avocado packinghouses in the province of Mpumalanga (South Africa) it was found that only one-third to two-thirds of the PRs were in place (Perishable Products Exports Control Board [PPECB]⁷, 2001). The survey was done based on the HACCP pre-audit list containing the PRs in Figure 4 and was based on PRs, which Mortimore described as the "HACCP Support Network" (Mortimore and Wallace, 1998). The support network shows the interrelationship of management systems and procedures and should be considered in any food business for the production of safe products, while the PRs in Figure 4 are those specifically important in a packinghouse and practitioners call them the wheels to get HACCP running in a packinghouse.

⁷ It is the mandated quality inspection organization in South Africa for perishables.

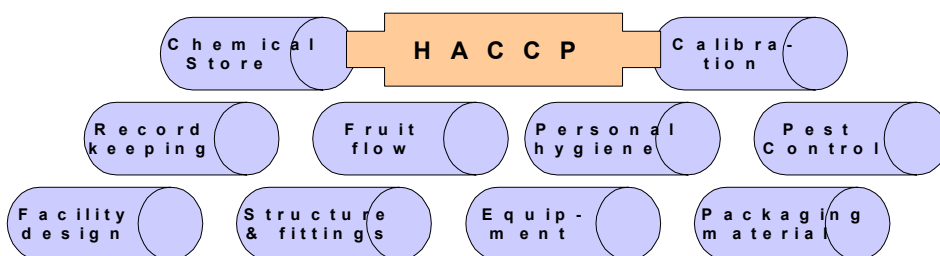


Figure 4. Wheels for HACCP in a Packinghouse from the PPECB HACCP Pre-audit List

In the support by exporters to packinghouses, special emphasis was placed on the implementation of PRs, with good results. While some people may see PRs as a new concept and think it makes HACCP more difficult, it is in fact the only way to keep the number of CCPs low and the HACCP plan manageable (Wallace and Williams, 2001). To keep the system as easy as possible, it is very important to ensure that everybody can understand it. This is particularly relevant in a packinghouse where most staff members have no higher education.

Project Planning

Since HACCP cannot be implemented overnight, the motivation and focus can fade. It is therefore helpful to jointly develop a proper project plan with realistic, measurable milestones that are regularly monitored by the HACCP team. Even though a certification is not mandatory, it is advisable to certify the system once it is implemented. The final audit day will serve as a deadline and the display of the certificate in the office is a reminder to maintain the system.

FOOD SAFETY STATUS IN PACKINGHOUSES

Prior to 2001 no fruit packinghouse in South Africa was HACCP-certified. Over the last two years, the combined efforts of packinghouses and exporters have been focused on getting the PRs in place. The PRs, therefore, form the main part of the progress report.

Prerequisites

Facilities have been upgraded over the last two years, from a basic packing location to a sound packinghouse. Often tools, farming machinery, personal belongings, packaging materials and chemicals were stored under the same roof as the fruit-sorting line. With extensions to the buildings, new storage rooms were created to fulfil the guidelines for chemical storage and allow space around the packing line for additional equipment (like conveyors to take waste straight out from the packinghouse or a washing line for the crates in which the fruit is delivered from the farm). All openings of the packing facility were closed: doors with plastic curtains or doors, windows with wire net and other openings with bricks or cement. Large openings were provisionally closed with mesh and net until the financial situation allows for the building of a wall. Most packinghouses have a corrugated iron roof which had to be insulated in order to keep the inside temperature moderate, or wind-

driven ventilators had to be installed. Floor and wall surfaces had to be plastered or tiled to make them smooth and washable.

Pest control used to be established in various forms, mainly biological. Some places had cats to control the rodents, while one place had actually built a birdhouse for their pet owl inside the packinghouse! These predators were replaced with a pest control service from a third party, or the packinghouses introduced their own system. The important aspects were that at least one person had to be trained to be in charge of the bait stations and mount them in sensible places (off the floor to avoid water getting into the stations and with a numbered signboard mounted above the station to do proper record keeping). A file is kept with evidence of this person's training, safety data sheets for all bait used and most important all records of the monitoring and maintenance done on the bait stations and changes to the system (floor plan and location of bait stations). To protect the wildlife around the packstation, organic bait is often used to control mice and rats. Insecticides have been installed in some places, but are not regarded as useful by all in the industry.

Hygiene is the most critical factor, which includes personal, environment, building and equipment hygiene. Those employers, who did not have uniforms for their staff before, introduced dustcoats and head-cover for all people working in the packinghouse. No records were kept before. Now, written house rules stipulate the wearing of adequate protective clothing and the washing of hands upon entering the packinghouse. Smoking, eating or chewing gum is not allowed and no jewelry may be worn while working. Hygiene training is offered to all staff and attendance is compulsory. Records of this attendance are kept for both in-house courses and outsourced training. Signboards on the walls remind workers to abide by these rules and regular checks are conducted and recorded. In some cases additional washbasins had to be installed and new sanitary installations had to be built to provide for a hygienic environment and appropriate behavior of staff. Health checks are done before the start of the season and a record is kept. All workers are advised to inform the packinghouse manager if they feel ill, to avoid contaminating fruits with pathogenic germs or viruses. Environment, building and equipment hygiene means cleaning. To do so correctly and regularly, cleaning schedules had to be drawn up for each area or item, detailing the procedure, the chemicals used and the frequency. The date and the name of the executing person are recorded on a checklist.

Water quality is one of the most important PRs. Most packinghouses are in the fortunate situation of having access to potable water from either a spring or a borehole on their own land. The managers in the packinghouses initially did not realize the need to have the water tested in a laboratory when they could drink it without adverse health effects. A check across all suppliers showed that every second one did not meet the local requirements for clean water, and thus they had to start chlorinating all process water for the packinghouse.

Maintenance used to be done in a reactive rather than a proactive manner. With the introduction of a checklist all critical breakpoints are now monitored on a regular basis and wearing parts are replaced before they break. All changes and adaptations needed on the line are done before the season starts.

Good Manufacturing Practice (GMP) had to be changed from grandfather's manufacturing practice. In many cases the standards had to be changed. Laws and regulations on workers' safety and welfare had changed but were not enforced. One example is that of first aid. In South Africa, a room with more than five workers is considered a workshop and must have a first aid box with a certain minimum content. A person trained in first aid has to be present during working hours. One person per packinghouse was trained and the minimal content list was sent to all packinghouse managers. The quality controls at arrival

and dispatch also had to be formalized. Today this is still a weak point in many packinghouses. The arrival quality is assessed visually but this does not follow a documented procedure and records are not taken. Only the official inspector, who has to inspect the fruit against the national export quality standards, does formal quality control. GMP also means full traceability of the products through the supply chain. Due to the method of payment, where the farmers are paid according to the achieved price of their products in the overseas markets, a traceability system was developed as the export industry grew. Except for a few big cooperative packinghouses, fruits from different growers are never mixed in the packing station. A gap is maintained in the pack line between deliveries at the packinghouse, so that the fruit packed into the cartons at the end of the line can clearly be allocated to the farm of origin. Each box is marked with the relevant grower code and the address of the packinghouse is printed on each box, as required by local and international regulations. The system became more formalized, after the South African Department of Agriculture issued all farmers registered to export produce with a so-called Production Unit (PU) code last year. This PU code replaced the former individually chosen grower code marked on the cartons. The PU code is linked to the pallet and recorded on the consignment note. Each pallet gets marked with a unique bar code and is registered on a computerized system. An international project is currently underway to identify what information needs to be linked to this pallet-bar code to satisfy all members in the supply chain.

HACCP Implementation and Certification

As (almost) all PRs are in place, the actual HACCP implementation can now take place. In the case of a packinghouse, HACCP, in the context of risk analysis regarding food safety hazards to the fruit during processing, occurs between the picking or delivery of the fruit and the dispatch of the pallets. Indeed the fresh fruit industry in South Africa is at the beginning of this implementation. Statistics show that no fruit packing operation in South Africa was HACCP-certified in 2000 and only 13 achieved a certification from a recognized certification body in 2001 (Table 2). This means 1.3 percent of packinghouses packing export fruit (971) in South Africa have a certified HACCP system in place today.

Table 2. Certified Packinghouses in South Africa for HACCP

Certified Body	2000	2001	2002E
PPECB	0	11	100
SGS ^a	0	2	40
SABS ^b (GP)	0	0	3
SABS (CA)	0	0	4
SABS (Natal)	0	0	1
CMI ^c	0	0	5
Total	0	13	153
Operating packinghouses	950	971	1,000
Percent certified	0	1.3	15.3

Note: ^a Société Generale de Surveillance South Africa; ^b South African Bureau of Standards; and ^c certified BRC, auditing HACCP as a PR.

Taking into account that the most costly aspect – the improvement of the facility, and the most time-consuming part – the awareness and the commitment of the management in the

packinghouse, was achieved over the last two years, we can expect a fast increasing number of HACCP accreditations in the near future.

Some processes and products are more difficult to keep under control than others. A heat process at the end of the production to control the microbial load can be measured, controlled and justified relatively easily compared to a minimally processed agricultural product, where the safety of the final product relies on the additive impact of a series of operations or practices that prevent or decrease contamination (Buchanan and Whiting, 1998). For fresh fruit it is on the one hand difficult to determine a critical level for microbial hazards due to the natural flora and the lack of research data for specific fruit, and on the other hand, it can be considered a low-risk product which will reflect in a “short” HACCP plan.

Looking at the hazards in a packinghouse from a theoretical point of view, there will be a small number of CCPs. The CCPs are expected to be:

- fruit arrival at the packinghouse (excessive chemical residues from crop protection);
- postharvest application step (excessive chemical residues from chemical dip);
- grading and sorting step (physical hazard due to light breakage) if the lights have not been covered as a “facility prerequisite”; and
- cool storage (microbiological hazard if temperature control systems fail).

CERTIFICATION BODIES IN SOUTH AFRICA (HACCP CERTIFICATIONS) AND REFERENCE DOCUMENTS

Whether an enterprise receives a certificate or not is based on an audit, including a physical inspection and a documentation check, against a reference. There is one national reference document in South Africa: SABS 0330: Code of practice for the implementation of a HACCP system.

This code was published in 1999 by the official standards body in South Africa and both certifying organizations: SABS and PPECB. The SABS 0330 code is a guideline and has no legal enforcing power. The National Department of Agriculture, in cooperation with the Department of Health, is currently working on a draft “Regulation for HACCP” which will make food safety an obligation in the fresh produce industry. Regarding these regulations there is no indication when it will be finalized (Department of Agriculture, 2002).

A third relevant certification body operating in South Africa is SGS, who refer to the Codex Alimentarius (Alinorm, 1998). Moreover many small companies offer HACCP certification, some are more and others less trustworthy. For enterprises wishing to access the export market the appointment of an internationally recognized certification body is recommended, since European clients may not accept unknown certifies.

Last but not least there are several American institutions that offer HACCP certification. The USA has mandated the use of HACCP in specific sectors of the food industry and has developed HACCP regulations for those. These are less relevant for the fruit industry in South Africa; not only for the reason that very little fruit is exported to the USA, but also because no specific regulations for fresh fruits and vegetables are in force.

FOOD SAFETY IN THE MARKET PLACE

Target Market “Europe”

The market in South Africa generally does not know oversupply. Wherever there is an offer, there will be two buyers. This is not a stimulant for competitiveness. That is one of the

reasons, why the “ISO boom”, which took place in Europe around 1995 and paved the way for further management systems like HACCP in food industries, never took hold in South Africa.

Clients in Europe expect products to come from factories, which have a western quality management system in place. No horticultural products will be accepted from farms, which do not follow the principles of EUREP GAP, and packinghouses, which are not HACCP-certified. As far as food safety is concerned they have the legal support, since the EU will make HACCP mandatory for all food handlers and processors by January 2004 (EU Directive 00/43, 2000). This also applies to facilities outside of Europe, if products are destined for a member state of the EU.

When this EU Directive was published in June 2000 the entire supply chain was aware of the requirements for the future. The awareness not only grew in the fresh fruit industry, where some pioneer packinghouses became HACCP-certified as early as 2001, but also amongst the Ministry of Health and the Ministry of Agriculture. After a ban on the dairy industry for the export of cheese to the EU, due to a lack of government procedures, a workgroup was formed to establish a code of food safety for fresh fruit and vegetables to prevent such a ban in other sectors. The resulting document is currently in the draft stage. This means that “European pressure” will soon result in the first local food safety regulation.

South Africa

It is impossible to produce 100 percent for the export market. A portion always goes to the local market. The “export packinghouses” – after making the effort to implement a HACCP system, will surely try to convey the message that their fruit is safe, in order to gain some headway and thus introduce a new standard to the local market. Indeed, the question was already raised at farmers’ days and meetings of the growers’ association – to what extent should one push the big local markets to implement food safety measures? Also, selected local supermarkets who are always trying to keep on par with European standards, are quickly drafting new supplier requirements with a strong focus on food safety. This is, of course, an additional incentive for producers to implement a HACCP system. To sell the local share to an up-market supermarket is financially much more rewarding than the local open market.

HACCP does not directly provide any advantage for a premium price, neither on the local nor in the European market. The game is to gain access to those clients, who do pay a better price and thus a higher profit is obtained.

CONCLUSION AND SUGGESTIONS

There is little doubt that HACCP has brought numerous benefits to the food safety scenario. One of the more important ones is the increased awareness of food safety and, as a result, improved transparency and communication between customers, processors and regulators, exporters and importers, scientists and consumers. For the fresh fruit industry in South Africa this has led to a better understanding of food safety amongst the packinghouse managers and owners, resulting in a general improvement of packing facilities and indicates that the national regulations will be brought in line with the European food safety requirements. In spite of the small number of packinghouses that achieved certification for HACCP until now, they are ahead of many other food processing sectors in terms of awareness, commitment and progress in implementing PRs. This has to be seen as a consequence of their export activity. Pressure from European clients and the EU Directive

mandating HACCP is the major driving force for the whole food processing industry in South Africa.

HACCP implementation in SMEs means, in most cases, attention first to the PRs with a special focus on personal hygiene. Even though there are national regulations for hygiene in place, they have not been enforced in the past.

To have a food safety system implemented makes the business less vulnerable to outbreaks of epidemics. In a country with poor sanitary infrastructure, the importance of trust from the clients in respect to food safety is not to be underestimated.

While all food operations involved in export will most likely be implementing HACCP, the SMEs producing for the local market might confront food safety with ignorance. It is yet to be proved that a local regulation, mandating HACCP, will change this scenario.

An HACCP information campaign on the national level might be needed to encourage the owners/managers in the food industry which would accelerate the implementation process.

Even with all the theoretical knowledge it is still difficult to implement HACCP in practice. Since HACCP is not prescriptive, each operation has to set individual “standards” on what is critical in the production and find justification for it. In the case of packinghouses, which all have very similar process steps, one might consider establishing a generic HACCP plan. Another approach could be the industry wide risk analysis, i.e. on microbiological risks on fruit surfaces. This would be a harmonized reference for the setting of critical limits.

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3. GMP/GHP AND HACCP SYSTEMS – EXPERIENCES OF SMALL AND MEDIUM FOOD ENTERPRISES IN POLAND

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INTRODUCTION

In the European Union (EU) countries all the participants of the food chain are obliged by the 43/93/EEC Directive to apply the principles of hazards analysis in line with the HACCP system.

The system is of a preventive character and the requirement for its introduction results from the need of consumer protection against the purchase and consumption of food which could carry health hazards (microbiological, chemical and physical). The HACCP system imposes the duty of defining and assessing hazards and monitoring the critical points. The system is not easy to introduce and its application in Polish conditions encountered many difficulties, resulting mainly from habits and the previously applied practices.

ACTUAL SITUATION IN POLISH FOOD LAW

Modern systems of food health quality assurance are based on the concept of creating production conditions which guarantee optimal quality products. It is necessary to define quality characteristics and potential dangers as well as forecast the quality of a finished product in these systems, which is opposite to traditional systems, which were based on controlling finished goods and eliminating products which did not meet defined requirements.

In Polish food companies, implementation of methods and systems of quality management and quality assurance are becoming more and more popular. In food processing some of the systems of food health quality assurance already are or soon will be obligatory. Thus, there is an existing binding Health Ministry regulation, as of 28 February 2000 regarding sanitary conditions and hygienic rules for the production and turnover of food products, beverages and additional substances. As well, there is an additional Health Ministry regulation, as of 22 November 2000, which introduces an obligation of implementing Good Hygienic Practice (GHP) and Good Manufacturing Practice (GMP) in food production and turnover. The regulation came into force on 20 July 2000.

There is a regulatory project of the Health Ministry still being prepared which concerns the scope and methods of internal quality control for food products, beverages, additional substances or other additions to food products and beverages as well as materials and products having contact with these articles, and the scope and methods of internal hygienic control. This regulation will introduce the obligation of implementing the HACCP system.

GMP/GHP AND HACCP – BASIC PRINCIPLES

The basic systems of health quality assurance used in food production are: GMP, GHP and HACCP – the system including the area of food health quality assurance. It has to be strongly emphasized that the HACCP system is an independent food safety assurance system, specific for the food sector. Implementation of the HACCP system in production plants processing food should be preceded by implementation of GMP principles and GHP. This would settle all the issues referring to plant hygiene and for complying with basic food production conditions. It is essential that all the hygiene-related elements, i.e., application of relevant hygiene procedures for a given production operation, appropriate washing and disinfecting agents, efficient technical equipment, efficient use of chemicals, water and time.

GHP means performing all the activities during production and processing of food products, while complying with conditions assuring the relevant health quality of the food products. GHP includes: maintenance of hygienic rooms, machines, production personnel, planned training courses and medical examinations, as well as registration of confirmed and controlled cleaning and preventative activities used in the plant agents, washing, disinfecting, pesticide and rodent control, and other means used to maintain hygiene. Every food producing plant should have an Instruction of Good Hygienic Practice, based on the binding Polish and world regulations, adapted to the plant and production character conditions.

GMP includes the basic areas of a company's activities, the level of which determines whether the produced food represents the relevant quality. Food production should take good advantage of Good Production Practice experiences. Elaborating GMP principles and following them are a basis for implementing other quality assurance systems. The experience makes us believe that just one GHP/GMP system should be discussed and implemented. Requirements of these systems are connected, interwoven with and dependent on each other.

After elaborating and implementing GHP/GMP, a subsequent, logical step is to elaborate and implement the HACCP system. Special attention should be paid to all the factors potentially dangerous for the consumer's health in order to guarantee food health safety. These factors have to be defined, and then preventative activities should be elaborated (prevention); if necessary Critical Control Points (CCPs) should also be identified to minimize or completely eliminate any possible dangers. The HACCP system consists of seven rules and is implemented in 12 stages. This system makes changes to previous habits, forces analysis of the production processes in the plant at the production places themselves, even at the places with no production problems, and shifts the responsibility to the employees directly connected with the production.

HACCP SYSTEM – EXPERIENCE FROM A SMALL TO MEDIUM FOOD PROCESSING ENTERPRISE (KOTLIN LTD.)

General Information about the Kotlin Ltd. Enterprise

The Kotlin Ltd. enterprise was established in May 1997 as a result of privatization of the Kotlin Fruit and Vegetable Plant, which had a 50-year history. The headquarters of the firm is located in Kotlin, in the heart of the Wielkopolska region, 85 km south of Poznań. The firm also has an office in Warsaw with sales and marketing departments.

The Norwegian capital group Orkla Foods has a majority share in the company, the remaining shares belonging to the State treasury and to workers and growers.

Kotlin Ltd. is an important producer in Poland of:

- deep frozen pizza (Sorella, Pan Pizza, La Cassina – 12 assortments in total)
- ketchup and other processed tomato products (tomato concentrate) and sauces (Gypsy, Mexican, Italian, Bolognese, Chinese)
- high and low sugar jams, fruit preserves and conserves
- canned vegetables and meat-vegetables.

The firm also produces deep frozen fruits and vegetables for domestic use and for export. The annual production of prepared products amounts to more than 12 thousand mt. The enterprise employs several hundred people, including highly skilled technical personnel and a specialized marketing and sales staff. Accepting the strategy of maintaining the leading market position in the production of products through the assurance of a consistently high quality, thus guaranteeing safety to the consumer, the Board of Kotlin Ltd. adopted a decision in mid-1998 to work out and implement a formalized HACCP system for all Kotlin products.

Expectations Before Implementation of a Quality Assurance System

- Having a complex system starting from the delivery of raw materials up to finished product distribution;
- Having a system in which the priority is a safe product for the consumer;
- Having a system which will improve the production process; and
- Having a system which develops independently.

History of HACCP Implementation

In November 1998 the chief team for HACCP, chaired by the manager responsible for the introduction of the quality control system in the plant, and five working HACCP teams in individual production departments, was established.

The initiation of the PL 9607-01-12 program, supported by PHARE, and the qualification of Kotlin as one of the pilot enterprises permitted the firm to benefit from the assistance offered in working out the HACCP system at the selected production line of deep frozen pizza.

The schedule of introducing the system into the enterprise takes into consideration the time needed for the implementation of each of the stages and responsibility for the execution. The schedule provides for a program of forecasted training sessions during the implementation and training of the managerial personnel (directors of departments heads) on the principles of the HACCP system; training for the medium-level managing personnel of the production departments; training of production personnel on the general principles of hygiene and the HACCP system; and training of inside controllers on the principles of the system's verification. It is the fundamental and indispensable scope of training.

The longest period of time in the schedule was envisaged for the stage of hazards analysis and working out the procedures and instructions (technological and position) with consideration given to corrective action for the CCPs. Working groups meet systematically on specified dates, one day every week, which is devoted to a meeting of the working group. This group has not completed the full introduction of the system for the pizza production line, the schedule providing for work completion by the end of 1999. It is related to the pending modernization of the line. After modernization is complete, the group must verify the revised documents in order to consider the impact of new and real production conditions. A thorough training for the CCP operators and the training of the internal controllers of the system was also needed.

Problems during HACCP Implementation

- HACCP team had no experience in work with HACCP;
- The production process was very complicated;
- At the same time they have been modernizing the production;
- At the same time they have started with HACCP for other production – too much work; and
- They had to check all documentation in the company, introduce necessary procedures.

Benefits from HACCP Implementation

- Training for employees;
- Good equipment and chemicals for cleaning and disinfecting;
- Plans for cleaning and disinfecting;
- New microbiological methods;
- Storage for products during shelf-life – monitoring quality;
- Auditing suppliers;
- “Clean” zones in the production;
- Training for internal auditors;
- Monitoring quality costs;
- Integration between departments in the company (Quality, Research and Development, Purchasing, Production, Investment, Technical);
- People feel high responsibility for work;
- Standardization of documents; and
- HACCP rules in investments.

Practical Advice

- Have a good HACCP team;
- Prepare responsibilities in HACCP implementation;
- Write minutes from each meeting;
- Have help from the management of the company;
- Find a good consultant;
- Prepare all norms, food law documents, quality requirements for products;
- Start HACCP implementation for one product or for one line (if you do not have good enough experience);
- Prepare realistic schedule for HACCP implementation;
- Prepare list of all documents (norms, procedures, instructions) which you have and which you will prepare;
- Prepare a training plan; and
- Prepare plan of each document.

SCIENTIFIC RESEARCH INSTITUTES WORKING ON THE IMPLEMENTATION OF THE HACCP SYSTEM IN THE POLISH AGRI-FOOD INDUSTRY

In the years 1998 and 1999, a Dutch consortium established by Agriment International B.V., and TNO Nutrition and Food Research Institute, in cooperation with leading Polish research institutes: the Institute of Biotechnology for Agricultural and Food Industry, the Institute of Meat and Fat Industry, the National Food and Nutrition Institute and the National

Veterinary Research Institute, have implemented a FAPA project in Poland called “Support for the Food Industry in Assurance of Food Safety and Quality”, financed by EU. Each of the institutes deciding to participate in the project had several years of experience in the popularization or introduction of the HACCP system and joined the implementation of the project on the basis of partnership.

The project called for the implementation of various targets – training for the HACCP system, counseling for enterprises in the system, and finally the introduction of the system in pilot plants and guidance during the introduction.

The project also plans for the establishment of information centers on quality control systems by the four institutes participating in the project as well as their organizing weekly workshops for the fruit, vegetable, meat and poultry industries.

CONCLUSIONS

The adjustment of the Polish food industry to a market economy and EU requirements is taking place on various levels. The basic actions aim to guarantee safety, introduce common hygiene rules and meet food quality standards.

Many Polish food producers, especially meat industry plants, have implemented or are implementing the HACCP system with an eye to export requirements and inspections carried out by the importing countries.

HACCP implementation and the adjustment to EU legal regulations concerning food hygiene, safety and quality will give food producers a stronger market orientation which will lead to a marked improvement in quality as well as provide producers with a stronger consumer needs orientation, which may increase the profitability of production.

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4. IMPLEMENTING HACCP IN SMEs – CONCEPT VS. CONSUMER PARTICIPATION, BUSINESS CULTURE AND POLICY APPROACH

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INTRODUCTION

Introducing any new concept or technology in small and medium enterprises (SMEs) requires a new approach, as they distinctly differ from larger enterprises in terms size, resources and access to knowledge. As HACCP is an uncompromising, demanding and exacting quality assurance concept, it is unfair to expect SMEs to implement it straight away without actually assessing their ability to do so. In addition SMEs may also be keen to ascertain tangible and immediate returns that accrue by investing in HACCP. If HACCP needs to be introduced and sustained in the long run in SMEs, especially in developing countries, it is imperative to thoroughly understand the level of consumer participation, prevailing business culture and the policy support and direction.

All new and promising concepts, including HACCP, have a greater chance of adoption when the benefits are quantified and presented in monetary terms. As business basically revolves around money, no amount of persuasion by harping upon social responsibility, statutory obligation and public health would succeed in convincing the SMEs to implement HACCP. This means HACCP campaigns with a judicious mix of technical and financial advantages can penetrate SMEs at a faster rate than the conventional ones.

HACCP as a Concept

Though several quality assurance options are available for SMEs, HACCP stands apart with emphasis on prevention strategies on known hazards and risks of them occurring at specific points in the food chain. It is this specificity which makes HACCP so effective and easy integration into Total Quality Management (TQM) and ISO 9000 makes it further more reliable. HACCP helps SMEs involved in food business to comply with legislation, supports due diligence and fulfils customer requirements for a food safety management system.

While traditional quality control approaches are generally characterized by unreliable end product testing, technical bias in choosing sample points and times and the variability of microbial methods and lag time for results, HACCP emphasizes a systematic, scientific, proactive and preventative approach to identify and assess the hazards associated with a food operation and defines the means of their control. HACCP also acquires significance as it helps the food industry in identifying, prioritizing and controlling major food risks and assuring consumers that the products are safest to the extent that science and technology allows. Unlike most of the traditional systems, whose implementation confirms the presence

of systems and procedures required for quality assurance, HACCP confirms the presence and effectiveness of a quality assurance system which is vital to instill confidence among the consumers and prospective buyers. The emphasis on continuous verification, documentation and rectification not only ensures the production of the safest possible food items but also assures the consumers and the prospective buyers that their interests have adequately been taken care of.

There are clear benefits of implementing HACCP for all concerned, namely; government, food industry and consumers alike. Some of the important benefits listed below should encourage businesses and governments to implement HACCP.

1. *Benefits to Consumers*

- Reduced risk of food-borne diseases
- Increased awareness of basic hygiene
- Increased confidence in the food supply
- Improved quality of life.

2. *Benefits to Industry*

- Increased consumer and government confidence
- Reduced legal and insurance costs
- Increased market access
- Reduction in production costs (reduced recall/wastage of food)
- Improved product consistency
- Improved staff-management commitment to food safety
- Decreased business risk.

3. *Benefits to Governments*

- Improved public health
- More efficient and targeted food control
- Reduced public health costs
- Trade facilitation
- Increased confidence of the community in food supply.

Despite all these proclaimed benefits the implementation of HACCP among many SMEs especially in the developing and underdeveloped countries is progressing at a painfully slow rate. A number of barriers are impeding the progress of HACCP implementation in SMEs. Internal factors specific to particular businesses, such as lack of resources and access to knowledge and external environment, availability of government support, and consumer interest are some of the key issues which require the attention of policymakers.

It is obvious that development of a strategy which could be uniformly applied everywhere is not possible as conditions vary from country to country. However, invariably business culture and consumer participation are the two factors which ultimately decide the success or failure of HACCP anywhere in the world. Unless these two issues are properly analyzed and tackled HACCP implementation would be restricted to a few select units. It is for the same reason that this paper has made an attempt to focus on these issues.

Business Culture

Business culture can be broadly described as the attitude of entrepreneurs involved in a particular business activity towards consumers, suppliers, buyers, competitors and the government. It is characterized by the ability to welcome and adjust to change, strive for

excellence and put consumer interests on the top of the business agenda. An ideal environment, especially in the food business, should inspire entrepreneurs to become proactive in adopting the best possible quality assurance practices, not only to have an edge in the market but also to discharge their social responsibilities towards consumers. Food safety and quality acquire added significance as they directly affect the life and limb of the consumers.

The successful implementation of any promising new technology or concept thus mostly depends upon the business culture prevailing in a particular country. As such, it is essential for people who are serious about HACCP implementation to thoroughly understand the prevailing environment in the food industry before formulation of any strategy. In mature economies such as in the developed world, introduction and implementation of HACCP is taken for granted by the consumers and the governments. Food industry is also reconciled to the inevitability of the enforcement of HACCP and has started to meet the challenges lying ahead.

However, other countries where food industry is in its infancy or in the developmental stage have reacted rather slowly towards a whole range of issues surrounding HACCP. In fact, their response is rather by compulsion than by choice. Most of them have reacted after realizing the potential damage that non-compliance to HACCP could result to their lucrative food exports, especially to the USA and Europe. India and Thailand which earn considerable foreign exchange through their seafood exports were some of the first countries in the Asian region to react and initiate efforts towards HACCP implementation.

Exports usually receive royal treatment in the developing countries for obvious reasons. However, the industry has a tendency to adopt dual standards when it comes to enforcing quality standards. Food items meant for exports are always considered, even publicized, to be of superior quality. Though this is justifiable to some extent as the businesses are expected to respond to the target market requirements, it may not pay in the long run as the domestic consumers would ultimately be exposed to the imported food items. With the WTO regime in place, developing countries are expected to open their food markets sooner than later and the compulsions of HACCP even for food items meant for domestic markets would invariably follow. Hence it makes sense for the food industry to produce all their products with similar care and passion irrespective of their ultimate market destinations. Countries like Japan could achieve high quality standards because of their insistence of the same, if not more stringent quality control measures, for products meant for local markets as that of exports. This philosophy effectively prevents classification of consumers on quality consciousness and instills confidence that they are being treated at par with the most demanding consumers of the world. But unfortunately food industries in many developing countries which plead vehemently for a level playing field to compete in the market, tend to overlook this important fact to the detriment of the long-term interests of the consumer as well as the entrepreneur.

The other obstacle preventing faster HACCP adoption by the industry, especially the SMEs, is the perceived lack of financial returns on the investment. While it is true to some extent that the HACCP advocates among SMEs could not provide convincing answers for the ROI (Return on Investment)-related queries, excessive emphasis on this issue may raise questions about the credibility and commitment of the industry towards food safety and quality assurance. HACCP has certainly the potential to increase market penetration in the overseas markets immediately, while it may take some time to achieve the same in domestic markets. Industry stands to gain in terms of reduction in wastage, recall, legal costs, insurance costs and also helping government indirectly in reducing public health costs. In the long run

the increased confidence of consumers in the food products is bound to increase consumption there by benefiting the industry. Keeping this in view, it is prudent for the SMEs to invest on HACCP taking advantage of various schemes available through government and other developmental agencies.

