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# A COMMODITY SYSTEMS ASSESSMENT METHODOLOGY

## FOR PROBLEM AND PROJECT IDENTIFICATION

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Once the basic methodology was developed, it was field tested under a variety of circumstances in countries as diverse as Taiwan, the four Windward Islands (Eastern Caribbean), Malaysia and Nepal. During this further learning and development process, over 100 professionals from a dozen countries made useful contributions with information, ideas and constructive criticism. It is not possible to mention them all, but special thanks are due the following: my colleagues from IICA, Rafael Marte and Gonzalo Estefanelli; Ron Wills, New South Wales University; Samson C.S. Tsou, Asian Vegetable Research and Development Center; James R. Jones and Paul Muneta, University of Idaho; Ray Gonzales, ASEAN Food Handling Bureau; Malaysian Agricultural Research and Development Institute postharvest specialists Abdullah Hassan, Abdullah Shukor Abd. Rahman and Lam Peng Fatt. Thanks are also due such dedicated professionals as Sing Ching Tongdee and Suraphong Kosiyachinda, Thailand; Lee Song Khuen, Singapore; Ofelia K. Bautista and Ma Concepcion Lizada, Philippines, who so willingly dedicated their time and knowledge to improving the methodology.

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## **Foreword**

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The publication of this manual marks the culmination of a long period of collaborative research by numerous professionals and organizations. In fact we believe that by providing the necessary organizational, institutional, and financial support over a period of approximately five years, the Inter-American Institute for Cooperation on Agriculture (IICA), the ASEAN Food Handling Bureau (AFHB), and the Postharvest Institute for Perishables (PIP), have demonstrated the effectiveness of inter-institutional cooperation.

The development of the Commodity Systems Assessment Methodology (CSAM) grew out of the perceived need for a systematic approach to identifying and resolving postharvest problems. However, during the basic research stage, the necessity to analyze postharvest problems from the perspective of a whole commodity system became increasingly apparent.

This manual was written to provide professionals in the agricultural sector with proven methodological tools which can be utilized in identifying and solving problems throughout a commodity system. A systematic approach, from planning to product distribution, helps to ensure that all factors affecting a given commodity are considered in development programs, whether related to pre-production, production, harvest, postharvest, or marketing.

While this manual is intended to provide guidelines for developing countries, it may not meet the needs of all persons, given the broad variations in geography, weather, cultural, and socio-economic conditions around the world. Users must innovate where necessary, and therefore develop modified versions of the methodology and instruments used herein.

Our three institutions intend to provide continued support for the further development of CSAM. Future activities are likely to include support for the application of CSAM in diverse countries, translation into Spanish and French, and publication of a condensed version that can be more readily utilized as a field manual.

We welcome suggestions for improvements in CSAM and invite readers to address inquiries to the persons indicated on the following page.

**Reginald Pierre (IICA)**  
**Raymundo T. Gonzalez (AFHB)**  
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# CHAPTER 1

## Purpose and Origin of This Manual

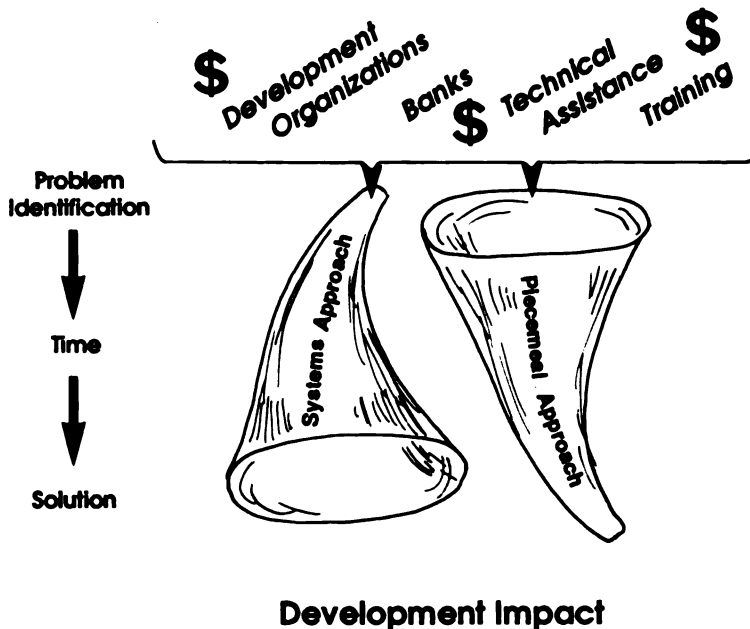
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Each year considerable sums of money are spent on development projects around the world which do not produce the expected results. This situation exists, at least partially, because of deficiencies in the process of problem analysis.

In any attempt to solve problems there are three basic steps:

1. Identification and description of the problem,
2. Identification and formulation of the solution, and
3. Execution of the solution.

This manual concentrates on steps one and two. In developmental work, both are interdependent; effective solutions cannot be prepared without a clear understanding of the problem(s).



While numerous books and training courses concentrate on project identification, formulation, evaluation, and monitoring, relatively little information is available on problem analysis, particularly from the perspective of a commodity system.

During university training, students are taught to identify problems using a comprehensive and inter-disciplinary approach. However, when students become professionals, they usually find themselves in very narrow positions within public or private sector institutions. Here, they tend to concentrate on very specific problems, making decisions with the limited information at hand. Even within many developmental organizations, there is normally a lack of interdisciplinary communication, leading to projects which often prove to be either partial solutions or no solution at all.

Many persons involved in project identification and formulation do not have the time or resources to organize and implement a proper in-depth diagnosis of problems -- a process which can easily take several months. Consequently, problem and project identification becomes highly dependent on literature and secondary data, which may lack detail and be based on the experience of a few local or international experts.

## **Pitfalls of problem identification**

In the process of problem and project identification, several pitfalls exist which are often overlooked by the professional with time and financial constraints.

The **first pitfall** is the tendency towards **over-reliance on readily available literature**. By this we mean literature available in libraries of embassies, developmental banks, international organizations or other information centers. Many in-depth studies with useful insights are only found at national and international universities and research centers and may not be readily available to short-term consultants. Some important documents are often available in only a few copies and are "hidden away" in private libraries or locked in desks of public sector employees. Being believers in the concept that information is power, they use these documents as their personal resource base. Local personnel are often aware of these documents while outsiders usually are not.

Additionally, much of the literature has been written by short-term consultants, based on work of previous consultants. In this way, statistics, problems, weaknesses, characteristics, cultural practices, and other statements are repeated so often in the literature that they become thought of as fact, even though at times they may have no substantive base. An example of this is the now often repeated statement that national postharvest losses of perishables are in the range of 20 to 40 percent. The greater the desire to obtain financing for a particular postharvest project, the higher the percentage of losses cited. Since there exists no quantifying data to prove the contrary, statements of this nature can be made with

impunity. People often quote the document Postharvest Food Losses in Developing Countries (National Academy of Sciences, 1978), which itself was based on a review of secondary literature and expert opinion. While being perhaps the best estimate of losses in perishables on a global basis, statements from this document are misleading when applied to specific circumstances.

In fact, postharvest losses range between near-zero and 100%, depending upon such local conditions as climate, politics, cultural practices of farmers and intermediaries, market demand, government marketing policies, road conditions, and level of knowledge. Without an in-depth understanding of these conditions, many writers introduce misconceptions into national planning documents.

A second pitfall is the over-dependence on a few national technicians with limited experience. Like professionals everywhere, they tend to be specialized in one particular field with their corresponding biases. It is also not uncommon to find national "specialists" in the agriculture sector, often in decision-making positions, who lack recent field experience or direct contact with the rural sector. Additionally, with a shortage of trained personnel in many developing countries, technologically trained specialists may occupy purely administrative positions and be out of touch with their specialties.

A third pitfall, related to the former, is the tendency to involve too few disciplines in problem identification. National professionals or consultants, bound by their terms of reference, may find themselves working with one particular institution. Since most institutions tend to specialize in one or a few disciplines, e.g. water resources, agronomy, marketing, or food processing, consultants may find themselves looking at a system which in fact is only part of the system. If the project is related to irrigation or production, the marketing or agroprocessing aspect may be overlooked. If the project deals with marketing, perhaps the production or postharvest elements are overlooked, or given too little attention. For want of a multi-disciplinary approach, projects often do not produce the desired results.

A fourth pitfall is related to timing of project implementation. For example, information systems, including investments in hardware, software, and personnel, are often implemented before there is a clear understanding of who is to use the information, what decisions are to be made with what frequency, and what is the least costly and most practical method to institutionalize the process. Yes, information systems are necessary, but they should evolve to satisfy needs and not be introduced as a panacea!

Another example of wrong timing which often occurs in developing countries is related to the construction of cold storage facilities. Although the technology is readily available and the inauguration of infrastructure makes for good politics, lowering temperatures at one point in a perishable food chain without being able to maintain the lowered temperature throughout the system may well increase, rather than decrease, postharvest losses.

As a result of improper timing of projects, good ideas can lead to costly mistakes. Additionally, white elephants create negative feelings among decision makers, making it all the more difficult to introduce such projects into the system when they are truly needed. Poor timing in project implementation is often a reflection of decision making based on insufficient information.

A fifth pitfall is related to the **biased nature of specialists**. When a problem is identified there is a natural tendency to identify its causes. Each expert will identify those causes with which s/he is most familiar. Faced with a problem of high postharvest losses, the technologist may point to deficiencies in equipment and storage areas; the agricultural economist may identify weaknesses in the distribution system; the agronomist is likely to blame preharvest factors; the sociologist is likely to stress contradictions between government policy and local customs; and so on. Even those who follow a holistic approach are, by nature, going to give more attention to certain parts of a commodity system than to others. This underlines the importance of an interdisciplinary approach.

Using the step-by-step commodity systems assessment methodology and instruments presented in this manual, professionals will be able to avoid the pitfalls described. Working together as an interdisciplinary team, they will be able to systematically organize their combined knowledge into a comprehensive overview of a particular commodity system. This will produce the necessary information for proper problem and project identification, thereby improving the chances for success of development projects. In this way, national specialists will also play a more direct role in the determination of those priority projects which get submitted to funding agencies.

A basic assumption made throughout this manual is that professionals can be found in developing countries who, when presented with good baseline information on a commodity system, will be able to identify projects and establish realistic priorities. The more complete and more accurate the information base, the more likely it is that decisions made will be the correct ones to overcome the identified problems.

Based on the above

**THE KEY TO PROBLEM SOLUTION IS PROPER PROBLEM IDENTIFICATION.**

## **Application of this manual**

This manual will prove useful to short-term consultants and decision makers interested in rapid appraisals and development from a commodity systems perspective. However, it has been prepared primarily with the national technician in developing countries in mind.

The application of the methodology contained in this manual requires an interdisciplinary or team approach. It is unlikely that one person will have all the knowledge to properly identify the problems related to preproduction, production, harvest, postharvest, and marketing which make up any commodity system.

This manual can be used in a workshop environment to train professionals in the commodity systems approach, either from a theoretical point of view, or as an applied, in-service, case study (specific commodity) form of training. In the first instance the trainees may be of the same or different disciplines. When the case study approach is used, the trainees should include persons with expertise in economics, agronomy, social sciences, food technology, postharvest, and marketing.

The manual will also prove useful to ministries of agriculture, marketing boards, corporations, research institutes, and other national institutions interested in the systematic improvement of production, postharvest handling and marketing within existing commodity systems. At the regional or national level, the methodology will prove valuable in the identification of agricultural development projects. It will be of particular value in the execution of rapid appraisal exercises, using interdisciplinary teams of national specialists.

A systematic and interdisciplinary application of this methodology will permit a rapid appraisal (2-4 weeks) of a commodity system. It will facilitate the identification of priority problems and alternative project ideas, and will permit the ordering of priority solutions into a development strategy and time frame.

Finally, for the student, this manual will promote a better understanding of commodity systems and the interrelationships between the diverse components and participants. It should serve as a valuable reference document for technical schools and universities teaching agricultural economics, food technology, postharvest handling, agronomy, sociology, and other subjects related to agricultural development.

## **Origin of the methodology**

An important feature of this methodology is that it permits an analysis of a whole commodity system, thereby facilitating the identification and prioritization of problems throughout the system. This leads to the development of more realistic solutions to the problems. The methodology brings many concepts, instruments and techniques together in one document and presents them as an integrated whole.

The Commodity Systems Assessment Methodology presented in this manual draws upon the work of a great number of specialists and was developed over several years. The original idea for the methodology stems from a study executed in Haiti describing the production and marketing system for beans, using an anthropological case study approach (Murray and Alvarez, 1973). This case study on bean marketing focused on the diverse participants in a particular commodity system and their decision making processes. It served as a model for a series of marketing studies carried out in Haiti and the Dominican Republic by the Inter-American Institute for Cooperation on Agriculture (IICA).

In 1975, an IICA food technologist developed a technological approach to looking at a food system, integrating the industrial flow diagram concept with a step by step case study method (Amezquita and La Gra, 1979). Case studies using this technological focus were carried out in the Dominican Republic on white potatoes, tomatoes and cassava (Secretaria de Estado de Agricultura, 1976 & 1977).

During the four year period 1975-79, the Ministry of Agriculture in the Dominican Republic and IICA executed an Integrated Marketing Project to develop marketing systems for organized farmers. A diagnosis of the agricultural marketing system in the Dominican Republic was published (Secretaria de Estado de Agricultura, 1977) including marketing channels of a variety of food crops utilizing the analytical approach commonly used by agricultural economists.

In analyzing the alternative approaches used by anthropologists, food technologists and agricultural economists, it became apparent that none of the three approaches provides a complete picture of a particular commodity system. However, the three approaches taken together yield a comprehensive overview which facilitates problem and project identification.

In the 1970's, the reduction of postharvest losses became a major objective of development organizations, just as food security has in the eighties. Each of these concepts generated new methods and instruments for looking at food systems (SEA-IICA, 1977; Rodriguez et al, 1985; La Gra et al, 1985).

During these same two decades (1970-89), development planners contributed valuable tools for project identification and design. The logical framework (Rosenberg and Posner, 1979) method of analysis has been adopted by many development institutions into their internal planning systems. Problem and objective analysis, based on cause-to-effect relationships, is another tool being promoted among professionals in the developing world (Deutsche GTZ, 1987). Concurrently, development banks have been carrying out intensive training programs for third world specialists in project identification, formulation and evaluation (Gittinger, 1972), and more recently, project monitoring.

By the mid-eighties, a paradoxical situation seemed to exist.

While:

- methodological instruments were available to study and evaluate food systems;
- techniques and methods for project identification and formulation were commonly known and available at the national level, and
- competent professionals were available at both technical and managerial levels in developing countries,

many agricultural development projects continued to yield poor results.

Analyses at the country level indicate that one of the reasons for this situation is the lack of integration and coordination among the diverse institutions involved in the development process, and among the specialists in the planning and execution of their work programs.

As a result, many specialists and their institutions seem to be "missing seeing the forest for the trees," giving highest priority to favored projects without a clear understanding or complete examination of the potential impact on the overall system. Review of experiences in many developing countries indicates an unhealthy misallocation of resources. Many research, training, infrastructure, information, and other types of projects have terminated without producing the desired results. In many cases they have made difficult situations worse. As examples:

- The construction of vertical silos in one country in the early 70's, when rice was traditionally handled in bags. The silos went unused for many years at a high cost of maintenance while warehouse space remained inadequate.
- The introduction of large-scale, state-operated cold storage facilities before production was properly developed and organized. This resulted in high maintenance and operational costs due to small volumes and improper location of the infrastructure.
- The establishment of sophisticated information systems in many countries of the developing world without a clear definition of users' needs for information. The raw data often goes unused and the systems are frequently abandoned when external funding ends.
- The establishment of regional and international information networks before national systems have the capacity to either generate or receive reliable information.
- The implementation of projects to increase production or productivity before markets are identified. This often results in higher production costs to the farmer, and decreased income, when increased output causes gluts and a corresponding drop in price.
- The implementation of research programs designed at universities or research centers without a clear understanding of farmers' major problems and needs. This often leads to scarce resources being allocated to problems of scientific interest but of low priority to the farmer.



To avoid these types of misallocation of scarce resources, it is necessary to have a comprehensive understanding of commodity systems, their structure, and how they function.

## **An interinstitutional effort**

Brought together in 1983 by common interests, the Postharvest Institute for Perishables (PIP) solicited the assistance of the Inter-American Institute for Cooperation on Agriculture (IICA) to develop a methodology for quantifying postharvest losses. The first joint activity was the application of a modified version of an IICA case study methodology (Amezquita and La Gra, 1979) to salad tomatoes and Chinese cabbage in Taiwan (La Gra et al, 1983) under the sponsorship of the Asian Vegetable Research and Development Center (AVRDC).

From this experience it was concluded that loss assessments should begin with a comprehensive overview of the commodity system. It was further concluded that due to the high cost in time and resources required to accurately quantify losses, such exercises should only be conducted after an initial assessment of a commodity system or when quantitative data is required to evaluate the economic feasibility of introducing change. From that point on, IICA and PIP decided to concentrate on developing an approach to evaluating commodity systems using existing instruments and methods.

In 1985, the ASEAN Food Handling Bureau (AFHB) invited IICA to participate in a workshop on postharvest loss assessment in Manila, Philippines. IICA presented a comprehensive approach for studying commodity systems and identifying those points in the system where food losses are greatest (ASEAN Food Handling Bureau, 1985).

In 1986, IICA and the Caribbean Development Bank (CDB) initiated a study of the production and marketing constraints of fruit systems in the Windward Islands of the Caribbean. This comprehensive study (La Gra and Marte, 1987) was carried out over a period of 18 months, using a commodity systems approach applied to seven specific fruits in four different countries.

In an attempt to develop a comprehensive methodology for analyzing commodity systems, from a postharvest point of view, PIP, AFHB and IICA formed an interdisciplinary team in 1986 to visit ASEAN countries and identify common problems and needs of both public and private sector institutions dealing with postharvest problems. As a result of numerous consultations with professionals in five countries, the first version of this manual was prepared (La Gra et al, 1987).

In 1987, the University of California at Davis, and PIP at the University of Idaho, with support from the US Agency for International Development (USAID), the United Nations Food and Agricultural Organization (FAO), and IICA, combined forces in the organization of a training course for 20 technicians from the Eastern Caribbean. The training concentrated on methods for reducing postharvest losses in perishables, based on a commodity systems approach. Participants were divided into four interdisciplinary teams.

Each team used a commodity systems approach to prioritize problems and to identify solutions, with the ultimate goal of identifying ways to improve the production and marketing of specific food crops in specific Caribbean islands (PIP/UCDAVIS, 1987).

In 1988, the Heads of State of the Organization of Eastern Caribbean States (OECS) requested the Caribbean Agricultural Research and Development Institute (CARDI), CDB, and IICA to prepare an "OECS Diversification Programme" for the export of non-traditional crops. This Programme was prepared in 1988, using a commodity systems approach (CDB/IICA/CARDI, 1986).

Based on the above experiences, the present manual was compiled in 1988 in draft form. During the period June 13-25, 1988, it was field tested in Malaysia at the Malaysian Agricultural Research and Development Institute (MARDI), under the joint sponsorship of MARDI, AFHB, PIP and IICA. During the two week in-service workshop, 24 MARDI professionals, covering 12 disciplines, applied the methodology, step-by-step, as presented in Chapter 4 of this manual. The end result was a case study (MARDI, 1988) on carambola (referred to as "star fruit" throughout this manual) which describes the system, analyzes the problems, identifies possible solutions, and outlines four project ideas in project profile format.

In April 1989, PIP applied the methodology to the case of ginger in Nepal. Modifications in the workshop were initiated based on the educational backgrounds of participants and their estimated knowledge of the subject matter. The workshop was shortened to one week and a case study was completed (McCullough and Haggerty, 1989) on ginger handling and marketing. The system was described, problems analyzed, and potential solutions were identified.

As can be seen from this brief history, many years of research and testing by dozens of professionals in numerous countries have gone into the development of the methodology contained in this manual. It is, therefore, with a great deal of confidence that it is presented to the reader for application and further development.

Whether utilized for a rapid appraisal or an in-depth case study, this Commodity Systems Assessment Methodology will produce for the user the following products:

- A description of the commodity system, identifying the principal components of the system and the major participants and their roles;
- Identification of the priority problems within each component of the commodity system and their causal relationships;
- Identification of possible solutions to the problems and their order of priority; and
- An adequate data base to identify project ideas and prepare project profiles.



# CHAPTER 2

## Introduction to Food Systems

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Primitive humans moved from place to place looking for food to satisfy their basic desires until they learned to cultivate the soil and raise animals. Since then, men and women have dedicated much of their time and intelligence to developing techniques and instruments to increase production of food in sufficient amounts to overcome scarcities.

Over time, distinct forms of social organization have evolved, modifying the direct relationships between man, land and food. Within every culture, the necessity of assuring an adequate food supply has contributed to the structure of society and the respective roles of men and women in producing and distributing food to consumers. Inequitable food systems have caused social revolutions. In any society, the availability and costs of food are variables closely linked with political decisions.



During the 20th century, industrialized countries have been able to establish food production and distribution systems which meet the needs of the majority of their populations. This has been possible because political decisions based on technical and economic criteria have resulted in systematic and continuous actions to improve the production and distribution of food.

Unfortunately, developed nations represent a minority of the world's population. In the developing countries of the world, conditions are very different:

- Overall performance of the agricultural sector in many developing countries has deteriorated during the 1980's.
- Technical agriculture, both in production and marketing, is lagging far behind that of developed countries.
- Over 50% of the food consumed in the world is still produced using predominantly human, non-mechanized labor.
- Intense rural to urban migration seriously aggravates an already critical socio-economic situation in large cities.
- No significant progress is being made in reducing the level of poverty in most developing countries.
- Governments have been slow in promoting rural development or designing social programs to insure the basic needs of low income groups.

One of the consequences of this situation is increased pressure for improved efficiency of food systems.

Within national strategies for economic development, policy makers have generally given high priority to the supply of basic foods for their citizens. During the first half of this century, the problem of food supply was estimated in terms of quantities required to satisfy national demand. The solution was approached in a rather straightforward manner to increase national production, build storage facilities and, as a last resort, import to cover any deficit.

During the decade of the sixties, with food production increasing to meet growing demand in urban areas, it became evident that modifications were also necessary in the structure and functioning of marketing. For physical availability of foods to translate effectively into an opportune supply, marketing facilities and services have to grow at least at the same rate as that of national production plus imports. Within this context, planners began to concentrate on both production and marketing in the food system.

## **Multi-disciplinary nature of the food system**

Any commodity system begins with decisions of what to produce and in what quantities. It continues through to the point where the product is consumed. Between these two points, many disciplines, including economics, sociology, politics, health, engineering, agronomy, entomology, pathology, planning, food science, and others, interact to contribute to the understanding and functioning of the system. To a greater or lesser extent, agriculture and its commodity systems are affected by most of the recognized academic disciplines. The functioning and structure of agricultural systems can be completely understood only if one spends the time to analyze them from many disciplinary points of view. The commodity systems assessment methodology presented in this manual, therefore, emphasizes the necessity to include experts from a number of disciplines to insure as complete an understanding as possible.

During the past 30 years, the fields of social science, food technology and economics have contributed valuable methods and instruments for analyzing food systems. Given each discipline's particular biases and different objectives, one should not be surprised that their respective research techniques and methods of data presentation vary. For example, when presenting a flow diagram of a marketing channel for a particular commodity, the social scientist is likely to emphasize the human element (Figure 2.1A), food technologists the technical aspect (Figure 2.1B), and the economist the institutional side (Figure 2.1C). None of these methods is necessarily more correct than the others; each is simply a means for facilitating the comprehension of a complex system from a particular perspective.

The three distinct methods, when treated individually, tend to produce a partial view of a food system. When the three disciplines are combined for the study of a specific commodity, they provide a more complete understanding of the system.

Researchers, regardless of their discipline, are normally under financial and time constraints and must choose between being very exact, about very little (the case study approach), or taking a broad overview of the subject of interest.

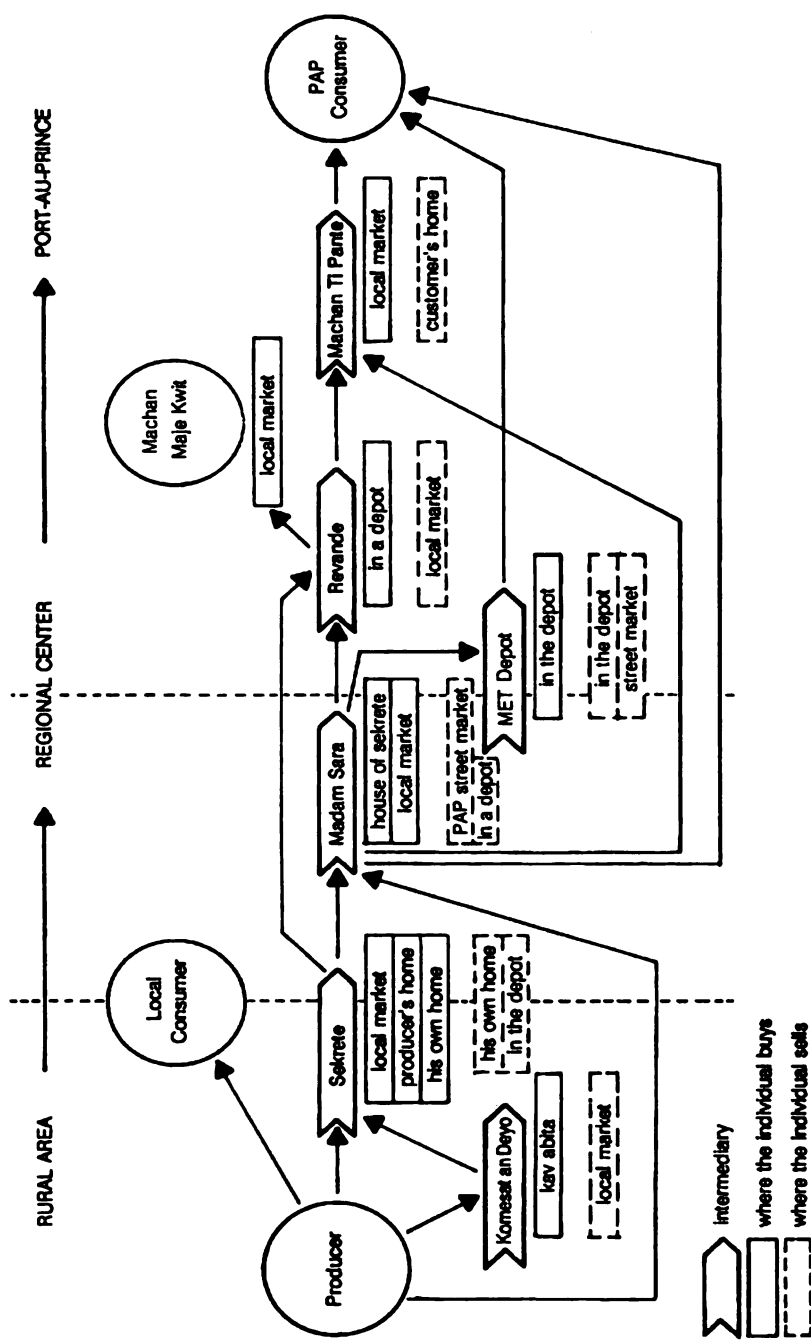
Researchers in all disciplines tend to ask the same basic questions:

**Who? What? How? When? Where? Why? and How much?**

However, the interpretations of the answers to these questions tend to vary with the discipline. For example, in analyzing why farmers do not apply proper cultural practices, agronomists and economists may emphasize the lack of farmer knowledge or the lack of proper inputs while the social scientist may point to the farmers' tendency to minimize risk.