SMEs shall overcome the misconception that HACCP involves a lot of investment and it is too exacting and rigorous to implement and sustain. SMEs must understand the fact that it is the rigor with which HACCP continuously assesses the process which makes it unique and provides the cutting edge for the food items in the final analysis. With right exposure and proper training, personnel working in SMEs can master various aspects of HACCP and implement it to their advantage in the long run. Since a major portion of food processing units lie in the small-, medium- and home-scale sectors it is imperative that without their commitment and cooperation HACCP plans would remain only on paper. SMEs that used to compete against a few local competitors must now be able to satisfy customers who are in a position to compare the quality of their products across the globe. HACCP is one of the tools available to convince them that the best possible effort has been put in to ensure quality and safety. With a lot of HACCP-related software at their disposal, SMEs can implement their plans without any hitch provided they have the inclination and commitment. SMEs which look upon HACCP as an opportunity are bound to gain in the long run and it is needless to add that others who view it as an obstacle are bound to lose sooner than later.

The tendency to settle for the minimum required standards is also one of the reasons for slow HACCP adoption. For years developing countries have treated their food enterprises leniently in the quality front believing that they would catch up with the developed world at an appropriate time. However quality standards, instead of getting stringent day by day, remained static adversely affecting the overall quality scenario of the food industry. Food businesses, instead of making efforts to meet the international requirements, lobbied vigorously against them quoting a variety of reasons such as lack of resources, technology, and a premium for quality in the market. In a nutshell, a soft statutory framework has resulted in a *status quo* mindset retarding the pace of quality improvement in the food industry.

Consumer Participation

The consumer is the cornerstone of any industry or business and a conscientious and demanding consumer, supported by an effective statutory framework, keeps businesses on their toes. Organized consumers have the capacity to force the food industry to keep their interests first while producing food items as any laxity directly affect their life and limb. On the other hand, a disorganized and indifferent consumer paves the way for production and distribution of mediocre quality food products. A discerning consumer in a developing market can always make out how the same producer is reacting differently when he is confronted with exporting to the developed world. A glaring example in this regard is seafood exports from countries like India. A temporary ban imposed by some European importers has galvanized the government, business and other agencies into action to find ways to meet the conditions of importers, such as HACCP compliance. However a similar sense of urgency was not shown to persuade food enterprises to comply with the HACCP for food products meant for domestic market.

An alert, well informed and organized consumer could have easily highlighted the above paradox to extract a better deal for domestic markets. Unfortunately no such positive development took place till today leaving the food industry in a state of complacency. This underlines the significance of educating consumers first about the importance of HACCP in

food safety and hygiene so that they could exert pressure on the industry. Any strategy to introduce and popularize HACCP in developing countries without adequate focus on educating and organizing consumers is bound to progress slowly, if not fail completely.

While consumers have every right to expect high quality food products at competitive prices, they must also realize that “quality comes at a price”, at least in the initial stages of the market development. Since implementing modern food quality and safety systems like HACCP involve considerable investment, businesses especially SMEs expect a certain premium for their food products in the market. A positive response from consumers encourages more and more SMEs to implement HACCP and offer their products at competitive prices. In contrast, a lukewarm response will deter prospective SMEs to implement HACCP and deprive the consumers of its benefits. Thus efforts shall be made to convince consumers and consumer organizations about the necessity of absorbing additional costs of HACCP implementation in SMEs in the initial stages. This ensures a steady supply of safe and high quality food items at competitive prices in the market in the long run.

Poor perception of food-borne diseases and the consequences is also one of the reasons for a lack of demand for HACCP among consumers in developing countries. Aggressive awareness campaigns about adverse effects of inferior food quality and the role of HACCP in preventing them would certainly help in generating enthusiasm among consumers. Consumer organizations have a major role to play in this direction especially in rural and semi-urban areas. It makes sense to pay a little bit extra for a safe and hygienic food item rather than spending huge amounts on medical bills to cure food-borne diseases.

Policy Approach

A coherent and proactive policy is perhaps the most critical factor which separates success of HACCP from failure. The government’s commitment sends the right signals to the food industry about the implementation of HACCP.

As discussed briefly earlier, an export focused policy is one of the main reasons for slow adoption of HACCP in SMEs. Since most of them are not involved in food exports directly, they have never felt the need and urgency to implement HACCP. Soft pedaling by the policymakers has also not contributed to HACCP’s cause. Emphasis on voluntary compliance has not paid rich dividends so far and it seems the time has come to look for hard options such as coming out with a definite time frame for compliance. Punitive action for defaulting units may also have the desirable effect in the food industry.

At present, in countries like India, 50 percent of HACCP implementation costs, subject to a maximum of Rs.1 million, are being offered as a grant for interested food enterprises irrespective of their size. Keeping in view the large number of food processing units operating at home, small and cottage level, it is worthwhile to enhance this assistance to 75 percent. However this enhancement shall be combined with a mandatory compliance of a specified time period. Involving banks and other developmental agencies in a big way to extend soft loans for HACCP implementation may also encourage many SMEs to come forward voluntarily.

The multiplicity of agencies and conflicting interests has resulted either in confusion or lack of action. Since HACCP revolves around a wide spectrum of activities such as health, agriculture, food processing, trade, exports etc., agencies responsible for these sectors are either claiming complete hegemony over HACCP or passing the entire buck to others resulting in the slow progress of HACCP implementation. An exclusive agency to monitor the implementation of HACCP in the food industry may yield better results rather than

cobbling a loose mechanism by drawing people from different agencies. The success story of Thailand is an excellent example to follow for the developing countries of the region to effectively implement HACCP. It has started working on HACCP since the early 1990s and emerged as one of the leading exporters of seafood to developed countries from the Asia-Pacific region.

The other area which requires immediate policy intervention is food legislation. Many developing countries especially in the South Asian region are still grappling with a legislative approach which is predominantly curative. Food legislation in these countries has yet to catch up with the latest developments, with modern quality and safety concepts such as Good Manufacturing Practice (GMP) and HACCP missing from them. This situation is not conducive for promoting a preventive approach to food safety. Minimum requirements prescribed in many cases are below Codex standards and arrived at as a compromise, taking shelter under the prevailing manufacturing and technological capabilities. Needless to add, proactive food legislation is essential for the success of HACCP and there is a need for immediate policy reorientation in this regard.

The policy of voluntary compliance without a specific time frame has not yielded desirable results, so far, in many countries of the region. Keeping in view the rise in food-borne diseases and the subsequent strain on budgetary resources to control them, it is prudent to make HACCP compliance mandatory for SMEs in a phased manner but within a specific time frame. This move, apart from contributing to overall improvement of food safety and hygiene, helps to harmonize with the global standards, gradually resulting in trade benefits. This suggestion may sound a little bit harsh in the context of the fragile nature of SMEs operating in the food sector, but in the overall interest of consumer's health and the beckoning export opportunities, SMEs may have to take this bitter pill sooner or later.

Apart from providing funds for implementing HACCP in SMEs, there is also a need to create mass awareness through different media for the benefit of consumers. A well informed and demanding consumer in turn would act as a catalyst for increasing the pace of HACCP adoption by the SMEs. Lack of awareness about HACCP and its impending benefits is impeding HACCP propagation and this could only be overcome with adequate budget allocation for innovative publicity campaigns. The ultimate aim of this strategy is to make the food industry use HACCP as a trump card in their marketing campaigns. Hence, mass publicity shall form an integral part of any HACCP policy in the developing countries for its success among SMEs.

Recognition and rewards act as a great stimulus for entrepreneurs to strive for excellence. Instituting national level awards for promoting and implementing HACCP in an exemplary manner may provide the much needed momentum for HACCP campaigns in the developing countries. Already some member countries like India are implementing similar schemes for promoting productivity in industry, agriculture and service sectors with considerable success. Similar efforts specifically targeting HACCP in SMEs may yield tangible benefits. If launching exclusive recognition schemes is not possible for any reason, HACCP implementation shall find a prominent place in the performance appraisal of SMEs operating in the food sector.

A shortage of adequate trained personnel to assist SMEs is also hindering the progress of HACCP implementation in many countries. There is a need to formulate a policy to encourage SMEs to train their personnel in various aspects of HACCP. In addition, institutions involved in producing food technologists and food engineers have to include HACCP in their curricula to meet the shortage of personnel. Engagement of foreign

consultants shall also be encouraged to keep pace with the latest developments in the west on a selective basis. Since these consultants come with a price tag, which is usually beyond the reach of SMEs, it is necessary to convince the concerned governments to extend these services under bilateral assistance programs. Bringing in international agencies like UNIDO, WHO and FAO may also help the cause of SMEs in expediting the implementation of HACCP.

Policies can succeed only when they are made after a thorough understanding of the ground realities and as such a reliable database about various aspects of HACCP implementation at the national level is essential. Unfortunately, enough attention has not been paid towards this issue so far and it is time to concentrate on developing national as well as regional HACCP databases, with emphasis on SMEs. Organizations like APO which have a tradition of conducting periodic surveys on important topics in the member countries can play a leading role in this regard. This will help not only in conducting objective comparative analysis but also in replicating success stories among different countries of the region.

To conclude, it is important to note that, HACCP policies formulated without proper understanding of business culture and the level of consumer awareness are bound to encounter road blocks sooner than later. Before launching large-scale HACCP campaigns, it is necessary to prepare SMEs mentally by explaining the inevitability of HACCP adoption not only for growth but also for survival. A business plan which justifies the investment in HACCP in clear monetary terms is the best way to convince SMEs to adopt HACCP. Exerting pressure through consumers is another way of increasing the pace of HACCP implementation among SMEs. A dual HACCP approach with emphasis on exports may not succeed in the long run especially in the open market era.

5. HACCP CERTIFICATION

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INTRODUCTION

The globalization of the food trade has necessitated a transnational system of production for foods. As a result, global sourcing of raw materials is increasing and the need for food safety for perishable products at the origin, after semi-processing and during distribution, has become important. To meet the rising demands of transnational production systems, there is a growing thrust on HACCP amongst the food industries and more and more nations depend on food produced elsewhere in the world.

The SPS (Sanitary and Phyto-sanitary) Agreement under the WTO Agreement makes it mandatory for all countries to maintain measures to ensure that food is safe for consumers and to prevent the spread of pests and disease among animals and plants. The HACCP system is a food safety management system recognized under the Codex Alimentarius Commission, which is the internationally recognized standard for world food trade under the WTO Agreement.

Many industries in the country are gearing up to the HACCP system in order to be able to meet the requirements of the exporting countries, which are recognizing the HACCP system as the most effective means of managing food safety in food industries and establishments. This is more prevalent in the high risk sectors such as fisheries, poultry, meat, milk and milk products. Some high-profile industries, which appreciate the importance of safety and enjoy consumer confidence, have also started implementing the HACCP system.

HACCP – ITS BENEFITS

The HACCP system, which is a preventive food safety management system, has shifted emphasis from resource-intensive end-product inspection and testing to prevention and control of hazards at all stages of food production. Since the focus is on food safety, the intent is to institute a preventive mechanism in the system.

HACCP brings considerable benefits to the organization:

- A. HACCP focuses on preventing hazards from contaminating food. Therefore it is an effective technique of minimizing risk and maximizing product safety.
- B. It is a sound, science-based, cost-effective system of targeting resources to critical areas of processing and reducing the risk of manufacturing and selling unsafe food products.

- C. As it places responsibility for ensuring food safety on the organization, it brings management commitment and encourages people from all operational areas in taking an active role in planning and implementing food protection controls.
- D. It increases awareness of hazards in general and of techniques that are controlling safety as well as product quality.
- E. It gives confidence to customers on food safety; assists in demonstrating food safety systems; and enables the organization to compete more effectively in international markets.
- F. It encourages in-depth understanding and familiarity with the procurement processes of raw materials, manufacturing systems and storage and distribution, emphasizing hazard prevention early in the food production system.
- G. It permits more efficient and effective government oversight, primarily because record keeping allows investigators to see how well an organization is complying with food safety laws over a period of time, rather than how well it is doing on any given day.

Implementation of an effective HACCP system requires commitment of the management and involvement of every employee in the company. It calls for defining the role and responsibilities of each and every employee managing, performing and verifying work affecting food safety.

THE PREMISES AND PRINCIPLES

The application of the HACCP system has certain premises and principles and conceptualization of these is essential for an effective food safety management system.

The Premises

The HACCP system is a proactive food safety management system, with focuses on prevention. It encompasses the key elements of good product management, good hygiene conditions and good manufacturing practices and calls for:

- a. critical examination of raw materials, processes, products;
- b. hygienic conditions from origin to consumer;
- c. identifying stages/processes where hazards could occur;
- d. instituting and maintaining controls at identified stages/processes;
- e. documenting the HACCP process and keeping records; and
- f. ensuring that the system continues to work effectively.

The Principles

It centers on the seven principles which outline how to establish, implement and maintain the HACCP system.

- Principle 1: Conduct a Hazard Analysis
- Principle 2: Determine the Critical Control Point(s) (CCPs)
- Principle 3: Establish Critical Limit(s)
- Principle 4: Establish a System to Monitor Control of CCP
- Principle 5: Establish Corrective Action for Deviation(s) that may occur
- Principle 6: Establish a Monitoring System for each CCP
- Principle 7: Establish Record Keeping and Documentation.

HACCP IMPLEMENTATION

An evaluation of a company's HACCP system is necessary to ensure that it is being implemented effectively and is suitable to achieve the objectives. An audit, which is defined as a systematic and independent examination to determine whether the activities and related results comply with the planned objective, is an effective evaluation of a company's quality and safety management system. It brings out whether the documented system has adequate evidence to demonstrate the effectiveness of its implementation.

A well conducted audit both as an in-house activity and a third party assessment provides an objective view of operations of an organization. It reveals the strong and weak points and also the non-conformities in the documented system and in its implementation. Either way, it affords opportunities for improvement. An audit is therefore, a constant measure of achievement of food safety goals and objectives set out by the management in their quality policy. The management gets an objective feedback based on facts, enabling it to make informed decisions towards improvement.

Why Audit?

The purpose an audit is to prove an independent assurance that:

- a) the documented HACCP system meets the specified policy and objectives;
- b) documented HACCP plans are such that the intended safety will be achieved;
- c) products are safe and fit for their purpose;
- d) all statutory requirements are met;
- e) the documented procedures and work instructions are being followed;
- f) objective quality data are recorded to demonstrate achievement of the specified requirements;
- g) any deficiency in the HACCP system, processes, practices or products are identified and appropriate corrective action is taken;
- h) information flow and communication; and
- i) future strategic planning.

Audit data may also be used for effective control of quality costs, allocation of appropriate levels of staff and equipment resources, identifying training needs and, as appropriate, providing opportunities for greater staff involvement in the achievement of goals.

Types of Audit

There are basically three types of audit, i.e. internal, external or third party.

1. *Internal Audit*

First Party Audit or the internal audit is carried out by an organization on itself, by auditors usually from within the organization, who are independent of the area being audited, but have some knowledge of the area being audited. If internal auditors are not available, outside qualified auditors may also be hired.

2. *External Audit*

An audit is being carried out by an external organization – this could be:

- (a) *Second Party Audit*: the customer auditing the supplier or a supplier auditing its sub contractors to assess their performance against contracted specified requirements; or

- (b) *Third Party Audit*: an independent organization (independent of both customer and supplier) is carrying out the audit. Independent third party audits are carried out on a manufacturer by third party auditors representing the purchaser, regulatory bodies or inspection agencies to give third party assurance that the food safety management systems are being implemented effectively.

Audit Planning

Once an organization registers itself with third party inspection/certification agencies, a number of steps are involved: i) Scrutiny of Application; and ii) Audit Planning.

Scope of Audit

1. Adequacy Audit

An adequacy audit of a manual/HACCP plan is the foundation for a compliance audit. When an application is received for HACCP-ISO 9000 Certification, the process begins with an adequacy audit of the documented system for ensuring that the audited company has a documented system that addresses the requirements of ISO 9000 and/or principles of HACCP. The main documents for adequacy audit are:

- a) quality manual
- b) HACCP plan
- c) standard operating procedures
- d) raw material specification
- e) good manufacturing practices
- f) plant and equipment hygiene.

2. Preliminary Visit

After an adequacy audit is completed, an auditor is expected to take a preliminary visit of the unit, prior to the compliance audit. The purpose of this visit is to establish an initial contact with the audited company and to find out whether any non-conformities highlighted during the adequacy audit have been resolved and also to gather the necessary information to plan the compliance audit.

This visit also establishes whether the audit would be viable or the organization would take more time to get ready.

3. Compliance Audit

A compliance audit is the systematic and independent examination undertaken to assure that all aspects of the prescribed quality system are being complied with by the manufacturers. Based on the results of such an audit the audit adjudges whether the system is effective or not.

Audit Preparation

Preparatory steps to be taken are:

- a) Audit Team Selection
- b) Audit Strategy
- c) Audit Schedule
- d) Notification of Audit

This includes:

- i. the name of organization/department to be audited
- ii. purpose and scope of audit

- iii. date of visit
 - iv. time of visit of the team
 - v. duration of audit
 - vi. leader of the team and team member(s)
 - vii. schedule of audit
 - viii. criteria document or standard and applicable background papers.
- e) Checklists.

Audit Execution

1. Review of Documentation

Auditors should be familiar with and have access to all audit documents. These include:

- quality manual and procedures
- prerequisite program
- flow diagram
- HACCP plan
- HACCP monitoring chart.

2. Process of Audit

1) Opening Meeting

2) Initiation of Audit

- a) The auditors are introduced to the functional hand. The interview with departmental head involves discussion of implementation of procedures, checking of records to established evidence of implementation. The main aspects of evaluation include:
 - checking currency of documents being used in the department and document control system in operation;
 - quality and HACCP monitoring records and how are they maintained and disposed off after retention period is over;
 - selection of CCPs;
 - review of CCP procedures, practice and records;
 - examination of test results and comparing with the contract/specified requirements. This would reveal quality and food safety status of product or service;
 - occurrence, review and disposition of non-conforming products; and
 - internal audit reports and corrective action on non-conformities.
- b) After the initial discussion with departmental head, the auditors move on to the actually performing personnel and gather information from them regarding:
 - finding out what actually happens and how activities are performed;
 - speaking to personnel at the work place gives them a feeling that auditors are concerned with fact finding; and
 - level of understanding of the system and training.
- c) Process of Information Gathering
 - Interviewing people
 - Witnessing operators and verification of facts
 - Recording facts.

3) *Collection of Findings*

- a) Identifying non-conformities
- b) Non-fulfillment of specified requirements is termed as a non-conformity. A non-conformity could be due to one of four reasons:
 - The auditee’s documented systems do not comply with the specified requirements;
 - The auditee has not implemented documented systems;
 - The documented systems implemented are not effective; and
 - The statutory requirements have either not been addressed or complied with.
- c) Recording non-conformities
- d) Categorization of non-conformities

Based on the extent to which a non-conformity has impact on the system, it is classified into two categories:

* Minor non-conformity

- An isolated minor incidence of failure to comply with procedural requirement;
- A minor departure from quality management or HACCP systems requirement; and
- A witnessed minor problem area in the system operation.

* Major non-conformity

- A significant departure from a specified requirement in the relevant standard (ISO 9001 and HACCP);
- A complete break down of operation of the documented system;
- Absence of a quality or food safety management system requirement; and
- A number of minor non-conformities of similar type spread in most of the activities constitute a major nonconformity.

4) *Evaluation of System Effectiveness*

The information from the findings during the audit, when analyzed in a decision-making sequence, provides the necessary basis to arrive at a reasonable conclusion. These may include:

- a) number of system non-conformities violating specified requirements against which system is evaluated;
- b) number of implementation non-conformities suggesting that stated system exists but is not operating effectively;
- c) number of non-conformities against each criterion which would indicate weakness with respect to certain requirements;
- d) number of non-conformities in each functional area or department suggesting lack of effectiveness of practices; and
- e) number of non-conformities indicating deviations on CCPs.

5) *Closing Meeting*

A closing meeting is held with the executive management and managers responsible for the functions audited, i.e., HACCP team. The objective of this meeting is to present the audit observation in such a manner that the organization clearly understands the outcome of the audit.

Audit Report

The audit report provides the findings and recommendations of the auditors in an impersonal form. The final recommendations are based on the findings of the audit. The team either recommends the granting of a certificate or specifies conditions to be complied with by the auditee prior to granting of certification.

Surveillance

Once a unit is granted certification, it is maintained through periodic surveillance audits of identified areas in order to ensure that the unit continues to follow the systems. The license renewed every three years.

ROLE OF THIRD PARTY CERTIFICATION

Official and officially recognized inspection and certification systems are fundamentally important and a widely used means of food control. The effectiveness of the food control measures provides confidence to the consumer about the quality and safety of the food supply. Certification is the procedure by which official certification bodies or officially recognized certification bodies provide written, or equivalent, assurance that the food or food control systems conform to requirements.

The Bureau of Indian Standards (BIS), the officially recognized certification body in India, besides offering product certification, also offers system certification schemes to the industry. These include:

1. Quality System Certification (against IS/ISO 9000)
2. Environmental Management System Certification (IS/ISO 14000)
3. HACCP Integrated ISO 9000 System Certification against IS/ISO 9000 and IS 15000:1998 Food Hygiene – Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its application.

BIS operates its certification scheme through its five regional offices and 24 branch offices spread over the country. It has a pool of trained auditors and HACCP experts who are able to provide service to the industry and provide certification of those units who have documented, demonstrable and transparent quality/ safety management systems that ensure customer satisfaction through an *inter alia* complaint redress mechanism. More than 850 units representing a wide spectrum of industrial and infrastructural activities have been certified. Of these, around 53 belong to the food and beverage industries, out of which 26 units have so far also taken HACCP Certification. These include 21 dairy units, two spices units, one processed meat export unit and one unit processing tomato puree and fruit-based drinks.

Conscious of the requirement of the food industry to be able to demonstrate compliance of food safety requirements through HACCP implementation, BIS is likely to launch the stand alone HACCP certification against IS 15000 shortly, for which policy level work is underway.

1. REPUBLIC OF CHINA

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FOOD INDUSTRY IN TAIWAN

In 2000, the total number of enterprises in Taiwan was 1,091,245. Amongst them, there were 1,070,310 small and medium enterprises (SMEs), accounting for 98.08 percent of all enterprises, while the number of large enterprises in 2000 was 20,935, accounting for only 1.92 percent (Ministry of Economic Affairs, 2001).

SMEs in Taiwan are characterized by innovation, flexibility, efficiency and the ability to adapt easily and rapidly to changes in international markets. Despite their limited resources, they have led the way in Taiwan's economic development, created large numbers of employment opportunities, and made a significant contribution to improving the quality of life and maintaining the social stability. The official definition for SME in Taiwan is set referring to the scope, capital, and the number of regular employees (Table 1). The food processing industry falls into the manufacturing sector while farming and the food service industry fall into the service sector.

Table 1. The Definition for "Small and Medium" Enterprise Revised in 2001

Scope of Industry	Small and Medium Enterprise		Small Business
	Basic	Exception	
Manufacturing, construction, mining and quarrying	Capital less than NT\$60 million	More than 200 regular employees	Less than 20 employees
Farming, fishing, forestry and animal husbandry. Water electrical, gas and fuel. Transportation, warehousing and communications. Finance, real estate, insurance, commercial service. Social service and personal service.	Capital less than NT\$80 million	More than 50 regular employees	Less than 5 employees

Source: Ministry of Economic Affairs, 2001.

Economic development in Taiwan has gone through three phases: agriculture, light industry, and high-tech industry, after World War II. In the 1950s and 1960s, the economy relied heavily on the food industry to earn foreign exchange to support the overall industrial development. However, liberalization in global trading in the past two decades, in addition to the appreciation of the local currency, labor shortage, and competition from other developing countries for international markets, has forced Taiwan's food industry to cope with a new business environment in which exports have decreased sharply while imports have boomed. The total production value of Taiwan's food industry in 2000 was US\$14.8 billion, representing 5.6 percent of the whole manufacturing industry in the country. In that year, US\$1.58 billion worth of food products, or 19.6 percent of the total production in the food industry was exported (Liu and Yuang, 2001). There are currently more than 4,700 local food processors employing some 112,000 people in total. Of course most of the processors are SMEs.

The government classified the food industry into 22 business categories. Major business categories with 1996 production value in parentheses are listed as follows:

- a. Meat packers (US\$2.83 billion)
- b. Frozen food processors (US\$2.81 billion)
- c. Animal feed mills (US\$2.34 billion)
- d. Rice husking mills (US\$1.62 billion)
- e. Non-alcoholic beverage plants (US\$1.42 billion)
- f. Grain mills (US\$1.11 billion)
- g. Wine and liquor plants (US\$898 million)
- h. Beer breweries (US\$745 million)
- i. Edible oil and fat plants (US\$669 million)
- j. Dairy plants (US\$667 million).

In 1996, the food industry focused on domestic sales, with the exception of meat packers that exported a large quantity of pork to Japan. However, that export market no longer exists since the breakout of epidemic porcine foot-and-mouth disease in 1997 (Council of Agriculture [COA], 2001).

CAS, FOOD GMP, GHP AND ISO

The food industry in Taiwan has been exposed to stronger and stronger challenges from importers since late 1970s. The situation can only be tougher after entry into the WTO in January 2002. Over these years, the ROC Government tried many ways to help the local industry. The COA initiated the Chinese Agriculture Standard (CAS) quality certification system for locally originated agricultural products. The Industry Bureau of the Ministry of Economic Affairs enforced another quality certification system, termed food Good Manufacturing Practices (GMP). Both systems have been adopted for over one decade and have been proved successful (Chinese Frozen Food Association [CFFA], 2001; and GMP Association, 2001).

CAS has expanded to 11 product categories, 182 certified food processing or retailing facilities, and 3,400 products. CAS fervently emphasizes freshness, high quality, and safety of products of domestic origin, with back up from periodical auditing and inspection of the

certified factories and products (CFFA, 2001). Consumers have been deeply impressed by the logo.

GMP focuses on product quality and hygiene practice in the manufacturing process. It is a mandatory requirement for the pharmaceutical industry, whereas it is a voluntary certification system for the food industry. The Industry Bureau started promoting food GMP in 1989. By the end of 2001, there were 299 certificated food GMP factories with over 3,400 products (CFFA, 2001).

While CAS and GMP are considered higher performance standards for average food products, and hence voluntary, the Department of Health (DOH) that is in charge of food product safety recently published a mandatory Good Hygienic Practices (GHP) guideline to set the minimum sanitation standards for food processors. GHP covers all aspects from processing premises, construction, equipment, personnel hygiene, standard sanitation operation procedures (SSOP), as well as water, suppliers, processing, storage, and transportation control, to record keeping and personnel training procedures. This guideline is regarded as the bottom-line compliance standard for local governmental agencies in performing routine auditing of the food processors and food service establishments within respective jurisdictional districts.

The Ministry of Economic Affairs introduced the ISO certification system in the early 1970s in order to upgrade and modernize domestic company management. The ISO system has been well known for a long time amongst local companies, particularly those in the manufacturing and service categories. However, due to the enormous paper work involved, only big enterprises would adopt the system in the beginning. More recently, SMEs are more willing to learn and implement it as motivated by government assistance including financial subsidization, tax deduction, consultation support, and other incentive programs. Therefore, the number of ISO 9000 or 14000 certified SMEs is increasing.

HACCP

Compared to other certification systems HACCP appeared last but its importance was recognized very soon as Taiwan was becoming a formal member of the WTO. When the Law Governing Food Sanitation was amended and promulgated in February 2000, GHP and HACCP concepts were integrated into the food safety control system. According to the Law, the DOH would announce mandatory HACCP implementation guidelines and effective dates for different food commodities at any moment. Yet so far, though GHP already became effective in September 2000, the mandatory HACCP has not been announced, partly because the HACCP accreditation mechanism has not been finalized. Nevertheless, certain pilot HACCP programs in seafood and some other food establishment sectors have been undertaken. The lunch box processing industry is a good example.

Most elementary and high schools in Taiwan do not run their own lunch programs for students. Most students buy lunch boxes from the processors contracted to individual schools. It is estimated that in the capital city of Taipei alone the daily demand of lunch boxes exceeds 140,000. Most of the lunch box processors are small in scale as compared with other food packers, and certainly belong to the SME category.

In 1996, there was a major food poisoning outbreak caused by contaminated school lunches supplied by a lunch box processor. More than 1,500 school children were hospitalized (Chen, 2001). Recognizing the threat, the government launched a three-year pilot HACCP certification program for the school lunch box processors. Food safety and sanitation

scientists in regional universities were invited and grouped in consultant teams to provide guidance and to assist the processors in establishing SSOP and HACCP programs. The DOH provided funding for the consultation, and for holding training courses for industry personnel to become familiar with the concept and implementation strategies of HACCP (DOH, 2001). Internationally recognized guidelines (National Advisory Committee on Microbiological Criteria for Foods [NACMCF], 1992; and Food and Drug Administration, 1998) and retail HACCP models (Snyder, 1991 and 1994) were adopted to develop this pilot HACCP program.

In the first year of the program (1998), 23 out of 25 participating lunch box processors were granted pilot HACCP certifications. The program was then extended to include hotels and restaurants. In the second year (1999), 50 lunch box processors and 25 food establishments out of 53 and 27 total participants, respectively, were granted the certificates. In the execution of the program, roundtable discussions between DOH officers and the university experts were held regularly. A consensus was collected and discrepancies were resolved in the discussion. The same forum was then used to develop legal standards for local authorities. By the end of the third year (2000), a total of 193 lunch box processors and food establishments were certified under this pilot HACCP program. The impact of this program to each party of concern is described in the following:

1. *Scholars*

The program provided an occasion for science to meet with reality. University scholars literally sat down with greasy-handed factory people solving practical management and processing difficulties together in developing applicable sanitation and safety control procedures that meet the specific needs of individual factories. Through roundtable discussions different points of view were brought up, discussed, hopefully resolved, and finally came to a consensus. For those unresolved issues, further research is carried out to look for ultimate solutions for the industry.

2. *Local Government Authorities*

Through the involvement in consultation and auditing processes, the staff in charge of food sanitation and safety became familiar with the HACCP system, knowing what it is, how and why it works, how to validate or to amend it, etc. These people can then be trainers to further advocate HACCP ideas in workshops that are regularly held by the local authorities for food processors.

3. *Clients*

The HACCP certification system helps elementary and high schools to select lunch box processors. It lessens the risk of food poisoning.

4. *Consumers*

Consumers are gaining awareness of the significance and the importance of HACCP certification through relevant activities of the DOH. However, consumers remain confused as to how to tell the difference between all the government-supported certification systems such as CAS, GMP, and HACCP. Obviously more consumer education is needed in order for the general public to fully understand HACCP.

5. *Suppliers of Raw Materials*

As a result of including raw material safety control measures as an important CCP in the HACCP plan, suppliers of raw materials have to take necessary action to meet the receiving specifications set by the lunch box processors. These actions have been traced all the way back to the original farm. Documents such as the sanitation certificate for imported

ingredients, drug residue proofs of meat animals, and pesticide application schedules that provide evidence for the safety of all the food materials are required. And hence, the modernized and integrated food safety control mechanism is forming.

6. Lunch Box Processors

Of course the certified lunch box processors are the biggest winners in the entire program. They enjoy the privilege of being welcome to bid for contracts with schools. In receiving the technical assistance from academic consultants in the development of HACCP plans, these processors also learned many other concepts of modern management. The government advertisements on TV, other media and public events distinguished them, and created a strong incentive for new members to join the program.

7. DOH

This is the first pilot HACCP program initiated by DOH. Though it may be too early to draw a firm conclusion, evidence did show that to enforce a mandatory HACCP program would be beneficial to the public. In the second year of the pilot HACCP program, there was a 30-percent decrease reported in the number of food poisoning victims in schools, as compared to the previous year. It was followed by another 28 percent reduction in the third year. Theoretically, a perfect HACCP program should result in virtually “zero defects”. In reality, over the three-year period of the pilot program, there were still four food poisoning cases originating from HACCP-certified companies. However, compared to 28 cases for non-certified companies in the same period of time, the result remains very positive. DOH and local government officers, as well as university scholars and industry representatives, have accumulated experience in the development and implementation of the pilot HACCP program. All these people are now working together to develop a complete HACCP training curriculum composed of three different levels for different needs. The qualifications for trainers, auditors, and on-line sanitary inspectors are also under discussion.

8. Legislators

This pilot program provided legislators in-depth information on how the mandatory HACCP regulation would look like once promulgated. The costs and benefits of HACCP programs would certainly impress legislators in both central and local governments, and would influence policy and legislation.

9. Other Food Industry Sectors

Since lunch box processors and food establishment operations are complicated by nature, their HACCP implementations provided a large amount of information for people in related food and supplementary industries to refer to. Raw material suppliers and distributors, package and container manufacturers, food machinery manufacturers, sanitary chemical and instrument suppliers, and perishable food product retailers are amongst them.

While a government agency initiated the implementation of HACCP program for the lunch box industry, seafood processors initiated it for their own industry as a result of the demand from overseas markets. The Frozen Seafood Exporting Association (FSEA) played a vital role in persuading the government to take necessary measures, including the offer of training courses and processing plant consultations, and the adoption of mechanisms to issue formal HACCP compliance certificates as a result of the mandatory HACCP control programs required by the European Community (Council of European Communities, 1991). One of the government agencies, Bureau of Standards, Metrology, and Inspection (BSMI), was later recognized by the European Community as a competent authority to issue the

certificate. Currently, HACCP programs in 43 seafood processors have been successfully implemented and certified by BSMI.

In conclusion, the three-year pilot HACCP programs for seafood and other food establishment sectors, including the lunch box industry, turned out to be a milestone en route to the successful full implementation of HACCP in Taiwan. It is worthwhile to emphasize here that all of the companies involved were SMEs. The experience from seafood processors proved the possibility for any specific line of industry to request for and to obtain assistance from the government and the academic world in developing an HACCP program, and to implement the program successfully. However, there have to be clear incentives to render smooth adoption of the program.

The food industry in Taiwan has already realized that it would not be long before the announcement of mandatory HACCP programs by DOH. However, challenges and hindrances are still there waiting for the government, industry, as well as academic society to overcome them. Examples are the discrepancies among sanitary and safety control measures, the lack of guidance manuals for HACCP plan development, the need for human resources for training, inspection and certification, and the demand for updated food safety standards based on scientific risk assessments.

In the past 40 years, the government developed some unique infrastructure and efficient guidance and assistance to the industry in Taiwan. SMEs' efforts coped with these measures and resulted in outstanding achievements. We are confident that our SMEs will do the same thing to implement HACCP in the food industry. We sincerely hope that our experience can be a good reference for you.

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2. FIJI

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INTRODUCTION

For the discussion of the present situation of the quality control in small and medium-sized food processing industries (S&M FPI) in Fiji, I think that sharing my own experience will be the indicator as to where it is at in quality controls in relation to S&M FPI.

My introduction to food processing was purely a commercial choice where I had the opportunity to buy an existing snack food business with dreams that I will be able to use my home-grown cooking talents to profitable uses.

The business in 1993 had closed its main line, i.e. aerated soft drinks as it could not compete with Coca Cola and also it did not improve or modernize. They turned their focus to snack foods as their main line and I took it over in 1994. The takeover period was for three months and it should be noted that during this period I was taught all the cooking and mixing methods hands-on, with traditional down recipes.

My introduction to anything regulatory was through the appearance of a City Council Health Department representative. Their job is to enforce the various health regulations targeted mainly at the building structures, aesthetics, equipment, hot water supply, ventilation, sanitation, etc. They conduct random checks throughout the year culminating at the end of the year where we had to comply to their standards prior to the issue of permits for the following year.

As our operation is located within the city boundaries our checks have been consistent with both the small and big industries within this boundary. My first introduction to a Food Processing Short Course Program was in 1996. This was not through an invitation, membership or a government program. It was a chance meeting with an expatriate university professor that led to my invitation to a Food Microbiology Workshop. Those who attended the workshop were line management staff from multinational companies and large local companies in the food industry. I was the only participant that may be categorized within the S&M FPI.

Since this first introduction to food processing, I have attended a regional food processing workshop in the University of the South Pacific hosted by the Taiwanese Government through the Forum Secretariat and numerous short courses in the University. How these courses have benefitted my company is an issue that maybe important to small business owners like me.

THE SITUATION OF S&M FPI IN FIJI

Small businesses in Fiji do not really have the financial capacity to employ educated tertiary level workers. In my business, I have 12 employees (three are illiterate, six are below

the grade 10 level education while three are grade 11 dropouts). So with the type of education level workforce available, I have since developed various vernacular training programs that have covered HACCP, quality circles, emergency evacuation plans, fire training and training sessions on Occupations Health and Safety (OHS). The delivery of these training sessions have been rated by our team as successful as we had since won a contract to supply our national airline with their in-flight snacks, exported our snacks to New Zealand for a while and most recently have added a new product line and revamped our packaging to try and exploit our regional markets.

Recently various island nations in the Pacific region had signed various trade deals making inter-regional trading much more accessible.

QUALITY ASSURANCE SYSTEMS/CONCEPTS ADOPTED BY OUR S&M FPI

If I was to define small and medium enterprises, then it will be something like this family-owned enterprise, employing less than 20 workers. I do not have statistics to highlight these areas, but our market information systems give us indicators on the various competitors out there.

In our type of snack food production there are two companies that are subsidiaries of big family businesses, about three are my scale and the rest are rural cottage industry types. Therefore, the small businesses workforce does not even qualify to attend formal training or short courses on quality programs.

To summarize this, I believe that for the small and medium enterprises, most of them adopt their traditional concepts that are maintained within the basic health practices and also within the confines of their local health authority bylaws.

For any quality programs to be implemented a specific program has to be designed to benefit the type of workforce that is employed in this small business sector.

IDENTIFYING ISSUES AND CONSTRAINTS IN THE ADOPTION OF QUALITY ASSURANCE SYSTEMS BY S&M FPI IN FIJI

It should be emphasized that quality assurance systems does not simply concern an awareness of quality, but it demands the implementation of new organizational systems or processes.

So how does a “Quality Assurance System” organization, be it the government, statutory body or an institute encourage the implementation of quality programs for S&M FPI? From my own personal experience as I have mentioned earlier, I was able to convert the various course contents into vernacular and train my staff accordingly. I may be fortunate that my educational and work background has enabled me to do this. For small business operators/ owners who do not possess appropriate background, how does the system deliver an appropriate quality program for them? The challenge is here!

The important challenges are:

1. ensure that appropriate quality programs are delivered to these segments of the workforce to suit their level.
2. ensure that the owners (traditional) and their educated and uneducated workforce work on the activities that are most important for the success of the business by accomplishing work group missions in efficient ways and eliminate work that is wasteful.

3. improve the 'quality of work outputs' amongst workers, i.e., the next person down the line who receives the work, so that the end-product quality is achieved therefore the external customers are satisfied.
4. utilize the combined skills, ideas and experience of every member worker to improve the business continuously through good teamwork.

STATE GOVERNMENT POLICIES FOR THE PROMOTION OF QUALITY PROGRAMS

In 1998 the Fiji National Training Council (FNTC) (a government statutory body) launched a nationwide productivity campaign aimed at promoting quality awareness with companies in Fiji. By then it was observed that many companies (big enterprises) have set goals and policies geared to satisfy customers' requirements and utilize the customers' feedback as a useful means of continuous improvements in quality.

During the interactive sessions with the executive management from the companies for the implementation of quality programs, few interesting issues emerged.

First was the issue of Trade Union attitudes towards this quality programs. It was difficult to introduce quality activities unless management obtains a written approval from union representatives. Sometimes these representatives have nothing to do with companies concerned.

The second issue is the role of the mass media. The national campaign for quality programs and school curriculum should be marketed aggressively for the promotion of the programs. The FNTC was to play a catalytic role for these campaigns.

The third issue was directed towards the small businesses. Small businesses are constrained by resources and often left out of these national campaigns. Given closer linkages and partnerships between large and small businesses in maintaining competitiveness in the market, it is important to develop a packaged program for small businesses to introduce and implement quality programs relevant to their absorptive capacities.

Along with the national programs, our government is also proactive in various regional and international program like the APO program of which I am grateful and honored to be able to participate.

Measures to Promote Adoption of Comprehensive Quality Assurance for S&M FPI

- * National Quality Program Campaign to include school curriculum, mass media and extensive outreach to all small enterprises
- * Participation or invitation of key persons in small businesses to more workshops, short courses, seminars, etc.
- * Program facilitators to be multi-skilled so as to be able to design the program to suit the type of workforce (semi-illiterate) absorbed in small businesses
- * Implementation costs of this quality program to be subsidized and be made known to the owner of the small businesses
- * Incentives programs, awards, etc. to be given to small businesses that contribute to upgrading quality.

3. INDIA (1)

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INTRODUCTION

India, the seventh largest country in the world occupies a geographical area of 32.9 million km². The temperature ranges from subzero in the Himalayas to about 50°C in the central and western parts. Agriculture is the main occupation of the people, with about 70 percent of the population engaged in this activity. Livestock rearing is complimentary to agriculture and is an integral part of the various farming systems. Agriculture contributes to the major fodder resource in the form of crop residues which are extensively fed to the animals.

India has successfully transformed itself from a food deficit to a food surplus nation. It is now moving onto the next logical step of promoting, processing and value addition of agro-products. A separate ministry has been established under the government to formulate and implement policies and plans for a rapid development of this industry. The plans aim primarily at improving the infrastructure, upgrading the technology, enforcing quality standards, rationalizing taxes and duties and activating domestic and export markets for processed food.

Current trends are enabling more export-oriented companies to become established as they act as a major contributor in the economic development of India. This contributes to:

- * the necessary foreign exchange
- * worthwhile employment to its people
- * technology and skills development
- * routes for profit and expansion
- * new products and processes.

WTO agreements include agriculture and food under operationally effective rules and disciplines. This acts as a milestone in multilateral trading systems. There are a number of negotiation agreements on various issues under WTO, however there are mainly two agreements which will affect the food industry:

- * Agreement on technical barrier to trade (TBT)
- * Agreement on sanitary and phytosanitary regulations (SPS)

ISO 9000 QUALITY MANAGEMENT SYSTEM AND HAZARD ANALYSIS CRITICAL CONTROL POINT

Since 1955, a joint FAO/WHO expert committee started to bring awareness on the importance of quality standards. Since 1993 there has been a rising interest in India on ISO

9000, particularly for companies seeking to expand into the European markets. ISO 9000 encompasses all of the activities of a company to ensure that it meets quality objectives and the HACCP system is directed towards ensuring the safety of food. ISO 9000 and HACCP are concerned with the quality and food safety management systems, respectively and have much in common. In fact, quality in a broader sense includes safety. Therefore, the best way is to use the ISO 9000 route to manage HACCP to ensure quality and safety of food. Both the systems are quality assurance systems designed to provide maximum confidence that a specified acceptance level of quality and safety are being achieved at an economic cost.

HACCP is a technique which involves examining the production process, identifying the critical areas of concerns (hazards) and putting measures in place to prevent potential problems from happening.

Benefits of HACCP

- * It is a proactive system for assuring safe production of food by emphasizing prevention rather than inspection;
- * Addresses all types of hazards – microbiological, physical and chemical and reduces the risk of contamination;
- * Transforms commodities into branded products and provides international acceptance; and
- * Demonstrates conformance to international standards and regulations and requirements of overseas markets.

Safe Quality Food (SQF) 2000 is a HACCP quality code designed specifically for business in the food industry.

The Indian Standards on Food Hygiene System Guidelines for its application is technically equivalent to its counterpart Codex document. With all these developments on the food product exports front it becomes all the more important for Indian exporters to adhere to the demanding terms of the international market in respect to quality, safety and delivery.

FOOD PROCESSING INDUSTRY IN INDIA

The food processing industry sector in India is one of the largest in terms of production, consumption, export and growth prospects. Important sub-sectors in the food processing industries are: fruit and vegetable processing, fish processing, milk processing, meat and poultry processing, packaged/convenience food, alcoholic beverages and soft drinks and grain processing.

As a result of policy initiatives undertaken since liberalization in August 1991, industry has witnessed fast growth in most of the segments. Processed food exports were valued at over Rs.135 billion (US\$3.2 billion) in 1998-99. Out of this amount, rice accounted for 46 percent, whereas marine products accounted for over 34 percent.

- * Primary food processing is a major industry with many rice, flour, pulse and oilseed mills. There are several thousand bakeries, traditional food units and fruit/vegetables/spice processing units in an unorganized sector.
- * In the organized sector, there are over 820 flour mills, 418 fish processing units, 5,198 fruit processing units, and 171 meat processing units.

- * India is the world's second largest producer of fruits and vegetables, but hardly 2 percent of the produce is processed. India is the land of spices producing all varieties worth over Rs.35 billion (US\$900 million) amounting to 25-30 percent of world production, which is processed for value addition export. It grows 22 million mt of oilseeds covering most of the varieties. Other important plantation products include tea, coffee, cocoa and cashew.
- * It has a large marine product and processing potential with varied fish resources along the long coastline, 28,000 km of rivers and a million hectares of reservoirs and brackish water. The livestock population is the largest in the world, with 50 percent of the world's buffaloes and 20 percent cattle, but only 1 percent of the total meat production is converted into value-added products.
- * India is the largest milk producer in the world and about 15 percent of the total milk production is processed through the organized sector.
- * Size of the semi-processed and ready-to-eat packaged food industry is over Rs.40 billion (US\$1 billion) and is growing at over 20 percent.

Laws Relating to Food Processing Industries in India

There are a number of food laws being implemented by various Ministries/ Departments. They are primarily meant for two purposes, namely: Regulation of specific food items; and Regulation of hygienic conditions of processing and manufacturing.

Some of these food laws are mandatory and some are voluntary. The details of various food laws in operation in India are stated below:

1. *Prevention of Food Adulteration Act (Ministry of Health)*

The Act lays down specifications for various food products and is mandatory. The Ministry of Health in 1995 had constituted a Task Force under the chairmanship of Shri Venkataramiah, Chief Justice of India (retired). The Task Force recommended that there should be emphasis on good manufacturing practices instead of detection of adulteration and prosecution. It also expresses concern over the lack of laboratory equipment and trained persons.

2. *Agriculture Produce (Grading and Marketing) Act (Ministry of Rural Development)*

This Act is commonly known as AGMARK and is voluntary. The Act lays down the specifications for various agriculture commodities, including some processed foods.

3. *Laws Being Operated by the Bureau of Indian Standards (BIS)*

BIS is the largest body for formulating standards for various food items. These standards are also voluntary.

4. *Essential Commodities Act*

A number of quality control orders have been issued under the Essential Commodities Act. These are Fruit Product Order (FPO), Milk and Milk Product Order (MMPO), Meat Product Order and Vegetable Oils Control Order. These orders are mandatory and primarily meant for regulating the Hygienic conditions.

5. *Export (Quality Control and Inspection) Act, 1963*

A number of exportable commodities have been notified of a compulsory pre-shipment inspection.

6. *Codex Alimentarius*

The Codex Alimentarius Commission, which is a joint commission of FAO/WHO, has developed an international standard on HACCP, defining it as 'a system which identifies, evaluates and controls hazards which are significant to food safety'.

MEAT PROCESSING INDUSTRY IN INDIA

Market Potential of Processed Meat

The Indian meat industry has undergone substantial changes coinciding with liberalization of economic policies of the country. The industry, which was once considered primitive, is now modernizing itself both in regard to the hygienic and operational techniques as well as in meeting with the environmental standards. Furthermore, greater emphasis is now being placed on product quality by the domestic and international markets. The need for upgrading of product quality, its presentation as well as hygiene and sanitary aspects related to the product and storage facilities is being felt more acutely.

There is low demand of bovine animals in the domestic market as the consumers have a preference for sheep, goat and poultry meat. Enough potential is therefore available for the production of buffalo meat for exports.

Livestock Statistics in India

1. Livestock Population

India is rich in livestock wealth. It accounts for nearly 16 percent of the world cattle population, more than half of the world's buffalo population and about 17 percent of the world goat population. The livestock population in the world, as well as in India, is as follows:

	World	India	Percent	(Unit: Number in million)
Cattle	1,343	218	16.2	
Buffalo	165	93	56.4	
Sheep	1,064	57	5.4	
Goat	715	123	17.2	
Pigs	909	16	1.8	

(Source: FAO Production data for the year 2000)

2. Slaughter Rate in India

	Population	Slaughtering	Percent	(Unit: Number in million)
Cattle	218	14.0	6.4	
Buffalo	93	10.3	11.1	
Sheep	57	19.1	33.5	
Goat	123	46.7	38.0	

(Source: FAO Production data for the year 2000)

The slaughter rate of goats and sheep is high largely to meet the domestic requirement.

3. Meat Production

As per FAO data, the world production of various kinds of meat is 228.91 million mt of which India's share is 4.65 million mt, accounting for about 2 percent of world meat production. The world vs. India's production of meat is as follow:

	World	India	(Unit: Number in million mt)
Beef and veal	57.13	1.44	
Buffalo meat	2.98	1.42	
Mutton and lamb	7.59	0.22	
Goat meat	3.71	0.46	
Pig met	91.03	0.54	

(Source: FAO Production data for the year 2000)

According to FAO data, total meat production in the country is 4.65 million mt. The exports, therefore, constitute 3.4 percent of the total meat production in the country, constituting a small percentage of the total meat production.

Meat Production Centers

The major meat production centers for export are: Aurangabad, Nanded, Bombay and Satara in Maharashtra; Goa; Medak district in Andhra Pradesh; Derabassi in Punjab; and Aligarh, Unnao and Ghaziabad in Uttar Pradesh.

In addition, the exporters source their meat requirements from various slaughterhouses throughout the country. Some of the slaughterhouses from where the exporters source their meat requirement are Deonar Abattoir, Mumbai, Meerut, Jaipur, Saharanpur, Bareilly, Hapur, Muradabad, Khurja, Gangoh, Hyderabad, Aligarh, Muzaffar Nagar, Buland Shahar slaughterhouses.

Major Destinations

South-East Asia and the Middle East Countries are the major destinations for the export of meat. Malaysia is the largest importer accounting for 32 percent of buffalo meat exports followed by UAE (22 percent) and the Philippines (20 percent). Saudi Arabia, Turkey, Eastern Europe, Commonwealth of Independent States (CIS) countries and African countries are the new markets, which could be developed for Indian buffalo meat. Australia, New Zealand, Argentina and Brazil are the major suppliers in the Middle East countries.

Slaughterhouses in India

There are nearly 3,600 municipal slaughterhouses in the country. These slaughterhouses primarily cater to the domestic market. However, exporters have also been procuring the meat from some of these municipal slaughterhouses. Most of these slaughterhouses have poor facilities for maintaining proper hygiene and sanitation. Also, the space provided is limited and as a result more numbers of animals are slaughtered in a smaller space. The cold storage facilities are negligible and they also lack trained man power.

Infrastructure Facilities

India has several integrated, mechanized slaughterhouse-cum-meat processing plants which also have facilities for slaughtering, processing, freezing, packing and cold storage of meat. Refrigerated containers are easily available for factory storage of frozen meat. Some of the exporters have started backward integration for rearing of animals wherein they provide veterinary health coverage and concentrated feed to the surrounding area. Skilled and technical manpower for slaughtering, processing, packaging etc., of meat is adequately available in the country.

The Government of India has notified three agencies, namely; state directorates of animal husbandry, Export Inspection Agency (EIA) and DMI for inspection of meat prior to export. The state government laboratories are not equipped adequately and do not have skilled staff to conduct various examinations of meat. These laboratories need to be further strengthened in terms of modern testing and skilled manpower.

We also need to have semi modern and modern abattoirs to produce quality meat of international standards. Railway transportation, under refrigerated conditions, needs further improvement.

SWOT Analysis

Based on the analysis of the current scenario in India, with respect to world trends, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is presented below:

1. Strengths

- * Large livestock population – 56 percent of world population
- * Availability of modern and integrated meat processing plants
- * Livestock reared naturally-free from growth promoters and hormones
- * Competitively priced
- * Poor demand in the domestic market
- * Increased availability of surplus exports.

2. Weaknesses

- * Meat produced from aged buffalo livestock
- * Undercutting of prices from the exporters
- * Social problems against meat production
- * Quality problems – sourcing of meat from unapproved meat plants.

3. Opportunities

- * Increased number of modern and integrated meat production facilities for exports
- * Huge potential for exports to South-East Asia, CIS, African countries and Eastern Europe
- * Rearing of male buffalo calf as meat animals.

4. Threats

- * Discrimination by some importing countries against Indian buffalo meat; SGS (Société Generale de Surveillance S.A.) inspection and restricting usage for manufacturing purposes by the Philippines
- * Campaign by foreign NGOs against Indian meat (PETA campaign in Malaysia)
- * Export subsidies by our competitors
- * Aggressive marketing campaigns by our competitors.

Identification of Problems

- * Prevalence of livestock diseases – the importing countries prefer to import meat from countries which are free from livestock diseases, particularly rinderpest and foot-and-mouth disease (FMD). With the help of the Ministry of Agriculture, India has been declared free from rinderpest; however FMD is still prevalent in many parts of the country.
- * The meat production section is unorganized. Presently, the animals are slaughtered in the slaughterhouses which are locally managed. Hence all the slaughtering activity is geared to the production of cooked meat, based on local social consumption patterns.
- * There are 10 integrated modern abattoirs and meat processing plants in the country, set up in both the public and private sectors. In addition there are 22 meat processing plants that source their meat requirements from municipal slaughterhouses. These houses have poor facilities for maintaining proper hygiene and sanitation and lack skilled manpower.
- * The exporters find it difficult to get approval from the government for setting up abattoirs and meat processing plants, due to socio-political problems.
- * Under the SPS Agreement, the importing countries have been insisting on better quality products. They are insisting on the introduction of strict quality control

measures in order to improve the quality, which includes grading of the plants, introduction of HACCP, regular training of meat processing plant workers and staff on following good hygiene practices.

- * A number of activist groups have been demanding closure of slaughterhouses and a ban on meat exports.
- * The liquid and solid waste generated from the abattoirs is quite detrimental to the environment. The waste disposal methods used trigger primary, secondary and tertiary environmental impacts. The waste effects the emission of greenhouse gases and the lactates deteriorate the soil quality and ultimately cause groundwater contamination.

Policies and Efforts of Government and Other Agencies

1. Upgrading of abattoirs:
 - a. Development of modern slaughter facilities (physical facilities): the slaughter facilities include holding of animals, sheds, clean water troughs, drainage, and ante mortem inspection arrangements
 - b. Abattoir Design Concept: the structure should be constructed with the following general layout:

Construction roof:	brick work with plaster on both sides
Flooring:	rough tiles on concrete base with proper slope
Doors:	rolling shutter/aluminum fly-proof doors
Windows:	aluminum/glass paneled with fly-proof shutters
Water supply:	overhead tank with water pump and jet boring

The schemes can be submitted to the Ministry of Food Processing Industries, Government of India under the development/modernization of meat processing plants.
2. Identification of FMD-free areas, particularly where export-oriented abattoirs are located, and are identified as disease-free zones. The total outlay of the project is 820 million for the compulsory vaccination of all suitable livestock species against FMD, for five consecutive years.
3. Need for modernizing quality control laboratories of the state government. There are 10 regional laboratories and one central laboratory. The laboratories should be strengthened and equipped with microbiological facilities for ensuring meat of an international standard – this is already in progress.
4. Need for strict laboratory inspection of meat and meat products. The Department of Animal Husbandry has planned to establish disease diagnostic laboratories in every district headquarter.
5. Training programs for meat workers regarding hygiene and sanitation needs to be organized regularly. Training programs for the workers and staff of the meat processing plants are being planned, involving state veterinary colleges and veterinary research institutes.
6. Rearing of male buffalo calves along scientific lines so as to fatten them quickly. The establishment of male buffalo calf rearing societies in the villages is set under the Department of Animal Husbandry.
7. Need for full utilization of animal by-products. All meat industries in the state are supposed to establish a dry rendering plant with a modern abattoir.

8. Agricultural and Processed Food Products Export Development Authority (APEDA) is encouraging the units to implement HACCP and is extending financial assistance under its planned scheme.

Creation of a Disease-free Zone

Animal husbandry plays a pivotal role in the economic security, nourishment and health of the masses. In the four pillars of animal husbandry, viz., breeding, feeding, heeding and disease control, the disease control part is of utmost importance because losses incurred by diseases are of immense magnitude. The disease-free zone concept was put forth by FAO and International Office of Epizootics (OIE). In the broader sense the disease-free zone will be created with emphasis on an FMD control program. It is well established that 95 percent of the total animal population at risk needs to be vaccinated for preventing any future outbreaks. The disease-free zone concept is to be implemented in the 110-km area around the district of Aligarh in Uttar Pradesh. The pilot project area will include 12 districts: Aligarh, Etah, Muradabad, Muzaffar Nagar, Buland Shahar, Hathrus, Firozabad, Badaun, Gautam Budh Nagar, Mathura, Agra, J.B.P. Nagar.

Agri-export Zone

The new concept of an Agri-export Zone was introduced by the Ministry of Commerce for the promotion and export of specific agricultural produce available in a contiguous area. The concept thus attempts to take a comprehensive look at a particular produce or product located in a contiguous area for the purpose of developing and sourcing the raw materials and their processing/packaging, leading to final exports. Thus the entire effort is centered on the cluster approach of identifying the potential products, the geographical regions these products are grown and adopting an end-to-end approach of integrating the entire system right from production till it reaches the market. There would also be a need to identify/enlist problems encountered at each stage. These difficulties could be procedural in nature or may relate to particular quality standards. A package needs to be developed to suggest solutions to these problems and agencies identified to implement these in a given time frame.

CONCLUSION

India has a livestock population of 470 million which includes 205 million cattle and 90 million buffaloes. The production of meat and meat products has shown impressive growth and enough potential is available to increase it further. The total meat production in the country is 4.6 million mt which includes beef, buffalo meat, mutton, goat meat, pork and poultry meat however only 1 percent of the total meat is converted into value-added products like sausages, ham bacon, luncheon meat, kebab, etc. The country has 3,600 slaughterhouses, nine modern abattoirs and 171 meat processing units licensed under the Meat Product Order.

The prevalence of various livestock diseases and inadequate modern and integrated facilities are the two major constraints for promoting the export of meat. India has achieved the rinderpest-free status. India is also free from Bovine Spongiform Encephalopathy (BSE) and scrapie. However, certain other livestock diseases like FMD, etc. are still prevalent in the country. The exporters are ready to set up modern and integrated meat production facilities. However, they are finding it difficult to get necessary approvals from the government for setting up these facilities because of the socio-political problems. India also has the advantage

of being price competitive particularly for buffalo meat. In view of the above, India has a huge production potential for the export of meat and meat products.

India is a member of WTO and is a signatory to the SPS Agreement and hence in order to engage in international trade India has to adopt the standards, guidelines and recommendations issued by the Food Hygiene Committee of the joint FAO/WHO Codex Alimentarius Commission, which advocates the adoption of HACCP. With more and more countries adopting stringent quality standards for food hygiene, it is imperative that the Indian industries induct the most advanced technologies into its food processing industries if it wishes to be competitive in food exports.

As discussed, the concept of an agri-export zone and disease-free zones are already in process to ensure safe and hygienic meat for consumers. Also the integrated meat processing plants are now coming up which will not only produce safe meat but will also be environmentally friendly.

Such regulations pose challenges to Indian food industries which are being converted into opportunities and will expand their business.

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4. INDIA (2)

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INTRODUCTION

India is a land of diversified culture and living habits and these form the basis for the food habits in every province. Since the early 1980s of the last century, economic reforms, equal opportunity to both sexes, and loss of joint family systems, brought challenges to the women of India. No doubt, Indian woman also stood up to expectations in all fields, and as a result family members who used to take care of food preparation at home no longer did so, and more and more they started outsourcing their daily food needs.

This requirement was recognized by small entrepreneurs and was taken up as their business. They started small using the knowledge they gained through working experience. As the business grew, they increased their employees, but had less control over production. We all know how this affected the quality of the product. Legislative requirements were introduced to take care of the product quality, obliging small and medium entrepreneurs to start adopting certain standards known in India and internationally. Major international food enterprises entered into the Indian market in the early 1990s bringing with them international standards like: GMP (good manufacturing practice); ISO 9000 and HACCP, changing the whole perception of food. There was an urgent need for small and medium Indian food industries to achieve these international standards in order to show their capabilities and to withstand the market and regulatory requirements.

QUALITY CONCEPTS ADOPTED BY SMALL AND MEDIUM FOOD PROCESSING UNITS

Small and medium industries work on small working capitals and maintaining a separate quality control laboratory is not feasible, hence these units try to only meet minimum regulatory requirements and do not think of the broader aspect on quality, but they do take care of general hygiene factors, which is the only one they can afford. As long as good supervision is present their product will not have many problems. They have their own practical and simple methodology of testing which cannot be considered in case of any problems in the product, and as soon as production increases and supervision activity lessens, the quality of the product is in doubt. Furthermore, they do not have any records to fall back on in case of any eventuality. Those units which can afford to have small quality control laboratories only perform those minimum tests required for regulatory purposes. These companies are in a somewhat better position than those which do not have any. At least, minimum quality controls are being met and the customer gets some sort of assurance.

CONSTRAINTS IN ADOPTING QUALITY ASSURANCE SYSTEM

Small and medium units work with small working capital and smaller returns. The small and medium units cannot afford to have a qualified person to take care of their quality control requirements. These small-scale industrialists have a very high degree of entrepreneurship but lack the managerial skills. As a result they do not give importance to the quality aspects. In this aspect, lack of awareness on the requirements and on quality is also a factor to consider. Those who are aware of the importance and requirements of the industry keep it in second place, first focusing on the cost involved in the process of adopting quality assurance systems such as ISO 9000, ISO 14000 and HACCP and obtaining the certification. The cost involved includes the cost of consultation, calibration, infrastructure development and certification.

Even if a small or medium entrepreneur, due to pressure from market or customer requirements, pooling on financial requirements goes ahead with getting his/her unit certified, he/she has to maintain the system as developed, bringing an additional burden on the entrepreneur. With this added consideration these small and medium entrepreneurs avoid adopting quality assurance systems and getting certified against the international standards.

The major constraints in adopting quality assurance systems are:

- 1) lack of awareness of the quality assurance systems, its importance in demonstrating food safety and its benefits; and
- 2) high costs involved in development, certification and maintaining the system.

The first problem can be addressed by conducting awareness programs (such as this one by APO and NPC) at the national and international level, specially for small and medium food processing entrepreneurs making them aware that the cost involved is not an expense but an investment for their business and these expenses will pay off in the long run and will give the following benefits:

- 1) Provide market differentiation and protection
- 2) Reduce product destruction and reduce recall, thus reduces business risks
- 3) Provide preferred supplier status
- 4) Transform food commodities into BRANDED products
- 5) Demonstrate conformance of international standards to domestic as well as overseas markets
- 6) Promote consumer confidence
- 7) Help in maintaining consistency of product quality.

Hence, in the initial stages what looks like an expense to small and medium entrepreneurs will be paid back in the above-stated benefits. This point should be driven in hard to small and medium entrepreneurs.