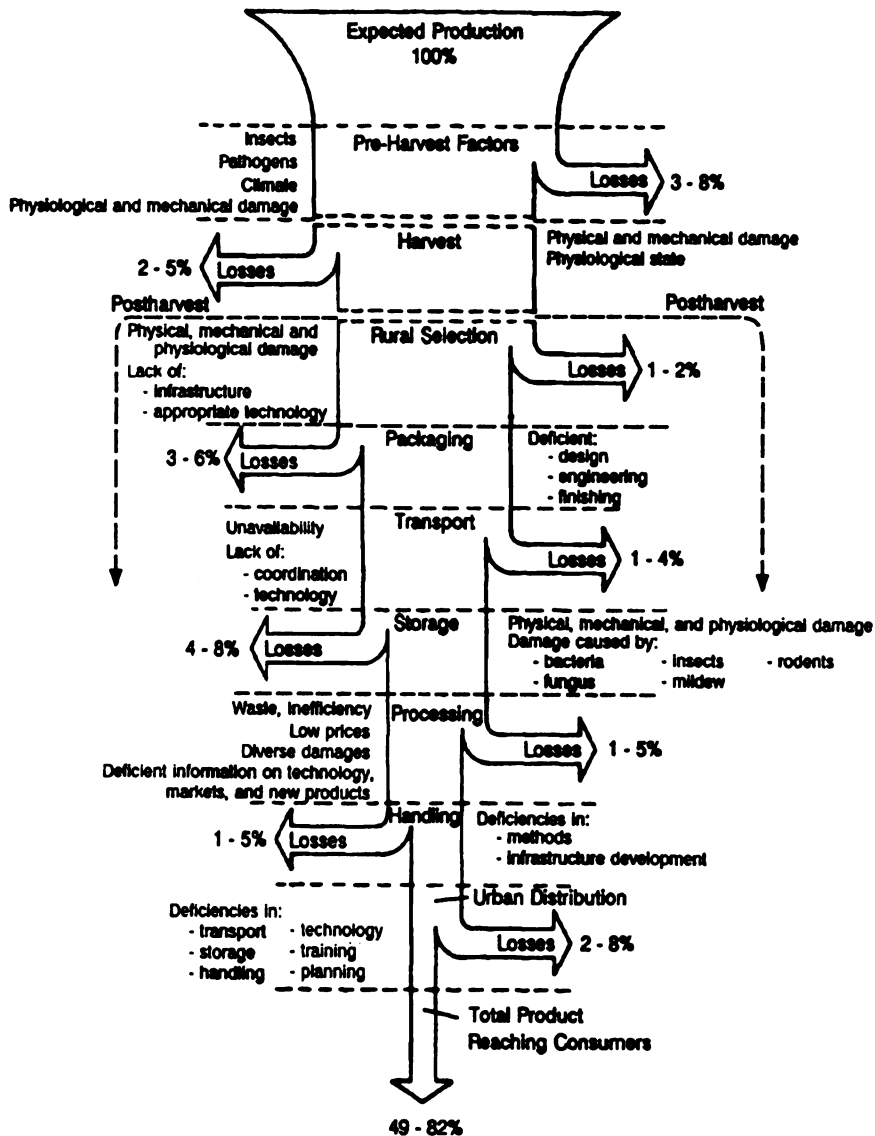
Solutions vary greatly depending upon which explanation is considered the cause of the problem. For example, in the first instance, the solution might call for training programs or the establishment of farm supply outlets; in the second case, emphasis might be given to reducing risk by improving market certainty.

Figure 2.1A: The movement of beans from producer to consumer in Haiti



Source: Murray and Alvarez, 1973, p. 19.

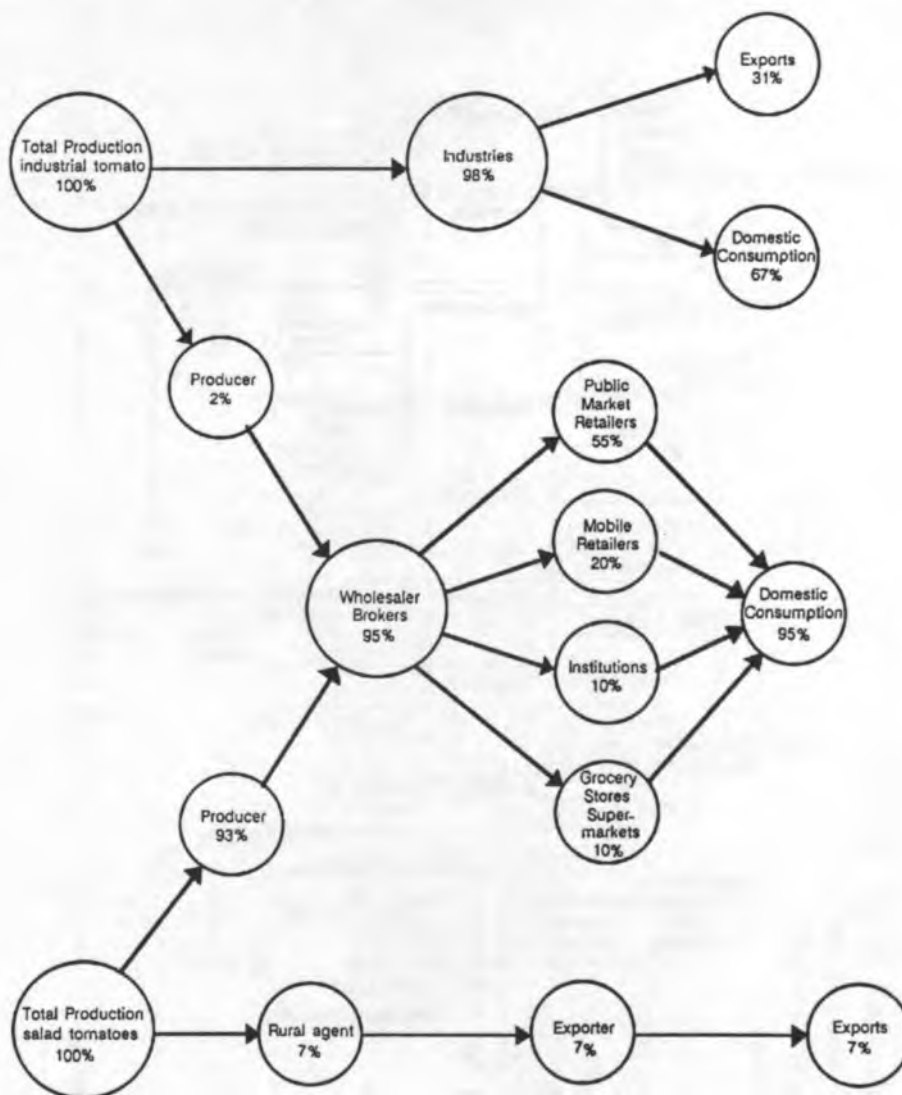
**Figure 2.1B: Steps in the postharvest system and percent losses at each step**



Source: Amezcuita and La Gra, 1979, p. 18.



**Figure 2.1C: Marketing channels for salad and industrial tomatoes in the Dominican Republic**



Source: Secretaría de Estado de Agricultura, 1977, p. 155.

Other examples could be cited showing how wrong decisions can be made even when such decisions are based on correct technical information. From their own experiences, readers can probably recall decisions based on partial analysis which led to what are referred to as "white elephants" – projects which have been partially or totally abandoned because of their ineffectiveness. Often the mistakes are due to decision making without adequate situational and problem analysis. In other cases the cause may be related to a particular discipline bias, too little participation from key disciplines or local politics.

While nearly all professionals and decision makers everywhere agree on the need for closer cooperation, effective coordination is more the exception than the rule. This may be due simply to a shortage of time or it may be a result of the ever present inter-institutional jealousy and competition among professionals. Coordination does occur, however, when each participant has something to gain by cooperating. By using a commodity systems approach to problem analysis, participants can be shown that interdisciplinary exchange and coordination will produce better results, thus benefitting the nation and all those associated with a successful project.

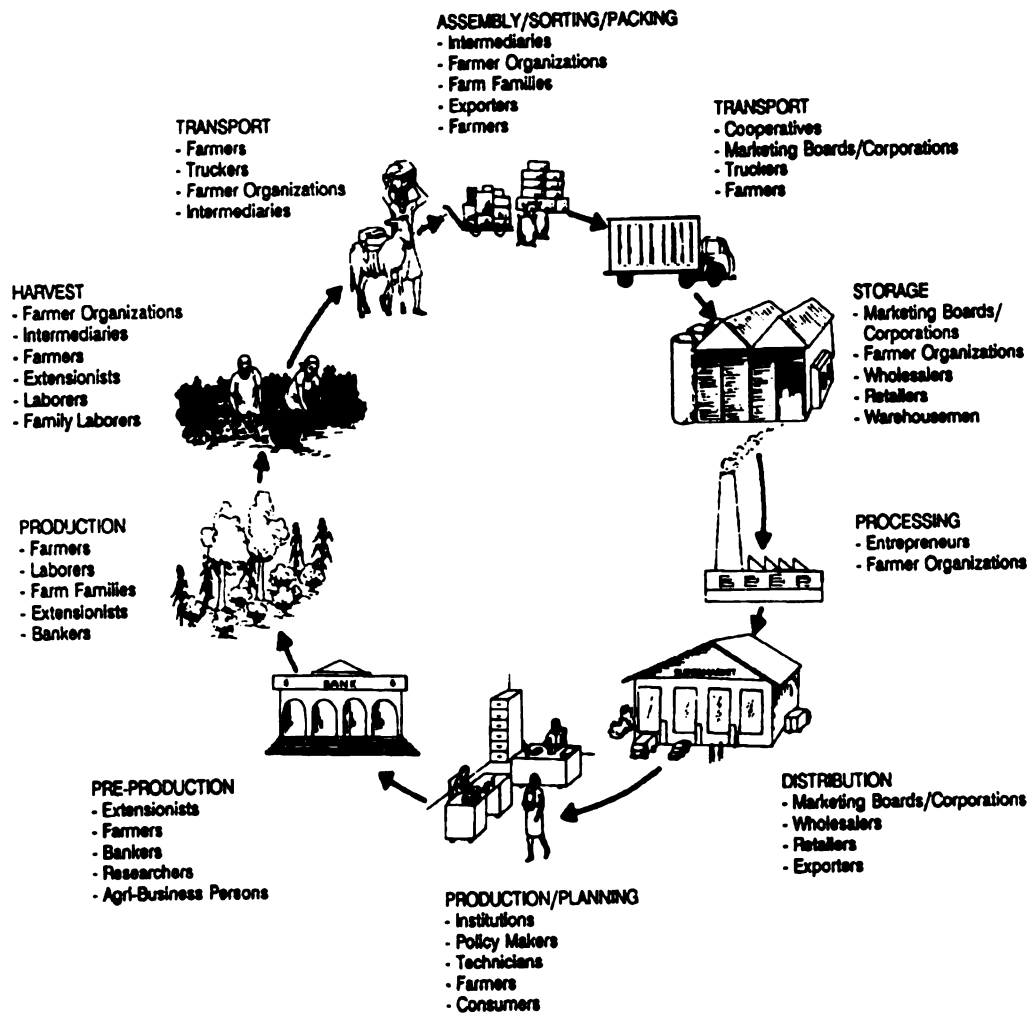
## **Interdependence of the components of a food system**

In Figure 2.2, the commodity system is visualized as a circle, extending from production planning (decision making) through production, harvest and distribution to consumers, thereby setting the stage for the next cycle of planning, production, etc. The components depicted in Figure 2.2 are applicable, in general, to all food crops, as well as livestock and fisheries. All of these stages are interdependent since the decisions and actions at one point will affect the quantity and quality of the commodity at subsequent points.

For all commodities there exists a period of information analysis and planning; a stage of preparation for production (preproduction); a period of production; a time for harvest; usually several occasions for transportation; stages where assembly, packaging or selection occurs; one or several periods of short or longer term storage; and a stage where the commodity is distributed to the final consumers. The only stage in Figure 2.2 which may be irrelevant for some commodities is processing.

The complexity of a commodity system will vary depending on such things as the level of development of the country, geographical location, crop, time of year, weather, road conditions, available technology, infrastructure, labor supply, distance to markets, market demand, and others. A systematic approach to evaluating all the components of a commodity system is presented in Chapter 3.

**Figure 2.2: Participants in the commodity system**



## **Participants in a commodity system**

In addition to identifying key points in a commodity system, Figure 2.2 also identifies the different types of participants functioning at the diverse points in most commodity systems. These include types of individuals such as farmers, truckers, and marketing intermediaries, and institutions such as ministries of agriculture, farmers' organizations, and marketing boards. Types of participants vary with the crop, country and particular circumstances.

While all participants make decisions which may affect the quality and quantity of a particular commodity in a food system, there is a basic difference between the two groups. **Decisions made by private sector participants are normally determined by that person's desire to secure economic gain. Decisions made by public sector participants are guided by a number of non-economic motives.** This is the principal explanation for the relatively high levels of economic efficiency in the handling of food by the private sector and the relatively low levels of efficiency when public sector institutions are directly involved in production, postharvest handling, and marketing of perishable produce.

In analyzing a particular commodity system, it is very important to obtain a clear understanding of the diverse participants in the food system and their respective roles and motivation. For example, decisions made by politicians to construct infrastructure to satisfy a local constituency may increase the costs of operation and postharvest food losses – e.g. a cold storage facility may be located in an area with insufficient production or in a poor location relative to the market. Ideally, higher costs (and lowered economic efficiency) can be justified based on social or other returns, but in many instances this is not the case.

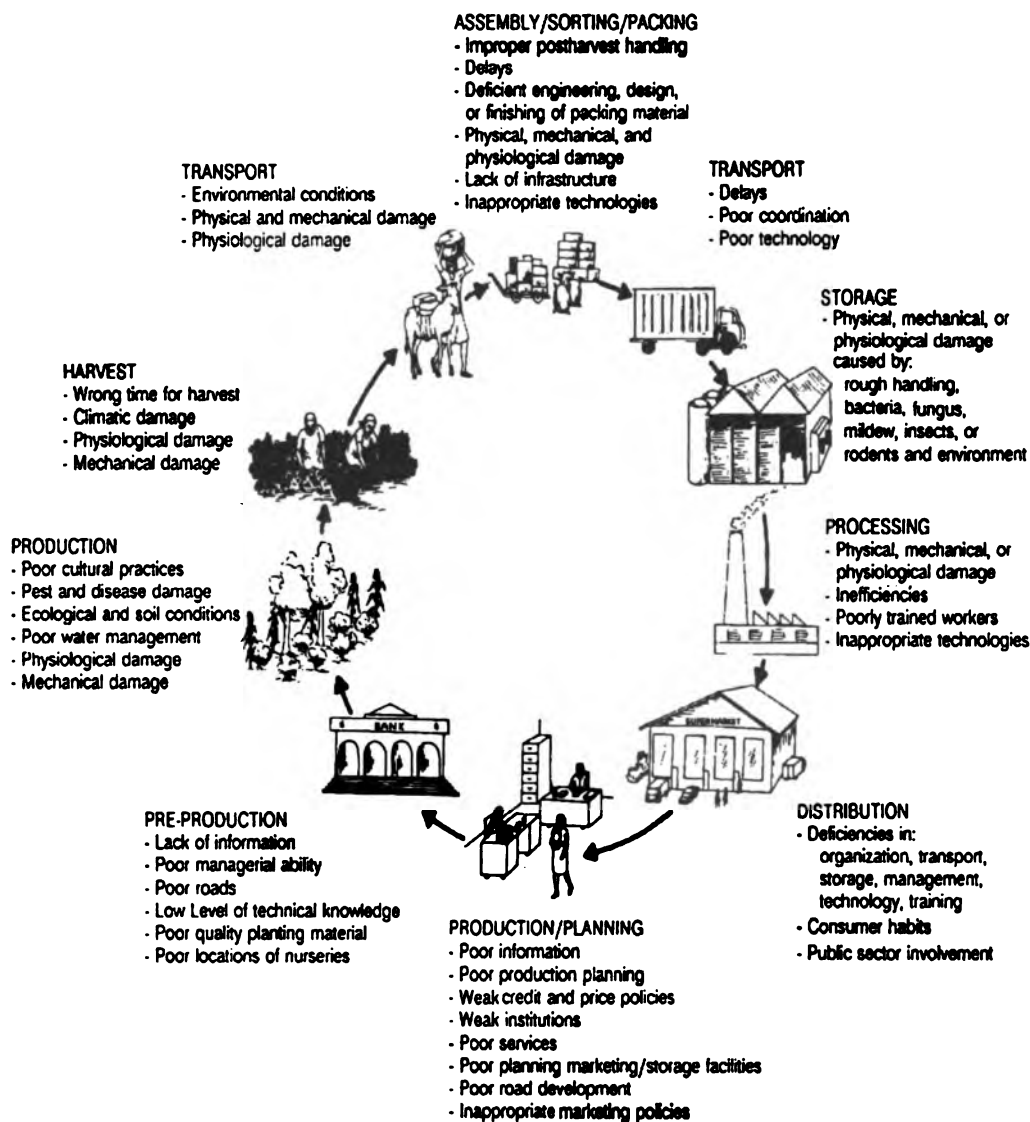
A private sector, profit-motivated decision can also contribute to inefficiencies in the total system. For example, decisions made by farmers or intermediaries to minimize investments in packaging materials may maximize their individual returns but result in increased postharvest losses at later points in the food system. In an ideal free market system, the costs of these losses would be passed back to the decision makers in the form of lower prices for their poorly packaged product; however, in many traditional marketing systems this does not occur.

## **Causes of food losses**

Some of the causes of pre- and postharvest losses at different points in the commodity system are indicated in Figure 2.3. While possible causes of food losses are infinite in number, some are more common than others.

Lack of information or poor planning decisions may lead to food losses. For example, agricultural policy which overstimulates production will cause gluts. This may lead to greater food and economic losses to diverse participants in the production/marketing system. In other instances, food losses may be the result of climatic conditions, physical

**Figure 2.3: Causes of pre- and postharvest losses at different points in the commodity system**



facilities, level of technology, cultural practices, prices of farm inputs, market prices, personal motivation, or many more. In most cases, with the exceptions of climatic conditions and acts of God (weather, catastrophes), the causes of pre- and postharvest losses are directly or indirectly related to decisions made by one or more of the diverse participants in the food system.

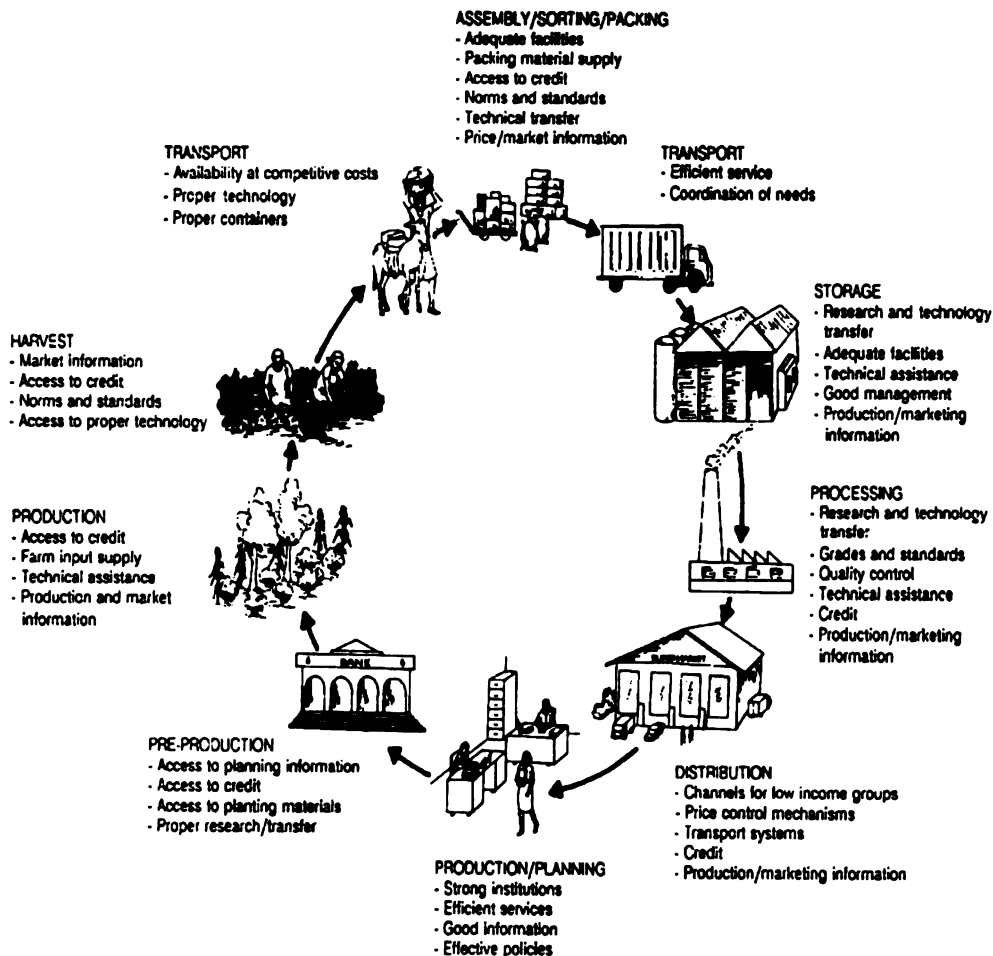
**It is important to stress how wrong decisions or problems occurring at an earlier stage in the food system may affect food availability, quality and cost at a later stage.** Some examples: A ministry of agriculture may introduce a specific cultivar which later proves unmarketable; poor quality planting material may result in low levels of productivity and/or poor product quality; poor cultural practices may have these same effects, as will poor harvesting practices; physical damage during harvest, transport or packaging will affect product quality further down the line, resulting in both physical and financial losses; physiological damage during storage will not only defeat the purpose for which storage was intended (extending the life and availability of the product) but will result in greater economic loss as a result of the storage costs.

### **Facilitating services**

To overcome constraints within the food system, both the public and private sectors must provide effective services which benefit farmers, farmer organizations, intermediaries, and other key participants who make the commodity system work. The efficiency of any commodity system is in direct relationship to the efficiency of the support services received by the diverse participants. Some important services which are required at each point of the commodity system are identified in Figure 2.4. While services such as information, technical assistance and credit are required at nearly each step in the food system, others may be specific to particular points in the food system, e.g. transportation, standards and quality control.

Figures 2.2, 2.3, and 2.4 thus show not only the interdependence of the diverse components of a food system but also demonstrate the usefulness of a multi-disciplinary, and preferably, multi-institutional approach in the identification and analysis of problems and alternative solutions.

**Figure 2.4: Facilitating services to overcome physical and economic losses at distinct points in the commodity system**



## **Food security: another dimension**

Increased production and marketing of basic foods as well as improvements in the system of distribution in third world countries has increased the physical availability of food to solvent consumers.

In spite of these improvements, the problem of hunger and malnutrition, far from being reduced over the past 25 years, has increased in many geographical areas. This is due, fundamentally, to low levels of income received by large percentages of the populations in many developing countries. Incomes are often so low that the food required to live at minimum health levels cannot be purchased, even when food is available in the marketplace.

The hunger and malnutrition suffered by the majority of low income populations constitute a chronic problem in Latin America, the Caribbean, Africa, and Asia. In light of this harsh reality, it is important that the fight against hunger and malnutrition concentrate on guaranteeing all individuals **real access to basic foods**. With this objective, the economic ability to purchase food must be given equal importance to that of an adequate physical supply and availability in consumer markets.

Under this concept of food security, any analysis of commodity systems should consider not only the efficiencies of production and distribution but also the real capacity of the different segments of the population to acquire and make proper use of basic food. Therefore, in addition to the more common evaluation of economic costs and benefits, more attention must be given to the social costs and benefits of alternative policies, actions and projects.

At the present time, nearly all developing countries lack systematic information which would allow decision makers to properly allocate resources among different crops, or between production and marketing systems, to insure that everyone has access to basic foods. Food security for all population segments is a goal which can only be considered in a multidisciplinary setting. The Commodity Systems Assessment Methodology presented in this document will generate information on selected commodity systems and organize it into a form which can be easily used by planners in their efforts to achieve national food security.