Now let us understand the cost factors involved. No doubt it is high, starting with consulting charges, then development of the system and changing of the infrastructure as per the requirement, and the certification cost is also to be considered. By this time the financial backbone of the enterprise is broken and this is not the end of it. The unit has to maintain the system which is not a one time activity; the Certifying Agency is back again for surveillance, which again is expensive. At the time of development, if the unit understands and takes part

with the consultant in laying out the system then they can run the system as developed, otherwise the small and marginal unit is back in the hands of consultants and the cost of the system is recurring, which is not a proper method of obtaining System Certification. As a Consultant, I have seen this happening in almost all of small and medium food processing units. Financial assistance to small and medium entrepreneurs will ease the financial burden to them and they will adopt the program of quality assurance systems more sincerely and will continue to run these systems.

The entrepreneur should view it as an investment for strengthening his business, rather than a customer/regulatory-driven requirement, and adopt these quality assurance systems for their business growth.

GOVERNMENT POLICIES AND PROGRAMS

As a result of the recent government policies, economic changes brought about by the WTO regime and trade liberalization many multinational food giants like McDonald's, Domino, Pepsi, Coca Cola, etc., have entered the Indian market. These markets were previously held by Nerulas, Campa Cola, etc. and have given a shake to the Indian small and medium food processing units. These units have taken up the challenge and are trying to cope with market demands – examples of these are seen through Haldiram, Nathu, etc., and even Mother Dairy milk processing and fruit and vegetable outlets are now HACCP-certified.

In order to help the small and medium food processing units in attaining these international quality assurance system certifications, the government has adopted some promotional programs through its ministries like Agricultural and Processed Food Products Export Development Authority (APEDA) and Marine Products Export Development Authority (MPEDA) under the Ministry of Commerce, but these are restricted to those who are in the Export Ministry of Food Processing, who is also giving aid in developing quality assurance systems. The Ministry of Small Scale Industry is providing financial assistance for obtaining ISO 9000 certification, but this is difficult for small and medium food processing units to approach.

The government has understood the financial burden which the food processing units have in adopting these quality assurance systems and has made provisions for these units. It is now up to the small and medium entrepreneurs to work for the enhancement of quality in their food processing units by utilizing these schemes.

MEASURES TO ADOPT QUALITY ASSURANCE SYSTEM

There is a discussion over which system should be adopted first, HACCP or ISO 9000. A number of companies have felt that a certain level of formal management systems is needed at the initial stage, which can be had by adopting the ISO 9000 system, before undertaking the “narrower” and more disciplined HACCP system. The consideration of whether to undertake a specific or a wider system, to commence with HACCP or ISO 9000, starts with the need to identify the level and extent of risks presently faced by the company. There is little point in embarking on a program to implement a formal quality assurance system if the unit is likely to be put out of business by a serious food poisoning incident in the near future. There is, therefore, a need for an analysis of the present risks faced by the company and the level of available resources, before finalizing which approach to take.

Once the unit has taken the decision on whether to start with HACCP or ISO 9000, there is no conflict between the two approaches, as long as the project is effectively managed. Starting with HACCP will generate the need for a formalized system of control and documentation, including, for example, the need to implement an effective calibration regime for temperature monitoring devices. Starting with ISO 9000 will provide the framework and control system, such as corrective action, which is necessary for successfully implementing HACCP.

CONCLUSION

HACCP focuses on prevention rather than cure and as such is complimentary with the principles of continual improvement. It provides the opportunity for the involvement of employees at all levels and for raising the awareness of each employee with respect to hazards, specifically those which may cause harm or concern to the consumer successful implementation of HACCP requires commitment from the entrepreneur. It requires adequate resources to conduct the study and associated training.

HACCP should be regarded as a problem-solving tool which can be used to identify hazards and risks throughout a food processing unit. The starting point, the timing and the scope of the HACCP study should be directly governed by the nature and extent of the risks faced by the food processing unit.

Small and medium food processing entrepreneurs should be aware of the requirements and understand that the cost involved is not an expense but an investment for their business and these expenses will pay off in the long run and give benefit.

Let us all look forward for safe food to be consumed by every one in this small world.

5. ISLAMIC REPUBLIC OF IRAN (1)

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INTRODUCTION

With the restructuring of the developing countries into market economies, quality is fast becoming one of the competitive issues of the 1990s. Governments and business leaders in the developing nations are realizing that quality standards are becoming the key to exporting, and that quality is an important element for the survival of organizations in the global economy. In other words, quality concern has become a reality that needs to be fully integrated into economic activities and development programs. Thus, a wave of government programs and increased customer sensitivity has combined to give quality a new visibility in developing countries.

The Islamic Republic of Iran is in the forefront of this movement in the Middle East countries. This report presents an overview of the quality movement in Iran, a developing country which has one of the most important economies in the Middle East countries. In this report, first of all, the status of quality management systems in Iran and the trend of its growth will be illustrated. Then the position of HACCP in food processing enterprises will be discussed, and also the difficulties and problems for adoption with this quality system will be defined. At the end, policies and strategies of the Small Industries Organization (SIO) of Iran for supporting and promotion of small and medium enterprises (SMEs) for moving to quality management systems and improvement of their quality and productivity will be explained.

QUALITY MANAGEMENT SYSTEMS IN IRAN

The recognition of Iranian enterprises with quality management systems goes back to 1994. In that year, through translation and publication of the ISO 9000 series standards, holding training courses and workshops, the managers and employees of Iranian enterprises have been familiarized with these standards. The result of that were two ISO 9002 certifications which obtained by two companies in 1995. Since then, every year the number of companies interested to implementing these standards has increased.

According to statistics and reports published by certifications bodies, up to end of the year 2001, the number of Iranian enterprises which succeeded to obtain these certifications came to more than 1,765 enterprises, and many other enterprises are in the process of implementation of this standard or final audits. Figure 1 shows the trend of implementation and obtaining ISO 9000 certification in Iranian enterprises.

In Iran, as in other countries, the most wanted quality management systems and the highest numbers of certifications issued were ISO 9000. But some activities have been done regarding other quality management systems and some progress has been achieved. Since 1999, with respect to important activities in automotive industries in Iran, the QS 9000

quality management systems have been well attended. In year 2001, some of the active companies in this industry became interested in ISO/TS 16949 standards. Other management systems such as ISO 14000, HACCP, Good Manufacturing Practice (GMP) and OHSAS 18000 have been attended and many enterprises succeeded to obtain certification of these systems or at present, they are in the process of implementation. Figure 2 shows number of certifications issued up to year ended 2001 with respect to sorting type of quality management systems.

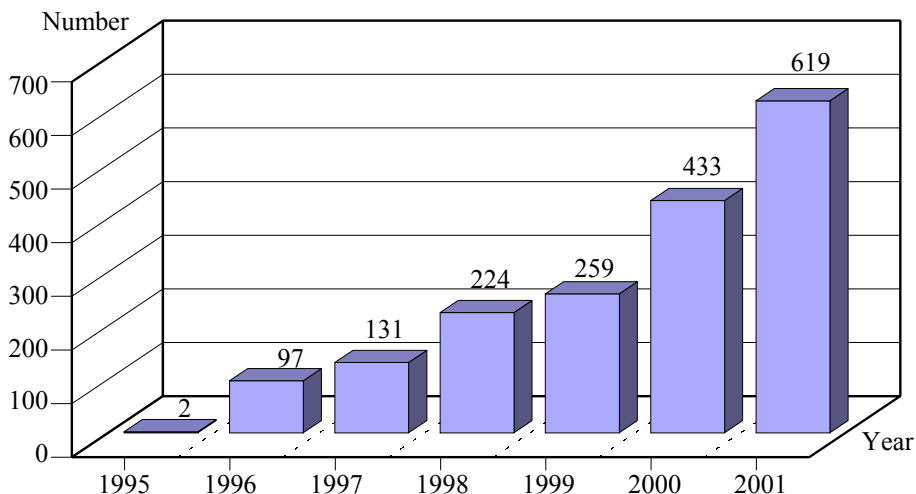


Figure 1. ISO 9000-certified Enterprises

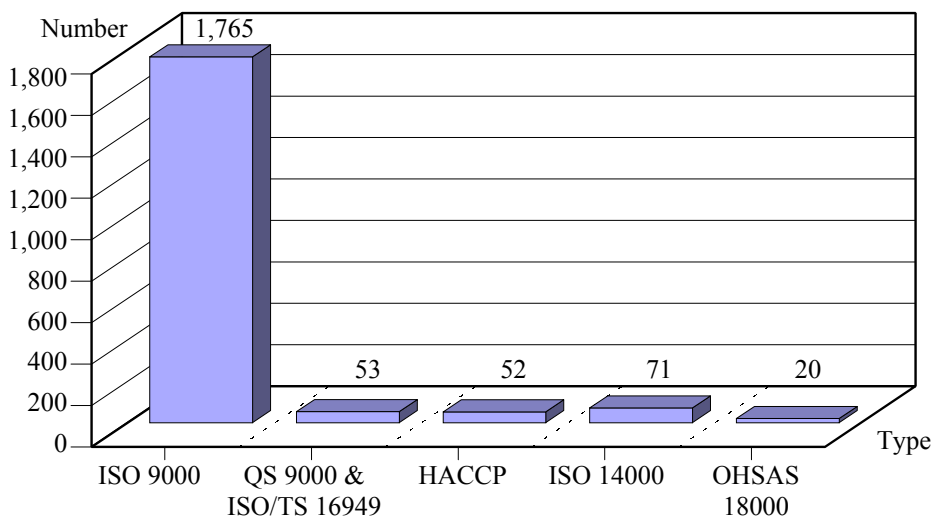


Figure 2. Certified Enterprises by Certification Type

HACCP IN FOOD PROCESSING ENTERPRISES

HACCP and GMP quality systems are also one of the popular quality management systems in Iran. Although, it is more than 20 years that pharmacy and food processing

enterprises of Iran are familiar with GMP principles and it is necessary to apply those principles according to regulations of Ministry of Health Care, up to this time the HACCP is unknown to many of SMEs of Iran.

The number of HACCP-certified enterprises was low in the first three years after the introduction of HACCP into Iran in 1996. The first certifications were awarded to one company that successfully implemented HACCP in 1998. By end of February 2002, the number of certified enterprises had increased by more than 25 times, as shown in Figure 3. Many Iranian food processing enterprises were interested in HACCP and GMP implementation, but are at different stages of development.

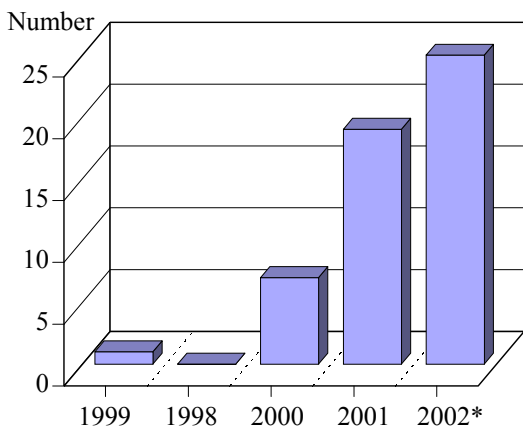


Figure 3. HACCP-certified Enterprises

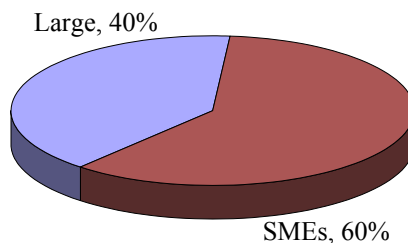


Figure 4. HACCP-certified by Size of Enterprises

As it is shown in Figure 4 above, out of 52 companies that have succeeded to obtain HACCP certification, 31 companies (60 percent) are in the class of SMEs. With respect to this point, more than 93 percent of food processing enterprises of Iran are small and medium, so we can conclude that implementation of HACCP systems in Iranian SMEs was slow. In these regards, the Government of Iran should take further action for supporting and promotion of SMEs.

CONSTRAINTS AND PROBLEMS IN THE ADOPTION OF THE QUALITY MANAGEMENT SYSTEMS

Implementation of quality management systems and the adoption of modern quality concepts are faced with many constraints and problems in SMEs. In Iran, many constraints and problems have prevented development and effectiveness of quality management systems in general, and especially HACCP systems. Some of this restrictions and problems are as follows:

- * Lack of knowledge and awareness in top management and employees of enterprises of quality management systems and HACCP and the benefits of such systems.
- * Lack of sufficient resources (books, papers, manuals, guidelines, etc.) for introduction of HACCP systems and lack of knowledge of this quality system in the mind of food processing enterprise managers.

- * Limited training courses related to HACCP system in respect to training courses in other quality management systems such as ISO 9000, ISO 14000, etc.
- * Limited number of trained consultants with experience in HACCP systems, especially in cities far from the capital.
- * High rate of consultant fees for implementation of quality management systems in general and specifically HACCP and lack of financial resources for payment of such fees in SMEs.
- * High cost of final auditing and issuance certification fees by certification bodies.
- * Unsuitable existing physical and environmental conditions and process for majority of small and medium food processing enterprises.
- * High costs for modification of process and work systems in adoption of principle and rules of GMP and HACCP in majority of small and medium food processing enterprises.
- * Lack of understanding a new competition conditions in respect to globalization of economics, because most enterprises focus on domestic markets.

STRATEGIES AND POLICIES OF SMALL INDUSTRIES ORGANIZATION OF IRAN

In accordance with reports published by the Islamic Republic of Iran's Ministry of Industry and Mines, more than 93.25 percent of Iranian enterprises are small (enterprises less than 50 employees). With respect to the important portion of small enterprises in Iranian industry and economics, the SIO of Iran with the propose of increasing industrial employment and supporting non-governmental small enterprises toward expansion in less developed regions in addition to promulgating policies to support small enterprises, was established in March 2001. In accordance with the articles of association of this organization, some of its tasks are as following:

- * Preparing policies and strategies for small industries with respect to general industrial policy for the country.
- * Guidance and support of small industries, to increase the level of employment, decrease waste and rework, observation of the natural environment, regulation and upgrading skills of employees.
- * Identify, recognize and minimize existing difficulties and problems in the process of establishment and development of small enterprises.
- * Preparation and development of short-term training programs for small enterprises.
- * Provide support plans for obtaining credits and financial facilities from the country's banking systems.

The SIO of Iran, from the date of establishment with respect to its duties, has established as a priority of its programs, the improvement of quality and productivity in small enterprises. Some policies and activities which have taken place within the last nine months (from May 2001 to February 2002) with respect to development of quality and productivity concepts are as following:

1. Training managers and employees of small industries and payment of 75 percent of their costs. According to this policy, within the last nine months, more than 10,152 man/days training courses were held.

2. Training and education of native and local consultants in respect of quality management and productivity systems for cities far away from the capital and payment 65 percent of their total costs. According to this policy, it has been planned that in year 2002, at least 300 individuals in 15 different cities will be trained in necessary subjects for consulting in quality and productivity programs.
3. Support for implementation of quality management systems projects toward payment of 50 percent of consultants and implementation costs of these systems. In this respect within the last nine months, the SIO of Iran has supported the implementation of quality systems in 292 small industries. Distribution of these 292 enterprises is shown in Figure 5. Also, next year the program of this organization is supporting of implementation quality management systems in 580 enterprises whose distribution is shown in Figure 6.
4. To offer financial facilities for purchasing equipment and modification of hardware and software systems, in respect of implementation quality management systems. In this regard it is expected that 75 percent of the required costs will be paid as a five-year loan to small industries.

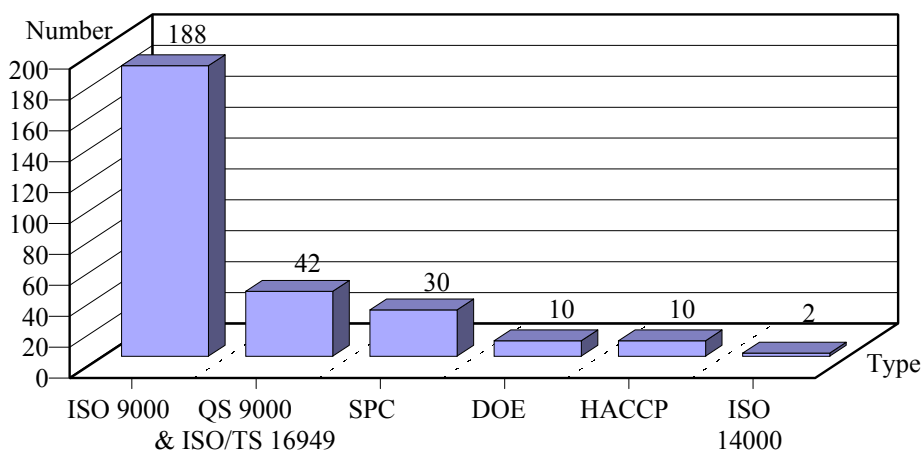


Figure 5. Support of Quality Systems in the Last Nine Months

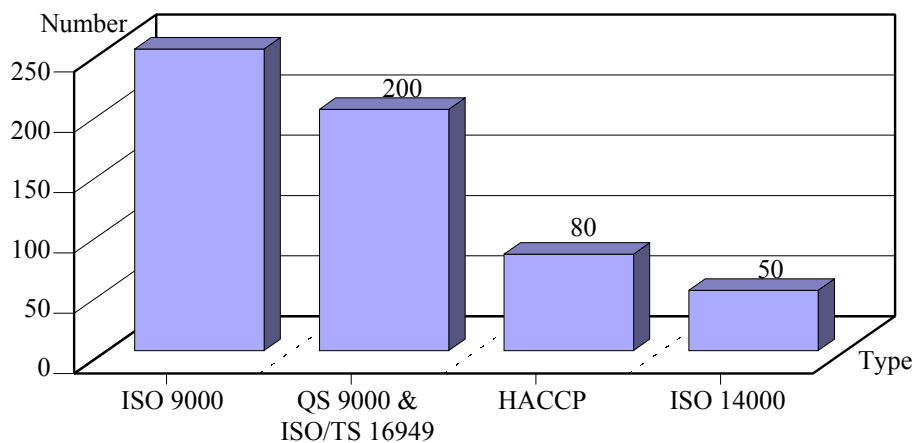


Figure 6. Support of Quality Systems Next Year

6. ISLAMIC REPUBLIC OF IRAN (2)

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In accordance with Iranian national legislation, which was approved by the government and parliament, health control of animal products for internal consumption or export to other countries falls under the responsibility of the Iran Veterinary Organization (IVO). There are two coastal areas located in the North and South of Iran as well as internal aquaculture farms which produce approximately 450 thousand mt of fish. In this field there are 14,000 active fishing vessels, 15 freezer vessels and some processing establishments.

All of these vessels and establishments are under the direct supervision of IVO as the competent authority. The application and implementation of HACCP systems in these plants is under the control of IVO. In 1994, the HACCP system became effective and the first activities began with training courses being held for related experts, with participation of FAO. In 1996, we started the practical application of this system for the fishery industry. At first, all plants which had received a sanitary permit from IVO were obligated to perform the executive requirements for the HACCP system (regarding sanitary conditions of facilities, establishments, etc.) and they were obligated to plan the HACCP system for their plants. IVO supports this industry by holding several training courses and providing expert visits and all plants are obligated to apply the system.

According to IVO regulations and rules, all plants must prepare a HACCP manual for each product. The following items should be considered in this manual: responsibilities of the manager; product description and identification of final consumer; drawing a production flow diagram and its effect on the site; hazard analysis and associated preventive methods; identification of critical control points and critical limits; identification of control and monitoring methods; identification of necessary corrective actions; and application of verification, research and documentation.

It is obligatory to supply one copy to IVO to provide further control and confirmation. If there is no discrepancy, IVO will give approval and legal certificates are issued for that company. Considering the favorable results of the HACCP system in the fishery industries, this system will be extended to other animal products. The program was started in 2000 and it will last for four years as follows:

1. Year 2000

- * Preparation of the Persian version of international standards and texts. Necessary manuals were translated and guidelines were made available for related industries.
- * Complying standards for execution and application of HACCP system in animal and poultry slaughterhouses, meat package plants, fish canning plants and milk producing factories. Training courses were held, especially for industrial managers.

2. Year 2001

- * Analyzing and identifying the domestic hazards of Iranian animal derived products. Shrimp was the first choice, so over 15,000 samples were taken and necessary lab tests

were carried out (organo-leptic, chemical and microbiological tests) and the analysis of results was in progress.

- * Special training courses were held for the General Directors of IVO.

3. *Year 2002*

- * Continuation of hazards analysis and identification of other animal products.
- * Publishing of the results of the shrimp hazard analysis.
- * Training courses are being conducted for food industries managers.

4. *Year 2003*

- * Considering the activities of the last three years, model centers will have to completely comply with this system.
- * This system is to be executed in each related industry such as livestock and poultry slaughterhouses, meat packaging plants and milk collecting centers, with the cooperation of a competent authority. They will be defined as a model for other industries.

It should be mentioned that before employing the HACCP system, the entire interpretation came from final product testing (microbiological Marjory test). However, after execution of this system, all documentation related to elements of the production chain to product consumption, which are designed in the framework of an HACCP system, are to be considered. The application of this system in food industries is being implemented as a management tool in order to improve the sanitary condition of foods in national plants and facilities. The IVO, as the competent authority, issues a sanitary operation certificate and a certificate of export for raw animals derived from processing plants. These plants could market their production in or out of the country. IVO experts continuously scrutinize related documentation and activities throughout the year. Any breach of sanitary conditions will result in the revocation of an operation certificate.

Recommendations

It is recommended that before application of the HACCP system in the food industry is implemented consideration should be given to the economic risk along with biological hazards in production training of involved personnel and governmental inspectors in order to introduce and apply the HACCP system in plants is obligatory. Also, food producers on different levels should be trained on the principles of HACCP and food hygiene. Required information and special sources and protocols are to be supplied by the government to assist in proper execution of the HACCP system. Also, competent advisory centers are to be established to assist in execution of the system. As well, this system should be implemented to shape a model for extension goals.

Also, execution of this system in other parts of the food chain, with special emphasis on the production of raw materials, should be considered.

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7. MONGOLIA

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INTRODUCTION

Food safety is an emerging issue in Mongolia as its international food trade expands and the numbers of food premises are increasing. This report aims to introduce the changes brought about in food safety in Mongolia, comparing pre- and post-1990, when the country made a dramatic socioeconomic change from a centralized economy to a free market economy. You will see the food safety situation in Mongolia from the effects on consumer's health, from the end of the food chain to food supply, storage and point of purchase. Some facts are given in Tables 1 and 2 as collected by the local inspection agencies within their current capacity of analysis and monitoring. Some positive changes are also mentioned, such as changes in legislative environment and technological improvement in small food enterprises during the last few years. The situation objectives of the National Plan of Action (NPAN) on food security, safety and nutrition in Mongolia will be stated.

Table 1. Bacterial Contamination of Food By-products

	1996	1997	1998	1999
Meat, meat products	35.4	26.05	27	25.5
Flour products	20.9	14.5	10	10.6
Milk, dairy products	25.6	29.4	33.1	22.7
Fruit and vegetables	7.8	18.3	10.2	7.7
Processed and semi-processed	29.5	30.5	22.4	19.4

Source: Quantitative reports of the State and City Health Inspectorates for the last five years.

Table 2. Results of Food Safety Inspection

	1996	1997	1998	1999	2000
Number of food premises	9,006	9,908	15,055	17,878	15,028
Number of inspections	25,726	25,985	32,972	32,525	31,197
Frequency of inspections	3.3	2.8	2.3	2.3	2.1
Value of destroyed food products (MNT)*	137.2	82.2	119.9	158.3	135.9
Contamination (percent):					
Chemical	9.7	13.8	18.1	14.7	
Microbial	35.8	17.7	15.5	16.9	
Heavy metal	1.06	15.3	5.1	13.7	

Source: Quantitative reports of the State and City Health Inspectorates for the last five years.

Note: * Mongolian currency, Tugrik; MNT1,100 = US\$1 by 2001.

FOOD SAFETY ISSUES

The country health reports of Mongolia show that gastrointestinal infections, diarrheal diseases and toxic infections contribute up to 30 percent of total infectious diseases. In Mongolia, typhoid and paratyphoid fever, shigellosis, hepatitis A, and brucellosis, have been registered in increasing numbers during the last years. Diarrheal diseases and bacterial food-borne infections are not often reported accurately whereas only extensive outbreaks of food-borne infectious diseases are reported and diagnosed. Hepatitis A is a significant public health issue. The prevalence of hepatitis A was 18.6 and 35.7 (per 10,000 population) in 1999 and 2000 with an increase of 1.9 times in 2000.

As a former “socialist” country Mongolia started its political and economical transition in the early 1990s and opened its markets to introduce a free market economy. Due to economic hardship and the cessation of financial assistance from the former Soviet Union and other socialist countries, the country became incapable of running its domestic industry, including domestic food production and related procurement, transport and distribution systems. This situation led to a decrease in food produced domestically, excluding foods from traditional animal husbandry, such as meat. For instance, Mongolia was a food-exporting country and domestic needs were well met by national production until 1991. Total sector production had decreased threefold in 1995 and 1.5 times in 2000, compared to production in 1991 and 1995, respectively. At present 70 percent of flour requirements are imported, which have increased by 33 percent compared to 1990 and by 43.3 percent compared to 1995. Although the number of domestic animals increased and subsequently the growth of meat production, the availability of milk and dairy products in 2000 has worsened compared to 1995 and 1990. On the other hand, as a member of WTO since 1997, tax on imported goods decreased to zero. All these factors are attributed to the increase of imported foods, and the number of small- and medium-sized food production enterprises and food outlets.

Mongolia is presently trading with more than 60 countries, including imports and exports. Although most traders import foods in bulk, a number of traders import food in small amounts making it difficult or even impossible to inspect. Moreover, since 1990 food sale and storage in ship containers is now becoming an unacceptably faulty practice of traders due to their sole purpose of earning and surviving. The container is not normally intended for food sale and it makes foods vulnerable to physical factors such as heat and cold. The State Inspectorate has revealed that more than 50 percent of foods sold in containers do not have permission from the appropriate inspection authorities. Moreover, 9.7 percent of foods were past their expiration dates, 28.7 percent failed to meet the frozen condition (in March), and 14.6 percent were improperly packaged. In this regard, the government must provide assistance to the traders to improve their food premises through a micro-credit scheme.

Domestic production is now trying to revive and technological improvements are being made, especially in packaging and labeling. However, domestic food industries have a lot to do in order to introduce HACCP, Good Hygienic Practice (GHP) and Good Manufacturing Practice (GMP).

By 2000 the number of food premises increased 1.7 times more than the level of 1996. With the increase of food premises, food contamination is also increasing, as seen in sample analysis. Laboratory analysis of the State Inspection Agency in 2000 revealed that 35.5 percent of the total samples failed to comply with the maximum acceptable level. Between 1996 and 1999, the average microbiological contamination of food products was recorded as 22.7 percent (Table 1); chemical contamination was 14.1 percent; and heavy metals

contamination was 6 percent. Results of a contaminants monitoring study (1999), undertaken by the State Inspection Agency of Hygiene and Epidemiology, showed that in 8 percent of a total of 2,116 samples, the content of aflatoxin B1 and B2 was higher than maximum acceptable levels (Table 2).

In the last few years the volume of foods destroyed because of their poor safety and the related monetary value have been increasing (Table 2). Therefore, in the future inspection agencies must work towards prevention rather than control, preventing them from importing poor quality products by providing information, training and communication.

LEGISLATIVE ENVIRONMENT

Between 1995 and 1999, the government has developed several legislative acts and regulations related to nutrition and food safety such as approval of Food Law by the Parliament in 1999 and International Codex standards through the National Standardization Office. In 2000, the President of Mongolia issued a decree consisting of three parts: organization of the consolidated structure of administrative management of food safety and security; establishment of a national reference laboratory on food safety and networking; and the introduction of HACCP and GMP in the food industry. Within the framework of this decree in 2001 the Government of Mongolia developed and approved a NPAN on Food Security, Safety and Nutrition, with the full support of WHO.

However, significantly important articles of the Food Law disappeared during the parliamentary discussion. The enforcement of laws and regulations are incomplete, and several areas of the food chain remain inadequately protected. Therefore, a review and updating of existing food safety laws and regulations, in accordance with international requirements and development of hygiene regulations based upon the Codex Principles of GHP needs to be done.

On the other side, enforcement of the President's decree to restructure the current organization of the agencies dealing with food safety is urgent. There are about six agencies under the five Ministries which are responsible for different aspects of food safety. The water and sanitation situation must be considered as part of the food safety issue, which was previously a separate issue. A recent hepatitis A outbreak shows a worsened situation of water supply sanitation, particularly in rural areas.

Considering the above situation, the NPAN has the following objectives and strategies on food safety:

- To harmonize the national food safety measures with international standards and establish a system which would have the capacity to conduct risk analysis and safety control measures;
- To strengthen food safety control laboratories and improve national human resource capabilities;
- To conduct training and advocacy on food safety issues for producers and consumers in order to improve proper culture in food consumption and public participation;
- To ensure the safety of water and sanitation; and
- To strengthen research, monitoring and information system.

Each objective has defined strategies as given below:

Under the First Objective

- * Develop inter-sectoral coordination and collaboration to strengthen food safety controls, including definition of responsibilities between different food control agencies;
- * Develop standard procedures for inspection and risk analysis and build human resource capacity on risk analysis;
- * Expand cooperation with other countries and international organizations on food safety; and
- * Establish a National CODEX Committee based upon the recommendations of CODEX.

Under the Second Objective

- * Review, update and enforce existing laws, decrees, regulations, requirements and procedures to improve food safety, including imported food, and in tourism outlets while minimizing their negative effects on trade;
- * Develop and implement a laboratory strengthening program by developing a laboratory accreditation system and participating in the work of the international laboratory accreditation system;
- * Use modern systems for providing hygiene and sanitary conditions in food chain/production, trade and services, such as GHP, HACCP, and GMP; and
- * Establish control systems to provide veterinary and phytosanitary conditions for raw commodities and processed foods.

Under the Third Objective

- * Review, update and implement existing laws, regulations, guidelines, and standards to ensure sanitation and the quality of drinking water and potable water for food processing, including collaboration with other water program/projects;
- * Estimate resources of water through exploration and survey of water sources in order to provide reliable quality and availability of water for the population;
- * Determine and create sanitation zones for water sources and certify them;
- * Set up equipment to soften and demineralize water in areas where the water quality has not met the standard requirements; and
- * Commence the establishment of networks at big basins to control water level changes and contamination of groundwater sources for big cities.

Under the Fourth Objective

- * Increase the capacity of human resources in Mongolia in the areas of food security, safety and nutrition, paying particular attention to policymaking and program-implementation areas within the government and its agencies; and
- * Increase the food security, safety and nutrition capacity of national research institutes and educational institutes.

CONCLUSION

Food safety is an emerging area in Mongolia, which needs strong international support towards implementation of NPAN. This would focus mainly on advocacy, training of different stakeholders, establishment of training programs, and strengthening of laboratory capacity. Changing economic circumstances have had a significant affect on the food safety situation. Vulnerability of traders and poor people to the different kinds of inspection penalties is very high but both destroyed foods and the labor of the traders as well as health

of population are all national values. Therefore, inspection agencies must work towards prevention, rather than control, providing training and micro-credit schemes. Many activities need to be performed for national consensus building in order to consolidate different food safety agencies and by using more radical approaches by both government and international agencies in a way which would implement the NPAN on food security, safety and nutrition.

8. NEPAL

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INTRODUCTION

The economy of Nepal is agro-based. Agriculture provides livelihood to more than 80 percent of the population. Its contribution to GDP decreased only by 6 percent over the 10 years, i.e., from 60 percent in 1982 to 54 percent in 1992.

Nepal is still at the threshold of industrialization. Taking into consideration its geographical situation and the availability of resources within the country, the scope for large-scale industries is very limited. By now a sizable number of food industries have been established both in public and private sectors. There are more than 957 organized food industries operating, which represent about 20 percent of all registered industries. This, however, does not include cottage-scale rice and oil mills, which are believed to number more than 3,500.