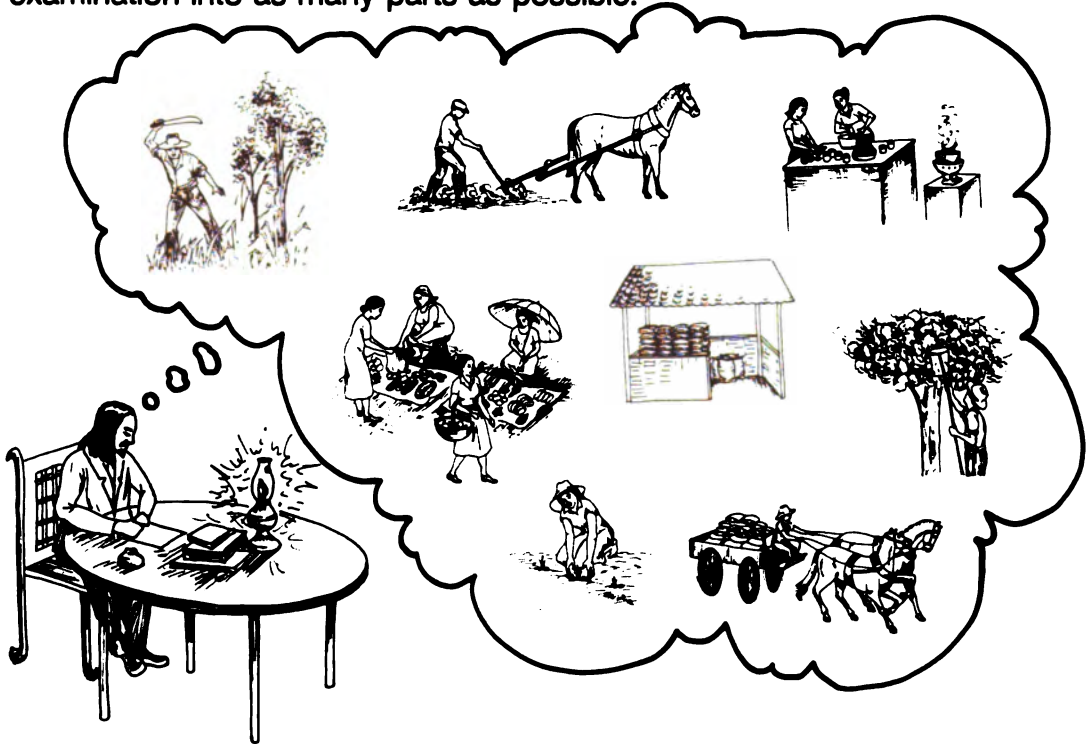
# CHAPTER 3

## Priority Components for Problem Analysis

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In order to overcome problems, their causes must first be identified. An economist dwelling upon costs and prices is likely to overlook problems of a technical or social nature. Likewise, the technologist and sociologist may fail to recognize important economic factors. A clear identification of problems requires looking in the right places and asking the right questions. If all the relevant disciplinary areas are investigated, then the important problems can probably be identified and ranked in some causal order.

As long ago as the mid-eighteenth century, the philosopher Rene Descartes, in his Discourse on Method (Descartes, 1975), pointed out that reality can only be understood by breaking it down into smaller and smaller parts. He suggested the need to divide each of the difficulties under examination into as many parts as possible.



**The application of existing methodologies, using an interdisciplinary team approach, will facilitate the identification of all relevant parts of any food system.**

Although the relative importance of the different components of a food system may vary with the crop, country and other factors, a large number are common for most commodities. In Figure 3.1, twenty-six components are identified. In some cases they are of an institutional nature and focus on participants such as ministries of agriculture, farmers and intermediaries, and the roles each play in the commodity system. In other instances, the components are of a functional nature, such as harvest, storage and transport, concentrating on processes or activities which take place at a particular point in a food system. In still other cases, the component may simply indicate a need to provide statistical or descriptive information which is considered important for the decision-making processes, e.g., statistics on production/marketing of the crop or crop environmental requirements.

The twenty-six components in Figure 3.1 are presented in a circle format. The center part of the circle is divided in half, identifying those components which fall into the preharvest versus the postharvest stages. Each half-circle is further sub-divided to indicate whether the components deal with

- a. pre-production (planning, policies and institutions),
- b. production,
- c. postharvest handling,
- d. transformation, marketing and distribution.

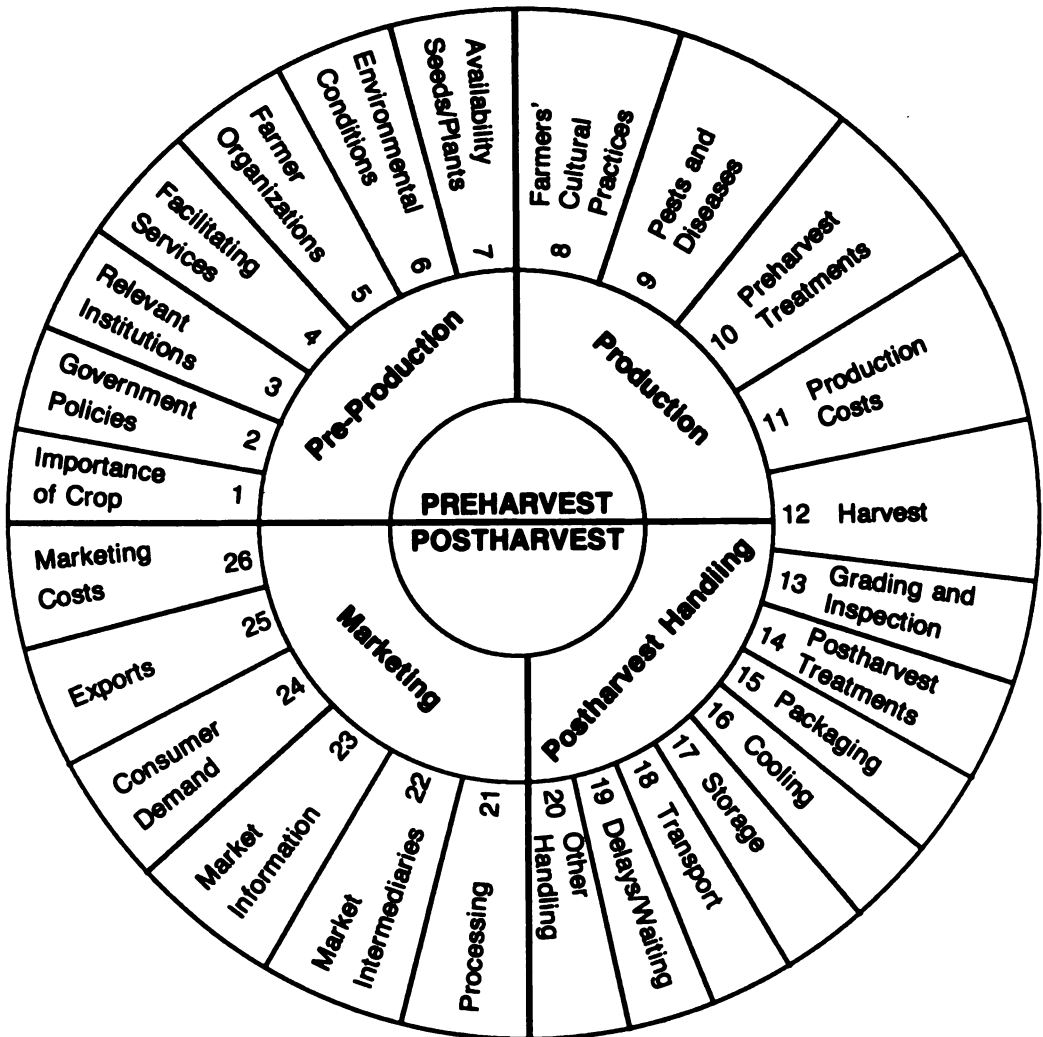
Each one of the twenty-six components is potentially important because the decisions or actions occurring at that point may affect production, productivity, quality or cost of the product at that or some later point in the food system.

However, **not all of the twenty-six components are relevant for each commodity system.** In some cases a commodity being produced in a particular geographical area may have a very short marketing channel and may bypass steps such as selection, packaging or storage. For example, industrial tomatoes may go directly from the farmer's field to the processing plant.

Components which may not be applicable to many crops include those such as preharvest treatments (component 10), delays (component 19), other operations (component 20), agro-processing (component 21), and exports (component 25). The other components should be relevant for nearly all commodity systems. On the other hand, it is expected that researchers of a specific commodity in a particular country may identify more than 26 relevant components. The 26 components included here are indicative, but not all encompassing.

The remainder of this chapter presents a short description of each of the twenty-six components. In each case the importance of the particular component and the type of information to be collected are described. An analysis of each relevant component for a

**Figure 3.1: Principal components for a commodity systems assessment**



particular commodity system will permit a good understanding of what takes place at each point in the food system and how production, productivity, product, quality, or cost may be affected.

For the researcher interested in designing a questionnaire to collect information on one or more of the twenty-six components, guideline questionnaires are provided in Annex 1. It should be stressed that these questionnaires are of a general nature and for reference purposes only. **Each questionnaire should be modified to meet specific needs of the country, the commodity, the geographic area, and the specific interests of the researcher and the institution s/he represents.**

As with the design of any questionnaire, the researcher must have a clear understanding of the type of output desired (tables, graphs, descriptive paragraphs, etc.) and how the information will be presented and utilized. It is only after the researcher has a clear understanding of **WHAT** information is required and **HOW** it will be presented that s/he should design the questionnaire to generate the desired results. In this way only useful information will be collected, thus minimizing time and expense.

Crops and livestock vary in their importance to the national economy with respect to their relative significance in the national diet, their nutritional value, and their ability to earn foreign exchange. Crops and livestock for domestic consumption and for export can be ranked from most to least important either by quantities produced, imported or exported, or the respective economic values of these quantities.

This section is intended to document the relative importance to the national economy of the commodity under study. The more important the commodity, the more likely it is to be taken into consideration in policy decisions and consequently allocated greater amounts of resources. Commodities of low volumes and values are less likely to be provided with the infrastructure and services required for efficient operations.

The relative importance of the commodity can be determined by analyzing production, imports, exports, and national/regional development plans.

Specific questions might relate to the following areas:\*

- a. Quantity and value of national and/or regional production by year.
- b. Total area harvested.
- c. Volumes and values of particular cultivars/varieties/types.
- d. Quantity and value of commodity imported and exported.
- e. Relative importance of the crop in national development plans.
- f. Ongoing or planned projects or plans which will affect the production and marketing of this commodity.
- g. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 01.

When the public sector establishes developmental policies for the agricultural sector, objectives are normally oriented to increase production and provide higher returns to farmers or reduce costs to consumers. Generally, the aim is to improve the welfare of both the rural and urban populations.

Since policy decisions are often made with biased or incomplete information, public sector policies sometimes negatively affect specific social groups or the overall economy. Such is the case when government promotes production without considering the effective market for the commodity, thus provoking gluts and reduced returns to farmers. Price policies can lead to decreased production – for example, fixing retail milk prices at near or below costs of production forces cutbacks on dairy herds and increased imports of low cost powdered milk. Although the consumer may benefit in price, the product may be of a lower quality and the national economy will lose foreign exchange. In other instances, implementation of a particular policy may actually lead to greater postharvest losses or introduce inefficiencies into the food system. For example, a government decision to undertake the marketing of perishable produce usually leads to increased food losses due to low levels of efficiency and poor management of storage facilities. On the other hand, tax concessions to farmers may stimulate production.

When analyzing public policy related to the food system, it is important to identify those which either positively or negatively affect production, price, income, and product quality.

Questions to be asked can include:\*

- a. What specific policy or set of policies affect production, price and product quality?
- b. What policies affect the internal marketing system?
- c. What policies affect imports and/or exports of the commodity?
- d. What policies affect consumption patterns?
- e. What taxes cause incentives or disincentives to production or marketing?
- f. What institutions are involved in determining the policies identified?
- g. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 02.

All countries have a variety of public and private sector institutions carrying out actions which have an impact upon pre- and postharvest losses of livestock and crops. The efficiency of the overall production and marketing system is often determined by the effectiveness of these institutions and the services they provide.

Because of the diversity of institutions, their internal complexity and their tendency to limit their activities to specialized areas, coordination and communication between them is normally lacking. Consequently, personnel from any one institution are unlikely to have a complete understanding of the whole commodity system.

The purpose of this section is to identify the principal institutions involved in preharvest and postharvest aspects of the commodity system under study and generate baseline information necessary to answer the following questions:\*

- a. What institutions are involved in actions which will affect the production, processing and marketing of the commodity or commodity group under study?
- b. What functions, services or other actions are undertaken by the respective institutions which may affect the quantity, quality and price of the commodity in question?
- c. Why are they undertaken?
- d. Where in the commodity system are these actions undertaken?
- e. When are they undertaken?
- f. How are they undertaken?
- g. With what resources are they undertaken?
  - human?
  - financial?
  - physical?
- h. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 03.



Productivity and product quality are often a function of the services available from public and/or private sector institutions. This is even more true in the case of small farmers with limited access to resources. If facilitating services (technical assistance, information, credit, farm inputs, and others) are adequate, yields and quality of products are likely to be high. When services are poor or nonexistent, yields and quality of produce are more likely to be low.

In this section, facilitating services offered by Institutions identified in Component 03 will be described and evaluated. The purpose is to determine their positive or negative impact upon the production, postharvest handling, and marketing of the commodity being studied.

Types of services to be considered include:

- construction and maintenance of farm-to-market roads,
- generation and transfer of technology,
- supply of planting material,
- supply of information for decision making,
- supply and access to credit,
- supply and access to farm inputs,
- availability of vehicles to transport produce,
- availability of technical assistance,
- availability of facilities for postharvest handling,
- and others.

For each type of service, questions should address such things as:\*

- a. Frequency and quality of service.
- b. Accessibility of the service to the intended recipients.
- c. Timeliness of the service.
- d. Duplication/competition between institutions.
- e. Users' opinions of the service.
- f. Impact of the service on production, harvest, postharvest handling, and distribution.
- g. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 04.

In developing countries, livestock and crops are often grown by farmers on very small plots of land. In the case of fruits, they may be produced in backyard orchards consisting of only a few trees. Sometimes only the surplus is marketed. A few head of small animals may be maintained as a form of savings. As a result of these production practices, a large number of products are marketed in very small volumes and with a wide range in quality. If modern technologies are used, unit costs of production may be very high and net returns to the farmer quite low.

One way for small farmers to overcome this situation, in an attempt to increase net economic returns, is to organize into groups, associations or cooperatives. **The assembly of relatively large volumes of a particular commodity by a group of farmers can lead to economies of scale, improved postharvest handling and therefore better quality produce, higher prices and increased net returns.**

It takes many years to organize and develop effective farmers' organizations with the capability of providing effective services to their members. In the meantime, their organizational weakness or non-existence can be a serious deterrent to development. Existing farmer organizations should be identified and their respective strengths and weaknesses evaluated.

Types of information to be collected should include:\*

- a. Names of farmers' organizations whose members produce, handle and/or market the commodity being studied.
- b. Quality of management and administration of the organization.
- c. Level of participation of members.
- d. Types, frequency and quality of services offered.
- e. Types of commodities handled.
- f. Experiences in production, marketing and processing.
- g. Availability of human, financial and physical resources.
- h. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 05.

## **ENVIRONMENTAL REQUIREMENTS AND CONSTRAINTS**

## **COMPONENT 06**

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The natural resources and environment of the production area affect not only the quantity of yields but also the quality of the produce and the time of maturity. Too much or too little rain, too high or too low temperatures, strong winds, steep slopes, or other negative environmental factors can significantly affect the quantity and quality of agricultural produce.

**Since product quality normally cannot be improved after harvest, it is important to initiate the postharvest process with the highest quality possible. If low yields and/or low quality are due to particular environmental conditions, it is important to identify these constraints as early as possible. This will help to assure a more effective allocation of resources, reducing the risks of constructing roads or providing other infrastructure which may be infrequently used. The object is to avoid unnecessary costs which reduce the product's competitiveness.**

Certain countries or regions of a country may have a comparative advantage due to their natural environment. Such is the case of Chile and New Zealand which can produce fruit and vegetables during the European and North American winters.

The types of information pertaining to the geographical area of production include:\*

- a. Soil conditions and fertility.
- b. Amount and distribution of rainfall.
- c. Period of drought.
- d. Water logging.
- e. Danger of flooding during the growing season.
- f. Risk of damage caused by strong winds.
- g. Average relative humidity.
- h. Temperatures (high, average, low).
- i. Slope of the land.
- j. Altitude.
- k. Comparative advantages of environment as far as market opportunities are concerned.
- l. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 06.

The production of quality produce requires access to quality genetic material (seeds, plants, tubers, livestock) at the farm level. When farmers cannot obtain quality genetic material they tend to utilize whatever is available. This often leads to the production of commodities of inherently poor quality, or even the wrong variety for the market. Proper genetic material can generate increased productivity and higher net incomes for farmers and intermediaries.

Sources of seeds and genetic material should be identified so the evaluators can determine whether the quantity or quality is a constraint to production. **If access to seeds and genetic material is determined to be a serious constraint, it may indicate the need for improving sources, delivery systems or for conducting research and development of improved planting materials.**

The type of information to collect in this section relates to the following areas:\*

- a. Sources of seeds, planting materials or livestock.
- b. Freedom of seeds and genetic material from pests and diseases.
- c. Farmers' access to seeds and genetic materials.
- d. Overall quality of seeds and genetic material.
- e. Farmers' and extension agents' opinions of seeds and genetic materials.
- f. Government's role and efficiency in supply of seeds and genetic materials.
- g. Cost of seeds and genetic material to farmers.
- h. Advantages of alternative seeds, planting materials and genetic stock.
- i. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 07.

Since product quality normally cannot be improved after the production phase, it is necessary to stimulate and train farmers to produce the best quality within their means. **One of the principal causes of low quality produce is the farmer's poor cultural practices.** In many cases poor cultural practices are a reflection of the farmer's attempt to minimize risks and farm inputs. For example, due to market uncertainties, the farmer may reduce production costs by declining to use certain chemicals and other farm inputs. In other cases poor cultural practices may simply be the result of a lack of information or lack of access to appropriate technologies.

The commodity system evaluators should identify and describe the typical cultural practices used by most farmers and how they affect both product quality and productivity.

Types of information to consider are:\*

- a. Farmers' motives for growing the crop.
- b. Source and quality of seeds, planting material or livestock.
- c. Type of farming systems used.
- d. Cultural practices with respect to:
  - soil preparation,
  - planting techniques,
  - fertilization,
  - irrigation,
  - use of labor,
  - use of machinery,
  - weed control,
  - pest control,
  - disease control,
  - pruning,
  - shade control,
  - others.
- e. Harvesting techniques and tools used.
- f. Postharvest handling practices.
- g. Decision making process for harvest and marketing of produce.
- h. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 08.

Most agricultural crops are affected by pest and disease problems at some point in the food system, either prior to harvest or during the postharvest stage. In some cases these pests and diseases may be economically insignificant, while in others they may cause so much damage that the profitability of the crop is affected. In some instances the pests and diseases may be of quarantine significance, thus prohibiting the commodity from crossing borders. This reduces the potential for earning foreign exchange.

The purpose of this section is to identify pests and diseases affecting the crop being studied and to determine whether or not they are, or could become, of economic or quarantine significance.

Types of information to be considered includes:\*

- a. Identification of all economically significant pests and diseases which affect the productivity and/or quality of the commodity, in order of importance.
- b. Identification of pests and/or diseases of quarantine significance, by country.
- c. Identification and analysis or description of the type of damage done to the commodity by each pest/disease, with respect to:
  - quantity,
  - quality,
  - value,
  - consumer demand.
- d. Identification and analysis of alternative methods and costs of control (preharvest and postharvest) of each pest and/or disease.
- e. Identification of potential marketing constraints caused by chemical controls (toxic residues).
- f. Identification of potential constraints to the introduction of an effective control program.
- g. Description of ongoing or planned actions or projects to deal with constraints.
- h. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 09.

Preharvest treatments, either physical or chemical, may have a favorable or unfavorable impact upon postharvest quality. Examples of treatments include such things as:

- a. The gathering of cauliflower leaves around the head prior to harvest to prevent yellowing.
- b. Twisting of cabbage (90 degrees) before harvest to break some roots and induce wilting – this causes the wrapper leaves to tighten, thereby helping to protect head during postharvest.
- c. Wrapping fruit while still on tree, e.g. apples, carambola (star fruit) and bananas may be wrapped with paper or plastic to prevent attack from birds, fruit flies and other pests or to enhance ripening or fruit color.
- d. Chemical treatments while in the field to extend postharvest storage life or enhance marketability, e.g., applying sprout inhibitors on potatoes or ethrel on apples to increase the red color.

In some cases chemical application can lead to postharvest residues which create marketing constraints.

All physical and chemical preharvest treatments which affect the postharvest quality of the commodity under study should be identified.

The information to be collected includes:\*

- a. Identification and description of physical and chemical treatments used on the commodity under study.
- b. Description of why, when and where each action is taken.
- c. Identification of the type of participant carrying out the action.
- d. Description of what impact the action has on:
  - quantity of production,
  - quality of production,
  - storage life,
  - marketability,
  - price of product.
- e. Identification of possible alternative treatments.
- f. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 10.

Farming anywhere in the world is a high risk enterprise. For small farmers growing horticultural crops it is particularly risky. Failure to earn adequate returns from their efforts will directly affect their family's nutrition, health, and education, in addition to their future efforts to continue farming. If the farming business lacks economic incentives, the farmers' children and perhaps the farmer himself will migrate to urban areas searching for a better way of life.

The small producer of horticultural crops is cost conscious and will try to minimize his risks, especially when markets are uncertain. Minimizing costs affects the quality and quantity of produce. For example, if the farmer reduces his costs by restricting his use of fertilizers, he may reduce yields and affect produce size or flavor. Minimizing marketing costs usually results in poor packaging which leads to undesirable bruising of the product. Production and marketing costs vary greatly with farm type and size.

A complete analysis should consider labor, material, managerial inputs, and their relations in any given commodity system. For example, the organic farmer reduces input costs for chemicals while increasing costs for labor and management. An analysis of all production and marketing costs can provide useful insights into possible causes of low yields and/or low quality of produce. It may also demonstrate the economic advantages and disadvantages of using different inputs and different production/marketing strategies.

The type of information to be collected includes:\*

- a. Establishment of assumptions regarding the size and operations of a typical farm.
- b. Identification of all types of production and marketing costs.
- c. Quantification of the production and marketing costs for a representative group of farmers.
- d. Comparison of costs of production and marketing recommended by the technician and those actually incurred by the farmer.
- e. Analysis of advantages and disadvantages of using each type of input.
- f. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 11.



When and how a commodity is harvested affects its postharvest life. A product harvested too early, too late, or damaged by improper techniques or tools, will have a shortened postharvest life. Steep terrain in growing areas may cause further difficulty by increasing danger to laborers and increasing labor costs and damage to produce. Socio-economic conditions which permit or stimulate the stealing of food may also be contributing factors. For example, where food theft is common, farmers harvest their produce before the fruit reaches its proper stage of maturity. This practice affects produce quality.

The techniques used to harvest the commodity can be identified and described. The impact of harvesting practices on marketable produce can be indicated. The information to be collected should cover the following aspects:\*

- a. Identification of who harvests the crop.
- b. Description of what actually takes place during harvest.
- c. Description of why the crop is harvested in a particular manner.
- d. Identification of time when harvest takes place -- time of year and time of day.
- e. Evaluation of how the harvesting techniques may affect marketable quantity and quality.
- f. Determination of relationships between harvesting practices and postharvest losses.
- g. Identification of alternative methods for improving harvest techniques.
- h. Identification and description of the harvesting tools and their positive and negative aspects.
- i. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE see Annex 1, Component 12.

Selection, sizing, grading, and inspection are terms with closely related meanings. In all cases the objective is to categorize the product in such a way that it will satisfy the needs of intermediaries and/or the intended consumers. In many developing countries, consumers tend to be more concerned with price than quality. In these circumstances, selection, sizing or grading may be minimal and appear to the casual observer as nonexistent. However, even in low income countries, consumers do have minimum standards and the marketing systems have evolved over time to satisfy these requirements. Care should be taken to study the process and methods used in traditional marketing systems to satisfy consumer demand, e.g., semi-processing in the marketplace (shelling peas, peeling, slicing and bagging fruit). Likewise it is important to understand marketing strategies adopted by wholesalers or retailers, e.g., to minimize their postharvest losses, marketers may mix produce of different sizes and quality and sell to consumers by the pile or bunch.

In more developed countries, higher incomes allow consumers to demand higher quality produce. Consequently, more attention and expense is given to the act of selection, sizing and grading.

In some cases, buyers (domestic or international) send inspectors to assure that the produce meets the desired standards. This is a common practice of the Japanese, for instance, when they purchase tropical fruit from Southeast Asia. In this case they carry out inspection to assure that the fruit is free from quarantine pests as well as to assure the high quality demanded by Japanese consumers. The USA maintains similar types of control through their Animal and Plant Health Inspection Service (APHIS) in countries which request pre-inspection.

The more selection, sizing, grading, and inspection which takes place, the higher the cost of the commodity to the consumer. Due to high standards in export markets, large percentages of produce are often selected out or rejected prior to shipping. The lower grade produce is then sold on the domestic market, fed to animals or becomes a postharvest loss.

This section identifies where selection, sizing, grading, and inspection occur in the commodity system and describes what takes place. The type of information gathered should include:\*

- a. Identification of points in the commodity system where some form of grading, selection, classification, or inspection takes place.
- b. Description of the actions carried out at each point.
- c. Identification of who is responsible for each action.
- d. Identification of when each action is carried out.
- e. Description of where each action is carried out.
- f. Analysis of why the action is carried out as it is.
- g. Identification of the tools, equipment, other material and laborers used in carrying out the actions.
- h. Identification of what criteria are used in carrying out the actions.
- i. Description of the relationships between the respective actions and market requirements.
- j. Indication of the magnitude of postharvest losses at diverse points in the system. (It is relatively easy to quantify the volume of losses during selection, sizing, grading and inspection by analyzing quantiles of each grade/size and volumes discarded at the end of operations during a specific time period.)

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 13.

# **POSTHARVEST CHEMICAL AND PHYSICAL TREATMENT**

## **COMPONENT 14**

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Horticultural crops are frequently treated chemically and/or physically during the postharvest stage as a means of extending shelf life or making the product more attractive to the consumer. As examples, calcium carbonate may be applied to the stem of cabbage to offset stem rot, ethylene gas may be used to enhance ripening of bananas, or dithane may be applied to root crops to control fungus. In treatment for fungal control, the chemical may be applied at the same time as the product is being washed.

Physical treatments include such actions as curing potatoes in the field, washing root crops, waxing citrus, and bagging.