Some of the food industries of Nepal, according to economic statistics include soft drinks, beer, distilled beverages, vegetable ghee, noodles, khandsari and regular sugar, biscuits/confectionery, bakery, pulses, ginger oil, tea, coffee, cardamom, dairy, meat processing, flour, rice and oil mills, fruit and vegetable processing.

Status of Traditional and Modern Food Processing Industries in Nepal

Traditional manufactured foods are beaten rice, corn, wheat and millet flour, sweets and confectioneries, vegetable oil and meat. Modern manufactured foods are rice, wheat, flour, dairy products, sugar, biscuits and confectionery, bakery products, tea, canned fruit and juices, vegetable oil and hydrogenated fats, alcoholic and non-alcoholic beverages.

As the country is mostly hilly and mountainous, the transportation system is the main hindrance to national development. Forty percent of the population is estimated to live below the poverty line. Low productivity of cereal food crops in the high hills are a major constraint.

The small- and medium-scale enterprises (SMEs) play a critical role in Nepal's industrial development. They account for a very substantial part of the output, employment and even exports. They are producers of a vast array of finished products and consumer goods. This, however, cannot benefit their position when it comes to competing in external markets or against imported products or products made with better technology and operational efficiency. It requires no deep analysis to state that in the fast changing economic scenario, the small- and medium-sized food processing enterprises need an altered strategy to hold their own and to thrive. Despite its significant contribution to Nepal's food processing industrial output, this sector has been suffering from multiplicity of problems, reflected in widespread problems.

Apart from basic needs like infrastructure, finance, raw materials availability, managerial skills and marketing, of critical importance in the current situation are technology, productivity and, most importantly, quality control. These three elements are so interlinked that it is not possible to speak of one to the exclusion of the others.

As a result of rapid urbanization, the increasing literacy, job opportunities and modern lifestyle have a direct effect on the food consuming pattern in Nepal. Consumer's preference for manufactured food has specially increased for the following products such as dairy, baked goods, vegetable oils, wheat flour, tobacco, tea, confectioneries and sugar.

The market for modern processed foods in Nepal is rather limited. The geographical situation, transportation system and low income of the people are the main constraints limiting the market. The growing situation of transportation and income generation activities in the past few years had shown the positive impact in the growth of modern food industries. The market for staple foods like noodles, biscuits, bread, fruit juices and processed milk is rather high. The country has capabilities in producing such foods, but limited market structure and the frequent availability of imported foods from India and abroad reduces the feasibility of establishing such industries. Export potential for processed food in India and other countries show a good scope for the establishment of modern food industries but quality assurance, adoption of ISO 9000, minor raw material dependency plus a lack of skills and awareness are the constraints for such establishment in Nepal.

Most of the small- and medium-sized food processing enterprises in Nepal are based upon simple technology and small-scale operations. However, in dairy production, sugar milling, alcoholic beverages and cigarettes industries, the technology used is modern. One wheat flour mill and one or two noodle factories are fully automatic with a high level of technology. Otherwise, in most of the food processing enterprises, material handling is done manually. None of the modern dehydration techniques have been used in the food industry. Most of the food industries operate multiple effect vacuum evaporator systems. In cold storage plants, ammonia refrigeration controlled atmosphere and holding disinfestation is used in fruit processing plants. The major problem is lack of skilled labor. In general, there is a short supply of semi-skilled workers, especially technicians, in Nepal. In most industries semi- and skilled technicians from India fulfill all the needs at present.

PRESENT SITUATION OF QUALITY CONTROL AND ITS PERCEPTION IN SME IN NEPAL

It is obvious that the presence of quality control in small- and medium-sized food processing enterprises is virtually non-existent. Many small industries do not even have basic quality control facilities. Large industries under foreign collaboration have fully equipped quality control, research and development facilities. The constraints of capital, skilled manpower and entrepreneurship could not develop even the minimum essentials of quality control among the locally owned and managed food processing enterprises. In the quality front, we cannot keep pace with other countries. One may feel that the modern quality concept with reference to HACCP in small- and medium-sized food processing enterprises is a totally new topic. Even though Nepal has an abundance of natural resources and low-cost labor due to a lack of scientific and technical manpower, we have not been able to increase the export market because of a poor quality image of our products, especially in SMEs.

ISSUES AND CONSTRAINTS

Misconception and Outdated Beliefs about Quality

It is generally believed that higher quality products mean more investment and higher product costs which cannot be afforded by the Nepalese food processing companies. But these perceptions are based on the inspection approach to quality where quality improvement was sought through stricter inspection.

Lack of Quality-related Training Facilities

Most quality problems arise because of lack of basic technical skills or inadequate awareness on the part of workers. At present there is no organized training for workers in the small- and medium-sized food processing enterprises.

Lack of Modern Management Practices

Most of the businesses in small- and medium-sized food processing enterprises are family-owned and without any formal organizational structure and clearly defined responsibilities. The management wants quick returns and shortcuts to achieve immediate gains. Therefore, there is a need to provide training to the managers on quality concepts with special reference to ISO 9000 and ISO 14000.

Promotion and Adoption of Quality Circles in SME of Nepal

Back in the early 1980s when the ISO quality system standards were just gaining ground, food processing industries were starting to realize that product quality should be managed. Productivity and quality has become the most important issue in the present context of globalization and liberalization of the economy due to the creation of high competition and a complex business environment. The Nepalese business environment is no exception. Therefore, in order to cope with the present situation productivity and quality improvement has become one of the most important issues and a timely strategy for facing the present situation.

In order to enhance productivity, emphasis should be given to the inexpensive methods and concepts of improvement of existing facilities. Minimization of defects, quality improvement and quality circles are economical and simple tools for improvement that could be implemented in food processing enterprises with limited resources. Nepal being a developing country with a low level of industrial activity has to emphasize the implementation of such concepts and has yet to develop local capabilities that could upgrade the levels of productivity.

MODERN QUALITY CONCEPTS

Quality Assurance System

Quality assurance means to give assurance to oneself and others. In the quality control process, customers should be identified first and every customer wants to be assured beforehand that the product he/she purchases complies with the quality requirements for safety and reliability. These can only be assured when the products are made according to specified requirements and are manufactured by those enterprises which possess a well-established and acceptable quality assurance system and are certified by impartial, competent and recognized third party bodies. In such cases, a producer has to develop an infrastructure

including sound testing, inspection and certification systems for quality management. Here is the major role of quality system management standards such as the ISO 9000 and 14000 series of standards which contain guidelines for how to develop and practice these quality management system. It leads to minimization of multi-fold inspection, saving time, money and efforts to eliminate the chances of defective production.

Since the dawn of history human society has been concerned with the quality of food. In primitive societies human beings used their mental faculties and physical organs for selecting the food quality by using their eyes, nose, bite and taste. Subsequent growth of commerce through barter system and development of science and technology helped to produce and sell varieties of non-natural or processed food items which we see in the present food market. All these foods and services have created dependencies. Sometimes those foods and services fail to deliver the expected quality resulting in loss of sales and can become costly and annoying. Some of the processed foods prepared from these industries often became threats to human safety and health and also to the environment. Human safety and health depend upon the quality of food prepared and processed in the factories.

Almost all governments have realized that domestic food resources need to be conserved and distributed in the best interest of the health and economic well-being of the population. A major part of human illness in the world is food-borne. Therefore, food adulteration and contamination must be prevented or at least reduced to the minimum.

In Nepal, food processing and distribution systems have to be improved to maintain quality and better consumer protection. Most of the management of small- and medium-sized food processing enterprises in Nepal feel quite satisfied with their performance, if they are able to make a reasonable profit. There is no driving force for serious efforts at improving their performance both in terms of quality and productivity. Large companies, food traders and the retailers have a very strong organization. They are using modern technologies for their economic benefit. On the other side, consumers are not well organized and have no strong voice against food adulteration, misbranding and unfair food business practices. In order to give consumers a strong voice, they have to be organized and run a collective movement. The consumer's grievances sometimes result in a consumer movement in Nepal. Consumers are willing to be organized and raise their voices against exploitation. But the majority of consumers are poor, illiterate and ignorant and they do not even know about consumers' associations and their usefulness. Thus, they cannot raise their voices against producers or food traders on the matter of quality of goods and services.

Although the government is now trying to develop the quality of food in the market, the major quality-oriented problems facing by the consumers in Nepal's food market are as follows:

1. Poor quality of food products.
2. Cheap quality foods mixed with the costly ones.
3. Misleading packaging and labeling information.
4. Adulteration, misbranding and lack of labeling.
5. There is no fixed price indicated on the packages.
6. Inadequate guarantees or warranties.
7. Too many unhealthy products.
8. The absence of reliable information like manufacturing date, expiry date, storage conditions, etc.

9. Use of inedible additives, pesticide residues, food colors, etc. Carelessly managed because of ignorance, negligence or undue profit motive.
10. Poor quality of after sales services.
11. Spoiled, dumped and date-expired foods in the market.
12. Consumers do not know where to complain.
13. Food law enforcement authority is not very active (to the extent that the public may feel secure).

The management of food processing industry should improve the quality of food products by removing such defects and shortcomings. In Nepal, we have no public analyst or any organization where consumers can complain about the quality of food.

GOVERNMENT POLICIES AND PROGRAMS

As food is essential for life, a worldwide investment has been made in the food business (food production, preparation, processing, transportation, packaging, storage and marketing).

Nepal cannot remain in isolation and out of this business chain. For the last three decades, food industries in Nepal have come into existence in considerable numbers and are growing more and more sophisticated.

We have a very limited experience of quality control management systems. There are a number of institutions involved in the development of regulations. The quality and promotional activities of food industries in Nepal are as follows:

1. *Industrial Promotion Board*

A high level industrial promotion board with 11 members under the chairmanship of the State Minister for Industry

2. *Industrial Manpower and Productivity Council*

This Council was set up with the representation of His Majesty's Government (HMG) employees and the private sector for to make the industrial sector more efficient and productive.

3. *Monitoring and Follow-up Unit*

Set up with the participation of private sector to avoid the possible tendency of monopoly that could rise in the industrial sector.

4. *Bureau of Nepal Standard*

This is mainly responsible for monitoring the national standard of foods and food products – certifies industrial products with NIS mark and monitors the quality of the product regularly.

5. *Central Food Research Laboratory (CFRL)*

A governmental organization mainly involved in quality control and adulteration control of marketed food products. CFRL and its branch offices are the only organizations where complaints can be registered but it does not have full authority. A committee under the chairmanship of Chief District Officer (CDO) has to adjudicate and settle problems. CFRL, since the last two years, has started issuing product quality certification systems to manufacturers. It independently approves products for adequacy before they are sold to the public and the certification has to be renewed every year.

In the backdrop of such gigantic tasks, the institutional effort is just a drop in the ocean. However, activities should be geared to highlighting issues on quality control, food technology development and promotion.

6. Consumers Organization

There are three consumers association in Nepal, namely; Consumers Forum, Consumers Association and Consumers Council. All of them are politically motivated rather than working directly for the public. Their work is confined to the urban areas.

Law Enforcement Problems

CFRL is the authority to decide on quality of foods. If they are found defective, complaints are made. But the CDO office, being the final authority, often takes a very long time to sort out the issues. Sometimes, negative results arise because of unfair dealing by the food traders.

Consumers do not even know about the law enforcement authority and the proper place and process to complain. Ninety percent of the people living in the rural areas have a very difficult life. Food is not sufficiently grown in the hills, therefore there is a food shortage. When there is a food shortage, a low quality food supply or unfair food activities regularly result.

In the urban areas like Kathmandu, Birgunj, Biratnagar and Pokhara, etc., people have better choices and facilities. They can buy foods according to their economic status and capabilities. Supermarkets with imported quality foods are also present in the urban areas.

SUGGESTIONS FOR TAKING MEASURES

Organizations such as the National Productivity and Economic Centre (NPEDC) can act as a supporting institution for promoting quality circles in the small- and medium-sized food processing enterprises of Nepal. Although NPEDC is engaged in productivity improvement and human resource development activities, it is not sufficient for total quality management in small- and medium-sized food processing industry in Nepal.

In regards to productivity improvement, it has successfully conducted training programs on productivity management-related topics. Quality circle is one of them. NPEDC can create the awareness in industry that quality circles are not only for consumers but also for the benefits of industry. If there is an improvement in the quality of the products, there will be more sales, lower costs, increased productivity, better customer satisfaction and higher profits.

At present, more emphasis should be given to building up the attitude towards productivity improvement. Before going directly to the lower level, it would be better that the higher level management should know about these tools and their benefits. Then it would be easier to make supervisors and shop-floor workers understand. After being successful in developing a consciousness about these basic things, other approaches can make the process action-driven.

For the implementation of quality circles at the food processing enterprise level, NPEDC can play the role of a catalyst. It can provide training on quality circles using local expertise and experts from abroad whenever necessary. But, first of all, there should be the commitment from top level management of concerned enterprises.

Competent test laboratories are also helpful for evaluating product quality, so that consumers can obtain unbiased information needed to make sound purchasing decisions.

The existing government institutions should have a complete package for quality assurance and improvement mechanisms especially designed for food processing industry. The government should introduce new systems of quality control so that the food processing industry will benefit and be upgraded.

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9. PAKISTAN

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INTRODUCTION

Agriculture is the mainstay of Pakistan's economy. It contributes about 32 percent to the GNP, and accounts for 57 percent of the labor force and over 50 percent of foreign exchange earnings. More than 70 percent of the country's population depends directly or indirectly on agriculture for its livelihood. The important agricultural commodities are cotton and sugarcane; cereals such as wheat and rice; oilseeds such as rapeseed and mustard; fruits; vegetables; livestock; and fisheries.

Pakistan possesses a fairly developed manufacturing base but food processing has not kept pace with overall industrial development. The major reasons for the primitive stage of the processed food industry are:

- short supply of meat and dairy products
- perishable nature of fruits and vegetables
- lack of adequate refrigeration and transportation facilities
- shortage of packaging and storing facilities
- the lack of incentives to encourage the processing of foods and their exports.

Due to the above factors, the existing food processing industry has not yet developed to its full potential. Accordingly, the machinery manufactured in the country caters to small units where per unit costs are higher. Pakistan's food processing industry is composed mainly of the following:

- Grain and flour mills
- Hydrogenated vegetable oil
- Dairy plants
- Fruit juice units
- Beverage bottling plants
- Snack foods
- Confectionery units
- Tea blending plants.

In addition, there are some small vegetable dehydration, spice and salt packaging, and cereal facilities. The meat and vegetable processing industry remains undeveloped.

GOVERNMENT POLICIES FOR THE FOOD PROCESSING INDUSTRY

- i. Sustaining and strengthening the process of agricultural transformation and modernization by increasing productivity through vertical expansion, diversifying agriculture into high value crops, and improving the pricing, marketing and grading;
- ii. Distribution systems to improve farmer income;
- iii. Providing and sustaining food security to all citizens by achieving growth rates in excess of population growth, achieving self-sufficiency in grains, and reducing edible oil imports;
- iv. Meeting the raw material needs of agro-industries and manufacturing;
- v. Increasing the productivity of livestock and fisheries;
- vi. Improving the prospects for agricultural trade by replacing inward looking protectionist policies with a more open, liberal framework and encouraging production of exports; and
- vii. Crops.

Sub-sectors

The main sub-sectors of the food processing and packaging industries are:

- dairy processing (milk, powder milk)
- seafood
- fruit and vegetable processing
- grain processing
- meat processing
- sugar processing
- vegetable oil processing
- beverage production
- packaging (metal, polyethylene, plastic, paper and paperboard).

The following is a brief description of the different sub-sectors of Pakistan's food processing and packaging industries:

1. *Dairy Processing*

Milk production at 20 million mt annually is small due to low yield and inadequate processing and refrigeration facilities. Most of the milk is produced in the rural areas and is consumed fresh due to the lack of preservation facilities. The market for milk is expanding at an annual rate of 5 percent. Pakistan imports powdered milk to meet the shortfall.

2. *Fish/Sea Food Processing*

Pakistan's sea coast yields a large variety of fish including shrimp, crab, lobster, sardines, pomfret, salmon, sole, and tuna. Total yield in 1995-96 stood at 609,000 mt. Of this, 47 percent is edible and 53 percent is non-edible fish; the latter is primarily used for fish meal.

Pakistan is also a major exporter of seafood. Consumption is low because of high prices and lack of marketing facilities.

3. *Fruits and Vegetables*

Pakistan grows citrus, mangoes, pomegranates, apples, guavas, grapes, dates, plums, banana and other fruits. Potatoes, onions, tomatoes, beans, cabbage, carrots, etc., are also

grown in substantial quantities. Most consumption is in the fresh form. Fruits and vegetables are processed to produce jams, jellies, ketchup and juices.

On the average, the production of fruits and vegetables equals consumption. The size of the market is expanding at the rate of 3 percent a year, the same as population growth.

4. Grain Products

The production of wheat, the staple diet, stood at 17.6 million mt in 1998-99. The total flour mill capacity is 7.5 million mt. Wheat production falls short of domestic requirements. As a result, approximately 2 million mt of wheat is imported annually. Rice is the second most important staple food in Pakistan. Its production was 4 million mt in 1998-99. There are about 400 rice mills, most of them of less than 5 mt capacity. About 1 million mt of rice, comprised of basmati (a superior quality rice), is exported.

5. Meat Processing

Meat production is about 2.2 million mt of beef, mutton and poultry. Meat processing and packaging is limited due to lack of freezing or chilling facilities in slaughterhouses or retail outlets. Local meat production equals consumption. Imports and exports are negligible. The market is expanding at 5-6 percent annually.

6. Sugar Processing

Pakistan grows sugarcane in sufficient quantities. There are at present 70 sugar mills with a combined processing capacity of 253,050 mt crushing days. Two and a half million mt of sugar were produced during 1998-99. In 1999-00 consumption rose to 2.7 million mt, but production remained at 2.5 million mt. The consumption of sugar is increasing at 4-5 percent a year.

7. Vegetable Oil

This sub-sector includes extraction of edible oils, its processing into refined cooking oil and hydrogenated vegetable oil (known as vegetable ghee) and butter. The sources of edible oil are local oil seeds and imported palm oil from Malaysia, and soybean oil from USA.

Edible oil processing is through expellers or solvent extraction. An additional process is undertaken to semi-solidify cooking oils to produce vegetable ghee. In addition to a large number of expellers at the village level, there are 106 vegetable ghee/refined cooking oil manufacturing units in the country. Most of these units are old and require major modernization and replacement of de-linting machinery and high pressure expellers. The average import of vegetable oil is estimated at 1 million mt annually, which forms nearly 85 percent of the total market demand. The market is increasing at 6-7 percent per year.

8. Beverage Processing

Beverage processing includes non-alcoholic drinks such as aerated water, fruit juices, and syrups. There are about 125 beverage processing plants meeting the overall demand; imports are negligible. The market is expanding rapidly at about 10 percent a year.

9. Packaging

Approximately 20 percent of packaging materials are imported. The total requirement for packaging paper and board is approximately 160,000 mt. The consumption of packaging materials is increasing rapidly because of the introduction of new products and brands. The market for packaging products is growing at around 6 percent a year. The major packaging products are corrugated board, paperboard/duplex board, kraft paper, glass bottles, plastic bottles, and tin products. Cardboard, paperboard and tetra-pack are produced locally, but specialty papers like tracing paper, cigarette paper, kraft paper and other paper are imported. Glass bottles are manufactured locally.

Plastic bottles and cans are also made in Pakistan, although their raw materials are imported. Stretch wrap consisting of plastics films, aluminum foil, and similar products are almost all imported.

PRESENT SITUATION OF QUALITY CONTROL IN SMALL AND MEDIUM-SIZED FOOD PROCESSING ENTERPRISES

At present, awareness of comprehensive quality assurance systems in the small and medium-sized food processing enterprises is low. It is only the exporting organizations that are aware and are following the international standards of ISO 9000. Presently the HACCP is implemented by the sea food exporters only. The government is taking concrete steps to create awareness and is facilitating organizations to apply for and implement international quality standards. The awareness on quality standards is increasing as these standards are compulsory, especially for exports.

Quality Assurance Systems Adopted by the Food Processing Industry

The small and medium enterprises in the processed food sector have developed quality assurance systems by implementing the following:

- Sanitation standard operating procedure
- Complaint handling systems
- Shipment record report
- Weekly inspection reports
- Freshness rating charts
- Hazardous analysis worksheets and plan forms.

1. *Sanitation Standard Operating Procedure*

This procedure ensures that:

- the water that comes into contact with food or food contact surfaces is derived from a safe and sanitary source
- there is no connection between the potable water system and any compatible system
- all food contact surfaces of plant equipment and utensils are designed of such material and workmanship to be easily cleaned and maintained in sanitary condition. It also checks for any toxic materials and the action of the food cleaning agents on the equipment surface
- all utensils and surfaces of equipment that contacts food during processing are cleaned and sanitized with effective cleaning and sanitizing procedures
- gloves and outer garments that contact food or food contact surfaces are made of an impermeable material and are kept clean and sanitary
- employees' hands, gloves, outer garments, utensils, food, and food contact surfaces of equipment that come into contact with waste, the floor, or other unsanitary objects do not touch food products without first being adequately cleaned and sanitized
- where applicable, employees' hands, gloves and outer garments, utensils, and food contact surfaces of equipment that come into contact with raw product are adequately cleaned and sanitized

- hand washing and hand sanitizing facilities are located at the entrance of the processing hall. These hand cleaning facilities should be equipped with hand cleaning germicidal soap and with a hand-dryer
- food, food contact surfaces and food packaging materials should be protected from adulteration with lubricants fuel pesticides, cleaning compounds sanitizing agents, metal fragments, and other chemical or physical contaminants
- any toxic compounds allowed in the plant are be identified, held, used, and stored in a manner that protects against contamination of food, food contact surfaces or packaging materials
- food, food contact surfaces and food packaging materials are protected from contaminants that may be sprayed, dripped, drained or drawn into food
- cold stores are to be kept in good sanitary hygiene conditions to avoid cross-contamination in products
- anyone who has or may have, by medical examination or supervisory observation, an illness, infected wound, an open lesion such as a boil or sore, or any problem that might contaminate food, food contact surfaces or packaging materials shall be excluded from any operations until the condition is healed or corrected
- adequate, readily available toilet facilities that provide for proper sewage disposal shall be available and maintained in a sanitary condition and in good repair
- the plant is designed to minimize the risk of contamination of the food, food contact surfaces and packaging materials.

2. *Complaint Handling Systems*

These are procedures that are followed to ensure that complaints from any part of the procurement, storage, requisition, manufacturing, packaging and shipment sections are duly reported and corrective action is taken by the responsible department until the problem is corrected.

3. *Shipment Record Report*

This report continuously ensures that the date, description, specifications and other details of the shipment are recorded and verified.

4. *Weekly Inspection Reports*

These ensure the sanitation of potable water, waste water systems processing equipment, utensils and plant facilities.

5. *Freshness Rating Chart*

These establish the criteria for determining the freshness of the raw materials ranging from very good to unacceptable condition.

6. *Hazardous Analysis Worksheet*

This reports the condition at inspection of all levels of processing, right from receiving to packaged form end and shipment.

7. *HACCP Plan Form*

This form specifies the critical points, significant hazards at those point, critical limits for each preventive measure, and monitoring of each corrective action taken.

HACCP Implementation in Pakistan Sea Food Industries

HACCP is a mandatory requirement of EU, Food and Drug Administration (FDA) of USA, and also Pakistan Fish Inspection and Quality Control Act, 1997 and Rules, 1998.

The following is a description of the implementation of HACCP in 18 approved establishments plants processing and packaging sea food:

1. Identification of critical points in each production unit
2. Establishment and implementation of methods for monitoring and checking such critical points, so that control can be applied and food safety hazards can be prevented or reduced to an acceptable level at that point
3. Keeping written records with a view to submitting them to a competent authority and for their own assessment, verification and review
4. Essential microbiological tests are being carried out by all approved processing plants in their own in- house laboratories
5. Marine Fisheries Department, being the competent authority, checks the record during inspection and takes samples for analysis for the purposes of checking, cleaning and disinfection
6. It is ensured by the Marine Fisheries Department that persons responsible for HACCP and all concerned staff receive adequate training to effectively participate in HACCP implementation.

GOVERNMENT POLICIES AND PROGRAMS ON THE PROMOTION AND ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS

Pakistan's recent emphasis on policies of liberalization, deregulation and privatization has opened many opportunities for Pakistan-based business, but has also created many challenges both for business and for policymakers. ISO 9000 is now a basic requirement for exporters, and organizational efficiency a must for all businesses.

The government has responded by providing much-needed support to industries in the process of upgrading and improving quality and competitiveness. A particular area of focus has been the improvement of a national Metrology Standards, Testing and Quality (MSTQ) infrastructure, with these measures being embodied in the National Technology Policy (NTP).

In order to establish an internationally recognized and accepted MSTQ system in Pakistan, based on ISO 9000 and other quality standards, the Ministry of Science and Technology (MOST), which is responsible for promotion of the MSTQ assurance systems in the country, is actively working on various programs, including the strengthening of various national agencies working in these areas.

1. *Pakistan Standards and Quality Control Authority*

- i. The Pakistan Standard and Quality Control Authority (PSQCA) was created in 1996 by merging the Pakistan Standard Institution (PSI) and the Central Testing Laboratories (CTL) in order to develop and promote adoption of international standards in the country, and to facilitate the provision of necessary quality assurance services. To assist Pakistan-based businesses in achieving ISO 9000, eight ISO 9000 certification bodies are operating in the country, mostly with foreign participation. The establishment of an ISO 9000 certification body within PSQCA is underway, and is intended to reduce the cost and time required for ISO 9000 certification. Additional measures are underway to strengthen all the functions and services of PSQCA, and an initiative to amend the PSQCA Act to provide a more promotional role for PSQCA, as well as the regulatory role embodied in the PSQCA Act of 1996.
- ii. As a major first step to promote ISO 9000 certification, the PSQCA signed an MOU with AOQC Moody International in 1998 covering joint certification and auditing

activities. In particular, AOQC Moody International is helping PSQCA establish its own independent ISO 9000 certification service.

- iii. About 271 companies in Pakistan have already obtained ISO 9000 certification, and more than 300 companies have applied for a government grant to obtain ISO 9000 certificates. This rapid growth trend is expected to continue.

2. National Accreditation Council

- i. The Pakistan National Accreditation Council (PNAC) was established in 1998, as an autonomous body under the administrative control of the MOST, to operate the ISO 9000 certification and registration system in the country. The NAC is a national body tasked to assess, qualify, and supervise ISO 9000 certification agencies and laboratories.
- ii. The MOST is pressing hard to get the NAC fully functioning as soon as possible. Suitable staff members have been recruited and the government has provided the necessary budgetary resources for this year and next year. A separate office for NAC is also being established, a draft quality manual has been prepared, preliminary operating procedures and guidelines are in place, and training programs being implemented by the NAC officers. In order to complete the preparation of documentation and the training of NAC officers, the MOST is seeking technical assistance from ADB, Swedish International Development Cooperation Agency (SIDA), and other donor agencies.
- iii. The NAC will seek registration with the International Accreditation Forum (IAF) and will also act as a focal point for coordination with international, regional and national organizations. This will ensure that all ISO 9000 certifications in Pakistan will have international recognition. This will facilitate local companies to obtain ISO 9000 certification and reduce the cost and time spent for calibrating testing equipment.

3. National Physical Standards Laboratory

- i. One of the 20 conditions of ISO 9000 certification is the calibration of testing equipment by certified and accredited laboratories. The National Physical Standards Laboratory (NPSL) is an autonomous organization working under administrative control of the MOST. The NPSL maintains primary standards and is used as a national body for calibration of equipment in a limited number of fields including mass, length, time, etc. In order to conform to ISO 9000 standards and ensure that its calibration services are accepted internationally, the NPSL is being upgraded, restructured, and strengthened under the World Bank assisted Industrial Technology Development (ITD) project.

4. Financial Support

- i. The MOST has launched the Consultancy Program for Industrial Technology Development (CPITD) to assist small and medium industries in improving products, services and productivity and also to create opportunities for local consultants to serve local industry. The project assists small and medium industries and enterprises to improve the quality and quantity of their products with grants to buy local expertise and services, particularly with the objective of competing in international markets. There are three parties to the proposed program: the consultancy providing the relevant services; the company in the process of upgrading; and the mediator responsible for the operation of the CPITD. The grant is provided to the consultant in the amount of 50 percent of the total cost of the work or a maximum of Rs.50,000.

- ii. To promote ISO 9000 certification, the MOST, in collaboration with the Ministry of Commerce, has launched a program to provide companies seeking ISO 9000 certification a grant of Rs.150,000 in addition to the Rs.50,000 available through the CPITD project. More than 400 applications have been received by the MOST and more than 200 grants have been approved.

MEASURES TO CREATE AWARENESS OF QUALITY ASSURANCE SYSTEMS

The Government of Pakistan has assigned the allocated the amount of Rs.23 million to PNAC to create awareness and provide training in quality management.

Under the project, various seminars, workshop and training courses will be conducted in all the major industrial cities with the objective of creating awareness among the industries and consumers with regards to the benefits of adopting quality improvement practices. Under the Technology Development Project various programs have been launched for the promotion of quality assurance. A national campaign is being launched to raise awareness among exporters, industries and services suppliers about trade policy and regulations being framed by World Trade Organization (WTO) in order to create an understanding on the importance of Total Quality Management and Productivity (TQM&P) and its application in the manufacturing and service industry.

In Pakistan over 2000 organizations are already ISO 9000-certified. Under an incentive program, these organizations are being paid Rs200,000 each, by the government. Environmental management systems, laboratory management, product certifications, standards on food and health safety and other quality areas are still in their infancy and need a lot of attention. The government has embarked upon a policy of privatization and liberalization of the economy. These trends and developments will create an environment for the industries to compete both in the local and international market.

Recommendations to Promote Adoption of Comprehensive Quality Assurance Systems by the Small and Medium Food Processors

- * Training programs should be started for creating awareness and providing training in quality management to personnel
- * National campaigns should be launched to raise awareness among exporters, industries, suppliers of services about the trade policy and regulation being framed by WTO, create understanding on the importance of HACCP, ISO 9000, TQM&P and their application in manufacturing and service industries
- * Resource constraints related to human, physical and systems covering quality assurance systems should be identified and assistance from international development organizations should be sought
- * Educational programs based on quality assurance systems should be introduced for food technologists
- * The importance and benefits of implementing quality assurance standards should be stressed upon the manufacturers/processors
- * Quality assurance systems should be enforced through regulations.

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10. PHILIPPINES (1)

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INTRODUCTION

One of the important sectors of the Philippine economy is the food processing industry. It converts most of the country's agricultural produce to new value-added products and provides employment to about 335,000 people, which was the highest among the manufacturing sector in 1995 (Bureau of Small and Medium Business Development [BSMBD], 2002). It contributed 37 percent to total gross value-added manufacturing in 1998 (Capanzana, *et al.*, 1999) and accounted for 3.4 percent of foreign trade, which is equivalent to US\$1,290 million in the year 2000 (Bureau of Export Trade Promotion [BETP], 2000).

The industry is composed of establishments engaged in the processing, preserving/curing, canning, drying, freezing or smoking of food products. In a survey conducted by Capanzana, *et al.* in 1998, the industry was estimated at 4,914 firms of which 90 percent or 4,400 firms are of micro, small or medium scale in size. The total number of food industries by sector and by region in the Philippines is shown in Table 1. It is composed of the following major sectors: cereal products, bread and other bakery products, beverages, dairy products, processed fruits and vegetables, processed fish and other marine products, processed meat and poultry, processed coffee and cocoa products, confectionery products and sauces, spices and other ethnic foods. The major processed food exports are fruits (39 percent), nut and coconut products (6.3 percent), sugar and sugar preparations (6.6 percent), cereals and flour preparations (2.3 percent), crustaceans (13.2 percent), tuna (10 percent) and mollusks (3.5 percent). Table 2 shows a summary of the Philippine food export, indicating a declining trend for the period 1996 to 2000, from US\$1.55 billion in 1996 to US\$1.29 billion in 2000. The decline could be attributed to a worldwide economic crisis and political problems that have affected the Philippines which resulted in a fluctuating value for the peso against the dollar. However, signs of an improving economy have started to reflect in 2000 as food exports rose by 9 percent, as indicated in Table 2.

Another factor affecting export trade is the current requirement for our export markets which include application of the HACCP system in the food production chain. In the United States, HACCP regulations for seafood, meat and poultry products were enforced since December 1997 and for fruit juice products, since 18 January 2002. In the EU, HACCP regulation for seafood products was enforced since 1994 and recently, the EU announced that mandatory HACCP application will be required in all food establishments by the year 2004. This may mean that in the future, all food exports to the EU must be processed under a HACCP system. Some Australian buyers of coconut products are now requiring HACCP certification from Philippine exporters.

Table 1. Total Number of Food Processing Industries by Category/Region in the Philippines

Region	Total		Cereal Products	Bread and Other Bakery Products	Beverage and Other Products	Dairy	Processed Fruit and Vegetable
	Number	Percent					
National Capital Region	1,455	29.6	108	206	33	68	380
Region 1 : Ilocos Region	24	0.5	1	-	1	2	9
Region 2 : Cagayan Valley	179	3.6	2	16	-	2	74
Region 3 : Central Luzon	223	4.5	53	47	5	10	20
Region 4 : Southern Tagalog	1,232	25.1	44	590	35	39	222
Region 5 : Bicol Region	282	5.7	7	195	-	10	17
Region 6 : Western Visayas	140	2.9	8	52	1	3	35
Region 7 : Central Visayas	210	4.3	10	134	1	-	33
Region 8 : Eastern Visayas	267	5.4	6	193	1	1	38
Region 9 : Western Mindanao	140	2.9	15	6	1	3	31
Region 10 : Northern Mindanao	96	2.0	7	3	5	7	44
Region 11 : Southern Mindanao	223	4.5	12	38	1	3	88
Region 12 : Central Mindanao	93	1.9	8	5	-	12	40
CAR ^a	224	4.6	2	91	3	1	71
CARAGA ^b	120	2.4	7	70	-	-	21
ARMM ^c	6	0.1	-	-	-	5	1
Total	4,914	100.0	290	1,646	87	166	1,124
Percent	100.0		5.9	33.5	1.8	3.4	22.9

... To be continued

Table 1. Continuation

Region	Processed Fish/Marine Products	Processed Meat Products	Processed Coffee and Cocoa	Confection Products	Sauces/Spices and Other Ethnic Products	Others
National Capital Region	208	144	19	65	49	175
Region 1 : Ilocos Region	9	1	-	-	1	-
Region 2 : Cagayan Valley	12	70	-	3	-	-
Region 3 : Central Luzon	21	20	1	25	2	19
Region 4 : Southern Tagalog	87	41	8	40	26	100
Region 5 : Bicol Region	17	10	-	20	5	1
Region 6 : Western Visayas	9	15	-	9	4	4
Region 7 : Central Visayas	11	7	-	6	2	6
Region 8 : Eastern Visayas	6	5	-	7	-	10
Region 9 : Western Mindanao	26	17	6	6	2	27
Region 10 : Northern Mindanao	1	13	7	8	-	1
Region 11 : Southern Mindanao	41	12	4	8	3	13
Region 12 : Central Mindanao	-	11	-	2	3	12
CAR ^a	1	4	-	4	7	40
CARAGA ^b	6	5	-	9	1	1
ARMM ^c	-	-	-	-	-	-
Total	455	375	45	212	105	409
Percent	9.3	7.6	0.9	4.3	2.1	8.3

Notes: ^a Cordillera Administrative Region; ^b it composes of Agusan del Norte, Agusan del Sur, Surigao del Norte and Surigao del Sur; and ^c Autonomous Region for Muslim Mindanao.

Table 2. Summary of Processed Food Exports by Major Product Group

(Unit: FOB value in US\$ 000)

Major Food Category	1996	1997	1998	1999	2000
Processed Foods*	632,330	589,729	520,021	491,988	512,520
Processed fruits	198,828	195,814	180,378	179,063	201,377
Nuts and coconut products	93,572	96,643	82,346	99,090	80,592
Sugar and sugar preparation	162,549	120,282	118,351	89,673	85,501
Cereal and flour preparation	21,325	36,542	25,501	34,369	29,564
Sauces, spices, mixes and condiments	18,602	18,385	17,564	17,921	19,481
Beverages	14,755	15,732	13,863	12,625	14,214
Dairy production and bird eggs	1,849	1,162	1,244	2,013	13,805
Cocoa and tea preparation	20,798	19,317	16,977	11,037	8,197
Processed vegetables	5,275	4,284	3,697	4,302	3,548
Coffee (processed)	3,319	3,201	1,374	888	1,757
Meat and meat preparation	218	1,095	515	937	1,615
Margarine, shortening, vegetable fats and oils	563	550	537	120	135
Animal feeding stuff	72,835	64,900	45,904	27,358	31,247
Miscellaneous edible preparation	17,842	11,822	11,770	12,592	21,487
Marine Products	416,107	415,248	436,490	360,428	388,032
Fish (live, fresh, chilled, frozen)	14,963	17,579	24,811	21,510	38,589
Shrimps and prawns	153,353	129,036	130,365	127,718	144,825
Tuna	173,931	169,791	203,095	136,634	127,288
Crabs, lobsters and other crustaceans	18,534	23,376	21,856	20,304	25,119
Mollusks	49,310	69,657	49,781	49,563	45,679
Milkfish	528	373	519	525	663
Fish fillet (fresh/chilled/frozen)	5,488	5,436	6,063	4,174	5,869
Fresh Foods*	480,410	408,930	310,595	320,932	379,991
Live animals for food	490	560	67	136	15
Meat	20	10	-	-	12
Cereals	2,490	3,500	470	489	658
Fruits	339,700	320,640	280,233	297,468	354,153
Vegetables	-	-	23,526	21,526	23,669
Nuts and coconut products	-	-	2,789	698	483
Coffee (fresh)	1,290	1,220	1,453	461	430
Cocoa, tea and spices	140	260	2,057	154	571
Dairy products and bird eggs	80	30	-	-	-
Sugar and honey	136,200	82,710	-	-	-
Total processed foods	1,528,847	1,413,907	1,267,106	1,173,348	1,280,543
Total Exports	20,542,550	25,227,720	29,496,353	35,032,670	38,077,951

Source: National Statistics Office (processed by BETP).

Note: * Excluding marine products.

THE PRESENT SITUATION OF QUALITY CONTROL IN SMALL AND MEDIUM FOOD PROCESSING ENTERPRISES

The common Quality Control (QC) problems encountered by food processing enterprises (FPEs) are their inability to produce products that maintain their quality during marketing and distribution; inability to monitor product quality between production runs and thus, product uniformity and consistency is not assured; failure to understand sources of quality loss in production; product contamination due to poor methods of plant sanitation which eventually can cause product spoilage or loss; and improper application of food additives and other technological inputs such as packaging materials, that could have a beneficial effect on quality. The major causes for these problems are as follows (Cariso, 1996):

1. *Inadequate Technical Resources*

This is more often observed in small food industries, as few of them have personnel who understand the technology involved in the process they utilize. This results in inadequate attention given to the control of quality.

2. *Poor Control over the Quality of Raw Material Purchases*

Some firms, particularly small processors, have little control over the quality of raw material purchases including purchases of packaging materials. Small firms have limited control because they have limited operating capital and purchase much lower volumes of these materials.

3. *Insufficient Investment in Plant Sanitation and Maintenance*

Many firms with limited capital resources do not invest in plant structures and equipment that may not directly affect production, but which are important in assuring product safety and quality.

4. *Limited Technical Assistance Available Outside Metro Manila Area*

Due to limited resources, technical information is not disseminated as extensively as desired.

Level of Application and Awareness of Quality Control and HACCP

Application and awareness on QC and HACCP of small and medium FPE are at different levels. Most medium FPEs are aware of the importance of QC applications in their operations to ensure product safety and quality. On the other hand, most small FPEs are not applying QC. In a survey conducted in 1998 by Capanzana, *et al.*, about 56 percent of the FPEs test both raw materials and finished products as their QC; about 6 percent test either raw material or finished product; and about 24 percent, which is comprised mostly of small FPEs, do not test both raw materials and finished products. Some FPEs testing their products have their own laboratories while some use outside laboratories. The same survey also showed that the typical tests performed are sensory evaluation, physical evaluation, microbiological testing and chemical testing. The common reasons for not implementing QC are: the tests are not necessary; the tests are not required; they do not know that the test is important; the tests are expensive; and there are no available testing facilities in their area.

Regarding HACCP awareness, most medium FPEs, especially exporters, are aware of the HACCP concept. Medium and small FPEs, producing for the domestic market, have little knowledge of HACCP and if ever they knew of HACCP, it is not applied because of the

same reasons cited above on non-application of QC measures. However, there is an increasing number of plants and personnel becoming aware of HACCP, as indicated by the considerable number of food companies and plant staff (about 300 food companies and 700 personnel) who either have attended a HACCP training course or have been provided with technical assistance on HACCP by the Food Development Center (FDC) from 1997 to 2001. This number does not include those who have attended HACCP seminars/trainings or have been provided with technical assistance on HACCP by at least four other government agencies, four private organizations and by academia. Based on plant inspection activities by FDC since 1997, almost all seafood export processors, except for dried seafood processors, are already applying a quality assurance (QA) system based on HACCP in compliance with market regulatory requirements of the USA and EU. Presently, some processors of fruit juices, fruit chips and coconut products, both for export and domestic markets have started to apply HACCP to meet the requirements of their buyers. Under the Good Manufacturing Practice (GMP) and HACCP Accreditation Program being implemented by FDC, a total of 74 out of 106 food processing establishments are applying a HACCP-based QA program.

QUALITY ASSURANCE SYSTEMS AND CONCEPTS ADOPTED BY THE PHILIPPINE PROCESSED FOOD INDUSTRY

Hygienic Safety through Good Manufacturing Practices

FPEs in the Philippines implement the basic requirements of GMP as part of their QA system to ensure the hygienic manufacture of foods and to comply with the minimum requirements of the Bureau of Foods and Drugs (BFAD) for the issuance or renewal of their license to operate a food manufacturing plant. BFAD is the regulatory government agency under the Department of Health tasked to ensure food control in the Philippines. All FPEs are required to comply with the minimum basic GMP requirements that cover building and grounds; equipment and other facilities; sanitary facilities and control; sanitary operations; processes and control; and personnel (Lanuza, 2001).

Quality Control of Raw Materials and/or Finished Products

QC procedures applied by almost all large FPEs and most medium FPEs include testing of both raw materials and end-products. Some medium FPEs used this method as their only means of QC and some even test only the raw materials or the end products. Some small FPEs do visual inspections of their raw materials and finished product as their QC procedure.

Quality Assurance System Based on the Principles of HACCP and/or ISO

The food industries in the Philippines are gearing up to adopt the HACCP principles as a minimum system of QC. The HACCP-based QA program applied by the industry involved the seven basic principles of HACCP such as identification and analysis of hazards; determination of Critical Control Points; establishment of critical limits; monitoring systems; corrective action; verification; and documentation procedures. The scope of the HACCP program usually covers both safety and quality of the product. To ensure effective adoption of the HACCP program, the following prerequisite programs are implemented: sanitary design, potability of water, sanitation procedures, personal hygiene, hygienic processing, rework procedures, supplier accreditation, product testing, training, repairs and maintenance

of equipment, pest control, waste disposal, recall procedures, handling and disposition of non-conforming products and others.

Inspection Agencies

The Philippines has a food control system being implemented by the BFAD-Department of Health for processed foods and by the various regulatory bureaus of the Department of Agriculture for fresh food produce. These agencies are mandated to ensure safe and good quality food and regulate the production, sale and traffic of the same to protect the health of the consumer (Lanuza, 2001). The enforcement activities are focused on licensing and inspection of food establishments, product registration, monitoring of trade outlets and monitoring of product advertisements and processes.

Infrastructure Available for Quality Control

1. *Food Development Center of the National Food Authority*

The FDC is an institution that provides technical services, technologies and training for the processed food industry. It is a department of the National Food Authority under the Office of the President. The FDC facility, worth ¥2 billion, was donated by the Japanese Government and is located at the Food Terminal Inc. Complex at Taguig, Metro Manila. Its mission is to develop and provide technologies and services needed by the food export industry to meet the requirements of the market for quality and price. In the pursuit of this mission, FDC seeks to strengthen the competitiveness of the food exports, to create value-added products from agricultural and fish produce and to upgrade manpower capability in the industry for food processing, packaging and QC.

The FDC strength lies in its commercial level experience in food processing; official relationship with the U.S. Food and Drugs Administration to certify the quality of food shipments on a by-product basis; Ministry of Health and Welfare of Japan as testing laboratory for food and food additives; and with the Australian Quarantine Inspection Service to certify food shipments to Australia; being a recognized process authority for the establishment of thermal processes for low-acid canned food products and for assisting the industry in insuring the safety of the scheduled process of their canned products; world-class facilities and equipment; and an established relationship with the food industry.

FDC undertakes the following activities to achieve its mission:

- * Testing and evaluation of the quality of food products based on market and regulatory requirements, i.e., chemical, microbiological and micro-analytical tests, evaluation of packaging materials, shelf-life testing, physical measurements, establishments of thermal process schedules, evaluation and drafting of labels for export markets and sensory evaluation of food products;
- * Development of processing and packaging technologies and pilot processing of new products for market testing;
- * Development and application of QA system based on HACCP; and
- * Conducting training courses, i.e., GMPs in food processing, basic and advanced HACCP courses, food testing, food labeling, and other relevant courses.

2. *Other Government Agencies and Institution*

Other government agencies and institutions that provide support services to the processed food industry on QC are the following:

- * Industrial Technology Development Institute (ITDI) of the Department of Science and Technology
- * Institute of Food Science and Technology at the University of the Philippines, Los Baños
- * College of Home Economics at the University of the Philippines, Diliman
- * Bureau of Fisheries and Aquatic Resources of the Department of Agriculture.

ISSUES AND CONSTRAINTS IN THE ADOPTION OF QUALITY ASSURANCE SYSTEMS SUCH AS ISO 9000, ISO 14000 AND HACCP

Issues and Constraints

- 1) Low level of awareness and adoption of QA system based on HACCP and/or ISO 9000 and ISO 14000 by the small and medium FPEs
- 2) Non-sustainable or ineffective application of HACCP-based QA system
- 3) Little attention given to HACCP prerequisite programs such as GMP by most small and medium FPE
- 4) High cost involves in plant repair and maintenance to comply with HACCP prerequisite programs such as GMP
- 5) High cost of testing equipment needed in the monitoring activities in the application of HACCP
- 6) High cost of seeking ISO certification
- 7) Limited number of technical personnel with good understanding on HACCP concept and its principles to assist the small- and medium-sized FPEs in identifying appropriate QA system
- 8) Limited information dissemination of existing technical information relating to food safety.

Suggestions and Recommendations to Promote Adoption of A HACCP-based QA System by the Small and Medium FPE

1. Government initiative and support in the conduct of the following activities in order to provide technical information and assistance on QC and HACCP adoption, particularly by small and medium FPE:
 - * Dissemination of existing technical information on QC and HACCP on a wider scale to reach all food processing areas in the Philippines;
 - * Holding of HACCP seminar/training courses nationwide, designed to assist the small- and medium-sized FPE in understanding HACCP, in developing HACCP-based QA system and techniques in its effective implementation. Consideration should be given to the level of education, culture and language of the small and medium FPE managers and staff;
 - * Hands-on technical assistance during the implementation of HACCP; and
 - * Development of generic HACCP plans prioritizing products of high market value and those associated with high risk or other points of consideration.
2. Provision of funding assistance to the industry to comply with the minimum requirements for HACCP prerequisite programs such as plant design, repair and maintenance.

3. Organization of food processors to enable them to have easier access to technical and financial assistance from the government and a stronger capability to find solutions to their problems on safety and the quality of their products. This is also to strengthen the partnership between industry and government.

PHILIPPINE GOVERNMENT POLICIES AND PROGRAMS IN THE PROMOTION AND ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS TO COPE WITH INCREASING INTERNATIONAL COMPETITIVENESS

The Philippine Government believes that it is important to strengthen food export and domestic trade by developing our status as a producer of safe and quality food products, especially when the world market for food products is becoming more competitive. To do this, the government is now moving towards strengthening its food control system to ensure safety and quality based on the implementation of GMP and HACCP.

Philippine Laws Relating to the Improvement of Food Safety and Quality

- 1) The Agriculture and Fisheries Modernization Act (AFMA, R.A. 8435)

The Law passed by the Philippine Congress in 1999 showed government intent and support in the development of the food industry. The AFMA specifically provides policy reforms and measures for the strengthening of the agriculture and food industry.

- 2) The Consumer Act of the Philippines (R.A. 7394)

The Law, which is the equivalent of the Product Liability Law in other countries, was enforced since 1992 to protect consumers against hazard to health and safety as one of its objectives (Bureau of Trade Regulation and Consumer Protection [BTRCP], no date).

- 3) The Export Development Act (R.A. 7884)

The Law was enforced since 1995 to evolve export development into a national effort (Export Development Council [EDC], 1995). Under this Law, technical support policies improve the quality of export products.

Government Programs to Promote Adoption of Modern Concepts of QA Systems to Cope With Global Competitiveness

1. GMP and HACCP Accreditation Program for Food Exporters

This is a voluntary accreditation of food establishments implementing GMP and HACCP. This was started by the FDC with PHP (Philippine Peso) 2.7 million funding from the Department of Trade and Industry and Department of Science and Technology in March, 1997. The program accredits food plants when they meet requirements for hygiene and sanitation and GMP; and food products when manufactured in GMP-accredited food plants and in accordance with QA program based on HACCP. The accreditation program's primary aim is to increase food exports by providing buyers and interested parties with information on Philippine food processing plants and food products that meet international requirements for quality and safety. However, food processors manufacturing products for the domestic market also took interest in the program and seek accreditation for their plants and products. Presently, the accreditation program covers food products intended for export as well as the domestic market. Through the initiative of the food industry, three government agencies

certifying similar food products for export, formed a Joint Management Committee to harmonize and recognize each others' accreditation and certification programs through a Memorandum Circular by the Philippine President in May, 1998. The three agencies are the BFAD of the Department of Health, Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture and the FDC of the National Food Authority. The harmonized accreditation program enabled the government to respond to the mandatory HACCP requirements of our export markets, primarily in the USA and the EU. The program also aims to strengthen and harmonize the accreditation and certification schemes in government as well strengthen and upgrade the manpower capabilities of each agency for the task.

To date, a total of 37 food plants have been accredited for GMP and 22 food products for HACCP. Of the 22 food products, 19 products are mainly for export and three mainly for domestic market.

2. *Program on the Improvement of Capability in Small and Medium Food Processors to Meet Quality, Especially Sanitary Requirements of Potential and Current Buyers*

This is being implemented by the FDC since June, 1999 with a PHP3 million funding support from the Department of Agriculture. The program objectives are: to upgrade the capability of small- and medium-scale food industries in implementing sanitation procedures, process control and HACCP; to encourage use of technical data and information by the industry in meeting market requirements for product quality; to ensure relevance of industry practices to CODEX standards and the application of risk analysis to food hygiene practices; and to minimize product detentions in the export market. Among the program activities are assistance to small- and medium-sized enterprises in sanitation and process improvement and implementation of GMP and HACCP, training on related technologies, and product analysis and access to other FDC services.

The above government policies and programs show their seriousness in upgrading the food processing industry, particularly for small and medium sized industries. In return, the government expects the food industry to continue introducing process control and QA systems within the production chain, such as HACCP, as a means to achieve food safety.

SUGGESTED MEASURES TO PROMOTE ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS SUCH AS HACCP

1. An active government intervention to promote and facilitate adoption of HACCP by raising the awareness of the industry on the following was recommended by WHO, 1999:
 - * Benefits and the need for introducing HACCP to produce safe food
 - * Benefits achieved in implementing a food safety management program
 - * Risks inherent in certain food stuffs or production processes
 - * Cost resulting from production failure
 - * Value of HACCP in safeguarding the enterprise image from any associated outbreaks or product recall.
2. A strong government commitment in the development and implementation of a successful HACCP initiative through the conduct of the following activities, as recommended by WHO, 1999:
 - * Identification of the industry sectors for which HACCP implementation is more important

- * Establishment of a HACCP Implementation Committee involving all interested parties, i.e., concerned government agency, food industry, private consultants, regulators
 - * Conduct a media campaign
 - * Development of HACCP guidance materials and HACCP generic models for priority products
 - * Training of regulatory personnel on HACCP
 - * Ensure through regulatory authorities that GMP is in place
 - * Funding support to accelerate the implementation of HACCP in high risk sectors
 - * Development of schemes that recognize HACCP systems such as accreditation programs.
3. Review of food laws to shift from end-point testing to a safety management system approach. When appropriate, the government may need to consider the necessity of mandatory measures.
 4. Encouragement of the processors to practice GMPs to cope with the difficulties associated with implementing HACCP. This will serve as an initial step to follow a graduated or stepwise approach to HACCP implementation.
 5. The government should encourage regulators, industry, educational institutes and independent experts to accept their roles in assisting small- and medium-sized food processors in applying HACCP-based QA systems.
 6. Advocacy by international organizations such as the APO.
 7. Technical support from the government for the following:
 - * The availability of appropriate current scientific support
 - * Access to low-cost analytical services
 - * Establishing and maintaining food-borne disease surveillance programs and access to collected epidemiological data.
 8. Strengthening the market requirement for QC through better implementation of food regulations on food safety and quality.
 9. Continuous monitoring and assessment by the government of the effective application of HACCP by the industry.

CONCLUSION

For the processed food industry to continuously prosper and be globally competitive, it should be able to achieve high levels of efficiency in terms of product safety and quality. The control of food safety and quality is the responsibility of both the processor as well as the government. Both should take preventive and proactive roles to ensure achievement of the above such as in the application of comprehensive QA systems based on HACCP.

It is hoped that the APO will continue to take interest in this endeavor to be able to come up with relevant and necessary projects that will successfully bring about increased adoption of QA systems based on the HACCP concept in food processing firms, particularly the small- and medium-sized enterprises.

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11. PHILIPPINES (2)

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SMALL AND MEDIUM FOOD PROCESSING ENTERPRISES IN THE PHILIPPINES

Structure and Ownership

Small and medium food processing enterprises are recognized as a major contributor to economic development and employment generation. In the Philippines it is doubly more so because the food sector is the biggest of the country's 28 manufacturing sector categories, representing 25 percent of the total number of establishments and providing 20 percent of total employment (Philippine Statistics Yearbook, 1995). There are about 200,000 small and medium food processing enterprises throughout the Philippines. If we added the unlicensed and micro food enterprises that number would be even much bigger. We might also note that some of the large food manufacturing establishments are considered large only because of their affiliation with large food manufacturing conglomerates, but are actually medium when taken individually. However these categories, as well as the micro enterprises, are not included in this presentation.

Practically all of the small and medium food processing enterprises are family-owned, even those structured as corporations. While a great number of such establishments may have started as partnerships involving friends, former classmates and various groupings, they almost always end up as family-based. The partners each split up to establish a separate company, this time family-based, producing the same product lines and competing for the same buyer.

It is noteworthy that women have started quite a number of these food processing establishments. The wife runs the business at first while the husband is employed elsewhere and when the company has become stable or when the market opportunity expands, the husband joins the company and co-manages it with the wife-founder.

Employees who learn the technology and/or marketing strategies from their former employers will form some companies. Such "budding" may not always be under amicable circumstances.

The educational level of small and medium food processing entrepreneurs varies widely. While most would have had some college education, there are many that have up to secondary schooling only. I am aware of one who did not even finish elementary schooling though he was known in the community as "very good in counting".

It is also noted that a great majority of food processing entrepreneurs have had no formal training in a food processing course in college. But some of those who have successful

food processing businesses have at least one child who took a food technology course in college. This ensures continuity of the business in family hands.

An approximate “guesstimate” would put the average age of small and medium food processing enterprises somewhere between 10-30 years, taking into consideration that while there are some which are 50 years old there are also some which are less than 5 years old. Many small food processing companies are formed/registered every year but many of these do not last to celebrate a second anniversary.

Some small/medium companies have graduated to large companies, usually through sales to a food conglomerate or through joint venture arrangements, mostly with buyers. There is one company in the Philippines who bought several small and medium companies and consolidated these into one large conglomerate retaining for a while the structure of the individual original small or medium companies. Successful small and medium food processing establishments are sold to big companies for several reasons, the foremost one being when none of the children show interest in succeeding their parent in running the company or if the company encounters some financial problem.

Products and Technologies

Product lines of small and medium food processing establishments vary as much as the varieties of food preparations available. Filipino ethnic food preparations constitute a large part of the product lines of many small and medium food processing enterprises. The Philippine Food Exporters and Processors Organization (PHILFOODEX), an industry association with over 300 member companies, dominated by small and medium enterprises, classify product lines as follows:

- * Sauces and condiments
- * Fruit and vegetables with specific sub-groups for mangoes, bananas and coconut
- * Meat products
- * Fishery products
- * Beverages including coffee, chocolate, herbal teas
- * Bakery and confectionery
- * Miscellaneous/others (always a good category to include).

Many of the initial products produced by small and medium food processing enterprises were developed in the owner’s home kitchen. Technologies/procedures may have been a treasured family recipe handed down from some ancestor or learned in one of many livelihood seminars conducted by government agencies, university extension or NGOs or even from a TV program or from a book.

Government agencies offering food technology courses are as follows: Department of Science and Technology; Bureau of Plant Industry; Bureau of Animal Industry; Philippine Coconut Administration; Technical Education and Skills Development Authority; Department of Trade and Industry through the Philippine Trade Training Center; Food Development Center; Agricultural Training Institute; Technology and Livelihood Resource Center; and the extension service units of various colleges and universities as well as NGOs all offer technology training. There are also private consultants involved in technology training.

Processing technologies employed by these small and medium food processing enterprises also vary widely from all manual operations to mechanized systems, even employing computerized packaging sections.

The fuel used also varies: some use wood, particularly the banana chip processors, others charcoal, gas or crude oil for those who generate steam from boilers. Decades ago a medium-scale integrated meat processor used biogas to supplement fuel used in the operation. That company has since closed, as did the biogas operation – a sad ending to a brilliant idea.

Market of Products by Small and Medium Food Processing Enterprises

The following are the categories of markets for products of small and medium food processing enterprises:

1. Local community market: Goods are sold within the local community through various outlets. This could be a special company outlet or distributed to various general stores or vended by independent vendors. Direct selling in offices is usual.
2. Regional community market: This is just a geographical expansion of the first. Outlets may be company-owned or distributors and agents are contracted to sell their products in various places, including direct selling to office employees at their places of work.
3. Multinational companies particularly fast food chains that require preprocessed goods as raw materials for their various food preparations: These are usually special arrangements because the customer provides the enterprise with specifications and the technology needed for the preparation of the product. Several small and medium food processing enterprises who now independently export started as suppliers for large companies such as San Miguel Corporation.
4. Export markets, notably in the USA, Japan, Canada, the Middle East, EU and Hong Kong: The main customers are Filipino expatriate and overseas contract workers. Many of the product lines are Filipino ethnic food preparations, or food preparations that have become comfort food for Filipinos. Many small and medium food processing enterprises directly export their own products but some supply to exporters, who consolidate products of many small and medium food processing establishments and export these sometimes, but not always, using their own brand.

QUALITY CONTROL SITUATION AND PERFORMANCE

Product Quality Systems Study

The Product Quality Systems (PQS) study is a section of a broader study commissioned by the Department of Agriculture on Global Competitiveness Strategies for Philippine Food Products done in 1999-2000 (this writer was a member of the technical team who conducted the PQS study). This study looked at the conformance of fresh and processed Philippine food products to global standards of food safety and quality and gave recommendations for improvement. The study focused on small and medium food processing enterprises.

The results of the study indicated the low competitiveness of Philippine food products in the world market. Such low competitiveness was attributed to the following:

1. High incidence of export product detention
2. Inadequate and/or unreliable supply of raw materials
3. Inefficient processing facilities
4. High cost of packaging materials
5. Inconsistent product characteristics such as appearance, color, flavor, and texture
6. Low labor productivity.

Product detention was considered significant because it involved safety issues. The causes of product detention were:

1. presence of filth
2. inadequate or improper processing of low-acid food
3. labeling violations
4. presence of microbiological hazards, salmonella, *Escherichia coli*, staphylococcus
5. Presence of chemical hazards. Use of prohibited additives
6. Wrongly declared or non-declaration of food additive used.

Besides the documentary evidence provided by selected export markets, the team did field research to have a firsthand look at the food quality and safety situation in the focus group, the small and medium food processing establishments. Some of the significant field findings were:

1. generally, there was a low level of conformance to Good Manufacturing Practices (GMPs) as prescribed by US Food and Drug Administration (FDA) regulations which is also adapted by the Philippine Bureau of Food and Drug. Specific violations in this regard were mostly on:
 - * building facilities such as screens drains floors, ceilings, sanitary facilities such as toilets, hand washing and employee lockers and lounges
 - * sanitary design standards of food processing equipment such as retorts exhaust box, blanchers, pasteurizers, cutters, and grinders. Use of non-stainless steel materials for food contact surfaces
 - * personnel hygiene practices such as dirty and improper attire, use of jewelry, use of bare hands in handling food, improper use of hair restraints, etc.
2. unsanitary facilities and practices in many slaughterhouses; also inhumane slaughter procedures
3. inadequate meat inspectors and inspection procedures
4. use of banned additives/preservatives in some products particularly meat and fish
5. use of rattan baskets as fish containers
6. inadequate icing/refrigeration of fish and meat
7. unsanitary handling of coconut and non-pasteurization of *buko* juice
8. high histamine level of traditionally-dried fish products
9. inefficient production system, such as use of inappropriate tools and uncomfortable working facilities
10. inappropriate and inadequate thermal process for many ethnic products
11. absence of thermometers in many food processing establishments
12. inappropriate packaging materials.

The documentary evidence as well as the field observations indicated the low conformance of many small and medium food processing establishments to international standards of quality and safety. It is also an indication of the level of awareness of management and food processing personnel to such food safety and quality standards.

A second look at the rejection/detention data bears out the fact that the rejection percentage represents only 0.5 percent of total food export in 1995 and also showed a decrease in the actual number of detained products from a previous period. However, what

is disturbing is that all of the small and medium food processing enterprises interviewed have experienced product detention, such that it had become common practice to input an allowance for detention in their product costing. This of course makes their product less competitive in the market accounting for at least 15 percent increase in cost.

Awareness Level and Implementation of Modern Quality Concepts

Various quality concepts have been introduced in the Philippines since the 1980s, at first to large corporations. Many foreign-funded programs on quality awareness were introduced to the small and medium companies. The most notable programs were the 5S, TQM (Total Quality Management), ISO 9000, ISO 1400, GHK (Good Housekeeping), Green Productivity and its various equivalents and GMP-HACCP.

The 5S had many initial successes. But while there are companies who sustained the program, there are more backsliders. There is no quantified data on the number of 5S practitioners among small and medium food processing enterprises: in my very limited world, I know less than five companies who are actively sustaining a 5S program. TQM has also been introduced but practice has been limited.