The types of chemical and physical treatments applied during the postharvest stage will be identified and described. The information to be collected should include the following:\*

- a. Identification of physical and chemical treatments and chemicals used.
- b. Purpose of each type of treatment and how the quality of the commodity is affected.
- c. Identification of where and when in the postharvest system the treatment takes place.
- d. Description of how the treatment is carried out and what is actually done to the commodity.
- e. Identification of who carries out the treatment.
- f. Identification and description of the tools, equipment, materials and labor used in the treatment.
- g. Identification of the cost of each treatment in time and cash.
- h. Identification of the potential impact of the treatment in the marketplace (how will consumers react?).
- i. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 14.

Packaging protects the product during postharvest handling and divides the product into more manageable units. It also improves the presentation of the product so it will be more acceptable to middlemen and consumers. Packaging is necessary for nearly all types of produce. As general rules: **the more perishable the commodity, the greater the importance of the quality of the package, and the more sophisticated the market, the more important the presentation of the package.**

The characteristics of packaging materials, methods used in packaging, and the relevant costs should be determined. Types of information should include:\*

- a. Identification of the points in the postharvest system where packaging or repackaging occurs.
- b. Determination of the specific purpose of packaging.
- c. Identification of who undertakes the packaging and where it takes place.
- d. Description of what is done to the product during the packaging process and how it is carried out.
- e. Characteristics of the package: size, strength, presentation, color, label, availability, cost.
- f. Minimum packaging requirements on local and international markets.
- g. Number of times package can be used and procedure for recycling.
- h. Ownership of the package, if the package is reusable.
- i. Labor costs associated with the use of the package.
- j. Information on reuse of package.
- k. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 15.

The temperature of fruits and vegetables at harvest is close to ambient air temperature, which may be as high as 40 degrees celsius. At this temperature the respiration rate of the product is usually extremely high. The higher the rate of respiration the shorter the postharvest life of the commodity.

It is often good practice to harvest early in the morning to take advantage of lower prevailing temperatures. However, early morning harvesting may not be feasible or temperatures may not be as low as desired. Rapid cooling (pre-cooling) of the product to the recommended storage temperature will prolong its postharvest life. Pre-cooling particularly benefits highly perishable produce such as strawberries and leafy vegetables.

Pre-cooling is not commonly carried out in most developing countries. Cooling for holding purposes at airports, seaports and marketing terminals is a more common practice. However, poor administration and operation of these installations frequently results in high postharvest losses. The high costs of operation of cold storage facilities often results in their being abandoned. Many intermediaries prefer the use of refrigerated containers which are mobile and less costly to operate.

Information relevant to cooling which should be collected includes:\*

- a. Identification of the type of cooling presently carried out (pre-cooling, temporary storage, maintenance storage).
- b. Description of the facilities, method(s) and equipment used in the cooling process.
- c. Identification of locations where cooling is carried out.
- d. Identification of who operates the cooling facilities.
- e. Determination of the effectiveness of the system for removing field heat and extending shelf life.
- f. Analysis of cool-chain: does product remain in controlled temperature environment until it reaches the market?
- g. Costs and benefits of operating each cooling system.
- h. Feasibility of introducing cooling systems.
- i. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 16.

To store a product and maintain its quality, efforts must be made to control the storage environment. In general, the temperature and humidity of air around the product are the major factors which contribute to maintenance of product quality. Under optimum temperature and humidity conditions, storage life will be extended to the maximum. Concentrations of the gases oxygen, carbon dioxide, and ethylene in the storage atmosphere can affect the storage life of the product. Certain combinations can stimulate the ripening process.

A complete assessment of storage will identify those occasions when the product is stored as well as the conditions and general characteristics of the storage environment. Storage takes place when the product is intentionally placed in a specific location to protect it from adverse conditions, or while it is awaiting sale.

The information to be collected should include:\*

- a. Identification of points in the postharvest system where storage takes place.
- b. Description of the type of storage and reasons for storing the commodity.
- c. Characteristics of the storage facility:
  - facilities and equipment (types and level of maintenance),
  - humidity range and methods of control,
  - temperature range and methods of control,
  - atmosphere of storage facility and control methods,
  - danger of contamination by toxic materials,
  - others.
- d. Normal duration of the product in each type of storage.
- e. Ownership of storage facilities.
- f. Persons responsible for storage operations.
- g. Method of operation of storage facilities.
- h. Type of damage caused to the commodity while in storage.
- i. Added costs to commodity price due to storage.
- j. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 17.

Produce, to be useful to consumers, must reach the diverse markets on a timely basis. As the commodity moves through the food system it may be transported by humans, animals, airplanes, boats, or ground vehicles. It may be transported many times and by different methods from remote rural farms. It may be carried by humans, animals, animal drawn carts or boats; from a rural assembly point, it may be transported by motorized vehicle to a regional or central wholesale market; from farms or from central assembly points it may be carried by airplane, train or ship to foreign markets. Each time the product is transported from one point to another it is handled, delayed, vibrated, placed under pressure, and subjected to a variety of conditions which may negatively affect the quality of the commodity and therefore its marketability.

Types of transportation used and points in the postharvest system where transport occurs should be identified and described.

Information to be collected should include:\*

- a. Identification of the diverse points in the commodity system where transportation occurs, as well as the participants, and methods used.
- b. Description of the transportation process and the conditions during transport: enclosures, temperature, humidity, height of stacking, nearness of produce to heat source (e.g., engines, air circulation), time of day and others.
- c. Distance (kilometers or miles) and duration (hours, days, minutes) of the transport.
- d. Description of the type of damage which occurs to the commodity during transport and expected causes.
- e. Identification of the costs added to the value of the commodity as a result of transportation at different points.
- f. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 18.



As any product moves through the food system towards its final destination – the consumer – it undergoes periods of delay or waiting. For example, products may be forced to wait to be loaded, unloaded, or for paperwork at a border crossing.

Delays occur when conditions neither permit nor require the immediate execution of the next step in the postharvest system. This is not to be confused with a storage or processing operation.

While a product is undergoing a delay or is waiting, it may be adversely affected by temperature, humidity or other atmospheric conditions. The commodity may absorb undesirable odors, be subjected to direct sunlight, or in some other way be adversely affected by temporary conditions or circumstances, thus lowering product quality. In some cases the delays are natural steps in the postharvest system, e.g., tomatoes in a pile at the edge of the field awaiting the next step (packaging, grading). In other cases the delays may be for socio-economic or political reasons, e.g., customs personnel may delay produce at a port or border until papers are completed and "informal taxes" paid.

The information to be collected identifies where delays or waiting occur and why, and should include:\*

- a. Points in postharvest system where delays and waiting occur.
- b. Characteristics of each delay:
  - cause of the delay,
  - person or thing responsible for causing delay,
  - length of the delay,
  - environmental conditions at point of delay.
- c. Normal conditions of the commodity at the point of delay.
- d. Damage done to commodity as a result of the delay and cause of the damage:
  - In terms of quality,
  - In terms of quantity.
- e. Alternatives for reducing the delays or waiting period.
- f. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 19.

As a product moves between the points of harvest and consumption, it passes through a series of steps which may be referred to as postharvest processes by the technologist or marketing functions (storage, transport, packaging, etc.) by the agricultural economist. Since it is not possible to include references to all the potential operations that may occur between harvest and consumption, "other operations" is included here as a catch-all.

The operations may be sub-divided into two types. Major operations are those of considerable significance in the particular commodity system -- for example, the field curing of onions. Minor operations are important but to a lesser degree -- for example, the act of placing a product in a container during harvest, unloading the product from the harvest container, loading a package onto a vehicle, or off-loading. These minor operations are usually conducted rapidly and at low cost but in some instances may be significant in increasing or reducing damage to a commodity.

This section identifies significant major and minor operations which may affect postharvest losses in the commodity system but are not included in any other section of the study.

The data collector should analyze the movement of the commodity from the point of harvest to the point of retail and list all operations which occur within the system and the point in the system where they take place.

The type of information to be collected includes the following:\*

- a. Identification of the specific operations and the points in the postharvest system where these operations occur.
- b. Description of each operation.
- c. Identification of who executes the operation and where and when it is carried out.
- d. Details as to why it is carried out in the present manner.
- e. Determination of what impact this operation may have on product availability and quality.
- f. Evaluation of the costs each operation adds to the value of the commodity.

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 20.

Agroprocessing includes any operation which chemically and/or physically changes the character of the raw product for the purpose of extending its shelf-life or converting the product into a more marketable form. The processing of food tends to stop or delay degradation of the commodity. Processing or semi-processing is a useful way to reduce postharvest losses. Agroprocessing is also an important method for increasing the salability of products which cannot compete in fresh markets

Agroprocessing occurs at many different scales of operation, e.g., grinding corn into flour in the marketplace; processing fruits into jams, candy and preserves at home; cottage-scale canning, drying and packaging; and industrial plant processing of fruits and vegetables.

This section will identify all types of processing (or potential for agroprocessing) undertaken and their most relevant characteristics. Types of information to be collected include:\*

- a. Identification of the types of agroprocessing or semi-processing the commodity undergoes and the point in the postharvest system where they occur.
- b. Geographical location of the agro-processing facilities.
- c. Description of the process which takes place.
- d. Identification and description of the market for which the commodity is processed.
- e. Participants involved in the processing function and their level of expertise.
- f. The dates when agroprocessing takes place.
- g. Added value and additional costs as a result of processing.
- h. Impact of processing on postharvest losses and markets:
  - reduction in losses,
  - increase in earnings to farmers,
  - benefits to consumers.
- i. Problems of supply of raw material.
- j. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 21.

In the marketing of any one commodity there are a wide variety of intermediaries – for example, local traders, wholesalers, retailers and exporters. These can be further subdivided depending upon characteristics such as their size of operations, products handled and the consumer groups they serve. Since different consumer groups demand different levels of services, the functions and characteristics of intermediaries vary widely.

In this section it is necessary to identify the principal types of intermediaries involved in the marketing of the commodity under study and describe their respective operations within the marketing system. Their characteristics should be outlined with the purpose of better understanding the workings of the system and identifying those factors which may affect the quantity and quality of the commodity being traded.

The types of information to be collected include:\*

- a. Identification of the principal types of intermediaries.
- b. Description of the principal functions of each type of intermediary and where, when and how in the system the functions are carried out.
- c. Evaluation of the reasons why the functions are carried out in the present manner.
- d. Inventory of available equipment, facilities, infrastructure and other resources available and/or necessary for effective handling and marketing.
- e. Identification of the differences in quality, if any, of the commodity handled by the different types of intermediaries and the reasons for the differences.
- f. Deficiencies in the operations which affect the quality of the commodity or lead to losses in quantity of product.
- g. Determination of the principal factors affecting marketing costs.
- l. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 22.

The most important aspect of a commodity system is the price for which that product can be sold. When prices are very low farmers may not even bother to harvest their crops. They may plow them under or leave them on the tree. This occurs when farmers anticipate that the added costs of harvesting and marketing will be greater than the expected sales price. At the opposite extreme, when prices are high, farmers and intermediaries will be stimulated to use techniques to maintain quality and improve presentation, even at a high cost.

When prices are high, some consumers will accept lower quality for a lower price. On the other hand, when market prices are low, consumers demand higher quality. High levels of postharvest losses are sometimes caused indirectly by low market prices. An awareness of prices in the marketplace will provide useful insights on supply, demand, and possible causes of postharvest losses.

Market information includes more than just market prices, however. It is also important to have access to reliable information on existing and future supplies, as well as trends and conditions of consumer demand.

This section should identify types and sources of price and market information available and characterize that information.

Data to be gathered include:\*

- a. Price and market information available:
  - type of information available and source,
  - frequency, reliability and quality of information,
  - time period and markets covered,
  - types of analyses carried out.
- b. Availability of information on supply of commodity:
  - type of information and source,
  - frequency, reliability and quality of information.
- c. Analysis of price/market information:
  - seasonal price indices and high/low periods,
  - causes of price fluctuation,
  - relationships between price, quantity, quality and postharvest losses.
- d. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 23.

Demand for fresh and processed produce varies greatly by country and by consumer group within individual countries. Particular preferences are the result of diverse factors, such as income, time, customs and religion. Low income consumers tend to purchase lower quality produce, given their interest in minimizing costs. High income consumers are usually prepared to pay higher prices for better quality produce. As housewives' time becomes more valuable, demand increases for convenience products such as canned and fresh frozen produce. Social and religious customs can be major determinants for the type and quality of produce acceptable to consumer groups – for example, turkeys on Thanksgiving Day and hams for Easter in the USA market. Many religions have specific requirements for food preparation, specifying quality, content and timeliness of preparation.

In terms of the commodity being studied, it is important to be aware of the economic status and the cultural and religious preferences of the consumers and/or potential consumers.

Proposed changes in any food system, whether to reduce postharvest losses, introduce new technology or modify packaging, must be tested to determine whether the proposed changes will be acceptable or not to the consumer in economic, cultural and/or religious terms.

Consumers can be identified and classified into categories, and their respective preferences for the commodity characterized.

Types of information to be generated include:\*

- a. Identification of principal markets: international, regional and domestic.
- b. Identification of consumer groups within each important market: high, medium and low income; ethnic groups and religious groups.
- c. Identification of particular preferences for the commodity in question: cultivar, size, color, flavor, texture, maturity, acid/brix ratio, quality desired, packaging requirements, number units/package, others.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 24.

Developing countries are giving more and more attention to the export of non-traditional agricultural produce as a source of foreign exchange earnings. As production for exports increases, so does competition between developing countries for the same markets. In order to export effectively, the exporting country must be able to compete favorably with other suppliers in terms of quantity, quality, price, and continuity of supply. In other words, they must have both comparative and competitive advantages in the production and marketing of a specific commodity in a particular market.

To determine the feasibility of exporting the commodity in question, the types of information which should be collected include:\*

- a. Identification of the specific product cultivar or variety to be exported.
- b. Characteristics of the demand for a specific product in each potential market:
  - country of destination,
  - particular characteristics of the commodity desired by the importing country (size, weight, color, flavor, texture, maturity, type of package, weight of package, etc.),
  - quarantine restrictions,
  - religious/cultural/price preferences,
  - present sources of supply to each market,
  - tariff and non-tariff trade restrictions,
  - transportation problems to importing countries,
  - potential labor (off loading) problems of importing country and other constraints,
  - reliability of importer/brokerage services,
  - form in which payments will be made.
- c. Characteristics of supply of the particular cultivar:
  - availability of commodity over time,
  - volume of actual and potential exports,
  - ability to meet the demand requirements (quantity, quality, price, product characteristics, transportation),
  - pest/disease constraints,
  - postharvest handling constraints,
  - infrastructure constraints,
  - ability to compete favorably with other countries,
  - other constraints.
- d. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 25.

In marketing systems around the world large numbers of persons wholesale and retail a great variety of produce. One can observe produce in woven baskets, fertilizer bags, new or used cardboard boxes, homemade wooden boxes, waxed or styrofoam boxes with ice and produce without packaging of any sort. Transportation may be undertaken with human or animal power, vehicles, boats, airplanes, or other methods. The hectic pace of the market system gives casual observers the feeling of disorganization.

Within this apparent chaos is a certain structure based on the precept of minimization of costs. Just as farmers attempt to minimize their production costs under conditions of market uncertainty, marketing intermediaries tend to minimize their marketing costs. They use a wide range of marketing strategies which may include packing produce in the field, minimizing investments in packaging material, utilizing public or rented transportation, or maximizing the use of family labor.

Although technical advisers and consultants constantly recommend "improved packaging," "better facilities," "new equipment," and "improved methods," all intended to contribute to better organization and improved marketing efficiency, intermediaries often find that these suggestions are not cost effective.

**To determine the feasibility of introducing innovations into the marketing process, it is necessary to obtain real postharvest handling/marketing costs.**

This section should generate information to permit the identification and quantification of marketing costs. As examples:\*

- a. For each type of participant (farmer, intermediary, cooperative, marketing board, wholesaler, retailer, exporter, etc.) identify all types of marketing costs between the farm and final market.
- b. Quantify all marketing costs including such items as: transportation, packaging, labor, information, communication, paperwork, etc.
- c. Others to be determined.\*

\* For GUIDE QUESTIONNAIRE, see Annex 1, Component 26.





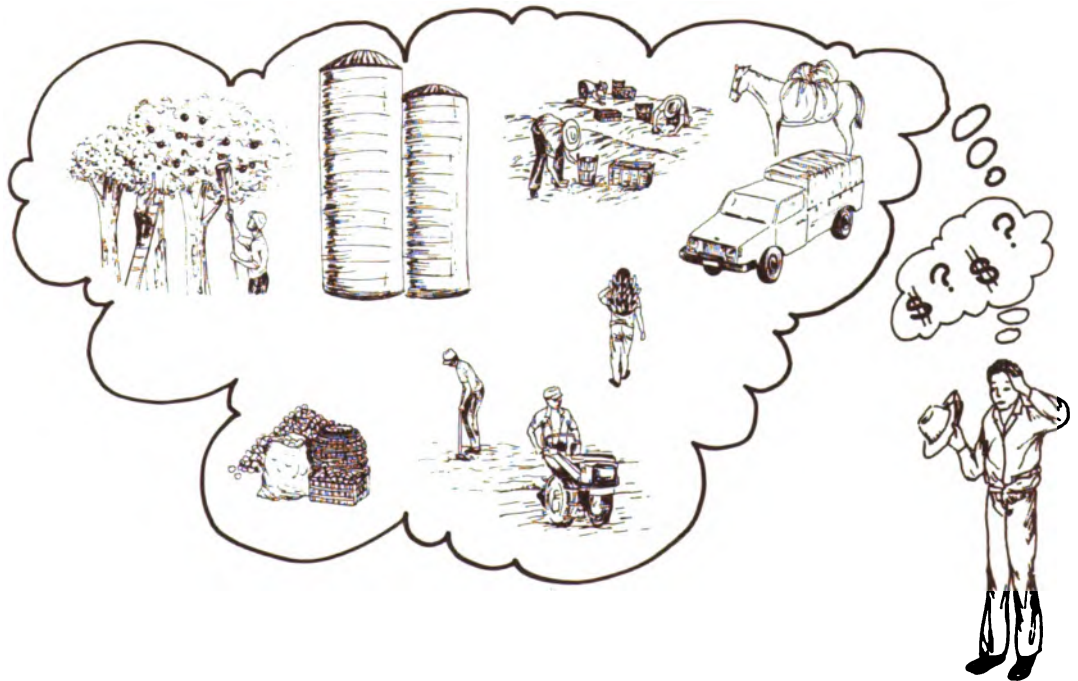
# CHAPTER 4

## Application of the Commodity Systems Assessment Methodology

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In the study of a commodity system, it is important to identify: (1) the inefficiencies within the system; (2) the factors adding costs to the product, and (3) cost effective solutions. To achieve this requires a comprehensive and systematic effort.

An ideal food system allows a product to move from the farm to consumer, arriving at the final destination at a price the consumer is willing to pay and with only minimal losses in quantity or quality. Losses which do occur in a food system indicate inefficiencies within that particular system. In many cases, the cost of reducing a loss -- e.g. using cold storage or introducing an improved container -- is greater than the value of the product saved by the innovation.



An underlying premise of this manual is that the **capacity to diagnose problems and identify solutions exists at the country level** whether that country is found in Africa, Asia, Latin America, or the Caribbean.

If society wants to improve the efficiency of existing food systems, it must increase the level of knowledge, technology and/or resources available to participants in the system and/or reduce the level of risk in production and marketing. For example, improved market opportunities may motivate farmers to improve product quality by investing more money in farm inputs and cultural practices. Facilitating the availability of financial resources to groups of farmers to permit the purchase of trucks, storage facilities and necessary equipment may also contribute to improved efficiency of commodity systems. Training of farmers and intermediaries in improved methods of management, production, postharvest handling, and marketing are examples of ways to increase the level of knowledge.

Any successful attempt to introduce innovations into a traditional commodity system will require an integrated effort between those who make the existing system work (farmers, traders, bankers, and truckers, among others) and those who would like to see the efficiency of the overall food systems improved (specialists, support institutions, politicians and other decision makers). Development of efficient commodity systems requires a joint effort between the private and public sectors.

To integrate the practical with the technical, or the private sector with the public sector, requires a detailed understanding of existing systems and how they operate. It requires the identification of the distinct actors in the system and an understanding of the role played by each. Generally, this type of information is not readily available in one document, one institution or the mind of one individual; however, it can be obtained and organized through a systematic effort.

The rest of Chapter 4 is intended to show how information on specific commodity systems can be collected and organized to identify major components, participants and priority constraints. This will facilitate the design of solutions and strategies oriented towards the improvement of food systems in third world countries. These solutions will be the focus of Chapter 5.

## **Formation of an Interdisciplinary Team**

Describing and analyzing a commodity food system is a team effort requiring input from specialists from all the disciplines. One of the first steps in organizing the study of a commodity system is therefore the formation of an **Interdisciplinary Team**. The exact make-up of this Team will vary with the type of commodity, the availability of human resources and support institutions, and the results desired from the study. This Team should include the specialists most knowledgeable about the diverse components of the particular commodity system – persons from both the private and public sectors, particularly farmers, intermediaries, transporters, agroprocessors, storage facility operators, extension agents, planners, and policy makers.

If the proposed solutions might require support from public sector institutions, then persons from such institutions should be included on the **Interdisciplinary Team**. In this way the study serves as in-service training for the individuals and may facilitate favorable decision making during the implementation process.

The team should be as few in number as possible but broad-based enough to cover all important components of the commodity system. If the group is too large for effective interchange, it may be sub-divided into two or more interdisciplinary teams which will meet from time to time to exchange knowledge and reach a consensus.

Another option that has worked successfully is to divide the group by discipline, allowing planners and economists to concentrate on **Preproduction**, agronomists, entomologists and other production-oriented people to work on **Production**, postharvest-related people to concentrate on **Postharvest**, and agricultural economists and marketing specialists to work on **Marketing and Distribution** (Malaysian Agricultural Research and Development Institute, 1988) . Each group works separately as a team but reports frequently to the others in plenary session. In this option, each subgroup is composed of persons from similar disciplines; therefore, their analyses are more likely to be carried out in greater depth.

All Team members should make reference to Components 01 to 26 in Chapter 3 and the corresponding guideline questionnaires in Annex 1. The twenty-six components of a commodity system presented in Figure 3.1 are divided into four quadrants: preproduction, production, postharvest, and marketing/distribution.

The presentation of the information generated by the **Interdisciplinary Team** can be both descriptive and quantitative—presented in the form of text, tables, graphs, figures and maps. The following sections on **Preproduction**, **Production**, **Postharvest Handling**, and **Marketing and Distribution** present the steps to be taken and tools to be used by the **Interdisciplinary Team(s)** during the Commodity Systems Assessment. In many instances, examples of how the information can be presented for best effect and analysis are given in Annexes 3 through 13.

## **Preproduction**

Most of the components described in this quadrant (Component 01-07, Figure 3.1) are applicable to more than one commodity and are of a more general nature than are the components of the remaining three sections, which tend to be crop specific.

In the description of the **Preproduction** phase it is important to assure that the **Interdisciplinary Team** includes specialists from central and agricultural planning units familiar with institutional structure and services from both public and private sectors. The **Team** should also include production specialists familiar with natural resources, environmental conditions and existing systems for the production and distribution of planting material.

One of the first types of analysis to be carried out by the **Interdisciplinary Team** is that regarding institutions. Given the often large number of public and private institutions involved in agriculture development activities, it is often a major achievement just to identify them and their respective divisions/units and functions relevant to the commodity under study. For each public sector institution pertinent to the production and marketing of the commodity of interest, a questionnaire similar to that shown in Annex 2-A should be completed.

In the case of private institutions, care should be taken to identify organizations of farmers and other support groups which affect the production, postharvest handling or marketing of the commodity being studied. Profiles of representative farmers' organizations can be prepared, including information on their backgrounds, organizational structures, characteristics of members, experiences, problems, and needs (see questionnaire format in Annex 2-B).

Information on development projects and activities which affect the commodity system and are sponsored by private sector groups or bilateral, regional, International, or other types of development organizations, should be collected using the guideline questionnaire presented in Annex 2-C.

The collected information can be summarized in table format as presented in the hypothetical examples of Tables 4.1 and 4.2. Details on the more relevant institutions and their programs, projects and actions can be described in supporting text.

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**Table 4.1: Major public sector institutions involved in planning, research, production, and marketing of commodity X in country Z**

MINISTRY	DEPARTMENT OR UNIT	RESPONSIBILITIES
Min. of Planning	Central Planning Unit	Central planning: formulate, monitor and evaluate projects
Min. of Agriculture	Ag. Planning Unit	Plan, formulate, and monitor projects. Provide support services
	Ag. Res. & Dev. Division	Research on production and postharvest constraints in fruits
	Department of Agriculture	Farm inputs, training, supervised credit
Min. of Education	Universities	Basic research on fruits and vegetables
	Division of Food Technology	Research, food processing, quality control, postharvest
Statutory body	Marketing Corporation	Provide services: information, packaging, technical assistance
National Development Bank		Provide credit for agricultural development

**Table 4.2: Private sector organizations, institutions, and associations involved in the production and/or marketing of commodity X in country Z**

NAME	FUNCTIONS/SERVICES/RESPONSIBILITIES
National Small Farmers Association	Provide services: farm input supply, credit, market information, transportation and marketing of produce
Lorry Operators Association	Transportation of agricultural commodities on a fee basis
Organization for Agricultural Development	Provide services to farmers: information, training of leaders in management, technical assistance in agricultural production, marketing, and project formulation
Food Processors Association	Processing of fruit products: fruit juice, citrus segments, fresh frozen fruit pulp
National Development Foundation	Management of credit programs, training in administration and accounting & technical assistance
Commodity Growers	Provide basic production and marketing services

Those members of the interdisciplinary Team specialized in production should analyze available information on existing and potential growing areas and compare it with the environmental requirements of the commodity being studied. (For an example, see Annex 10.) Needs for infrastructure in growing areas should be compared with what is already available. Any serious constraints related to roads, transport costs, or others should be identified.

The interdisciplinary Team should identify, analyze, and summarize existing policies, plans, programs, and projects which affect the commodity of interest. Relevant information on policies, plans, and projects may be presented as shown in Table 4.3 and described in more detail in a baseline document, including respective objectives and strategies. Likewise, existing tax and financial incentives should be identified and described, with a brief analysis of their present or expected impact on the specific commodity.