GHK is focused on environment, waste minimization and energy saving. There were seven small and medium food processing enterprises involved in the pilot project and there are plans to expand. Green Productivity which incorporates environmental concerns to productivity measures. Similar programs have been introduced through public seminars and consultations with small and medium food processing enterprises. Today environment is the key word in most foreign-assisted projects for small and medium enterprises.

The Bureau of Product Standards of the Department of Trade and Industry has promoted ISO 9000 through a series of public seminars all over the country. I am not aware of a small or medium food processing establishment who has an ISO 9000 certificate, though there are several large food processing companies who have. ISO 1400 is relatively new in the Philippines, and to my knowledge, no small and medium food processing enterprise has been so certified. The biggest deterrent to ISO certification is the cost of certification. In the words of an entrepreneur “the certification cost is equivalent to my working capital”. The Bureau of Product Standards has emphasized that the absence of certification should not be a barrier to the implementation of the ISO 9000 system.

HACCP was introduced to small and medium food processing enterprises in the early 1980s through symposia and meetings of the professional organization, the Philippine Association of Food Technologists (PAFT), but it was largely ignored until 1997-98 with the mandatory HACCP requirement of the EU and the USA for seafood products. All seafood processors, many of which are small and medium enterprises, who export or who supply to exporters, are fully aware of HACCP and have either a HACCP system in place or are at least working on compliance with HACCP.

Multinationals like Nestlé and McDonald’s as well as other international fast food service restaurants chains, international hotel chains, airline-catering companies require HACCP from their local suppliers. Many suppliers are small and medium food processing enterprises. This sector is HACCP-aware. We gauge this by the number of attendees to the public seminar-workshops on HACCP who indicate that their reason for attending is because their customers have sent notice that they will be audited for HACCP compliance and are therefore in a hurry to implement HACCP.

In direct contrast to the above two groups, the exporters and the suppliers to international food chains, the small and medium food processing enterprises selling in local

community markets are not aware of HACCP, although they are aware of basic food hygiene practices that they do not necessarily practice. This is evident even in the way food is handled in the market.

ISSUES AND CONSTRAINTS FOR ADOPTION OF QUALITY SYSTEMS WITH EMPHASIS ON HACCP

1. Management commitment, the first prerequisite in establishing any system is not always present. The main reason for this is the financial requirement for implementation. Small and medium companies usually operate on very limited margins and any strain on that is always difficult. The economic benefit of HACCP is not felt unless there is pressure from the customers.
2. Lack of trained instructors/consultants particularly in the provinces to assist companies in implementing HACCP. Because many small and medium food processing enterprises do not have in-house technical experts to assist in HACCP implementation, they need external expert assistance that is not always present in many provinces.
3. Lack of a simplified tool for HACCP implementation that can be used by small food processing enterprises, like an easy-to-follow manual for workers.
4. The high cost of certification – This is particularly true with ISO certification. In the case of HACCP, there is a local certifying body composed of three agencies: Food Development Center, Bureau of Food and Drugs and the Bureau of Fisheries and Aquatic Resources. Although the fees are a lot lower than that charged by ISO-certifying bodies, many small companies in the provinces still cannot afford to pay for the travel and hotel expenses of the people who will do the audit.
5. In the case of HACCP compliance, the GMP infrastructure prerequisite, e.g., screening, putting up drains and hand-washing facilities, and changing work tables and equipment to comply with sanitary design constitute a major constraint.
6. Compliance with the documentation requirement of all quality systems has been a major setback. Most companies find it difficult to maintain quality systems records.

GOVERNMENT INITIATIVE FOR THE PROMOTION AND ADOPTION OF HACCP

The government initiatives are regulatory, training, industry assistance, certification program and upgrading laboratory facilities to support HACCP.

Regulatory

The Department of Agriculture is putting in place the Agriculture and Fisheries Modernization Act that specifically requires the adoption of HACCP for all agricultural and fishery produce. The Fisheries Administrative Order, signed in 2001, specifies basic requirements of GMP and SSOP (Sanitation Standard Operating Procedures) intended for processors of products for export. For shellfish processors HACCP is mandatory. The same administrative order also gives guidelines for implementing HACCP.

The National Meat Inspection Commission has set out plans to implement HACCP regulations for slaughterhouses, primary processors and retail outlets. It is currently formulating strategies to assist small and medium meat processing establishments in HACCP implementation. In progress at this time is a training program for slaughterhouse personnel

in HACCP fundamentals and the training of inspectors in HACCP-based inspection system.

Training and Industry Assistance

Training in the quality systems, particularly that of HACCP, is being conducted by various agencies of government: notably, various bureaus of the Department of Agriculture; Department of Science and Technology; Department of Trade and Industry, notably through the Philippine Trade Training Center; and state universities and colleges through extension services to the food industry also do training. The Food Development Center, a division of the National Food Authority, is also very much into training and industry assistance.

GMP-HACCP Certification Program

In order to address the detention issues of Philippine food exports the Bureau of Export Trade Promotion initiated the HACCP certification program. The agencies involved in the certification are the Food Development Center, the Bureau of Food and Drugs and the Bureau of Fisheries and Aquatic Resources.

Upgrading Laboratory Facilities for Testing

This has been an ongoing project of the Department of Science and Technology in the last five years. The regional and provincial laboratories are being upgraded to accommodate the testing needs for HACCP implementation.

The Food Development Center Food Analysis Laboratory services HACCP requirements of small and medium, as well as large, food processors.

In addition to upgrading government laboratories, private laboratories are accredited to do analysis requirements of regulating agencies, such as the Bureau of Food and Drugs.

Government Liaison with Industry Associations

Industry associations such as the PHILFOODEX have been working with the government in assisting its members in the implementation of various programs, notably GMP-HACCP and the other quality systems. The PAFT through its members is also working with government in HACCP training and implementation. The Foundation for the Advancement of Food Science and Technology (FAFST) has initiated a Food Safety Network for micro, small and medium food processing establishments and is working closely with the Bureau of Agricultural and Fisheries Product Standards and some regional offices of the Department of Science and Technology and the Department of Trade and Industry. It also publishes the *Food Safety Bulletin*, which is HACCP-focused.

Many initiatives have been put in place for HACCP implementation by food establishments, particularly by the small and medium food processing enterprises, but all these efforts have barely scratched the surface, and there is still much to be done.

RECOMMENDED STRATEGIES FOR ADOPTION OF HACCP BY SMALL AND MEDIUM FOOD PROCESSING ENTERPRISES

1. Encourage all industry associations to broaden and deepen their commitment to assisting its members in HACCP implementation by aiming for 100 percent compliance by its members. (PHILFOODEX technical committee has placed this objective in its five-year plan).

2. Implement HACCP-based inspection system to place more responsibility for self-inspection. This would entail thorough training of both company-in-house auditors as well as government inspectors.
3. Start a risk assessment program.
4. Formally involve academic institutions in specific programs needed for HACCP implementation. Today, the practice is for the academic institution to pick out random areas, as it likes to do. More direction in terms of specific outputs for HACCP implementation by small and medium food processing enterprises will maximize the benefits from this resource. Even student research for course completion under the guidance of faculty members can be geared towards actual industry needs. On-the-job training requirements of food technology students can involve assistance in specific food industry problems.
5. Work out incentives for GMP improvements such as providing low interest loans or interest holidays for investments needed for GMP compliance.
6. Recognize full HACCP implementation with awards such as presidential recognition and perhaps some kind of tax holidays.
7. Encourage establishments of more analytical laboratories by low interest loans/tax-free importation of equipment while developing internal capability for analytical equipment manufacturing.
8. Develop capability of local food fabricators to design sanitary food equipment.
9. Develop a comprehensive safety education program to make consumers aware of the need for safe products. The USDA's Fight Back Campaign can be a model but it should be geared to local situations.
10. A long-term development of food quality and safety culture should start by incorporating it into school the curriculum, starting from grade school.

12. SRI LANKA (1)

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IMPORTANCE OF HAZARD ANALYSIS AND CRITICAL CONTROL POINTS

Under prevailing liberalized trade policies existing in Sri Lanka there is an urgent need to improve the quality of processed products, especially those of small- and medium-scale (S&M) industries, so that such products could be introduced to the global market at competitive prices. In this context, introduction of modern quality assurance concepts, such as HACCP, to S&M food processing enterprises in Sri Lanka assumes importance. Generally, most of the people who are engaging in S&M agro-food processing industries in the country do not have proper knowledge about quality assurance and food safety. HACCP will provide the knowledge for formulating and introducing comprehensive quality assurance systems, including the HACCP concept, in order to further develop the food industry in Sri Lanka.

PRESENT SITUATION OF QUALITY CONTROL IN S&M FOOD PROCESSING ENTERPRISES

The small agro-food processing industries have a general idea about quality measures, but not in detail. Our organization is detailing the quality aspects for the people who are engaged with grains, pulses, vegetables and fruit. As far as the food industries are concerned, they can be divided into seven areas, namely; tea, coconuts, fruits and vegetables, cereals, milk, spices, and fish and meat.

Tea Industry

All agro-based industries have S&M units. These industries started during the colonial era with a traditional method, but have since been converted to new technologies, except for the tea industry. The tea industry is the main foreign exchange source for Sri Lanka. From the beginning the tea industry had a strong quality assurance system because it produces mainly for the export market (in addition to the local market).

Apart from the medium- and large-scale tea operations, small-scale tea holders are very common. There is a Small Holders Tea Association which was established in Sri Lanka to develop the smallholder tea industry. The Tea Research Institute in Sri Lanka also originated to develop the tea industry in Sri Lanka. Generally whether small or medium, the tea industry has always had some sort of quality assurance, but medium-scale companies have traditionally had an increased level of controls. As a result, companies in this field have implemented the HACCP system and five others also received ISO 9002 certification.

Coconut Industry

The coconut industry was also a major foreign exchange source from colonial times. It produces crude coconut oil, desiccated coconut and coconut cream milk, mainly for the export markets. Processing of these products is carried out in modern, well maintained factories which have their own quality assurance laboratories. The reason for this development is that export buyers demand an assurance of quality in order to avoid hazards. In Sri Lanka the main problem in the coconut and cereal industries is aflatoxin (0.5 ppb). There are three ISO 9002-certified factories and one factory with an HACCP system implemented at this moment.

Fruit Processing Industry

HACCP and Sri Lanka Standard (SLS) certification is very important, but adoption of these systems is very limited, especially in small-scale industries, which are situated mostly in urban areas. Small-scale processing is being done manually and relies mainly on experience. Most of these factories do not have staff with any technical background or technically qualified staff. They have a limited amount of unskilled labor to minimize the cost of production. They cater to the limited domestic market within the area.

Sri Lanka Standard Compulsory Product – Ready-to-Serve

SLS is compulsory for the industries which produce Ready-to-Serve (RTS) fruit drinks such as fruit cordials. The industries involved in such production must have obtained the SLS mark and must employ at least one technically-qualified person. Some of these small producers know the ISO 9000 standard and HACCP system, but they hesitate to implement them because they are financially unstable and the same time, they do not get any extra financial benefit out of it.

Medium-scale Fruit Industry

Medium-scale fruit industries have a good eye on quality standards and assurance. The main reason is these companies are catering to the export market as well as the local market. At present, to compete in the global market their products should be produced according to international standards. As a result, they must adopt the quality assurance concept. In Sri Lanka most of them have SLS certification. Some of the factories have been certified by international certifying bodies like Skal Netherlands, National Association for Sustainable Agriculture (NASA) Australia, Institute for Marketecology Organization (IMO) Switzerland, DNV (Det Norske Veritas) and other foreign companies. These certification bodies concentrate on Good Manufacturing Practices (GMPs) and process control documentation systems. These medium-scale fruit factories produce fruit- and vegetable-based products, jams, cordials, chutneys sauces, pickles, *sambols*, canned fruit juices/pieces, individually quick frozen (IQF) fruit pieces, which are considered the most effective fruit preserving method today.

In Sri Lanka, one of the most organized fruit processing factories is Kelani Valley Canneries (KVC). They produce a variety of fruit products certified by SLS organic certification from NASA and IMO, ensuring that the highest standard of quality is maintained. At present the KVC is also planning to implement the HACCP system in the near future, which will be helpful for competition in the international market and will increase their business and demand.

The overall view in Sri Lanka is that medium-scale organizations are keen on getting the ISO 9002 standard and implementing the HACCP system in their processing lines to enable them to enter into the international market.

One concept of the Institute of Post Harvest Technology in Sri Lanka (which I belong to) is to train the agro-food processing enterprises, both small and medium scale, to produce high quality food products by introducing modern technical approaches, knowledge, GMPs and finally SLS certification and HACCP system. We have opened new laboratories, with sophisticated instruments, which are very useful in the rural food industry of Sri Lanka.

One of the concepts of the Government of Sri Lanka is to improve the postharvest food industry at the rural level because raw materials which can be processed are found all over the island, but they are seasonal. In order to take advantage of the off-season, some sort of modern preservation methods should be adopted. For example, during the mango season much fruit is wasted because of the lack of proper preservation methods at the rural level.

Cereal Industry

Our organization is the main organization that handles the cereal industry. Earlier, our institute was named the Rice Processing, Research and Development Centre, and was part of the Paddy Marketing Board, under the Ministry of Agriculture in Sri Lanka. Most of the traditional methods adopted for processing of cereals were not compatible with modern technology. Because of these traditional systems, considerable losses in quality and quantity occurred in postharvest operations.

In Sri Lanka, the staple food is rice, therefore our organization had to contribute more scientific and engineering background for quality improvement and assurance. Rice is consumed according to consumer preference in both the raw and parboiled varieties. The S&M rice producers/millers in Sri Lanka produce rice for national and local markets. Both S&M millers use old, semi-modern and modern mills for rice processing. Rice mills can be divided into three categories: traditional steel hullers; semi-modern rice mills; and modern rice mills.

As far as the quality standards are concerned, traditional steel hullers are not acceptable, but the semi-and modern rice mills are. Our institute carried out research, training programs, consultancies and advisory services to improve both S&M millers to produce high quality rice according to SLS in Sri Lanka, through modern technology to international standards. The Government of Sri Lanka and Japan International Cooperation Agency (JICA) provides bank loans to improve the rice mills which permits the production of high quality rice to meet international levels through the collaboration with our organization. We hope to improve the rice industry to achieve international quality standards and get SLS and implement the HACCP system.

Milk Industry

Generally, all over the island, milk is produced both at the farm and domestic levels. According to the milk industry there are also S&M levels. The people who collect milk (collectors) have to sell their milk to S&M level producers, but there are few S&M manufactures that produce curd, yoghurt and ice cream using traditional methods. Those producers do not have veterinary surgeons or technically-qualified personal to maintain quality assurance, but have only practical knowledge about the industry. The other reason they are unable to control the quality is because they collect the milk from various milk producers.

Large-scale animal farms produce most of the good quality milk products because they have qualified technical staff to handle the process. They have the GMPs and there are some milk-based RTS drink producers have SLS certification. However, most of the S&M producers do not have SLS certification.

Spice Industry

The government provides a subsidiary loan system to improve the cultivation of spices, such as cloves, cardamoms, nutmeg, cinnamon and pepper. The S&M industry people collect raw material from farmers or dealers and produce essential oils, spice powders, and other products. Some of them have SLS standards, but none have obtained ISO 9002 certification nor have implemented HACCP systems at the moment.

Apart from these, there are a few organizations engaged in processing organic spices for export markets and those factories have been certified by international bodies. These factories are well designed to meet the quality standards and documentation systems are maintained.

Fish and Meat Industry

In Sri Lanka, the fish and meat industry, regardless of scale, have to export their products. The European market is one of the main buyers of Sri Lanka's fish and meat products. The exporters insist on HACCP, so each and every factory implements the HACCP system in their factories. The SLS inspect those factories regularly to check whether they are maintaining the high quality standards relevant to HACCP. Those who are engaged in the export market must adopt HACCP systems.

Apart from that, there are a few small-scale companies who cater their products to the local market and also have quality standards and factories at an acceptable level. Some of these small-scale companies have the SLS standards. In the fish and meat industry, three factories have implemented the HACCP system and two have ISO 9002 standard certification.

PERCEPTION AND AWARENESS OF MODERN QUALITY CONCEPTS, SPECIFICALLY HACCP, IN S&M FOOD PROCESSING INDUSTRIES

Generally, perception and awareness levels of modern quality concepts with special reference to HACCP in S&M food processing industries is poor in Sri Lanka. The exceptions are the fish and meat industries where foreign buyers request and insist upon HACCP. As a result, the fish and meat industries employ educated technical people, who implement the essential GMPs.

The reasons for poor perception and awareness are:

- * people with limited education are employed on their process lines and, as a consequence, they do not sufficiently understand technical matters.
- * limited finances constrain their ability to invest in professional people and the technical improvements required.

QUALITY ASSURANCE SYSTEMS AND CONCEPTS ADOPTED BY THE FOOD PROCESSING INDUSTRY

In Sri Lanka, the food processing industry adopted the quality assurance systems and concepts to a limited extent as outlined above. It can be briefly highlighted as follows:

SLS Standards

The SLS Institute (SLSI) issues the certification mark (SLS mark) to manufacturers to use on their products to educate the buyer to that particular standard of food product (the SLS standard). In this way, the buyer has a guarantee and assurance of quality that the food item has been tested and certified by the institution according to the established standard.

The product certification scheme has been reorganized incorporating the new requirement, which conforms to the twelve elements prescribed in the ISO 9001 quality system standard.

The twelve elements are:

1. management responsibility (ISO 9001 – 4.1)
2. quality system (ISO 9001 – 4.2)
3. purchasing (ISO 9001 – 4.6)
4. process control (ISO 9001 – 4.9)
5. inspection and testing (ISO 9001 – 4.10)
6. control of inspection, measuring and test equipment (ISO 9001 – 4.11)
7. inspection and test status (ISO 9001 – 4.12)
8. control of non-conforming product (ISO 9001 – 4.13)
9. handling, storage, packaging, delivery (ISO 9001 – 4.15)
10. control of quality records (ISO 9001 – 4.16)
11. internal quality audits (ISO 9001 – 4.17)
12. training (ISO 9001 – 4.18)

After receipt of an application, the inspector will visit the factory to examine the testing facilities available and independent tests are carried out to determine whether the products conform to the relevant Sri Lankan standard. SLS is compulsory in the RTS fruit drink industry regardless of industry scale.

Before the license is issued, the applicant has to agree with the SLSI conditions. However, the ultimate objective of this exercise is to improve the overall quality of the products.

HACCP System

There are six organizations already implementing the HACCP system. They are: poultry meat processing (2); meat value-added processing (1); tea processing and bagging (2); and coconut milk canning (1).

ISO 9000-certified Companies

There are 20 companies in the food sector that have taken up the SLS and ISO 9000 standard. They include: tea and allied industries (5); meat and fish industries (4); coconut and allied industries (3); biscuits confectionaries (2); ice cream (1); salt (1); jelly crystals (1); gherkin based pickles (1); chocolate (1); and soft drinks (1).

Organic Certification Systems

There are a few international standard certification bodies in Sri Lanka specifically devoted to organic standards. They are: NASA (Australia); Skal (the Netherlands); and IMO (Switzerland).

These organizations have their own codes of practice. They are very supportive of GMPs and quality standards applied in the factories.

There are about 20 organizations in Sri Lanka certified by the above-cited international organic certification bodies.

SQF 2000 Certificate

This is the combination of ISO 9000 standard and the HACCP system. It covers the entire HACCP system and 75 percent of the ISO 9000 standard. SQF (Safe Quality Food) 2000 is an Australian-originated standard and it is recognized in Europe.

MEASURES TO PROMOTE ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS

- (A) Conduct educational and training programs about the importance of quality standards, benefits, and systems of HACCP and GMPs in both S&M food processing industries.
- (B) Introduce a financial facilitation scheme for implementing SLSI standards and HACCP systems. If the loan scheme is low interest and on an installment basis, the company will be attracted to it.
- (C) Create more awareness about the standards and HACCP systems with both producers (companies) and consumers.
- (D) Promote ISO 9000 and HACCP compliant industries by giving them more exposure and facilities in the international and local markets.
- (E) Increased exposure to export markets provides new concepts and higher incomes through quality standards and HACCP implementation. As more organizations explore the export market with quality competition, producers will have to follow higher standards and HACCP systems in order to meet international requirements.
- (F) Competition among the companies and presenting the reward system will motivate producers to implement higher quality standards and the HACCP systems.
- (G) Legislating quality standards and HACCP schemes for all S&M food processing industries.

13. SRI LANKA (2)

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INTRODUCTION

Although the country has a limited industrial base, the manufacturing industry has grown significantly over the last few years and in 2000, almost one-fourth of Sri Lanka's domestic output was derived from manufacturing (mainly the processing of tea, rubber, coconut and the manufacturing industry). The services sector where tourism and financial services play a major role contributed 50 percent of GDP. Agriculture, which was the mainstay of the economy at independence in 1948 and accounted for 40 percent of the GDP has decreased in importance over the years and in 2000 accounted for only 18 percent of GDP. A wide range of crops changing from tropical to semi-temperate is grown on about one-third of the 6.5 million ha in Sri Lanka.

The country's agriculture consists of two sub-sectors: a) food crops mainly produced for domestic consumption, such as staple rice, maize, chilies, pulses and vegetables; and b) fruit and export crops, such as tea, rubber, coconut, cocoa, cinnamon, cardamom, cloves and pepper.

The position of the Sri Lanka food processing industry can be explained in the following table:

Sector	No. of Establishments (Five or More Persons Employed)	No. of Employees
All manufacturing	17,238	603,122
Food manufacturing	2,864	85,675
Food manufacturing as a percent of all manufacturing	16.61	14.21

By studying the table, it can be seen that a considerable number of employees (14.21 percent) are engaged in food processing industry.

ISSUES AND CONSTRAINTS IN THE ADOPTION OF THE QUALITY ASSURANCE SYSTEMS IN FOOD INDUSTRY

- 1) Most of the small- and medium-scale factories operating in Sri Lanka are working with very little profit margin and little access to additional financial resources to implement quality standards and systems.

- 2) The designs of some factories constructed in past, are not conducive to the application of modern quality systems. Therefore, those companies have to spend a considerable amount of money to modify their factories.
- 3) The awareness levels of modern quality systems and benefits to the consumer through the production of quality-certified products are very limited in the rural areas. Therefore, these consumers are reluctant to spend more to buy a high quality product.
- 4) The financial support available to modify the factories and procedures and to implement quality standards and systems is insufficient.
- 5) The Sri Lanka's fruit processing industry has not explored the full potential of the export market, which would seriously contribute to the quality standards of the industry.

GOVERNMENT POLICIES AND PROGRAMS FOR THE PROMOTION AND ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS

- 1) In the fish industry, the Ministry of Fisheries has implemented a code of practice to start and run a fish processing factory. According to these regulations all factories which process fish products should implement a HACCP system in their plants. The national body for standardization, the Sri Lanka Standards Institute (SLSI), inspects the factories and issue certificates which enable them to export their products.
- 2) The National Development Bank (NDB) in Sri Lanka in technical collaboration with the SLSI offers technical and financial assistance to small and medium entrepreneurs to obtain ISO 9000 certification. This scheme can be described as follows:
 - a. Funding is available through NDB to meet the cost of obtaining ISO 9000 certification from SLSI including consultancy costs incurred in developing quality management systems.
 - b. SLSI assesses and evaluates the company's quality system, and the effectiveness of its implementation and grants certification if necessary.
 - c. SLSI conducts post-certification surveillance visits to ensure that the system is maintained.
 - d. The cost of obtaining an ISO certificate will be funded to a maximum of SLRp. (Sri Lanka rupee) 650,000, one-fourth in the form of a grant and the balance by way of a loan at a concessionary interest rate of 3 percent per annum.

National Quality Award

SLSI annually presents the prestigious national quality award for those who produce high quality goods and services. Organizations are assessed by SLS using an evaluation system along the lines of the globally recognized Malcolm Baldrige National Quality Award of the USA. During the process, applicants for the award will be categorized in to three sectors.

1. Large scale – over 250 employees.
2. Medium scale – between 50 and 250 employees.
3. Small scale – less than 50 employees.

The following areas are evaluated:

1. Leadership
2. Strategic planning
3. Customer and analysis
4. Information and analysis
5. Human resource development and management
6. Process management
7. Business results.

Under the process management section, the quality system of the company will be assessed. If it is a food manufacturing plant, implementation of a HACCP system would be a distinct advantage.

SLSI has trained 200 ISO 9000 consultants whose service could be obtained at a concessionary rate for local manufacturers.

SLSI provides the training in standardization and quality management through seminars, workshops and training programs for all grades of industrial personnel, with a view to creating an awareness and to provide the knowledge base for producing quality products and obtaining ISO 9000 implementing HACCP systems.

In coconut sector the financial assistance to put up quality assurance laboratories in processing plants, is given by the Sri Lanka Coconut Development Board.

MEASURES TO PROMOTE ADOPTION OF COMPREHENSIVE QUALITY ASSURANCE SYSTEMS IN THE COUNTRY

- 1) Introduce a financial facilitating scheme for implementing ISO 9000 standards and HACCP systems. At least 50 percent of the total project cost (consultation cost, certification cost, plant and building upgrading cost, documentation cost, etc.) should be borne by the scheme. The balance of 50 percent may be paid by the manufacturer in an interest-free installment scheme basis.
- 2) Promote ISO 9000/HACCP-owned industries by giving them more exposure in the international market. This could be done by offering them the opportunity to participate in foreign trade fairs and the provision of publicity through government publications published in foreign countries, etc.
- 3) Give more recognition to the ISO 9000/HACCP-owned factories in the local market by creating more awareness about these standards and systems among the local consumers.
- 4) Start education programs for small-scale industries who operate in rural areas on quality standards and systems, their benefits and the financial assistance given to obtain quality standards and systems.
- 5) Expansion of the export market.

If more organizations explore the export market, the quality standard of the industry will increase according to international requirements.

CONCLUSIONS

It could be identified that most of the medium-scale food processing industries in Sri Lanka are familiar with comprehensive quality assurance systems.

Continuous awareness programs of new concepts would help the small-scale industries to familiarize themselves with such systems as well as improve the awareness among consumers as well.

Implementation of quality policies leading to comprehensive quality assurance systems, while giving the industry sufficient financial assistance to improve all the necessary requirements would help to enhance the quality in small- and medium-scale food processing factories in Sri Lanka.

14. THAILAND (1)

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QUALITY ENHANCEMENT THROUGH HACCP IN THAILAND

Present Situation of Quality Control in Small and Medium Food Processing Industries in Thailand

After the economic crisis of 1997 in Thailand, the Thai Government tried to recover by all possible means. One strategy was to gain greater access to world markets. However, even though non-tariff barriers were lowered in international markets, exporters had to meet strict food safety standards. As a result, exporting foodstuffs became more difficult. Different countries in the world markets have different safety requirements. To meet all of their requirements, there is generally an international standard issued by the Codex Alimentarius Commission to be used as a guideline in formulation of food regulations. Any exporter whose product safety standards comply with this standard, would likely gain acceptance by the importing country. As a result, the Thai Government assigned some government services/organizations to assist them in extending and improving the quality (through GMPs and HACCP systems) of all important foods and to adopt similar standards to facilitate and protect their trade.

So far, there are about 12,000 food processing enterprises in Thailand and only 265 factories have adopted HACCP-based food safety standards. Most of them are fish and fishery products, since our export markets require us to have health certificates backed by HACCP quality assurance (QA) systems. In the near future, HACCP systems for fruit juice are going to be put in place for our export markets as well. The Thai Government is now urgently trying to move forwards in ensuring the proper controls in all similar food and beverage products.

However, HACCP and GMPs are not our only concern in food exports, but ISO 9000 standards are now well recognized as measures to prevent technical barrier of trade and are accepted in several sectors. It provides a good image for that firm or organization. Those ISO 9000-certified businesses are proud to put such an achievement symbol on their product label and at the front gate of their building. For HACCP, on the other hand, the consumer awareness level is still low. Therefore, to achieve success in extending this concept and standard to the local market, Thai people should be informed on what this standard is and how it is going to affect their lives.

QUALITY ASSURANCE SYSTEMS AND CONCEPT ADOPTED BY FOOD PROCESSING INDUSTRIES

Good Manufacturing Practice

GMP is a prerequisite program to the HACCP system because HACCP must be built on a solid foundation of proper procedures. These are often established through the

application of the codes of practices of food hygiene. They usually provide the basic environmental and operating conditions that are necessary for the production of safe and wholesome foods including facilities and location, cleaning and sanitation programs, training, traceability and recall, pest control and management commitments. All these prerequisite programs must be documented and audited on regular basis.

Hazard Analysis of Critical Control Points

HACCP is a systematic approach to the identification, evaluation and control of those steps in food manufacturing that are critical to product safety. It is a tool that enables management to control and assure the safety of products. The basic aim of the HACCP concept is to assure the production involving controlled raw materials, the process, the environment, personnel, storage and distribution that provide safe food products by means of prevention instead of by quality inspection. Generally, HACCP methodology is considered as a standard production method for food manufacturers to implement and maintain a production control system. However, application of HACCP is not only limited to companies that prepare, process, handle, package and transport and/or trade foods. Besides the food industries, hotel and catering industries must be included. Producers of fresh vegetable products are not yet compelled to implement a safety system according to the HACCP principles, but they have to follow Good Agricultural Practices (GAP).

International Organization for Standardization

ISO is a worldwide federation of international standard bodies. The major objective of ISO is the promotion of standardization and related activities throughout the world to prevent technical barriers to trade. ISO standards are voluntary, unless a business sector makes them a market requirement, or unless a government issues regulations making their use obligatory. The main part of the adopted standards is concerned with health, safety or environmental aspects.

The most used and probably best known of all ISO standards is the ISO 9000 series for quality. It provided a framework for quality management and quality assurance. These standards were generic and independent of any specific industry or economic sector. The 9000 series consists of two major groups, i.e., standards for internal and for external quality assurance.

Internal quality assurance is focused on improving efficiency as well as the quality of products or services within the organization. For this purpose, the standards of the ISO 9004 type were recommended. These standards provide guidelines for the development and implementation of quality management. It includes typical elements of quality systems but also pays attention to the economic aspects (i.e., benefits, costs and risks) of quality assurance.

External quality assurance is focused on assuring customers that the products or services meet the required specifications. For this purpose the three 'certification' standards; ISO 9001, ISO 9002 and ISO 9003 could be applied. In these standards, specific quality system requirements are described, which cover topics ranging from management responsibility, purchasing and contract review to inspection, process control and corrective action. A total of 20 topics were described. The systematic approach enabled companies to operate in a consistently, measurable and efficient manner. The main differences between the three standards concerned the scope of the standards are as follows:

- ISO 9001 was the standard for quality assurance for companies involved in design, development, production, installation and servicing;

- ISO 9002 was the standard for quality assurance in production, installation and servicing; and
- ISO 9003 was the standard for quality assurance in final inspection and tests.

Constraints in the Adoption of Quality Assurance Systems in Thailand

Key factors effecting on the adoption of QA system are:

1. Cost

There are additional costs to have QA systems implemented in the factory, i.e., training of employees, hiring qualified persons, documenting all data, fees for quality assurance certificates, costs to improve the process, etc. For small and medium enterprises (SMEs), it is quite a significant portion of the revolving funds available. Therefore, if not for exporting and the regulatory controls, it is unlikely that SMEs would invest in such systems.