**Table 4.3: Policies, plans, programs, and projects which affect a commodity**

IMPACTING AREA	NATURE OF IMPACT
Production policy	Provides subsidies on farm inputs
Agro-processing policy	Promotes local agro-industry via import controls and low interest credit
Agricultural credit	No clear policy; access to credit difficult for small/medium size farmers
Farmer organization	Government policy does not favor or support organization of farmers. Co-operative law outdated
Marketing policy	Government controls on commodity X. Government distribution through statutory marketing corporation
National Plan	Clearly states that agriculture is to receive priority attention
Agricultural Plan	Commodity X to receive priority attention in development scheme
Commodity X Projects	500 acres of land to be developed for the production of commodity X

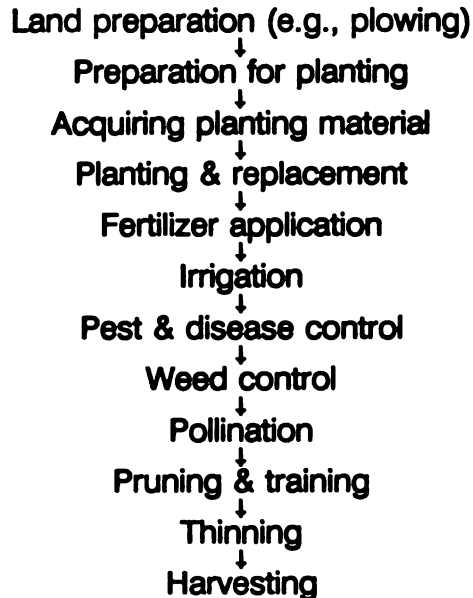
This analysis of **Preproduction** aspects should provide a first indication of feasibility of expanding and/or improving the production of the commodity. If, for example, the only feasible growing area requires a road which is not expected to be constructed for several years, it would be impractical to promote increased production of the commodity. Likewise, if planting material is a constraint, the production program may have to be delayed. If institutional weaknesses are detected, policy changes or institutional strengthening activities may be required as a pre-condition. If insurmountable problems are diagnosed at this stage, it may be necessary to stop at this point and select another priority commodity. If the **Preproduction** conditions look favorable, the **Interdisciplinary Team** will move on to **Production**.

## **Production**

While it is true that there are many differences in the production of fruit, vegetables, root crops, and grains, and that each specific crop has its own particular characteristics and needs, it is also true, in general, that nearly all agricultural crops have similar needs. For example, all require some land preparation – even mushrooms and hydroponic vegetables. Most crops are placed in the ground in the form of seed or plants. All require water, fertilizers, weed and pest control. Most undergo pollination and all are eventually harvested. This commonality among crops facilitates the design of a model which can be used for describing the production process for any crop.

The best starting place for an analysis of the production system is the identification of the diverse steps in the production process. For most crops this entails some variation of those shown in Figure 4.1. Based on this general model, steps can be added and/or deleted until all the important steps in the production process have been identified for the particular commodity being studied.

**Figure 4.1: Steps in the production process of most crops**



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The formation of the Interdisciplinary Team should take into consideration these basic steps in the production process. This is to assure that the Team includes members with the necessary expertise for an in-depth and complete analysis. For each step in the production process, the Team must identify the different types of participants and analyze the positive or negative impact of each upon product quantity and quality in the preharvest and postharvest stages. One way of beginning this process is by answering the following six basic questions:

1. Who is responsible for the action?
2. What action is taken?
3. How is the action carried out?
4. When is the action carried out?
5. Why is the action carried out in that manner and not some other?
6. Where is the action carried out?

After discussion and analysis in plenary session, the interdisciplinary Team can summarize the answers to the above questions in a table format, with the steps of the production process along the vertical axis and the above six questions along the horizontal axis as shown in Form 4.1.



**Form 4.1: Summary of production process for commodity X in country Z**

<b>STEPS IN THE PRODUCTION PROCESS<sup>a</sup></b>	<b>WHO TAKES ACTION?</b>	<b>WHAT ACTION TAKEN?</b>	<b>HOW ACTION TAKEN?</b>	<b>WHEN ACTION TAKEN?</b>	<b>WHY ACTION TAKEN?</b>	<b>WHERE ACTION TAKEN?</b>
Land preparation						
Hole preparation						
Acquiring seeds/plants						
Planting						
Fertilization						
Irrigation						
Pest/disease control						
Weeding						
Pollination						
Pruning & training						
Thinning						
Harvest						

***\*The steps should be modified in accordance with the particular commodity being studied.***

Form 4.1 produces a succinct summary table such as shown in the example for starfruit in Malaysia in Annex 3. The summary table should be supplemented with additional detail presented in tables or text. Descriptive material might include information on such things as common farming systems, methods of propagation of planting material, nursery management and standards used, description of cultivars or seeds, type of fertilization, particular cultural practices, pest and disease control, and impact of preharvest factors on postharvest losses, among others.

The principal reason for describing the production system is to identify operations within the existing system which negatively affect product yields and/or quality, or contribute unnecessarily to costs of production. Although resources and time are not normally available to quantify the actual impact of preharvest factors on either preharvest or postharvest losses, the interdisciplinary Team (including farmers) can make a useful subjective evaluation of their significance. The results of such an evaluation can then be summarized following the format presented in Form 4.2.

**Form 4.2: Magnitude of losses caused by preharvest factors for commodity X in country Z**

STEPS IN THE PRODUCTION PROCESS+	NOT SIGNIFICANT		SIGNIFICANT		VERY SIGNIFICANT	
	Quan*	Qual*	Quan*	Qual*	Quan*	Qual*
Land preparation						
Hole preparation						
Acquiring plants/seeds						
Planting						
Fertilization						
Irrigation						
Pest/disease						
Weeding						
Pollination						
Pruning & training						
Thinning						
Harvest						

\* "Quan" = Quantity of losses; "Qual" = Quality of losses

+ The steps should be modified to reflect the commodity system being studied.

*Note: Place "X" in the appropriate box for each step. In those cases where "X" indicates significant or very significant losses, details should be provided in writing. If reliable information is available, the "X" can be replaced by an estimated percentage loss.*

Form 4.2 provides a format to indicate the magnitude of losses (both preharvest and postharvest) caused by preharvest factors. For example, improper practices in training fruit trees in the nursery, or on the farm, may cause fruit to come in contact with the ground, resulting in reduced quality, hence unmarketability. Losses may occur prior to harvest as a result of pests or diseases. Produce reaching the point of maturity may be of poor quality for a variety of reasons – as examples, the lack of proper fertilization, poor water management, or inadequate control of birds or other pests. An example of the application of Form 4.2 to the case study of starfruit in Malaysia is shown in Annex 4.

The production specialists, including farmers, may decide simply to indicate the magnitude of the losses with an X in the respective column of Form 4.2, or if they have sufficient information, may choose to estimate the percent of losses at specific points in the system.

The Interdisciplinary Team (including farmers) should be asked to address the following question: **Given the existing state of the art, can the preharvest factors causing preharvest or postharvest losses be reduced in technological and/or economic terms?** From Form 4.2, the experts should discuss in plenary session each of the causes identified as "significant" or "very significant" and decide whether the causes of preharvest and/or postharvest losses can be controlled or eliminated in technological and/or economic terms. Their responses can be summarized using a format similar to that presented in Form 4.3.

**Form 4.3: Feasibility of reducing the preharvest factors causing preharvest or postharvest losses**

STEPS IN THE PRODUCTION PROCESS*	REDUCIBLE IN TECHNOLOGICAL TERMS		REDUCIBLE IN ECONOMIC TERMS	
	Yes	No	Yes	No
Land preparation				
Hole preparation				
Acquiring plants/seeds				
Planting				
Fertilization				
Irrigation				
Pest/disease				
Weeding				
Pollination				
Pruning & training				
Thinning				
Harvest				

*\* The steps should be modified to reflect the commodity system being studied.*

By identifying those preharvest factors which experts feel significantly affect either preharvest or postharvest losses and which can be feasibly modified, decision makers are provided with necessary information to help them allocate scarce resources. For example, they may decide to designate resources to eliminate or reduce the indicated constraint, e.g., improve planting material by building nursery infrastructure and training nursery managers. On the other hand, if immediate solutions are not available, they may decide to allocate additional resources for research to identify solutions, e.g., the selection of cultivars tolerant to a specific pest or disease.

## **Postharvest**

Once the production system, with its participants and problems, has been described and analyzed, the **Interdisciplinary Team** will move on to the handling of the commodity in the postharvest phase.

No technology has yet been developed which can completely stop the deterioration of food, whether in the fresh or processed form. Consequently, once food enters the postharvest state it begins a process of continuous deterioration, and the success of food distribution depends in great part on the capacity and effectiveness of the marketing system and the methods used to reduce the speed of the deterioration processes.

Most chemical reactions in fresh food products are regulated by the catalytic action of enzymes. The activity of enzymes is in turn partially regulated by temperature and tends to increase from two to four times for each 10 degrees Centigrade rise in the temperature of the medium where the reaction takes place. For this reason temperature is considered the most important determining factor in the deterioration of food products and the consequent duration of postharvest life.

The second most important factor, especially in the tropics, is humidity. While high humidity favors growth of fungi, molds and bacteria, low humidity, especially when combined with high temperature, can cause produce such as fruits, vegetables, tubers, roots, and meats to dehydrate, thus affecting weight, quality and appearance. While the deterioration process is relatively slow in the case of grains, the postharvest life span of produce such as leafy vegetables can be as short as a few hours.

In the previous section -- Production -- the product was attached to the mother plant and all efforts to maintain productivity and quality took place in the farmer's field. In the postharvest stage, the product moves from point to point where conditions, environment and types of treatment vary. In describing the postharvest process, the objective is to identify and describe each point where people, machines, tools, or other physical materials come in contact with the commodity, affecting its quantity, quality and appearance.

For example, improper harvesting or the manner of placing a product in a container may break the skin on the commodity, exposing it to pathological damage at a later stage. Mechanical damage may occur as root crops are dug. Loose packing may cause damage due to vibration during transportation. Weak containers may cause damage from weight pressure. Products may inadvertently be left in direct sunlight or in storage under undesirable conditions of temperature or humidity.

The human compulsion for economic gain or social pleasure may lead some system participants to make decisions which will negatively affect product quality at a later stage -- e.g., farmers watering down products or adding soil and stones to increase weight; marketing board personnel failing to remove perishable produce from the sun during a cricket or soccer match. As the number of participants and steps in the postharvest system increase, the opportunities for damage to the commodity also increase.

As a product moves from the point of harvest to its final destination, many types of handling and functions are carried out which affect the particular product. To facilitate the study of the postharvest process, these actions have been categorized into five types.

**OPERATION:** Those eventualities which a product undergoes and which prepare it for a following step – e.g., the act of harvesting a product, trimming, washing, waxing, and packing, among others.

**TRANSPORT:** Transport takes place when a product is moved from one place to another, except when such movement forms part of an "Operation" or is caused by a participant at the site during an "Operation" or an "Inspection."

**INSPECTION or CLASSIFICATION:** This occurs when products are examined to verify their quality, quantity or other characteristics. It includes the process of regrouping products into different categories or classes.

**DELAYS (WAITING):** This occurs when conditions do not permit or do not require the immediate execution of a planned following step. When the delay is intentional, the action is classified as an "Operation."

**STORAGE:** This takes place when the product is intentionally placed in a specific location to protect it from adverse conditions or to hold until it can be marketed.

In describing the postharvest system, the **Interdisciplinary Team** should identify all the important steps where the product undergoes a particular treatment and set-up a matrix similar to that shown in Form 4.4. As each important step in the system is identified, it should be categorized as an Operation (O), Transport (T), Inspection (I), Delay (D), or Storage (S). The movement of the product can then be diagrammed in columns of Form 4.4 by connecting the symbols from step to step with a line.

At this point the **Interdisciplinary Team** should evaluate its members' experiences and abilities to insure that it has the expertise necessary to evaluate all the steps identified. If it does not, new members should be added to the team.

The next step in describing the postharvest system is to generate the additional information to fill in the remaining columns of Form 4.4, indicating ambient temperature and relative humidity at each step, distance covered when movement is involved, and time required to complete the action. Any other relevant information can be included in the column for observations. Examples of the application of Form 4.4 are presented in Annex 5-A, showing the flow diagram for starfruit in Malaysia, and Annex 5-B, showing the flow diagram of salad tomatoes in the Dominican Republic.

The information from these tables can be presented graphically as shown in Annex 6-A. If a more expressive presentation is desired, the format shown in Annex 6-B may be used.

**Form 4.4: Flow diagram of steps in a postharvest system**

STEPS IN THE POSTHARVEST SYSTEM*	SYMBOLS					ADDITIONAL INFORMATION				
	O	T	I	D	S	Temp	Rel. Hum	Distance	Time	Observations
Harvest										
Transport										
Assembly										
Packing										
Loading										
Transport										
Unloading										
Waiting										
Stacking										
Storage										
Loading										
Transport										
Unloading										
Wholesale										
Loading										
Transport										
Unloading										
Retail										

O = Operation; T = Transport; i = Inspection; D = Delay; S = Storage

\* Note: *The steps should be modified to reflect the commodity system being studied.*

Once the important points/actions through which a particular commodity passes are identified, the subsequent step is the identification of the different participants carrying out the distinct actions. To facilitate this exercise, a format such as Form 4.5, which is similar to Form 4.1 used to describe the steps in the production process, can be utilized to describe the postharvest process.

In Form 4.5, each step in the postharvest process for a particular commodity is listed in the first vertical column. The respective answers to the six questions along the horizontal axis should be written into the corresponding boxes. An example of a completed table, based on a case study of starfruit in Malaysia, is presented in Annex 7. Since the information presented in table format is only a summary. It must be supported by more detailed information describing each step in the postharvest process, participants involved, equipment and materials utilized, and actions taken.

The information gathered by the specialists forming the Interdisciplinary Team will identify the principal causal factors contributing to postharvest losses. It should also permit the identification of those operations which have little or insignificant impact on losses. In plenary sessions, the specialists should agree on the level of significance of postharvest losses at distinct points in the system. That is to say, the specialists should use a subjective or "gut feeling" to decide whether the postharvest losses are high, medium or low at each point in the system. These can be summarized in a format such as Form 4.6.

In the analytical process the specialists must keep in mind that:

1. A low percentage of losses can be significant if the total volume of product handled is large or if the cost of reducing losses is low, and
2. What is viewed as insignificant for one socio-economic strata may be quite significant for another.

Based on the information from the previous tables, interviews with farmers and intermediaries, knowledge and experience of the postharvest specialists, and other descriptive information, graphical presentations can be made which will summarize the range of postharvest losses at different points in the commodity system. Two alternative methods are shown in Figures 4.2 and 4.3. While Figure 4.2 presents the components of the postharvest system and indicates the severity of the losses, Figure 4.3 actually attempts to specify the level of losses at key points.

**Form 4.5: Identification of participants and their respective actions in the postharvest process for commodity X in country Z**

<b>STEPS IN THE POSTHARVEST SYSTEM*</b>	<b>WHO TAKES ACTION?</b>	<b>WHAT ACTION TAKEN?</b>	<b>HOW ACTION TAKEN?</b>	<b>WHEN ACTION TAKEN?</b>	<b>WHY ACTION TAKEN?</b>	<b>WHERE ACTION TAKEN?</b>
Harvest						
Transport						
Assembly						
Packing						
Loading						
Transport						
Unloading						
Waiting						
Stacking						
Storage						
Loading						
Transport						
Unloading						
Wholesale						
Loading						
Transport						
Unloading						
Retail						

\* Note: *The steps should be modified to reflect the commodity system being studied.*



**Form 4.6: Impact of postharvest operations on postharvest losses for commodity X in country Z**

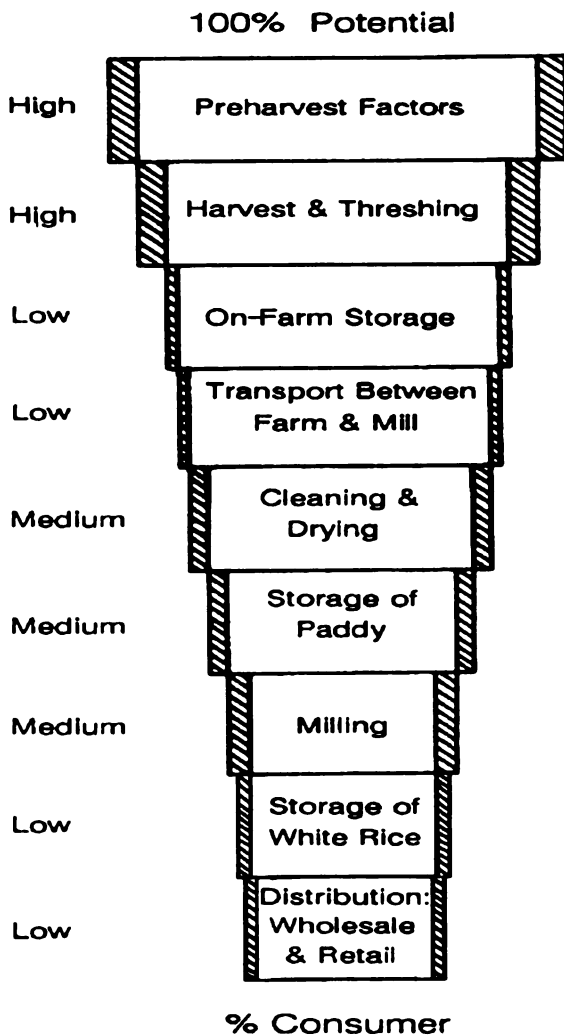
STEPS IN THE POSTHARVEST SYSTEM+	NOT SIGNIFICANT		SIGNIFICANT		VERY SIGNIFICANT	
	Quan*	Qual*	Quan*	Qual*	Quan*	Qual*
Harvest						
Transport						
Assembly						
Packing						
Loading						
Transport						
Unloading						
Waiting						
Stacking						
Storage						
Loading						
Transport						
Unloading						
Wholesale						
Loading						
Transport						
Unloading						
Retail						

\* "Quan" = Quantity of losses; "Qual" = Quality of losses.

+ The steps should be modified to reflect the commodity system being studied.

Note: Place "X" in the appropriate column for each step in the system. In those cases where "X" indicates significant or very significant, provide further details in writing. When reliable quantified loss information is available, replace "X" with a percentage.

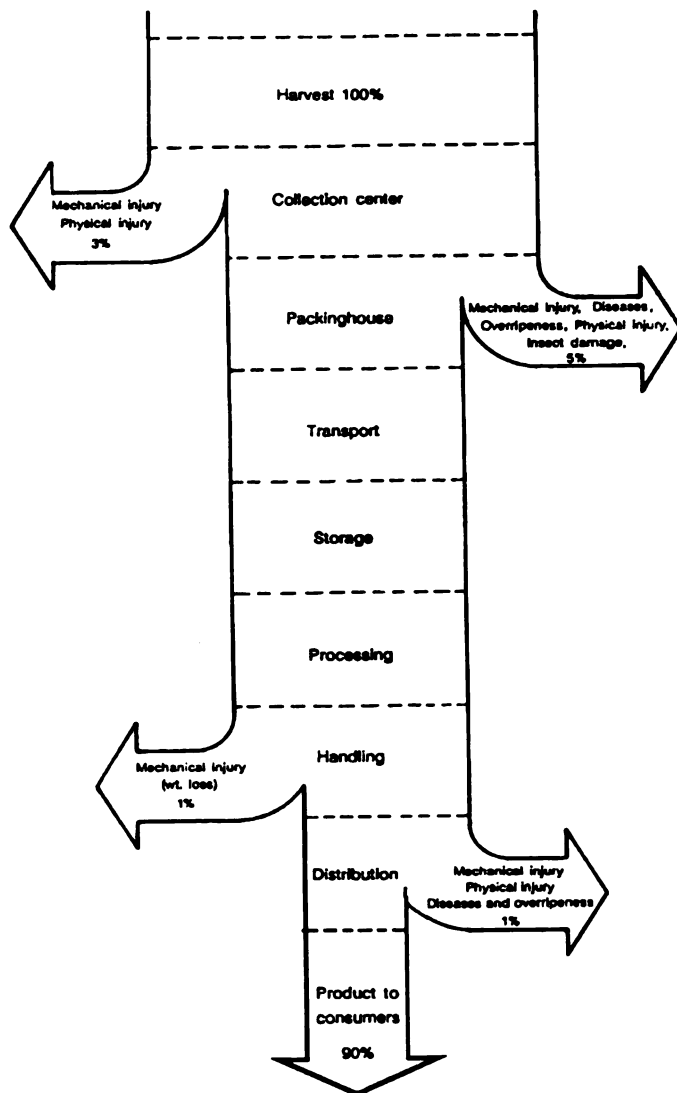
**Figure 4.2: Estimated levels of pre- and postharvest losses of rice in the Dominican Republic, 1982**



 General estimates of the magnitude of losses

Source: La Gra, Martinez y Martinez, 1982, p. 50.

**Figure 4.3: Steps in the postharvest system for starfruit and estimated percentage losses in Malaysia, 1968**



Source: Malaysian Agricultural Research and Development Institute, 1988, p. 47.

As was done in the analysis of the production system, the **Interdisciplinary Team** can ask the question: **Given the existing state of the art, can the postharvest factors causing postharvest losses be reduced in technological and/or economic terms?** After discussion among the specialists, including farmers, intermediaries and other relevant participants, the answers can be summarized in a table similar to that shown in Form 4.7.

The identification of those points where postharvest losses are felt to be significant will facilitate decision making. If the **Interdisciplinary Team** feels that losses can be reduced in both technological and economic terms, then innovations and modifications to the system can be suggested. These may include actions or project ideas requiring investments in such things as infrastructure, equipment, tools, materials, training, or policy recommendations which affect the postharvest system.

If it is felt that losses cannot be reduced in either technical or economic terms, then perhaps recommendations can be made for specific research projects to verify low levels of losses at different points in the system, experiments with alternative methods of packing, transport and storage, trial shipments, or others.

## **Marketing and distribution**

Marketing must be considered during the planning of production and throughout all the business activities associated with the flow of goods and services from production to consumption. In this sense, the concept of market is present when the farmer makes decisions about what crops to plant, when to plant, which and how many inputs to apply, how much and what source of labor to use, when to harvest, and when to sell to whom. The intermediary is also thinking of the market when s/he decides what products to buy, what quantities, what quality and at what price; how and when to transport, select, store, package and sell the produce. **Marketing is the integrating force for all these different decisions.**

Developing countries are keen to increase their earnings of foreign exchange. They normally attempt to do this either by increasing their domestic production of imported items or by increasing their exports of traditional and non-traditional products. Most countries attempt to do both.

Effective marketing, whether local, regional, or extra-regional, requires the ability to provide some minimum quantity of an agreed-upon-quality product to a given market on a regular basis and at a competitive price. When analyzing the marketing distribution system, it is necessary to generate information which will permit a good understanding of the system and its potential for development.

**Form 4.7: Feasibility of reducing postharvest losses in technological and economic terms**

STEPS IN THE POSTHARVEST SYSTEM*	REDUCIBLE IN TECHNOLOGICAL TERMS		REDUCIBLE IN ECONOMIC TERMS	
	Yes	No	Yes	No
Harvest				
Transport				
Assembly				
Packing				
Loading				
Transport				
Unloading				
Waiting				
Stacking				
Storage				
Loading				
Transport				
Unloading				
Wholesale				
Loading				
Transport				
Unloading				
Retail				

\* Note: *The steps should be modified to reflect the commodity system being studied.*

The make-up of the **Interdisciplinary Team** should include persons knowledgeable of marketing institutions, transportation, agroprocessing, and both domestic and export marketing. As identified in the final quadrant of Figure 3.1, the components dealing with marketing, distribution and agro-processing should be identified, described and analyzed.

Emphasis should be given to the collection of information concerning:

- participants in the marketing system;
- market channels;
- prices, marketing costs and profitability;
- availability and access to financing;
- service institutions and quality of services provided;
- characteristics of consumer demand (domestic and abroad);
- agroprocessing capabilities;
- availability of transport;
- available marketing infrastructure; and
- potential to supply domestic and export markets.

The team should determine the marketing channels for the commodity under study by reviewing the literature on the commodity and interviewing hands-on marketing persons. The information obtained can then be summarized in graphic form following the model presented in Figure 2.1-C.

This type of diagram provides three kinds of information:

1. Types of traders or intermediaries involved in the marketing of a specific commodity;
2. Alternative channels followed by the product from farm to consumer; and
3. Estimated percentage of the total amount of produce moving through each point in the commodity system.

Form 4.5 in the Postharvest section will facilitate the identification of the different types of participants involved in the postharvest process, including the diverse marketing intermediaries. Specific information on channels followed and the percentage of total crop moving through each point should be determined or estimated by review of national production and marketing statistics, literature and interviews with knowledgeable persons. For each participant, detailed information can be gathered using questionnaires similar to those for Components 21 to 26 in Annex 1.

Based on available statistics, a table should be prepared which indicates apparent consumption of the specific commodity per capita. This requires information on national production and imports/exports. It should also give some indication of the quantities of the product allocated for seeds and animal consumption and some estimate of postharvest losses. Data should cover a 10 year period, if possible.

An example of how to determine apparent consumption is shown in Table 4.4, using data from a case study of onions in the Dominican Republic. In this case, the second column shows total yearly national production. From this figure the quantity going for non-human consumption is subtracted (seeds, animal consumption, and postharvest losses). To the resulting figure, imports are added and exports subtracted. This yields apparent national consumption. Converting to pounds or kilograms and dividing by national population will produce apparent consumption per capita in pounds or kilograms/year.

**Table 4.4: Apparent consumption of onions in the Dominican Republic, 1960-77**

YEARS	NATIONAL PRODUCTION (000) Quint	SEEDS AND LOSSES (000) Quint	IMPORTS (000) Quint	EXPORTS (000) Quint	APPARENT CONSUMPTION (000) Quint	POPULATION (000)	APPARENT CONSUMPTION PER CAPITA (lbs/yr)
1960	241.2	36.2	21.9	-	226.9	3038.1	7.4
1961	284.5	42.7	16.7	-	258.5	3127.6	8.3
1962	293.3	44.0	33.3	0.03	282.5	3219.8	8.8
1963	317.5	17.6	52.2	0.01	352.9	3314.6	10.6
1964	360.5	54.1	7.7	-	314.1	3412.3	9.2
1965	140.0	21.0	34.8	-	153.8	3512.9	4.4
1966	170.0	25.5	49.9	0.05	194.3	3616.4	5.4
1967	150.0	22.5	2.9	0.19	130.2	3723.0	3.5
1968	120.0	18.0	4.1	0.66	105.4	3832.7	2.8
1969	198.5	29.8	26.8	4.88	190.6	3945.7	4.8
1970	220.5	33.1	1.5	2.18	186.7	4061.9	4.6
1971	220.5	33.1	-	0.10	187.3	4181.6	4.5
1972	242.6	36.4	-	0.14	206.0	4304.9	4.8
1973	264.6	39.7	9.0	5.14	228.8	4431.7	5.2
1974	224.0	33.6	3.8	0.70	193.5	4562.3	4.2
1975	189.9	28.5	-	7.65	153.8	4696.8	3.2
1976	157.8	23.7	-	3.16	131.9	4835.2	2.7
1977*	-	-	-	-	-	-	-

\* Estimated; "Quint" = Quintal = 100 lb.

Source: Secretaria de Estado de Agricultura, 1977, p. 167.

A marketing study should give some indication of the major marketing costs and the respective profits received by the farmer and each type of intermediary. Efforts should be made to identify case studies in the literature which indicate marketing margins for the selected commodity. If such information is unavailable, and resources permit, case studies may be carried out to obtain at least a general impression of marketing costs and margins.

Case studies can be undertaken by interviewing and observing different intermediaries in the marketing channel during the same time period. A few such interviews can provide a rough indication of the respective margins.

A hypothetical example for the presentation of market prices and marketing costs and margins is presented in Annex 8-A, and in graphic form in Annex 8-B.

Postharvest losses often fluctuate with the availability of produce in the market. As more produce becomes available, prices drop, consumers become more selective and more produce is discarded or fed to animals. Since one of the best indicators of volume of produce in the market is produce price, when average monthly wholesale or retail prices are presented in table and graph form, it is easier to visualize what is happening in the marketplace. Periods of low prices normally indicate larger supplies, whereas periods of high prices tend to indicate scarcities of the commodity in the marketplace.

An example of average monthly wholesale prices of sweet potatoes in Santo Domingo, Dominican Republic, over a 10-year period, is presented in Table 4.5. For each year, monthly averages and coefficients of variation are calculated. For each month of the 10-year period, a seasonal index is calculated. The seasonal indexes plotted in graph form yield a seasonal wholesale price index as shown in Figure 4.4. This figure indicates those months in which prices are likely to be lowest (supply greatest) and those months when prices are likely to be highest (supply lowest), based on a 10-year average of prices.

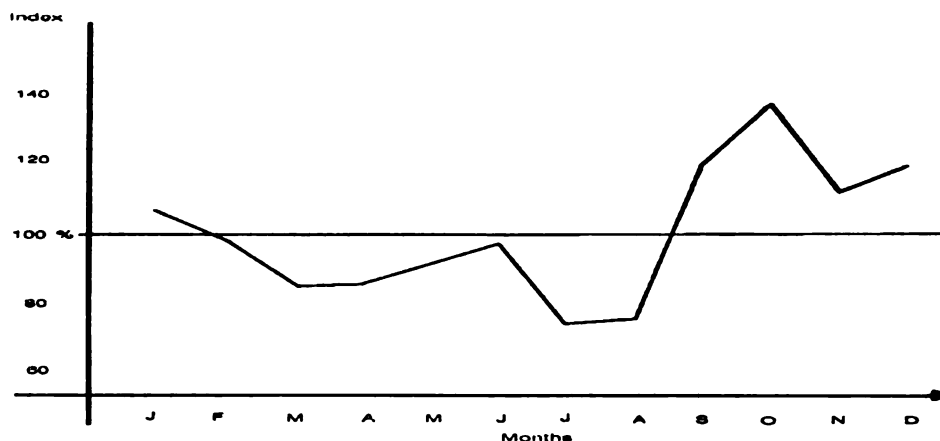
**Table 4.5: Average monthly wholesale prices of sweet potatoes in Santo Domingo, Dominican Republic and seasonal price indices (RD\$/100 lbs)**

Month	1968	1968	1970	1971	1972	1973	1974	1975	1976	1977	Seasonal Index
January	3.64	2.44	2.90	2.52	4.02	2.60	7.67	6.57	9.67	6.32	107
February	3.70	2.34	2.85	2.92	3.71	2.43	5.82	5.12	6.44	5.00	96
March	3.03	2.27	3.07	2.79	3.54	2.69	4.02	3.91	4.72	6.24	84
April	2.62	2.22	2.92	2.99	3.31	2.66	3.13	4.31	3.66	9.69	84
May	3.60	2.14	3.34	2.85	3.56	5.91	3.59	7.60	3.37	11.90	91
June	4.81	1.77	3.95	2.60	3.09	4.32	3.26	6.19	3.39		97
July	4.26	1.85	3.65	2.32	2.56	5.47	2.88	9.37	3.32		72
August	5.31	1.93	3.71	2.56	2.93	6.21	3.25	11.22	3.68		74
September	5.30	3.18	5.00	3.39	2.57	9.41	5.22	11.75	5.93		120
October	3.19	3.74	4.61	3.27	3.02	7.75	5.82	10.32	8.04		139
November	2.55	3.30	3.02	3.07	2.62	6.47	6.50	9.81	6.67		113
December	2.41	3.32	2.82	2.51	2.67	6.66	6.24	10.02	7.41		120
Average	3.72	2.54	3.48	2.90	3.13	4.99	4.78	8.18	5.56		

Source: Secretaria de Estado de Agricultura, 1977, p. 138.



**Figure 4.4: Seasonal wholesale price index of sweet potatoes in Santo Domingo, Dominican Republic, 1968 - 1977**



Source: Secretaría de Estado de Agricultura y El Insitituto Interamericano de Cooperacion para la Agricultura, 1977, p. 137.

The extent to which the quantity of a product supplied or demanded is affected by changes in price is known as elasticity. Most agricultural products have relatively inelastic demand and the price elasticity of demand is usually negative, i.e., less than one. This means that for a given percent change in price, the percent change in demand will be smaller and in the opposite direction. Thus, if price is lowered by 10% there will be a less than 10% increase in demand. If price increases by 10%, there will be less than a 10% decrease in demand.

Price elasticities of demand are useful in determining how consumers are likely to react under given price situations. If price elasticities are available, they should be utilized in the projections of demand for the commodity being studied.

In the analysis of demand, whether domestic or foreign, consumer demand characteristics must be identified and described to help determine the real potential of a particular market as well as the national ability to supply that market. For any commodity it is necessary to know the intended consumer's preference in such things as size, color, weight, flavor, texture, degree of maturity, and preference for package. In addition, it is important to identify potential constraints such as pests, diseases, insecticide residues, and other factors that might affect ability to market.

Form 4.8 is suggested as one method for summarizing such information. An example of the application of this method to four export markets for Malaysian starfruit is demonstrated in Annex 9.

**Form 4.8: Characteristics of demand for commodity X in country Z**

DEMAND CHARACTERISTICS*	INFORMATION FOR INTENDED MARKET	
	Domestic	Export
Preferred cultivar:		
Preferred size:		
Preferred weight:		
Preferred color:		
Preferred flavor:		
Desired texture:		
Preferred degree maturity:		
Preferred type package:		
No. units per package:		
Preferred wt/package:		
Other preferences:		
Constraints:		
Pest problems:		
Disease problems:		
Insecticide residues:		
Quarantine restrictions:		
Other constraints:		

\* Note: *This list should be modified based on available information and information needs for the commodity being studied.*



# CHAPTER 5

## Identifying Solutions to Problems

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Now that the CSAM has facilitated a better understanding of a commodity system and its problems, it is easier to identify possible solutions. The **Interdisciplinary Team** will have identified and described the principal characteristics of the participants and their actions throughout the commodity system. As this team obtains information about the characteristics of pre-production, production, harvest, postharvest, and marketing, each member will begin to decide what is working well within the system and what is not. The team members will be able to link problems and their causes with particular participants – e.g., farmers, intermediaries, companies, organizations, institutions, and others. This information, when properly organized and analyzed, will lead to the design of solutions, expressed in the form of projects.



The objective of this chapter is to present some instruments which will facilitate the identification and organization of problems and their causes, and the design of solutions.

## **Problem analysis**

Problems occur at all points in any commodity system and come in all sizes. Small problems occurring on the farm -- e.g., poor pruning and improper harvesting -- may become very large problems in the marketplace when the produce cannot be sold due to poor quality. Someone who observes a farmer in the marketplace unable to sell his produce might conclude that the problem is in the market. In fact, the inability to market a product is usually an indicator of problem(s) in the commodity system. Unless we know the root problem and its causes, we cannot design effective solutions.

**Any analysis of problems affecting commodity systems must necessarily look for causes in each component of the respective commodity system.**

Problem analysis has been defined [Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), 1983] as a set of techniques to:

- analyze the existing situation surrounding a given problem condition,
- identify the major problems and the core problem of a situation, and
- visualize the cause-effect relationships in a Problem Tree diagram.

The starting point in problem analysis, therefore, should be the identification of as many of the related problems as possible and their respective causes.

As should be apparent from any analysis of a commodity system, the problems vary in accordance with the type of participant. Farmers, for example, may have problems related to land, labor, information, financial resources, cultural practices, management, markets, and many more. The farmers' problems are likely to cover the full range, from planning all the way through the system to marketing.

Problems experienced by intermediaries and traders begin at the farm gate, although in many cases the causes of the problems are linked with preharvest factors. The types of problems affecting intermediaries are more likely to relate to operating capital, communications with suppliers, regularity in supplies, quality of produce, infrastructure, packaging materials, and transportation.

Public sector institutions may have internal constraints caused by local politics, staffing problems, deficient resources, contradictory sectoral policies, poor leadership, and many more. Farmers' groups and other private sector organizations may not be achieving their objectives due to poor organization and management, or problems related to staff, working capital, infrastructure, equipment and others.

The more in-depth the commodity system analysis carried out, the greater the number of problems and causes identified. The purpose of the detailed description of a commodity system is to provide an information base for problem identification. If each member of the

**Interdisciplinary Team** is experienced and knowledgeable in his/her particular area, and if the description of the commodity system is carried out in detail, then conditions will be set for a problem brainstorming session.

## **Brainstorming for problems**

Brainstorming for problems in a commodity system can be facilitated if the participants are brought together in a comfortable and informal setting with a discussion leader and rapporteur. While the group leader stimulates discussion, the rapporteur lists all the problems and causes of problems suggested by the participants. At this stage the problems are listed as they arise, in no particular order.

Brainstorming sessions should be carried out with all members of the **Interdisciplinary Team** after each has had ample opportunity to review the available information on the commodity system. The group leader must insure that the problems presented are existing ones, not potential or anticipated ones or personal opinions.

During the brainstorming session, members of the **Interdisciplinary Team** will suggest problems and causes of problems negatively affecting a particular commodity system. During this process, one suggestion will lead to another, creating a cross-fertilization of ideas. Once the respective team members have exhausted their supply of ideas, the recorder will produce a listing of all the problems. This list should be distributed to each participant for review and modification and a final list should be prepared.

## **Problem checklist**

Once the brainstorming session is completed, the **Interdisciplinary Team** may choose to review the checklist of Potential Problems presented in Annex 11. Since this is a rather long list, it could take several hours or days to analyze point by point. To avoid inappropriate use of scarce time, the checklist should be reviewed quickly by each team member, to jog the memory, with the purpose of identifying important problems or causes of problems that may have been overlooked in the brainstorming session.

The checklist may also be used as a format to summarize problems as shown in Table 5.1 or to serve as a guide in organizing the problems from the brainstorming exercise by particular components of the commodity system. By grouping the problems according to their respective points in the commodity system, the team puts them in a perspective which contributes to understanding of cause and effect relationships.

The priority problems identified in Table 5.1 were obtained as follows: First, an interdisciplinary team of fruit production and marketing specialists carried out a brainstorming session to identify the problems affecting the production and marketing of paw paw (papaya) in Barbados. A very long list of problems was obtained which was then reordered following the guideline checklist in Annex 11. The same team of specialists then reviewed the complete list of problems to identify those of highest priority. These were then

listed as presented in Table 5.1. The point in the system where the problem occurs and the nature of that problem are presented in the first column of Table 5.1. More specific details of the problem are indicated in the last column on the right. In this latter case, details should be included showing how the problem affects quality, quantity, price or availability of product. The details have been simplified in Table 5.1 due to space constraints.

**Table 5.1: Priority problems in the production of paw paw (papaya) in Barbados\***

POINT IN THE COMMODITY SYSTEM WHERE PROBLEM OCCURS	INDICATE PRIORITY PROBLEMS (X)	SUMMARIZE PROBLEMS IMPACTING QUALITY, QUANTITY, PRICE OR AVAILABILITY OF COMMODITY
<b>AGRICULTURAL POLICY:</b>		
- credit	X	no loan portfolios for fruit
- planning	X	bias towards non-food crops, e.g., cotton
<b>INSTITUTIONAL ASPECTS</b>		
- staff(MOA and BMC)	X	too few to provide necessary services
<b>ENVIRONMENT</b>		
- soil	X	heavy soils in project area
<b>PRE-PRODUCTION:</b>		
- irrigation systems	X	not available at production site
- packing houses	X	none available
- planting material	X	susceptible to bunchy top disease
<b>CROP CHARACTERISTICS:</b>		
- uniformity of size	X	fruits cover wide range of sizes
<b>PRODUCTION</b>		
- farm inputs	X	proper type unavailable
- technical know-how	X	proper techniques unknown
- water	X	poor distribution of rainfall
- labor	X	expensive, scarce, low yields
<b>HARVEST</b>	X	tool inadequate, techniques unknown
<b>POSTHARVEST HANDLING</b>		
- on-farm handling	X	lack of proper knowledge of handling/packing
- packing shed	X	facilities not available
<b>PROCESSING</b>		
- insufficient supply	X	low domestic supply
- infrastructure	X	no facilities for canning/freezing
<b>MARKETS/MARKETING</b>		
- demand	X	market potential unknown
- supply	X	prices too high
- air transport	X	very expensive
<b>CONSUMPTION</b>		
- local	X	competition with imports of temperate fruit
- external	X	lack of information or markets

\* Note: *The data for this table was prepared by going through the problem checklist in Annex 11. Only the priority problems checked with an "X" are summarized here.*

## Problem tree diagram

A problem tree diagram is simply a way of visualizing the cause and effect relationships regarding a particular problem situation. In such a diagram the causes are presented at lower levels and the effects at upper levels. The core problem connects the two. Thus the analogy with a tree: the trunk represents the core problem, the roots are the causes, and the branches represent the effects. The more specific the causes, the more likely they are to lie at the lower levels of the tree diagram; however, the location of a problem on a tree diagram does not necessarily indicate its level of importance.

There is no one correct way of formulating a tree diagram. Different individuals or groups, given the same list of problems and causes, will normally organize them differently in a tree diagram. This is due to the different levels of knowledge and experience of each person, and the amount of time available for analysis. Given sufficient time and exhaustive discussion, however, different interdisciplinary teams are likely to produce very similar results. In general, the more complete the level of knowledge of the participants and the longer the time dedicated to analysis, the greater the likelihood of similarity in results.

As has been stressed earlier, the key to problem solution is proper problem identification. The tree diagram facilitates the organization of problems into a logical sequence which will lead to logical conclusions and the identification of cost-effective solutions.

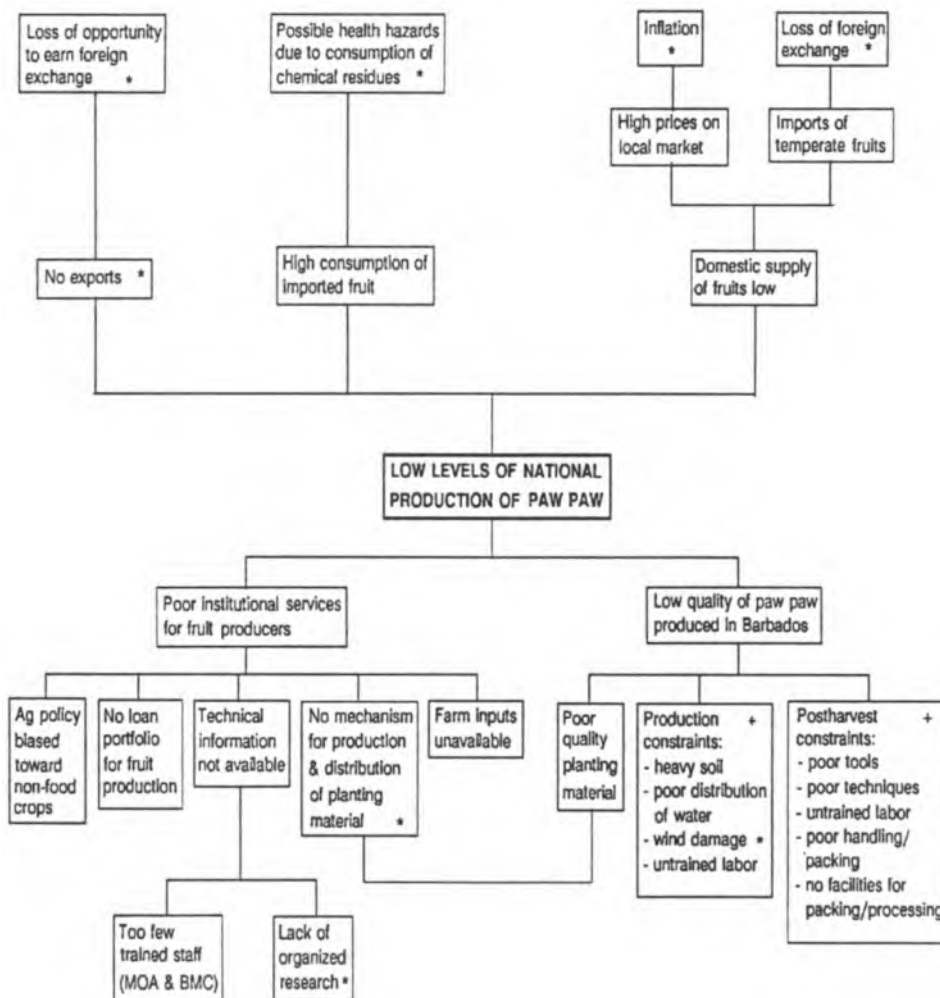
Figure 5.1 presents the information from Table 5.1 in a problem tree format. In this case the core problem is stated as "Low level of national production of paw paw." The causes of this core problem, as indicated in Figure 5.1, are due to: "poor institutional services for fruit farmers," on one hand, and "low quality of paw paw," on the other. The causes of each of these respective problems are identified at lower levels of the problem tree. Problems which were not identified in Table 5.1, but resulted from discussion during the preparation of the problem tree, are indicated with an asterisk (\*).

Three effects from the core problem have been identified in Figure 5.1. These are: (1) non-exports of papaya which leads to the loss of opportunity to earn foreign exchange; (2) high levels of consumption of imported fruit which can result in health hazards if produce with chemical residues is imported; (3) low domestic supply of papaya resulting in high domestic prices, inflation, and imports of temperate fruits, resulting in losses of foreign exchange. Of these effects, low supply of domestic fruits, high prices on the local market and imports of temperate fruits were identified in Table 5.1. The other effects, indicated with an asterisk, were identified during discussions between team members in the preparation of the problem tree.

If so desired, causes and effects can be detailed to the point where several pages might be required to show the problem tree. In general, the more detailed the analysis,



**Figure 5.1: Problem tree showing cause and effect relationships in the production and marketing of paw paw (papaya) in Barbados, 1988**



\* Problems not in Table 5.1 which were identified during preparation of the problem tree.

+ For lack of space, the problems are listed vertically; they should be in separate boxes similar to the other problems shown on this level.

**the more complete the understanding of the commodity system and the greater the probability of designing effective solutions.**

The problem analysis can be concluded when the **interdisciplinary Team** decides that the essential information has been included in the causal network and shows the cause-effect relationships which characterize the problem situation being analyzed.

## **Objectives analysis**

The **objectives analysis** is the process whereby the problems are converted into objectives or goals towards which activities can be directed. It also includes an analysis of the objectives to determine whether they are practical and can be achieved.

In carrying out the **objectives analysis** there are five basic steps:

1. All the negative statements shown on the problem tree are restated as positive statements.
2. All the "objectives" are reviewed to assure that they are desirable and realistically achievable in an acceptable time frame.
3. Those objectives which do not meet the conditions mentioned in (2) are modified: those which are undesirable or cannot be achieved are deleted.
4. Any new objectives which are desirable or necessary to complement existing ones should be added to the diagram.
5. The "means-end" relationships thus derived should be thoroughly examined to assure validity, logic and completeness of the diagram. Modifications should be made as necessary.

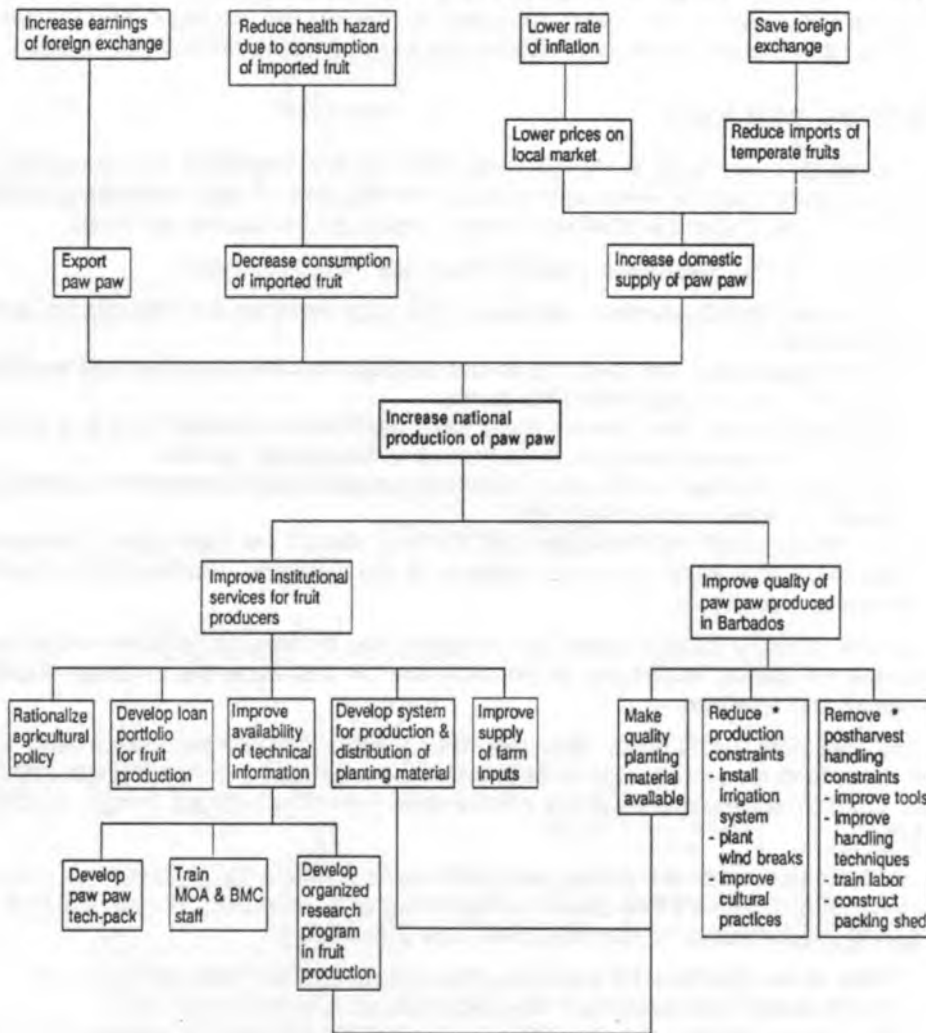
When the problem cannot easily be converted into positive statements (objectives) it may indicate an unclear statement of the problem. In that case the problem should be reconsidered and rewritten.

In the final analysis of each objective, the question should be asked whether the achievement of the lower level objectives is sufficient to achieve the next highest objective? In other words, has the cause-effect relationship been transformed into a means-end relationship?

As an illustration, when the above guidelines were applied to the problem tree presented in Figure 5.1, the objectives tree shown in Figure 5.2 was the result. Three decisions were made during the formation of the objectives tree (Figure 5.2):

1. There is no objective for improving the production problem of "heavy soil." This cannot easily be overcome in the short run, so it was not included.
2. There is no objective for establishing a processing industry for papaya. The private sector has no interest in this goal at this time, so it was not included.
3. A technological package must be developed and published in the form of a tech-pack for the training of farmers: therefore, this objective was added.

**Figure 5.2: Objectives tree for the production and marketing of paw paw (papaya) in Barbados, 1988 (derived from Figure 5.1: Problem tree)**



\* For lack of space, the following problems are listed vertically. They should be shown in boxes like the other objectives at this level.

By starting at the bottom of the **objectives tree** and working upwards, it can be seen that the achievement of the lower level objectives will lead to the achievement of the objective at the next highest level. Each objective seems to be realistic and attainable within the actual circumstance of the local culture and environment. Thus we can conclude that the objectives contained in this tree diagram are viable and can give direction to development projects.

## **Analysis of strategy alternatives and project identification**

Continuing with the Barbados papaya example, Figure 5.3 shows some worksheet notations which can help in an analysis of the situation. Each of the rows of objectives has been assigned a number from one (top row) to 7 (bottom row) in the right-hand margin. The objectives in the top rows are quite general whereas those in the bottom rows are more specific. If the problem tree had been developed to its full extent, the bottom-most rows would be even more specific. As the objectives become more specific, they might better be called **expected results or outputs**. For example, in row 7, expected results can include: a papaya tech-pack, trained staff, an organized research program, an irrigation system, wind breaks, improved cultural practices, improved tools, improved postharvest handling, trained laborers, and a packing shed. From row 6, an expected result might be an improved system for production and distribution of planting material.