2. Understanding

Implementing QA system requires the full cooperation of the employees and management in all functions. Therefore, all of them need to have a clear understanding of the purpose and procedures in successfully applying the system. Then, they can perform their own duties following the established plan in accordance with the regulations. However, the turnover rate of manpower in the SMEs is quite high. The trained employees may quit and change their jobs every 6-12 months. Thus, it causes uncertainty and reluctance on the part of the business owner to continue investing money for employee training. This results in the situation where employees who are still working in the factory may not understand much about the efforts to do additional tasks associated with the QA system.

3. Readiness

Having this system implemented needs a lot of paper work to be used as documentation during system verification, monitoring or auditing. Moreover, all persons may have additional work to ensure compliance with the QA system. Management may therefore decide that their factory is not ready to start up such a system. Consequently, they put this quality assurance projects on hold or pending.

4. Advantages

Up until now, if it were not for the export business, most of the management of SMEs would claim that they do not find any advantages of having QA systems implemented in their factories. In local markets, the consumers are not aware of risks caused by consuming products that do not have this kind of certification. It is only small segment of consumers who pay attention to the product labels and are willing to pay the extra cost for the certificate symbol. Therefore, without forcing them all to upgrade their standards by issuing a regulation and subsidizing them for a certain period of time, it is hard to convince them to voluntarily implement QA systems in Thailand.

GOVERNMENT POLICIES AND PROGRAMS ON PROMOTION AND ADOPTION OF HACCP

To cope with the increasing international competitiveness due to trade liberalization and economic recovery, the Thai Government assigned six government services and one private sector firm in assisting and supporting food processing enterprises to be able to adopt the HACCP system. The Food and Drug Administration (FDA) of Thailand, as one of the responsible parties, recently changed their role to be more energetic and protective of

consumer concerns. They also developed an organizational network for cooperation on all consumer-protective activities as well as the promotion of export markets in order to boost the countries economy.

The strategy of being more protective to the consumer means that consumers will get products of higher quality that are safe, effective and economical. This is particularly true for food products or healthcare products, where FDA will emphasize implementing safety and quality standards for products launched onto the markets. Pharmaceuticals and medical implements will have close supervision during production procedures.

The action which FDA have carried out directly with the consumer is based on increasing consumer awareness by promoting and supporting all the activities involving information transfer. Consequently, FDA have urged consumers to be more active in exercising their rights. In addition, FDA also created a consumer network to be used in a consumer protection program that is now led by other government organizations and the private sector.

One important assigned task to FDA is boosting up the export markets. Thus FDA must be able to support and provide assistance to those involved in the export business. This mission is a key factor that can help to resolve the economic problems of the country.

As the QA system is of great importance, so FDA has decided to use HACCP as an analytical tool that enables management to introduce and maintain a cost-effective food safety program, since this system provides protective measures for all steps in the food chain. Moreover, it has been well recognized worldwide. Implementing such a QA system has convinced the Thai Government that it could help to develop the food industry and promote export market. As a result, FDA issued the regulations for improving the Thai food safety standards by using HACCP as a QA system since 27 August 1997. Meanwhile, export food markets themselves have already set the standard and regulations to control Thai exports. As an example, food industry enterprises that export fish and fishery products to USA, not only require health certificates, but also must have implemented an HACCP program. This has been done in Thailand as a regulation since 18 December 1997. In addition, WTO has also accepted HACCP (from CODEX) as an international standard for food products.

The duties of FDA are not only issuing of regulations but also working together with other government services, i.e., Thai Industrial Standard Institute (TISI) to act as a certification body for HACCP system. This cooperation should enhance the promotion and support for food industries to be able to adopt this quality system without a lot of difficulties. Subsequently, the Thai food safety standards should get approved and accepted internationally. As a result, the export business is expanding and the country getting more foreign exchange.

For another strategy, 2-3 years ago FDA announced that they issued the procedure for managing a service fund. The objectives of this program were to support all the services FDA had for their customers and provide the activities involved with the means to improve standards such as document and process verification, process auditing and consumer protection research, etc. Following this procedure, any person who wants to get services from FDA related to drug, food, cosmetic, medical implements, dangerous and addictive substances is required to pay for such services. FDA sets the time period to perform those services and informs the customer. If the FDA officer cannot finish the requested task within the mentioned period, FDA provides a proportional refund for the customer. This procedure has been in effect since 13 November 1997. However, upon request to government services, the enterprise could ask for a waiver on this service charge.

Another government service that is particularly responsible for a range of industry-related issues is the Ministry of Industry. The Director of the Economic Institute, Ministry of Industry has disclosed that among 12,000 food industries in Thailand, there are only 264 which have HACCP QA system certificates. However, this information was developed at the beginning of 2001. The National Food Institute (NFI), private sector, and other involved parties were asked to provide the information on those industries that have undergone training for HACCP implementation. NFI also conducted a feasibility study to increase the number of HACCP-certified industry to 1,000 within the next five years. The priority has been placed on all food export and food chain industries. However, the achievement of this goal will be limited by the number of HACCP experts available to carry out the work.

At present, there are five certification bodies that provide certification services in Thailand:

- (A) FDA and TISI provide certificates for all food products.
- (B) Fisheries Department, Ministry of Agriculture and Cooperatives provides certificates for fish and fishery products.
- (C) Cattle Department, Ministry of Agriculture and Cooperatives provides certificates for cattle products.
- (D) The Agricultural Academic Department, Ministry of Agriculture and Cooperatives provides certificates to fruit and vegetable products.
- (E) SGS Company Ltd., an international company, provides certificates for all food products.

In conclusion, the number of factories in Thailand that already have HACCP certification and their industry classification are as follows:

Type of Industry	HACCP-certified Plants
Poultry and meat	7
Milk and milk product	9
Fish and fishery products	177
Fat and oil	1
Fruit and vegetable	27
Cereal and cereal product	13
Sugar and snack	-
Tea, coffee and co-co	3
Seasoning and condiment	19
Drink and refreshment	-
Ready-to-eat or instant food	9
Total	265

Source: National Food Institute, Fisheries Department, FDA and TISI, Medical Science Department, and SGS, 2001.

The numbers of factories that obtained HACCP-classification by certification body are shown below:

Certification Body	HACCP-certified Plants
Campden and Chorleywood Association, England	33
Fisheries Department	183
FDA/TISI	35
Medical Science Department	5
SGS	41
Total	297

Source: National Food Institute, Fisheries Department, FDA and TISI, Medical Science Department, and SGS, 2001.

Another QA system, GMP, which is considered to be a basic hygiene protocol, is required prior to getting HACCP certification. Therefore, the Thai Government issued the new regulations for GMP effective at the beginning of 2001. For the time being, GMP is basic for all types of food products (57 products), but in the future there will be specific GMPs for particular products such as water, milk, canned foods, etc. Later, the government plans to move forward to require HACCP in the same manner. As a result, new food processing enterprises in Thailand will be required to have GMPs ready, but for the existing enterprises, they must be available within two years after issuance of this regulation.

SUGGESTED MEASURES TO PROMOTE ADOPTION OF A COMPREHENSIVE QUALITY ASSURANCE SYSTEM

QA systems should be implemented as a consequence of regulations rather than the voluntary actions of industry. Quality systems such as GMPs have been introduced in Thailand as far back as 1986. Initially, only exporting businesses were interested in this system, but now quality assurance is considered as a necessary system needed for control as a regulation because:

- a) the requirement to improve the living standards of people and the country's economy has pushed the government to have effective controls for the safety of food products.
- b) the trend of world trade and standards involving foods has required the Thai food standard to become stricter in order to reduce international trade barriers.

The cost of certification can be claimed as a 200-percent tax deduction for the first three years. This 200-percent tax deduction concept already applies to conducting the research in Thailand. After the economic crisis in 1997, the government is very eager to develop and improve our own technology instead of transferring technology from other countries. They assigned research promotion organizations such as the Thailand Research Fund (TRF) and the National Science and Technology Development Agency (NSTDA) responsibility for promotion and funding the research in many areas. One such campaign to draw attention to the importance of research to industry is the 200-percent tax deduction. The industries are aware of their own needs to improve the processes and to produce products more efficiently. For example, they may require modifying the equipment to be more suitable to their raw materials or even to develop new machines for product development. The researchers should have their institutes enrolled as a qualified body. However, acceptance for the 200-percent tax deduction depends on the purpose or objective and scope of the research. The research promotion organization has set criteria to determine the acceptability of

requests. Once the project has fulfilled all the criteria, the expenses of research can be claimed for 200-percent tax deduction.

Promoting the adoption of food safety standards should be done in a similar manner. Some of the key factors that have hindered food enterprise owners from making the decision to implement QA systems are the costs associated with training their people, issuing and renewing certificates, etc. Since most of food industries are SMEs, the government can subsidize them in terms of tax refunds. The cost of issuing and renewing certificates in Thailand is about B300,000 every three years. This amount of money is quite significant for SMEs. Therefore, if the government can let SMEs claim this cost for a tax deduction of 200 percent, it can reduce the pressures or burdens for SMEs who have to compete with global market changes and to comply with new regulations.

Governments should have export departments and ministries of commerce set up food export funds. All food export enterprises should annually contribute some money to this fund. This fund will be used or reserved as a source of low interest loans that any food processing enterprise could use to implement HACCP systems. It should not only be used for HACCP certification fees, but also for process improvement and employee training. This strategy is similar to the funding from the Department of Energy Development and Promotion, Ministry of Science, Technology and Environment. The government has added a surcharge to the price of fuel to help contribute to this fund. Any factory that needs to do the process improvement in order to reduce the use of energy can get subsidized from this fund without any interest. This policy for saving or reducing energy is being modified to have effective controls by issuing as official regulations in the near future.

Greater media attention to promote HACCP and develop local consumer awareness is required as soon as possible. This will be another driving force to make the food processing enterprises adopt HACCP systems. ISO has had success in their promotion. Most people in every walk of life know of or have heard about ISO. Since everyone consumes food, HACCP has to get the same attention. Thus, many forms of information transfer, such as television, radio and newspapers, etc., have to be employed immediately. Once people get to know the risks of consuming foods without certified QA systems, more and more of them will be willing to pay for this benefit.

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15. THAILAND (2)

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INTRODUCTION

Currently, the export of foods brings large incomes into the country. According to the Bank of Thailand's export statistics, income from food exports has been among the top-10 ranking income generators for the last 10 years. These days, customers are much more aware of safety and hygiene issues. Hence, entrepreneurs in the food industry focusing on customer satisfaction should develop and improve their product manufacturing processes. HACCP is one of the quality management systems emphasizing the importance of hygiene and food safety. The Government of Thailand is aware of its importance and the Ministry of Industry has been assigned to motivate, promote and support the small- and medium-sized food processing industry (S&M FPI) enterprises to adopt this quality system for their processes. During the 1980s and 1990s GMP/HACCP were promoted throughout the food industry, but as of 24 July 2001, GMP has become mandatory for all new plants. In 2003, the standard will be enforced for all factories concerned and HACCP will be mandatory as well in the near future.

CURRENT STATUS OF QUALITY CONCEPTS AND SMALL AND MEDIUM-SIZED FOOD PROCESSING ENTERPRISES

At present, worldwide entrepreneurs in the food industry agree with the importance of hygiene and safety in foods because they are aware of the expectations of the consumers who desire that the foods they eat be safe and suitable for consumption. Food-borne illness and food-borne injury are at best unpleasant; at worst, the consumers who eat defective foods can die. But there are also other consequences. Outbreaks of food-borne illness can damage trade and tourism and lead to loss of earnings unemployment and litigation. Food spoilage is wasteful, costly and can adversely affect trade and consumer confidence. So, the entrepreneurs in the food industry being fully aware of its importance know that they have to control both the quality and safety of foods.

In Thailand, the quality systems such as quality control, quality assurance, ISO 9000, ISO 14000, GMP/HACCP, etc. were promoted in many fields of industry including the food industry since the 1980s. Now there are many organizations to implement quality assurance and management systems and many organizations have received certificates including the 3,719 factories which received ISO 9000 certificates (information as of 5 February 2002) and the 458 factories that received the ISO 14001 certificates (information as of 11 October 2002).

APPLICATION OF QUALITY ASSURANCE SYSTEMS IN SMALL AND MEDIUM-SIZED FOOD PROCESSING ENTERPRISES

The international trade at present has changed its approach because of trade liberalization under the WTO regime. Entrepreneurs concentrate on quality, costs and delivery as well as food hygiene. If entrepreneurs want to increase their market share they must ensure that their products are better than that of the competition. Hence, they need to improve their management to be sure that they can produce the products and services required by consumers. Quality management systems are one of the most appropriate approaches to use in this situation.

Quality management systems are promoted in Thailand, such as productivity improvement, QSME (Quality System for Small and Medium Enterprises), ISO 9000, ISO 14000, ISO 18000, GMP/HACCP and other management systems. In the food industry, GMP and HACCP are one of the quality assurance systems to ensure that the products coming from the manufacturers are of good quality and hygiene.

Important Factors to Affect the Entrepreneur Awareness on Food Quality and Safety

1. Behavior of consumers has changed in the last two decades; they are more concerned on health and safety and pricing has become a less important factor.
2. Trade liberalization under the WTO regime makes competition fierce in every type of industry, including the food industry.

Application of HACCP Systems to Food Safety

Prior to the application of the HACCP systems to any sector of the food chain, it has to be ascertained that sector is operating according to the Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practice, and appropriate food safety legislation. Management commitment is necessary for improvement of an effective HACCP system. During hazard identification, evaluation and subsequent operations in designing and applying HACCP systems, consideration has to be given to the impact of raw materials, ingredients, food manufacturing practices, the role of the manufacturing processes to control hazards, the likely end-use of the product, categories of consumers concerned and the epidemiological evidence relative to food safety.

The intent of the HACCP system is to focus control at CCPs (Critical Control Points). Redesign of the operation should be considered if a hazard which must be controlled is identified but no CCPs are found. HACCP should be applied to each specific operation separately. CCPs identified in any given example in any Codex Code of Hygienic Practice might not be the only ones identified for a specific application or might be of a different nature. The HACCP application should be reviewed and necessary changes made when any modification is made in the product, process, or any step. It is important when applying HACCP to be flexible where appropriate, given the context of the application taking into account the nature and the size of the operation.

HACCP System Consists of the Following Seven Principles

- Principle 1 – Conduct a hazard analysis
- Principle 2 – Determine the CCPs
- Principle 3 – Establish critical limit(s)

- Principle 4 – Establish a system to monitor control of CCPs
- Principle 5 – Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control
- Principle 6 – Establish procedures for verification to confirm that the HACCP system is working effectively
- Principle 7 – Establish documentation concerning all procedures and record appropriate to these principles and their application.

Application of HACCP principles consists of the following tasks as identified in the logical sequence for application of HACCP:

1. Assemble HACCP team
2. Describe product
3. Identify intended use
4. Construct flow diagram
5. On-site confirmation of flow diagram
6. List on potential hazards associated with each step, conduct a hazard analysis, and consider any measures to control identified hazards
7. Determine CCPs
8. Establish critical limits for each CCP
9. Establish a monitoring system for each CCP
10. Establish corrective actions
11. Establish verification procedures
12. Establish documentation and record keeping.

Steps to Implement HACCP

Plan	<ul style="list-style-type: none"> * Initial HACCP review * HACCP policy * Identification and evaluation of hazard * Food safety legislation * Objectives and targets
Do	<ul style="list-style-type: none"> * HACCP plan * Operational control * Structure and responsibility * Training, awareness and competence * Communications * HACCP documentation * Document and record control
Check	<ul style="list-style-type: none"> * Monitoring and measurement * Records * HACCP audits
Action	<ul style="list-style-type: none"> * Non-conformance/corrective and preventive action * Management review
Continual improvement	

The factories which have received HACCP certificates in Thailand by product categories are:

No.	Type of Products	Quantity (factory)
1.	Seafood	200
2.	Meat products	34
3.	Vegetable and fruit	39
4.	Rice and flour products	19
5.	Milk products	12
6.	Coffee and others	35
Total		339

(Information as of 11 October, 2001)

Major Issues and Problems with HACCP Systems in S&M FPI in Thailand

- * Lack of involvement of top management
- * Inadequate budget to improve and develop management systems
- * The limitation of technology to preventive food from being contaminated with harmful, undesirable microbial growth and deterioration
- * Lack of expertise/advisors for S&M FPI
- * The lack of government monitoring and recording after implementation.

KEY INSTITUTIONS INVOLVED IN PROMOTING HACCP SYSTEMS IN THE FOOD INDUSTRY

As the assigned organization, the Ministry of Industry has cooperated with leading organizations such as National Food Institute, Food and Drug Administration, Thailand Industrial Standard Institute, and Thailand Productivity Institute to promote and provide consultancies in GMP/HACCP. The Department of Fisheries, Department of Livestock Development, Department of Agriculture Thailand, Department of Medical Science, Food and Drug Administration have worked with the Thailand Industrial Standard Institute and other private organizations such as SGS (Société General de Surveillance), RWTÜV to provide certification for the GMP/HACCP system in Thailand.

Until now, up to 339 factories are GMP/HACCP-certified (information as of 11 October, 2001). After the certification is achieved, the companies may move on towards other management systems such as ISO 9000, ISO 14000 or Thailand Quality Award through subsidies from the Ministry of Industry.

CURRENT STATUS OF ACTIVITIES RELATED TO HACCP SYSTEM IN FOUNDATION FOR THAILAND PRODUCTIVITY INSTITUTE

The Foundation for Thailand Productivity Institute (FTPI) operates in an independent manner under the Ministry of Industry. Our Institute provides training and consulting service on Productivity Improvement, Quality Management System (ISO 9000), Environmental Management System (ISO 14000), QS 9000 as well as ISO 18000 and Human Resource Management. Regarding to GMP/HACCP, FTPI also promotes GMP/HACCP by organizing

training and consulting to industries. In addition, FTPI is a member of the APO. The International Cooperation Division undertakes APO activities. These activities include participating in and hosting APO projects such as training, seminars, meetings and study missions on various subject areas covering the agriculture, industry and service sectors.

In January 2002, FTPI has incorporated with Department of Industrial Promotion to establish many projects such as Industrial Restructuring Plan (IRP), Invigorating Thai Business (ITB) and Training Lead Consultants (TLC). These projects established to support S&M FPI entrepreneurs to improve and develop the weakness of the management system. These projects were subsidized from the Ministry of Industry to about 75-80 percent of the total cost of the improvement in each factory to hire the consultant or the expert to help the entrepreneurs to improve and develop their management system to better compete in the international market.

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Department of Medical Science www.dmasc.moph.go.th
Food and Agriculture Organization of the United Nations www.fao.org
Food and Drug Administration: www.fda.moph.go.th
National Food Institute www.nfi.or.th
Thai Industrial Standards Institute: www.tisi.go.th

16. VIETNAM

Le Thi Nga

Director

Viet Tien Food Processing

Joint Venture Company

Ho Chi Minh City

INTRODUCTION

Vietnam has changed its face into a free market. But in developing the economy it has met many difficulties, such as market and technical competition. Nowadays, many small- and medium-sized food processing industries (S&M FPIs) in Vietnam consider quality control systems as a key measure to compete on internal and global markets. In Vietnam, FPIs apply quality control systems such as ISO 9000, ISO 14000 and HACCP.

Viet Tien Food Processing JVC – A Pioneer FPI to Implement HACCP in Vietnam

Our company was established in 1996. It is one of the famous companies in food processing in Vietnam and products include chili sauce, tomato sauce and soy sauce.

We have distribution chains over all Singapore and have gained 30 percent of the market share there. Since we have become aware of the benefits of ISO and HACCP systems, we have implemented them as of July 2001 and plan to get certification in October 2002. We have become one of the pioneering S&M FPIs to implement HACCP in Vietnam.

General Economic Situation

Vietnam is trying to become a member of the WTO. Our country is entering during an era of reforms, openness and integration to the regional and global economies. This is an important period for the future development of our country. Economic integration makes relationships much closer among countries, which involves the process of free trade and traffic of commodities, services, capital and labor. It also includes the coordination of political initiatives, economics and finances, establishment of legislation and standards, quality and information transfer systems, etc. These factors contribute to the management and promotion of entrepreneurship and the internationalization of small enterprises.

In order to achieve globalization, Vietnam regularly attended ASEAN and APEC meetings in order to reduce trade limiting measures such as import duties, subsidized pricing, supply chain monopolies and technological barriers that may be instituted in the near future. In order to circumvent these measures, Vietnamese companies must improve their quality and technical capabilities as soon as possible. As Vietnam is an agriculture-based economy, there are excellent export opportunities for processed food products. However, the quality control situation in S&M FPIs is far from satisfactory.

An assured and less demanding domestic market and lack of awareness of modern quality concepts, among other constraints, have hindered the development of FPIs, which could compete and survive in a highly quality-conscious and competitive global food market. At present in many developing countries within the region, only a few food exporting

enterprises implement modern quality assurance and improvement concepts. In general, processed food products from Vietnam cannot compete in the international food market due to lack of quality assurance. Hence the products have usually been relegated to lower-end markets or to a lower grade status.

APPLYING QUALITY ASSURANCE SYSTEMS

Nowadays, Vietnam has tends to improve the quality perception of FPI by applying quality control systems such as ISO 9001:2000, ISO 14000 and HACCP. ISO 9000 became popular in Vietnam as of 1998. Up to now, about 600 enterprises, including 200 FPIs were certificated ISO 9000. For ISO 14000, only 20 companies (mainly big foreign companies and joint ventures) were certified. However, in order to be able to compete and survive in the highly competitive global food market, S&M FPIs in my country have to improve their systems for modern quality assurance, such as HACCP. In Vietnam, only seafood enterprises apply HACCP systems. For the FPI, the “Thang Long Wine” – a government enterprise and Nestlé Vietnam – a joint venture enterprise have both been certified. About 10 other enterprises will get their certificates this year.

In general, the perception of HACCP is at a low level in Vietnam, but we are an agricultural country with many food exporting companies. Therefore the application of HACCP systems on S&M FPI will be a necessary development for the future.

The benefits of an HACCP system are clear:

- * Product safety control
- * Identification of hazards and measures for assurance of product safety
- * Establishment of a system to monitor control of CCP (Critical Control Point)
- * Application for all stages in the processing food cycle
- * Effective use of resources and timely approach to food safety problems
- * Higher level of responsibility and control in the food processing factory
- * HACCP strategy incorporated into quality control procedures and GMP (Good Manufacturing Practice)
- * An exceptionally reliable guarantee of safety for consumers
- * An internationally accepted standard for export sales
- * A cost-effective way of reducing wastage.

BRIEF REVIEW OF HACCP SYSTEM

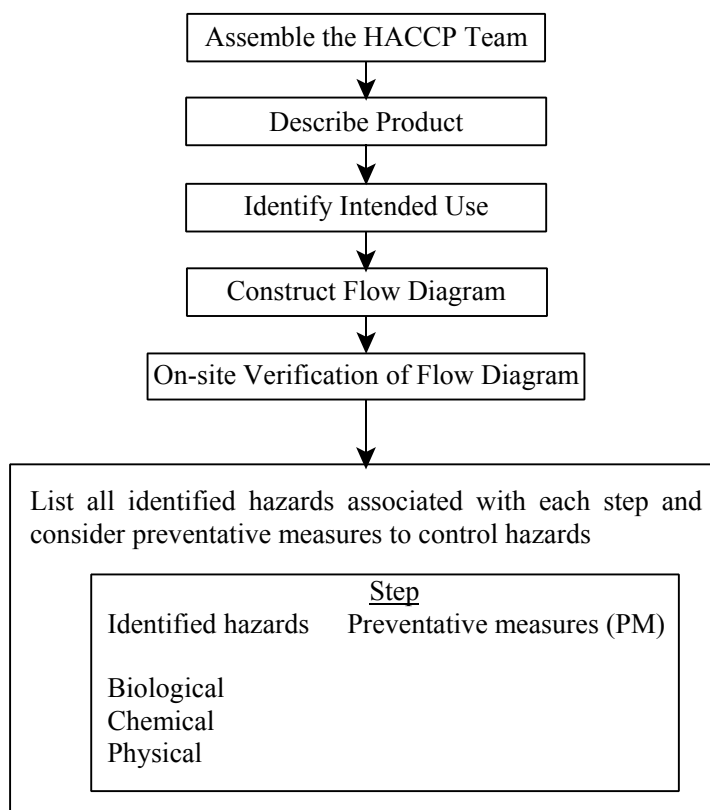
HACCP is a tool to identify and assess hazards and establish control systems that focus on preventive measures rather than relying mainly on end-product testing. Any HACCP system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments. The system can be applied throughout the food chain from the primary producer to the final consumer. The successful application of HACCP requires the full commitment and involvement of management and the workforce. It also requires a team approach. This team should include appropriate experts. Examples might be agronomists, veterinarians, production personnel, microbiologists, medical or public health specialists, food technologists, chemists and engineers according to the particular study. The application of HACCP is compatible with the implementation of quality

management systems, such as the ISO 9000 series and is the system of choice in the management of food safety within such systems.

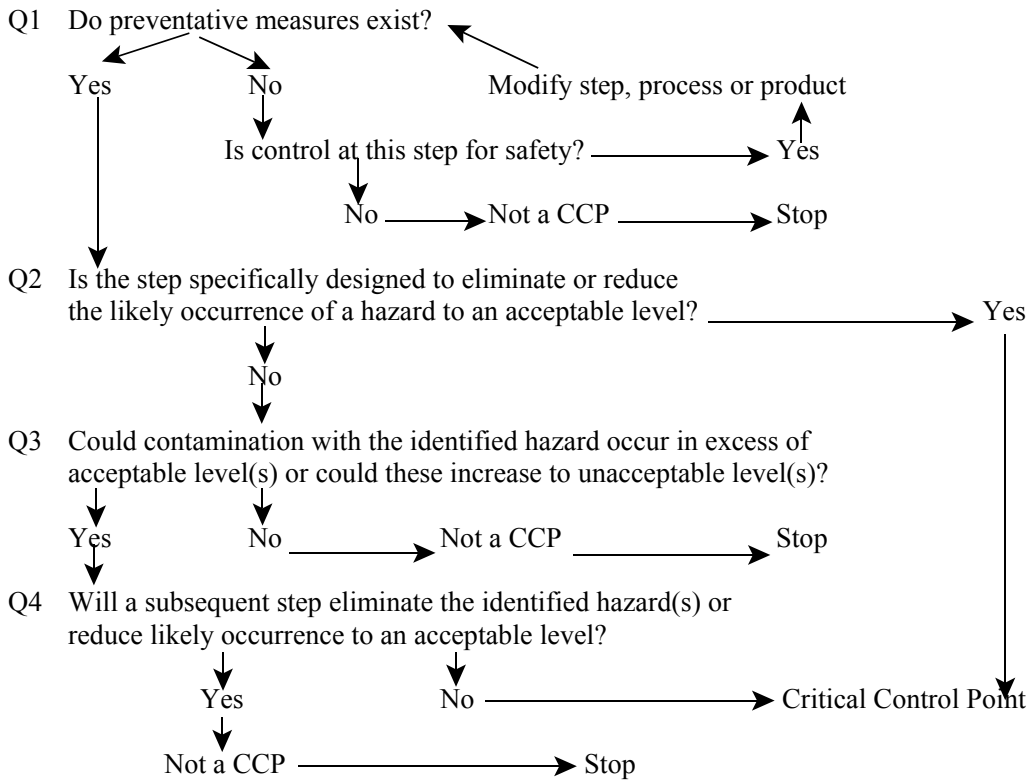
Training of personnel in industry, government and academia in HACCP principles and application, and increasing awareness of consumers are essential elements for the effective implementation of HACCP.

STATE GOVERNMENT POLICIES AND PROGRAMS ON THE PROMOTION OF HACCP

At the present, the Government of Vietnam encourages S&M FPIs to increase their competitiveness by applying modern quality assurance systems such as ISO and HACCP. There are many programs, including financial support for implementation and adoption by enterprises in general as well as for FPIs. Standard organizations perform many training, promoting and consulting activities for S&M FPIs. The APO plays an important role in the organization of workshops, meetings, training courses and documentation for S&M FPI. However, implementation of HACCP systems requires major investments for infrastructure. For this reason, only a few of the larger companies (mainly in the government sector) can afford it. Most S&M food enterprises concentrate on other measures such as ISO at this moment.

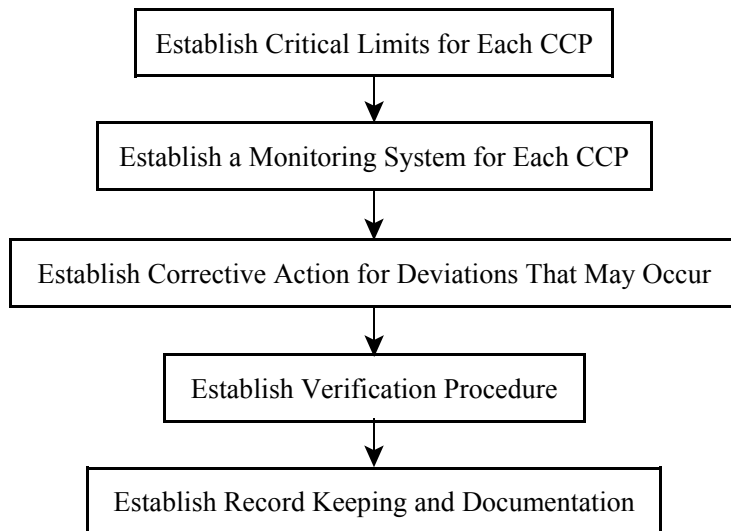


Logical Sequence for the Application of HACCP



Apply HACCP Decision Tree to Each Step with Identified Hazard(s)
(answer question in sequence)

Proceed to next identified hazard in the described process:



HACCP Worksheet

1. Describe Product

2. Diagram Process Flow

3. List

Step	Hazards	Preventive Measures	CCPs	Critical Limits	Monitoring Procedures	Corrective Actions	Records

4. Verification

MEASURES TO PROMOTE THE ADOPTION OF HACCP

In order to promote the adoption of HACCP systems, the government must:

- * provide strong financial support to S&M FPI for implementing HACCP
- * support S&M FPI to produce high-quality products for the global market
- * increase the consumer awareness of food safety
- * institute strict control measures for FPI

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2. PROGRAM OF ACTIVITIES

(26 February–4 March 2002)

Date/Time	Activity
<i>Tues., 26 Feb.</i>	
Forenoon	Opening Ceremony Presentation and Discussion on Topic I: <i>International Development on Food Safety Systems and Marketing of Processed Foods</i> by Mr. Cornelis Sonneveld
Afternoon	Presentation and Discussion on Topic II: <i>Quality Management Systems in Small and Medium Food Processing Enterprises – Experience of South Africa</i> by Ms. Sandra G. F. Keller Presentation and Discussion on Topic III: <i>GMP/GHP and HACCP Systems – Experiences of Small and Medium Food Processing Enterprises in Poland</i> by Ms. Maria Rozpendowska Presentation and Discussion on Topic IV: <i>Implementing HACCP in SMEs – Concept vs. Consumer Participation, Business Culture and Policy Approach</i> by Mr. K. V. R. Raju
<i>Wed., 27 Feb.</i>	
Forenoon	Presentation of Country Report by Participants Presentation and Discussion on Topic V: <i>HACCP Certification</i> by Shri P. K. Sarkar
Afternoon	Presentation of Country Reports by Participants
<i>Thurs., 28 Feb.</i>	
Forenoon	Presentation of Country Reports by Participants Presentation and Discussion on Topic VI: <i>HACCP – Challenges Facing Developing Countries</i> by Dr. S. R. Gupta
Afternoon	Presentation of Country Reports by Participants
<i>Fri., 1 March</i>	
Forenoon	Field Visit
Afternoon	Interaction with Ministry of Food Processing Industries Officials
<i>Sat., 2 March</i>	Trip to Agra
<i>Sun., 3 March</i>	Workshop
<i>Mon., 4 March</i>	
Forenoon	Summing-up Session Valediction