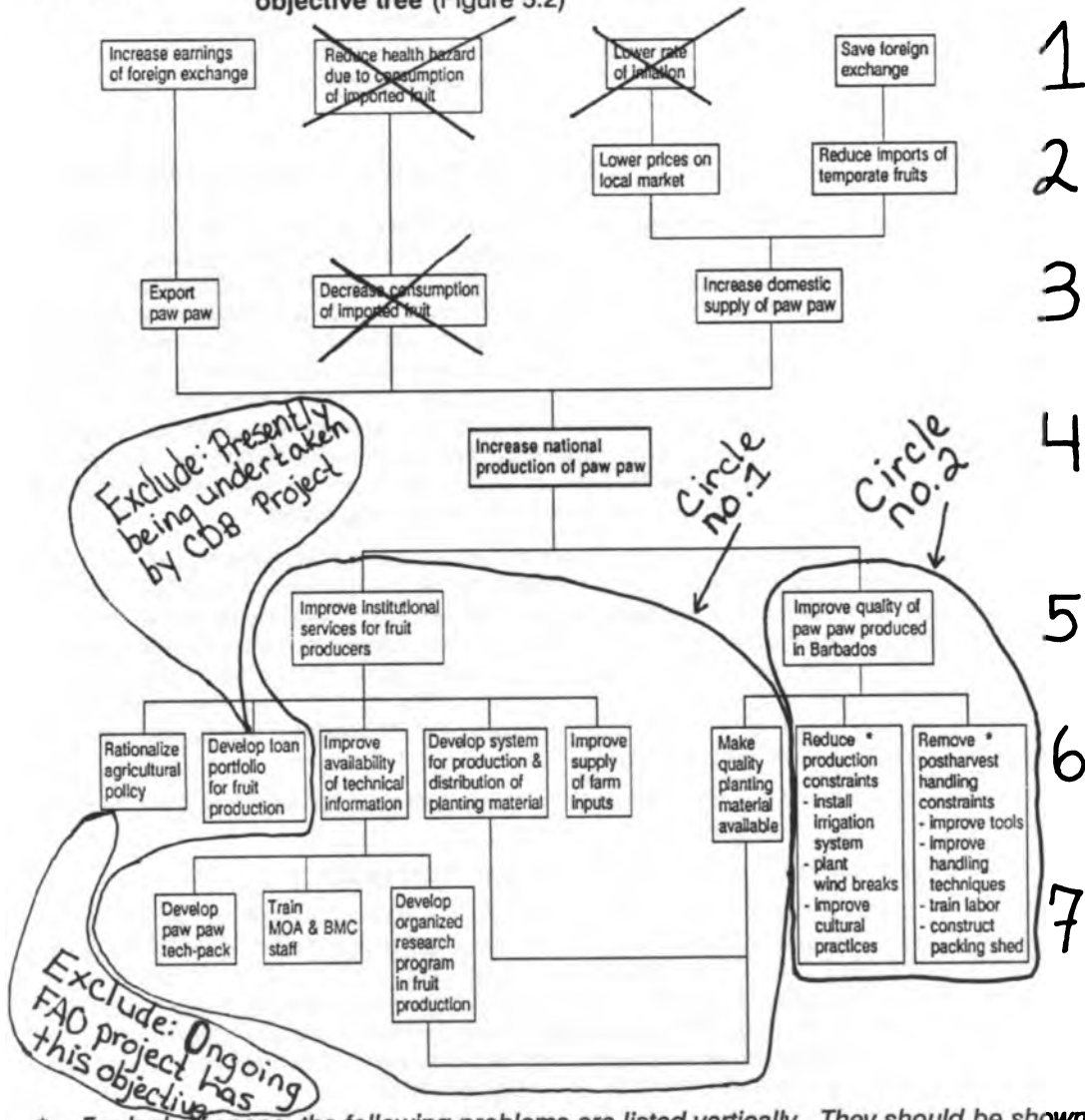
A few of the objectives in rows 1 and 3 are somewhat out of place when compared with the others. That is, they deal with inflation, health hazards and consumption of imported temperate fruits and need not necessarily be included when considering action to improve the production and marketing of fruits. These can be eliminated without affecting the strategy to be developed and, in fact, have been crossed out in Figure 5.3. Upon analysis of the remaining objectives in rows 1 to 4, it becomes obvious that they are closely interrelated, i.e., they deal either with import substitution or export development, both of which affect foreign exchange earnings.

If an attempt were made to define one General Objective which encompasses all these objectives (rows 1 to 4) it might be the following:

**"Increase the domestic supply and exports of good quality fruit."**

At the fifth level of objectives (Figure 5.3), there is a distinct dichotomy in which one branch (see circle #1) specifies objectives to be achieved within public sector institutions, e.g., Ministry of Agriculture, and the other branch (see circle #2) specifies objectives which can best be achieved by working directly with the private sector (farmers, intermediaries, etc.). Since target groups are different in each case, and since the institutional objective deals with fruit whereas the other deals only with papaya, it would make sense to consider these as two distinct project areas within an overall strategy.

**Figure 5.3: Identification of alternative strategies and projects, based on the objective tree (Figure 5.2)**



\* For lack of space, the following problems are listed vertically. They should be shown in boxes like the other objectives at the 6th and 7th levels.

## Participant analysis

When persons, groups, institutions, and organizations see that they have something to gain from a project, they are much more likely to play an active role in working toward the success of the project. **Problems do not exist in isolation but are closely linked with people, groups, institutions, and organizations, and usually more than one person or group.** This leads to a further complication in that a problem affecting one person or group in a negative way may be beneficial to others. Therefore, any attempt to remove a particular constraint may come up against resistance. As examples:

- Import laws disadvantageous to farmers may have been lobbied into place by traders. Since traders (Importers, wholesalers, exporters) normally have more political and economic clout than do farmers, the laws are difficult to change.
- The organization of a marketing cooperative may put some intermediaries out of business. These might then use their economic strength and political influence to weaken the cooperative.
- A government marketing board may be suffering great losses in both dollars and produce while benefitting employees with jobs, and consumers through low prices. Any attempt to improve operational efficiency by reducing staff will be met with strong resistance.
- Two or more institutions may be duplicating research or training efforts, but professional pride and competition may keep them apart.

Parallel to the process of describing systems and identifying problems, the **Interdisciplinary Team** should analyze the diverse participants and their characteristics, e.g., status, interests, resources, motives, attitudes, strengths, weaknesses, and their potential support or opposition to actions that remove constraints. Important questions are: Which are the target groups? Which will play a supportive role? Which will benefit from the actions (potential supporters)? Which will be affected negatively (potential opponents)? An attempt should also be made to identify how the persons or groups will be affected.

In the execution of the **Participant Analysis**, the **Interdisciplinary Team** should collect the necessary information to fill in Form 5.1. The steps involved in this process are indicated below:

1. List all types of participants (persons, intermediaries, groups, companies, organizations, institutions, projects and others) identified in the analysis of the commodity system. These are all potential target, support, or opposition groups (Note: at this point the reader should refer to Forms 4.1 and 4.5 where different participants in the production and postharvest systems were identified).
2. Review the list to determine whether each represents a homogeneous unit or whether the group can be further subdivided – e.g., government institutions can be divided into the Ministry of Agriculture, Planning Unit, and Marketing Board. Intermediaries may be categorized as wholesalers, retailers, and exporters.

3. Characterize and analyze each participant, considering his/her social characteristics, organizational structure, status, interests, motives, attitudes, strengths, weaknesses, shortcomings, and potential role to be played.
4. Identify possible positive and negative consequences of introducing changes into the commodity system and the potential impact upon the diverse participants.
5. Fill in Form 5.1 indicating whether participants are **target, support** or **opposition** groups, or whether they belong to some other group affected by changes in the system. Describe how they are affected, emphasizing the economic or social impact.
6. In the case of ongoing projects, identify those which complement, duplicate or compete with the proposed project.
7. Develop strategies for dealing with the more important persons, groups and/or ongoing projects.

**Form 5.1: Expected impact of efforts to modify a commodity system**

PARTICIPANTS IN COMMODITY SYSTEM*	HOW AFFECTED:	
	Positive Effects	Negative Effects
Target groups: - - - -		
Support groups: - - - -		
Other groups affected - - - -		
Ongoing projects affected - - - -		

\* Note: Refer to Forms 4.1 and 4.5 to identify the participants.

Projects benefitting large numbers of participants are more likely to receive support during the implementation phase. Projects having a negative impact upon some participants with strong economic and/or political clout are more likely to run into delays during the implementation phase.

Based on the results of the participant analysis, the interdisciplinary Team, in coordination with planners, should attempt to reach a general consensus as to whose interests and views are to be given priority when carrying out problem analysis and project design.

To return to the Barbados papaya example, the participant analysis showed that the FAO had just initiated a technical assistance program to assist the Ministry of Agriculture in rationalizing its agricultural policy. Additionally, interviews with specialists determined that the Caribbean Development Bank (CDB) had just authorized a loan to the Barbados Development Bank to establish a line of credit for fruit producers. Consequently, since these two problem areas were felt to be well on their way to being resolved, both were excluded from the two circled areas which encompass possible project ideas (Figure 5.3). Nevertheless, both the FAO and the CDB actions remain integral parts of an overall strategy to improve fruit production in Barbados.

If the two circled areas are to be considered possible project areas, then the level 5 objectives in Figure 5.3 can be considered the specific objectives for each project, i.e.:

- Improve institutional services for fruit producers, and
- Improve the quality of papaya produced in Barbados.

Thus far in this analysis we have identified a general objective, two specific objectives (one for each project) and various expected results or outputs. Furthermore, logic tells us that if we continue one step further, we could identify a number of specific activities which will be required to achieve the expected outputs. These would undoubtedly include such things as training, planning and construction of physical facilities, planting wind breaks, diagnosing farmers' specific needs for planting materials, and designing and testing new tools.

## **Summary of project identification**

In synthesis, the analysis of Figures 5.1 to 5.3 has resulted in the following:

- A causal relationship has been identified between problems on the farm, postharvest handling, public sector institutions and the country's balance of payments situation.
- It therefore stands to reason that resolution of the problems at the lower levels of the problem tree could produce a positive impact on the overall economy of the country.



- The objectives tree facilitated the identification of objectives and desired results which should in turn lead to the formulation of projects to overcome the identified problems.
- By identifying participants, ongoing actions, and means-end relationships, conditions are set to identify priority project areas.

Given this information, a strategy for developing the papaya industry in Barbados can be summarized as follows:

Execute a series of actions through both public and private sectors to remove the on-farm production and postharvest handling constraints and thus significantly increase the availability of good quality papaya for the domestic and exports markets. Efforts should concentrate on improving the institutional services for fruit producers in general, including improved planting material for papaya, and improving infrastructure and human resources in selected production zones. An ongoing research and information network will be established within the Ministry of Agriculture.

Such a strategy led to the identification of the five actions or projects presented in Table 5.2.

## **Criteria for establishing priorities**

Because there may not be sufficient resources to implement all the projects simultaneously, some projects may have to precede others. In the Barbados case, for example, the development of good quality planting material is undoubtedly of the highest priority while such actions as the institutionalization of a supply system for farm inputs, while important, is of a lower level of priority.

Criteria to be considered in determining priority should include technical feasibility, costs and benefits of the project or action, social impact, and political support for project or action. Criteria of local significance can be added as conditions warrant. To quantify the relative importance of the different projects, the Interdisciplinary Team carrying out the analysis can arbitrarily assign numbers to each criterion, say one for low priority and five for high priority. An application of this methodology for the case of papaya in Barbados is presented in Table 5.2.

In the interpretation of Table 5.2 we can conclude that all five actions are technically feasible and that none have any political opposition. The benefit/cost ratio is highest for the generation of good quality planting material and the installation of irrigation; without either of them efficient papaya production could not take place. The social impact is highest for the generation of quality papaya planting material; its development will stimulate many farmers to initiate papaya production and employ more people. The packing shed is also important since it will create new jobs for a number of persons.

**Table 5.2: Prioritization of selected actions and projects for the development of the paw paw (papaya) industry in Barbados**

CRITERIA*	ACTIONS AND PROJECTS				
	Generate Quality Planting Material	Improve Supply of Farm Inputs	Install Irrigation System	Improve Harvest Tools	Construct Packing Shed
1. Technical feasibility	5	5	5	5	5
2. Benefits/costs	5	3	5	4	4
3. Social impact	5	2	1	1	4
4. Political feasibility	5	5	5	5	5
Total	20	15	16	15	18
5. Falls within national objectives	yes	yes	yes	yes	yes
6. Falls within executing institution's objectives	yes	yes	no	yes	no
7. Priority of timeliness	5	3	3	2	3

- \* 1. If technology readily exists, it is 5; the more adaptive research required, the lower the rating.  
 2. The higher the benefit to cost ratio, the better the rating; 5 is the highest.  
 3. The greater the social impact, the higher the rating; 5 is the highest.  
 4. The lower the degree of political opposition, the higher the rating; 5 is highest.  
 5. "Yes" if action is in line with national objectives; "No" if it is not.  
 6. "Yes" if action is in line with implementing institutions' objectives; "No" if it is not.  
 7. The higher the number (5 highest), the more timely the action and the more likely that the action is a precondition for other actions. Lower numbers indicate that the action can be delayed until other actions are in place.

After totalling the number of points, however, there are at least three additional questions which should be asked:

- Does the project fall within national objectives?
- Does the project fall within the objectives for the organization to implement them?
- When should the action be initiated relative to the other actions?

The responses to these three questions, for the case of Barbados papaya, are presented in the second part of Table 5.2. All five actions fall within national objectives. Since the irrigation system and the packing shed will be owned by private farmers, the construction of these two facilities does not fall within the objectives of the implementing institution (Ministry of Agriculture). This indicates that the actions will need at least two different implementing bodies – the Ministry of Agriculture, on one hand, and one or more farmers on the other.

With respect to timeliness, the first action is of highest priority, to be followed by actions two, three and five, then action number four, in that order. The reason for this ordering is that the generation of quality planting material is a precondition for the others, i.e., there is no need for farm inputs, an irrigation system, picking tools and a packing shed if the problem of poor planting material cannot be resolved. Farm inputs and irrigation will be required before harvesting tools and a packing shed are purchased; however, the packing shed should be initiated with sufficient time to assure that it is ready by harvest.

At this point it is useful to ask another question:

- What important political or bureaucratic decisions must be made before implementation can take place?

This question should be asked for each project identified. Sometimes the implementing agency is unable to execute certain actions without the authorization of another agency or institution. Some examples:

- Permission may be required from the Water Resources Department before an irrigation system can be installed.
- A policy change may be required before a new marketing strategy can be applied.
- A change in the organizational structure of an institution may require cabinet approval.

If these possible bottlenecks can be identified during the design stage, then strategies can be developed to keep them from becoming hindrances to the project during implementation.

Other useful questions are:

- What are government development-policy priorities?
- Is available manpower sufficient to implement the project?
- Will the action or project complement or compete with similar actions by other donor or support groups?
- Are there any other local, regional, or national conditions which may affect project implementation?

## **Project profiles**

While there are many definitions for development projects, the important thing is to understand a project's characteristics. The more salient characteristics of a development project are the following:

1. Projects have a physical dimension which establishes limits to their available resources.
2. Projects have a temporal dimension. Since they begin and end at specific times, they can be differentiated from ongoing institutional activities.

3. Projects conform to a well defined unit (group of actions) which can be evaluated to determine its success.
4. Projects have clearly defined objectives which tend to be innovative, rather than perpetuating an existing situation.

**Hence, a project is a set of interrelated activities aimed at a common goal/objective and implemented during a given period of time with a predetermined quantity of resources (goals + resources + activities + time).**

If we accept this definition of a project, then we can prepare a project profile by:

1. Defining its goals, objectives and expected outputs;
2. Describing the project's principal activities;
3. Indicating the resource requirements; and
4. Establishing a time frame for the beginning and ending of the project.

**Anyone capable of analyzing a commodity system and identifying priority problems and needs is also capable of identifying a project idea and expressing it in the form of a project profile.**

The key to project identification and formulation is knowing what the priority problems are. Since the priority problems have been neatly organized in the problem tree (Figure 5.1), converted to objectives in the objectives tree (Figure 5.2) and analyzed in alternative strategy analysis (Figure 5.3), the writing of a project profile is a straightforward task. That is, the commodity system analysis has identified all the basic information necessary to prepare one, or several, project profiles.

While different people and organizations use different outlines for project profiles, basically they all contain the same type of information to greater or lesser degrees. Based on our definition of a project given above, the following minimum information should be included in a project profile:

1. **Title** (reflects the most important feature of the project).
2. **Definition of problems/justification** (derived from the problem tree).
3. **Goals or general objectives** (derived from an analysis of objectives tree and alternative strategies).
4. **Specific objectives** (derived from analysis of the objectives tree and alternative strategies).
5. **Expected outputs** (Identified from the lower levels of the objectives tree). The expected outputs are the results wanted at the end of the project.
6. **Activities to be executed** under the project which will produce the expected outputs. (These are a logical extension of the expected outputs and must be carried out to achieve the expected outputs.)
7. **Expected duration** of the project (determined by the time required to complete all project activities in their proper sequence).

8. **Estimate of costs** (derived from an analysis of inputs required to implement activities).
9. **Implementing organization or agency** (determined through an evaluation of organizational capability, source of funding, and local politics).

Project profiles are short descriptions of potential projects. As noted, they can be written in many different formats. Annex 12 presents two **project profiles** developed following the guidelines presented in this manual (Chapter 5) and based on Figure 5.3.

## **General observations on the use of CSAM and project profiles**

The purpose of this manual is to provide a methodology to study a particular commodity, from planning production to final distribution and consumption, and to identify priority problems occurring along the way and the means of resolving them. The careful reader now has the necessary information and tools to identify problems and to prepare project profiles. However, you cannot feed a child project profiles, nor are they useful for purchasing health care or school books. What then do we do with a project profile?

The answer, of course, is to move them into the proper channels which will lead to funding. This funding can then be used to execute priority activities which will improve the efficiency of food systems. These outputs hopefully will generate economic or social benefits for the intended beneficiaries of the project.

In any country, there are a number of local, national, multinational, international, bilateral and non-governmental organizations active in agricultural development activities. Some organizations only provide loans; others only grants or technical assistance. Still others may provide loans, grants and technical assistance. While some organizations only work through governments, others only provide their assistance through the private sector. Some development organizations provide financial and technical assistance based on little more than a two page profile. Others may require several volumes of additional information before they release a dollar.

In whatever circumstances, the project profile plays a key role in obtaining assistance from development organizations. Project profiles resulting from the application of the CSAM represent the principal results of a thorough, albeit rapid, appraisal of a commodity system. Those individuals who have managed the implementation of the CSAM must insure that decision-makers, when presented with project profiles, understand the tremendous effort that has gone into the identification of priority problems and the subsequent design of appropriate solutions expressed in project format. A CSAM implementation report will sometimes help in this respect, but often decision-makers are too busy to go into the details of a larger report. Still, in one way or another, they must be made aware of how the project profile has been developed and made to understand the validity of its recommendations.

If a project profile is submitted to a potential donor who likes the project and offers to finance it, so much the better. However, in most cases, project profiles are not immediately financed since they normally do not provide the potential donor with sufficient information to determine feasibility and level of risk. Still, it is the project profile which either stimulates the donors to ask for additional information (a positive sign) or inform you that they are not interested (avoiding further waste of time). Profiles, therefore, are a very important tool for agricultural development.

Good profiles may lead either to direct assistance or, if additional information is required, they may become the first step in the project cycle followed by development banks. This project cycle includes: project formulation and evaluation; appraisal and negotiation; project financing and implementation; monitoring and evaluation. One way of contributing to a good project cycle of agriculture development is by learning to prepare good project proposals. The first step in this process is learning to write a good project profile.

Many donor agencies require the use of the Logical Framework (Rosenberg and Posner, 1979) for the presentation of a project proposal. The application of a CSAM and the resulting project profiles will yield the majority of the information required to complete a "log frame." Information on the Logical Framework and methods for using CSAM-generated information in the development of a log frame are contained in Annex 13.



# CHAPTER 6

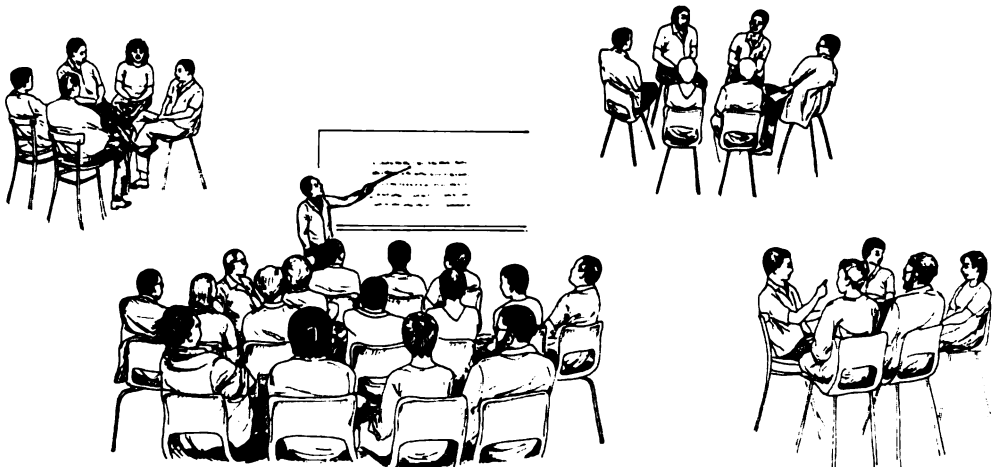
## Organizing a Workshop

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It is expected that workshops using the CSAM methodology will be held in third world countries, sponsored by one or more national institutions, with perhaps an international institution providing technical or financial assistance. Participants in the workshops will form an interdisciplinary group, including farmers, marketing intermediaries, and public sector professionals. A coordinating individual or group will be designated to oversee all aspects of the workshop, including planning, implementation and presentation of the results to appropriate authorities.

### Coordinating Committee

A Coordinating Committee for the workshop should be formed several weeks or months prior to the expected inauguration of the event. Members of this committee should be drawn from each of the sponsoring and support institutions. The Coordinating Committee should determine the objectives of the workshop, identify the needs in personnel, financial and logistical support to obtain the desired results, identify the type of support to be provided by the sponsoring institutions and take care of the necessary organization and management.





**Chairperson:** Selected as the head of the Coordinating Committee, the Chairperson is responsible for communication and coordination with other institutions involved in the event, oversees all sub-committees, has the final word on all decisions affecting the workshop, and is responsible for its success or failure.

**Secretariat:** The Secretariat includes a coordinator, designated by the Chairperson, one or more secretaries, one or more drivers, and a support staff (as needed) to provide drawing, copying and other required services. Provided on a full-time basis by the respective Institutions sponsoring the workshop, the Secretariat provides all the necessary secretarial and administrative services to the resource persons and the workshop participants. It prepares all draft documents, insuring that they are properly organized and stored on word processors, and distributes the final workshop report at the closing ceremony of the workshop.

**Working Groups:** Prior to the execution of the workshop, Working Groups will be formed to generate baseline information in such areas as: pre-production and institutional aspects, production, postharvest, and marketing. Each of these groups will have a coordinator who will form part of the Workshop Coordinating Committee. Prior to the workshop, these coordinators will prepare baseline documents from secondary data in their respective areas and present them to the other participants during the first two days of the workshop. The four heads of working groups will learn the CSAM methodology in order to organize similar workshops for other commodities.

## **Expected outputs**

The **Coordinating Committee** should determine the workshop's objectives and clearly define its expected outputs. For a two-week workshop, some or all of the following results can be obtained:

1. Descriptive and quantitative baseline documents on the commodity of interest, including institutional, production, postharvest, and marketing aspects.
2. Identification of significant problems affecting the commodity system.
3. Determination of the magnitude and causes of postharvest losses and other problems in the commodity system.
4. Identification of appropriate projects and interventions to alleviate the problems identified.
5. Definition of a strategy or plan of action for developing solutions and implementing actions.
6. Training of national professionals in the application of the CSAM methodology.
7. Training of participants to have a better understanding of a commodity system and all its interrelationships.

The achievement of these results will require a very serious commitment on behalf of the sponsoring institution(s) in terms of material and human resources. It will also require good organization, effective resource persons and dedicated participants.

## **Institutional support**

The impact of the workshop will depend to a great degree on the type of institutional support received. If the participants attend on a part-time basis and material support is weak, they will receive the message that their respective institutions are not considering the workshop as a very serious training event. Consequently, the level of learning and transfer will be low. However, if participants are relieved of their normal duties, allowed to participate on a full-time basis and are notified that they will be expected to apply the methodology in their future activities, a more positive message will be sent.

The type of institutional support required from the sponsoring institution(s) can be summarized as follows:

**Participants:** All participants will be expected to be involved on a full-time basis for the duration of the workshop. This will also apply to administrative and secretarial support staff.

**Equipment:** Sponsoring institutions will make available all necessary equipment to assure a successful workshop. This will include transportation for resource personnel, administrative staff and field trips; overhead and slide projectors; access to photographic equipment to document the commodity system; at least one word processor; access to photocopying services; and others as determined necessary.

**Materials:** Participants and administrative personnel must have access to the materials required to satisfactorily undertake their assignments. These will include such items as pads, pencils, slide film, overhead projection laminates, flip charts, computer diskettes, binders and paper for documents, and others.

**Meals:** For the duration of the workshop, arrangements should be made for participants to take their lunch as a group. This will facilitate maintaining a rigid schedule – a requirement if the desired outputs are to be achieved. Given the intensive nature of the workshop, morning and afternoon breaks with refreshments may be desirable. These breaks also help build rapport between participants.

**Miscellaneous:** Depending on the host country and the commodity being studied, there may be unforeseen expenses such as payments to resource persons, purchase of small volumes of produce being studied, and transportation costs. It may be necessary to hire someone from the private sector to prepare tables, graphs, maps, or other visual aids. A small fund should be established to cover these types of miscellaneous expenses.

## Baseline documents

Workshop participants will include a large number of individuals specialized in specific areas who, more than likely, are unfamiliar with other disciplines. For example, macro-economists are likely to know relatively little about production and postharvest handling of a particular crop; agronomists and food technologists may well find economic terminology confusing, and marketing specialists may know little about pest and disease constraints.

As a means of informing the participants about the state-of-the-art of a particular commodity, baseline documents should be prepared by the respective coordinators of the working groups prior to the workshop. During the first two days of the workshop, the baseline documents will be presented and discussed among the participants. Each baseline document will provide descriptive and quantitative information on the particular crop as indicated below.

**Macro-economic baseline document:** will include information on the relative importance of the particular commodity to the economy; public sector institutions and their functions and services; national agricultural policies; special projects, programs and plans which may affect the commodity being studied; incentive programs and policies (tax, finance, exemptions); private sector institutions and organizations and their services and functions (farmer organizations, non-profit support organizations); principal problems; and others.

**Production baseline document:** should contain information on the history of national production of the particular crop being studied; actual and potential land use and area in crop; environmental requirements of crop; agronomical characteristics; actual production constraints; farming systems; planting material; cultural practices; pests and diseases; production costs; principal problems and needs; and others.

**Postharvest baseline document:** will cover the identification and description of postharvest handling practices; available infrastructure and equipment; agroprocessing potential and characteristics; principal problems and needs; and others.

**Marketing baseline document:** should consider imports and exports of the commodity being studied; national and external demand; marketing channels; marketing margins; characteristics of demand; consumption patterns; marketing costs; market potential; and others.

## Resource persons

**Commodity systems specialist:** One resource person familiar with the commodity systems assessment methodology should be available for the duration of the workshop. The resource person should be available one week prior to the workshop to assist the Coordinating Committee in organizational arrangements.

The functions of this specialist will include:

- a. Coordinating with the Workshop Chairman to assure that all necessary resources have been allocated for the workshop, including qualified participants, materials, transportation, equipment, eating arrangements, field trip arrangements, working and office space, administrative and support staff, copying service, and others;
- b. Making an introductory presentation at the workshop on the CSAM methodology, the diverse tools presented in this manual and their use;
- c. Opening the plenary sessions each day of the workshop with summaries of the previous day's accomplishments, material to be covered and expected outputs for that day;
- d. Responding to questions from participants and leaders of the different working groups with regard to methodology and presentation of results;
- e. Functioning as a central clearing house for all material produced for and during the workshop and assisting the Coordinating Committee in the preparation of the final workshop report.
- f. Others that the Coordinating Committee may determine.

**Planners:** An introductory presentation to the workshop should be given by some decision maker from the agricultural sector (National Planning Office, Ministry of Agriculture) focusing on national development plans with respect to the commodity being studied.

**Farmers:** In addition to the farmers selected to participate in the workshop on a full-time basis, representative farmers, with different size operations and methods of farming, should be selected as resource persons. Ideally, field trips to their farms could be arranged. These farmers should be asked to discuss such things as their cultural practices, pest and disease constraints, costs of operation, methods of postharvest handling and marketing, their decision-making processes for their farming operations, and their principal problems and needs.

**Intermediaries:** Depending on the crop to be studied, intermediaries involved in transportation, assembly, wholesaling, retailing, storage, and export should be identified and arrangements should be made for field visits to their sites of operation. These intermediaries should be asked to describe their operations; their interrelationships with farmers, other intermediaries and government; and their principal needs for improvement. Each visit should include a period for questions and answers.

**Agroprocessors:** For those products which undergo some form of agroprocessing, arrangements should be made to visit agroprocessing facilities and to discuss with management their operations, problems and needs.

## **Selection of participants**

While the number of workshop participants should be adjusted to meet local facilities and circumstances, in general, the number should not exceed twenty-five. Groups larger than this become difficult to manage, particularly when making field visits. The participants should include farmers, intermediaries, and specialists from disciplines such as: economics, agricultural economics, agronomy, entomology, food technology, engineering, marketing, sociology/anthropology, resource development and others relevant to the case at hand.

Participants may be drawn from those institution(s) sponsoring the workshop, as well as from other public sector institutions, private sector organizations or businesses and the farming community.

## **Development of workshop agenda**

Each workshop agenda will be adapted to the local needs and the available resources of the sponsoring institution(s). While most workshops should be similar in content, the time dedicated to each element will likely vary. The workshop program should include:

- registration of participants and inauguration of workshop;
- presentation of the CSAM methodology;
- presentation of baseline information on commodity being studied;
- identification and collection of missing information;
- field trips to farms, postharvest handling and agro-processing facilities;
- description of the distinct components of the commodity system;
- analysis and prioritization of problems in the commodity system;
- identification of project ideas and required actions; and
- formulation of project profiles.

The actual workshop program will be determined by the Coordinating Committee, assisted by the CSAM specialist, during the week preceding the workshop.

The actual time dedicated to the different subject materials during workshops executed in Malaysia (Malaysian Agricultural Research and Development Institute, 1988) and Nepal (McCullough and Haggerty, 1989), are shown in Table 6.1.

**Table 6.1: Allocation of time to workshop topics executed in Malaysia (1988) and Nepal (1989)**

WORKSHOP TOPICS	MALAYSIA WORKSHOP (hours)	NEPAL WORKSHOP (hours)
Registration	1.0	informal
Inauguration	1.0	0.5
Overview of commodity systems methodology	2.0	2.0
Presentation of baseline documents	4.0	2.0
Analysis of additional information needs	2.0	1.5
Collection of missing information	20.0	6.0
Description of specific commodity system	14.0	16.0
Problem analysis	15.0	4.0
Identification of alternative solutions	16.0	4.0
Project formulation	8.0	4.0
Logical framework analysis	4.0	0.0
Total	88.0	40.0

As a general rule, most of the workshop time will be dedicated to the collection of missing information, description of commodity systems, problem analysis and the identification and formulation of solutions. The more information included in the baseline documents (prepared prior to the workshop), the less time required for information collection during the workshop. The more time available towards the end of the workshop, the greater the likelihood of developing detailed project profiles.

## Conducting the workshop

The workshop should be conducted in an informal atmosphere and should be dynamic and flexible enough to adjust to needs as they develop. Each workshop should have a moderator or facilitator who is specialized in communication and group dynamics. This person may be either a natural leader or formally trained in these areas. This facilitator should be a key person in integrating workshop participants so that they play active roles in the discussion of problems and solutions. S/he may also assist the Chairperson in overcoming logistical and other problems as they arise.

After the opening ceremony has concluded, the CSAM resource person will present an overview of the methodology to be used during the workshop, showing how a systematic, step-by-step analysis can result in a rapid assessment of a specific commodity system. Immediately thereafter the coordinators from each of the working groups will summarize the information contained in the baseline documents. The need for additional information will then be evaluated, and subsequent activities will include the design of questionnaires, interviews and field visits to collect missing information.

Due to the difficulty of working in large groups, the plenary body should be divided into interdisciplinary sub-groups of from five to eight persons. Each sub-group should include farmers, people with postharvest and marketing experience and professionals from as many disciplines as possible. Whenever group work is required, i.e., for the collection of missing information, for problem analysis, for the identification of project ideas and other solutions, and for the formulation of project profiles, these sub-groups should be convened. Each sub-group should select its own coordinator and rapporteur for reporting back to the plenary session.

Plenary sessions are required each time new information, methodologies or working instruments are introduced. Longer plenary sessions are required to present and discuss the results of the working groups and to carry out activities of mutual interest, such as brainstorming.

The workshop facilitator and Coordinating Committee should periodically evaluate the progress of the workshop. When certain sessions seem to become tedious or boring, a field trip can be planned or new subject material introduced to stimulate the group. The order of presentation of subject material can be modified to fit the specific needs of the participants.

The typical workshop will span a two-week period, but can be longer or shorter based on detail desired, resources available, and the complexity of the systems being studied.

## **Collection of missing information**

Chapter 3 describes in considerable detail the type of information which should be obtained on each of the relevant components of a given commodity system. A comparison of Chapter 3 guidelines with the baseline documents presented by the working groups will give an indication of the missing information which needs to be collected. Some of the missing information may be obtained from secondary documents. Some may also be collected during field visits to farmers, intermediaries, exporters or other participants in the commodity system. In those cases where questionnaires are required, the guidelines in Annex 1 may prove useful.

Each working group will determine its particular requirements for information and will develop methods to generate it during the time allocated for this activity. In some instances the necessary information may be impossible to collect in the short time period available. In these cases, recommendations should be made for developing longer-term research activities to be carried out after the workshop.

## Checklist for organizing a workshop

To facilitate the organization of the workshop and to insure that all members of the Coordinating Committee and institutional decision makers are kept informed of the headway being made, a checklist of workshop activities should be maintained. The Chairman of the Coordinating Committee, and each member, should keep their own copy of the checklist. A model of a workshop checklist is presented in Form 6.1

**Form 6.1: Checklist for organizing a workshop**

WORKSHOP ACTIVITIES	DATE ACTION TAKEN	PERSON RESPONSIBLE
1. Formalization of workshop request		
2. Identification of institutional support		
3. Selection of workshop commodity		
4. Selection of geographical crop area to study		
5. Selection of participants		
6. Formation of coordinating committee		
7. Preparation of baseline documents: - macro-economics - production - postharvest - marketing		
8. Identification of missing information: - macro-economics - production - postharvest - marketing		
9. Arrival of commodity system resource person		
10. Selection of national resource persons: - policy - production - postharvest - marketing		
11. Preparation of workshop program		
12. Selection of secretary		
13. Materials and equipment: - paper, etc. - projectors/camera - transportation - computer/word processor - copying facilities - other		
14. Food arrangements		
15. Transportation arrangements		
16. Execution of workshop program		





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# **ANNEX 1**

## **Example Questionnaires for Commodity System Components**

**COMPONENT 01**

**Relative Importance of Crop**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Overall agriculture setting:  
Total national land area: \_\_\_\_\_ (sq mi, acres, ha)  
Area suitable for agriculture: \_\_\_\_\_ (sq mi, acres, ha)  
Marginal land area: Steepland \_\_\_\_\_  
Deep peat \_\_\_\_\_  
Acid sulphate \_\_\_\_\_  
Marsh land \_\_\_\_\_  
Salty soils \_\_\_\_\_  
Others (specify) \_\_\_\_\_

2. Area (ha, acres) suitable for cultivation of crop group, e.g., fruit cultivation: \_\_\_\_\_  
Area (ha, acres) suitable for specific crop cultivation, e.g., starfruit cultivation: \_\_\_\_\_

3. Common Name: \_\_\_\_\_  
Scientific Name: \_\_\_\_\_  
Commercial Clones: 1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_

4. Total crop area planted and level of production for the past five years.

<u>Year</u>	<u>Hectares</u>	<u>Production</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. Projected hectareage cultivated and expected level of production for the next five years (based on normal growth trend).

<u>Year</u>	<u>Hectares</u>	<u>Production</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

6. Major producing areas and estimated hecterage:

	<u>Region/location</u>	<u>Hectares</u>	<u>Production</u>
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____

7. Import/Export information for the last five years:

Year	Export		Import	
	Quantity	Value	Quantity	Value

8. Is this crop given priority in the National Development Plan?

yes ( ) no ( )

9. If no, why not? \_\_\_\_\_

10. If yes, what are the criteria for selection?

- ( ) food security                      ( ) export potential                      ( ) income generation  
 ( ) market demand                      ( ) employment                      ( ) marginal land use  
 ( ) others (specify): \_\_\_\_\_

11. If the crop is for export, what are the country's major comparative advantages in production and export?

- ( ) low production costs                      ( ) high quality product                      ( ) low transport costs  
 ( ) fruit fly-free zones                      ( ) few pest/disease problems  
 ( ) others (specify): \_\_\_\_\_

12. Observations: \_\_\_\_\_

13. Summary of problems identified which may affect production, processing, postharvest handling or marketing of crop:

- 1.
- 2.
- 3.
- 4.

**COMPONENT 02**

**Public Sector Policies**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. **Policies and strategies:** Identify and describe existing governmental policies and strategies which directly or indirectly affect the production and/or marketing of this product or groups of products.

Policies: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Strategies used for implementation of policies: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. **Projects:** Identify and describe existing or planned projects which will impact on the production, processing, postharvest handling and/or marketing of this product. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. **Incentives/Disincentives:** Identify and describe any existing or in-pipeline incentives or disincentives which favor the production, processing, postharvest handling or marketing of this crop.

<u>Incentive</u>	<u>Relevant Institution</u>	<u>Brief description of incentive</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
<u>Disincentive</u>		
_____	_____	_____
_____	_____	_____

4. Are national production goals established for this commodity?  
yes( ) no( )  
If yes, what are they: \_\_\_\_\_  
\_\_\_\_\_
5. Which policy or policies most strongly impact the crop production system, to what degree, and why? \_\_\_\_\_  
\_\_\_\_\_
6. Do any of the policies/strategies impact the postharvest losses?  
yes( ) no( )  
Explain: \_\_\_\_\_  
\_\_\_\_\_
7. Summary of problems identified which may impact production, processing, postharvest handling or marketing of crop.
- 1.
  - 2.
  - 3.
  - 4.
  - 5.



**COMPONENT 03**

**Relevant Institutions**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Institutions responsible for planning:

<u>Ministry</u>	<u>Department or Unit</u>	<u>Responsibilities</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

2. Institutions involved in production system:

<u>Ministry</u>	<u>Department or Unit</u>	<u>Responsibilities</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Institutions involved in processing of product:

<u>Ministry</u>	<u>Department or Unit</u>	<u>Responsibilities</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. Institutions involved in postharvest handling and/or marketing of crop:

<u>Ministry</u>	<u>Department or Unit</u>	<u>Responsibilities</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. Institutions responsible for research:

<u>Ministry/University</u>	<u>Department or unit</u>	<u>Type of research</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

6. Private sector Institutions/organizations involved with crop:

<u>Name</u>	<u>Functions or actions</u>
_____	_____
_____	_____
_____	_____

7. Other ministries/departments directly or indirectly involved in the development of crop:

<u>Ministry/Department</u>	<u>Responsibility or functions</u>
_____	_____
_____	_____
_____	_____
_____	_____

8. Identify the coordinating body, if any, responsible for the development of the crop industry and describe its function:

Name of coordinating body: \_\_\_\_\_  
 Functions a. \_\_\_\_\_  
 b. \_\_\_\_\_  
 c. \_\_\_\_\_

9. Indicate level of coordination of the various institutional activities:

	<u>Well coordinated</u>	<u>Satisfactory</u>	<u>Poorly coordinated</u>
Planning	( )	( )	( )
Production	( )	( )	( )
Processing	( )	( )	( )
Marketing	( )	( )	( )
Research	( )	( )	( )

10. Summary of key public and private sector institutions for the development of the crop industry:

<u>Name of institution, unit, department, or organization</u>	<u>Principal constraints</u>
_____	_____
_____	_____
_____	_____

# COMPONENT 04

# Facilitating Services

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

**1. Transportation:**

- a. Farm accessibility (road conditions)  
 ( ) good ( ) acceptable ( ) poor

Observations: \_\_\_\_\_

b. Availability of vehicles for:	<u>Good</u>	<u>Acceptable</u>	<u>Poor</u>
- Production inputs	( )	( )	( )
- Farm to packinghouse	( )	( )	( )
- Farm to market	( )	( )	( )
- Packinghouse to wholesaler	( )	( )	( )
- Packinghouse to port	( )	( )	( )
- Export: air shipments	( )	( )	( )
sea shipments	( )	( )	( )

- c. Describe priority constraints affecting transportation:

1. \_\_\_\_\_  
 2. \_\_\_\_\_

**2. Information (Info):**

	<u>Production</u>		<u>Postharvest</u>		<u>Markets</u>		<u>Prices</u>	
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
Institutional info available?	( )	( )	( )	( )	( )	( )	( )	( )
Sufficient for decision making?	( )	( )	( )	( )	( )	( )	( )	( )
Sources of institutional info?	_____	_____	_____	_____	_____	_____	_____	_____
Other sources of information?	_____	_____	_____	_____	_____	_____	_____	_____

Describe priority constraints related to information:

\_\_\_\_\_

**3. Credit:**

<u>Sources</u>	<u>Type of collateral required</u>	<u>Interest rate</u>	<u>Limits of credit</u>	<u>Sufficient</u>	
				<u>Yes</u>	<u>No</u>
_____	_____	_____	_____	( )	( )
_____	_____	_____	_____	( )	( )
_____	_____	_____	_____	( )	( )

Describe constraints with respect to credit :

a. \_\_\_\_\_  
 b. \_\_\_\_\_

4. Farm inputs:

<u>Types of farm input</u>	<u>Available when needed</u>		<u>Principal source of input</u>
	<u>Yes</u>	<u>No</u>	
- fertilizers	( )	( )	_____
- chemicals	( )	( )	_____
- tools	( )	( )	_____
- Irrigation equipment	( )	( )	_____
- natural pesticides	( )	( )	_____
- others _____	( )	( )	_____

Describe constraints related to supply of farm inputs:

- a. \_\_\_\_\_  
 b. \_\_\_\_\_

5. Technical assistance (TA):

<u>Operation</u>	<u>TA is available</u>		<u>Source of TA</u>	<u>TA is sufficient</u>	
	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
Production	( )	( )	_____	( )	( )
Postharvest	( )	( )	_____	( )	( )
Marketing	( )	( )	_____	( )	( )
Processing	( )	( )	_____	( )	( )

Describe constraints with respect to technical assistance:

- a. \_\_\_\_\_  
 b. \_\_\_\_\_

6. Postharvest facilities:

	<u>Owner/Operator</u>	<u>Is capacity sufficient?</u>		<u>Is service efficient?</u>	
		<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>
Cold room	_____	( )	( )	( )	( )
Packinghouse	_____	( )	( )	( )	( )
Refrigerated truck	_____	( )	( )	( )	( )
Others (specify)	_____	( )	( )	( )	( )

7. Describe constraints with respect to postharvest facilities:

- a. \_\_\_\_\_  
 b. \_\_\_\_\_

8. Identify and describe any other existing or needed services or infrastructure relevant to the production, processing, postharvest handling, or marketing of the crop in question: \_\_\_\_\_  
 \_\_\_\_\_

**COMPONENT 05****Farmer Organizations**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify the active farmer organizations involved with the production or marketing of the crop. For each organization identified, provide the following information:
  - a. Name of organization: \_\_\_\_\_
  - b. Name of key person: \_\_\_\_\_
  - c. Location, address: \_\_\_\_\_
  - d. Number of active members: \_\_\_\_\_
  - e. Types of commodities handled: \_\_\_\_\_
  - f. Services offered to members, e.g., information, technical assistance, credit, transport, storage, grading of produce, farm input, supply, marketing, etc.: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - g. Important experiences of the organization in production, postharvest handling, processing or marketing: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - h. Quantify the organization's resources (human resources, financial resources, vehicles, equipment, buildings, etc.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - i. The management/administration of this organization is considered:  
very good( ), good( ), satisfactory( ), poor( ), very poor( ).
  - j. Does this farmer organization have full time management?  
yes( ) no( )
  - k. Does this farmer organization have an established financial accounting system?  
yes( ) no( )
  - l. How important is the crop to this farmer organization?  
( )very important, ( )average importance, ( )not important
  - m. Describe the principal problems identified by the farmer organization:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. Does government policy favor( ) or disfavor( ) the strengthening of farmer organizations?

3. Identify the active farmer organizations within the potential production areas. For each, provide the following information:
- a. Name of organization: \_\_\_\_\_
  - b. Name of key person: \_\_\_\_\_
  - c. Location, address: \_\_\_\_\_
  - d. Number of active members: \_\_\_\_\_
  - e. Types of commodities handled: \_\_\_\_\_
  - f. Services offered to members, e.g., information, technical assistance, credit, transport, storage, grading of produce, farm input, supply, marketing, etc.: \_\_\_\_\_  
\_\_\_\_\_
  - g. Important experiences of the organization in production, postharvest handling, processing or marketing: \_\_\_\_\_  
\_\_\_\_\_
  - h. Quantify the organization's resources (human resources, financial resources, vehicles, equipment, buildings, etc.) \_\_\_\_\_  
\_\_\_\_\_
  - i. The management/administration of this organization is considered:  
very good( ), good( ), satisfactory( ), poor( ), very poor( ).
  - j. This farmer organization has full time management.  
yes( ) no( )
  - k. This farmer organization has an established financial accounting system.  
yes( ) no( )
  - l. How important is the crop to this farmer organization?  
( )very important ( )average importance ( )not important
  - m. Describe the principal problems identified by their farmer organization:  
\_\_\_\_\_  
\_\_\_\_\_
4. If there are no farmer organizations dealing with the commodity, explain why not:  
\_\_\_\_\_  
\_\_\_\_\_
- Recommendations with respect to farmer organizations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. Summarize the principal problems affecting the development of farmer organizations.
- 1.
  - 2.

**COMPONENT 06**

**Environmental Requirements and Constraints**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Optimum growing conditions for crop:

1.1 Soil: a. type: \_\_\_\_\_  
b. pH: \_\_\_\_\_  
c. slope: \_\_\_\_\_

1.2 Monthly water requirements: \_\_\_\_\_

1.3 Temperature range within which crop does well: \_\_\_\_\_

1.4 Humidity range within which crop does well: \_\_\_\_\_

1.5 Photo-period (length of daylight required): \_\_\_\_\_

1.6 Other: \_\_\_\_\_

2. Crop sensitivity to weather conditions:

	<u>Sensitive</u>	<u>Moderate</u>	<u>Tolerant</u>	<u>Remarks</u>
- drought	( )	( )	( )	_____
- heavy rain	( )	( )	( )	_____
- water logging	( )	( )	( )	_____
- strong winds	( )	( )	( )	_____
- high temperatures	( )	( )	( )	_____
- low temperatures	( )	( )	( )	_____

3. Optimum storage conditions:

	<u>Shelflife (days)</u>	
	<u>Minimum</u>	<u>Maximum</u>
- ambient temperature	_____	_____
- cool storage (@ _____ °C)	_____	_____

4. Quality of soils in the production area in question are considered:  
very good( ), adequate( ), or deficient( ).

5. Typical soil conditions in production area:

Soil: a. type: \_\_\_\_\_  
b. pH: \_\_\_\_\_  
c. slope: \_\_\_\_\_

6. Rainfall (mm) in the production area during the growing season:  
Minimum\_\_\_\_\_ Maximum\_\_\_\_\_ Average\_\_\_\_\_
7. Rainfall is considered excessive( ), adequate( ), or insufficient( ).  
Explain:\_\_\_\_\_
8. Are rains torrential to the degree of damaging the crop? yes( ) no( )
9. Does the crop suffer from water logging (excessive amounts of standing water) at any time during the growing season? yes( ) no( )  
Explain:\_\_\_\_\_
10. Does the area suffer from flooding during the growing season? yes( ) no( )  
Explain:\_\_\_\_\_
11. In case of drought conditions, is irrigation available? yes( ) no( )  
Explain:\_\_\_\_\_
12. What is the temperature of the area during the growing season?  
maximum\_\_\_\_\_ minimum\_\_\_\_\_ average\_\_\_\_\_
13. Is frost or cold temperature a constraint in this area? yes( ) no( )  
Explain:\_\_\_\_\_
14. Are high temperatures a problem for this crop in this area? yes( ) no( )  
Explain:\_\_\_\_\_
15. What is the average relative humidity of the area during the growing season? \_\_\_\_\_%  
Is there a significant daily variation? yes( ) no( )  
Explain:\_\_\_\_\_
16. What is the slope of most of the land in the growing area?  
very flat( ), gently sloping( ), moderately sloping( ), steep( ),  
very steep( ), rolling( ), mixed flat and sloping( ).
17. How do the above ecological conditions generally affect crop production and/or yields?\_\_\_\_\_
18. Summarize problems which may impact production and/or postharvest handling:
  - 1.
  - 2.



**COMPONENT 07****Availability of Seeds and Planting Materials**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

	<u>Name</u>	<u>Source</u>
1. Commercial seeds available:	1. _____	_____
	2. _____	_____
	3. _____	_____

2. For each type available, answer the following questions:

	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>
a. Yield (good, moderate, poor)	_____	_____	_____
b. Quality (good, moderate, poor)	_____	_____	_____
c. Cost (high, medium, low)	_____	_____	_____
d. Demand (high, medium, low)	_____	_____	_____

3. Is there a need to introduce new seeds or cultivars? yes( ) no( )

4. If yes, what improvements are needed? \_\_\_\_\_  
\_\_\_\_\_

5. Principal source of planting material? \_\_\_\_\_

6. Is planting material imported( )? or produced by the government( )? commercial growers( )? farmers( )? others? \_\_\_\_\_

7. Are seeds hybrid( )? open pollinated( )? or other? \_\_\_\_\_

8. Is the quality of planting material considered high( )? satisfactory( )? or low( )?

9. Is the germination rate of seeds high (80-100%)( )? medium (60-80%)( )? or low (less than 60%)( )?

10. Are seeds or planting material readily available? yes( ) no( )

11. What are the principal complaints from farmers concerning seeds/plants (quality, cost, availability, etc.)? \_\_\_\_\_  
\_\_\_\_\_

12. What are the opinions of extension agents with respect to these complaints?

13. Are fruit tree plants obtained from private( ), or public sector nurseries( )?  
Name of source:\_\_\_\_\_
14. If obtained from the public sector, are they subsidized? yes( ) no( )  
Explain:\_\_\_\_\_
15. Age of plants when moved from nursery to field?\_\_\_\_\_
16. Are they seedlings( )? or grafted( )? If grafted, are they trained? yes( ) no( )
17. Grafting success rate: high( ), medium( ), low( ).
18. Are plants certified disease free( )? appear to be disease free( )? or do they appear diseased( )?
19. Are plants available in sufficient quantity to meet demand? yes( ) no( )  
Explain:\_\_\_\_\_
20. Is credit available to the farmers to allow purchase of seeds or plant stock?  
\_\_\_\_\_
21. Are seeds or plant stocks generally available at the proper time of year?  
\_\_\_\_\_
22. Based on available seeds or planting material, are productivity and quality expected to be high( ), medium( ), or low( )?
23. Summary of problems identified which may affect the production, processing, or postharvest life of product.  
1.  
2.  
3.
24. Other Observations:\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**COMPONENT 08****Farmers' Cultural Practices**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Why does the farmer grow this crop?  
( )no other alternative, ( )tradition, ( )best money-making alternative,  
( )other (specify)\_\_\_\_\_
2. Most common type of farming system:  
( )mono crop ( )intercrop ( )rotation ( )backyard garden  
( )slash and burn ( )plantation  
( )other (specify)\_\_\_\_\_
3. How is the ground prepared for planting?  
( )plowed by tractor ( )plowed with animals ( )worked by hand  
Describe:\_\_\_\_\_
4. Planting hole size and method of preparation:\_\_\_\_\_
5. Describe type of planting material used:\_\_\_\_\_
6. Describe planting distance and pattern used:\_\_\_\_\_
7. Do farmers carry out a plant protection spray program for pests and disease?  
yes( ) no( ). If yes, describe methods:\_\_\_\_\_
8. Do farmers fertilize the crop? yes( ) no( ). If yes, describe method, formula, frequency,  
and quantity used:\_\_\_\_\_
9. Do farmers use irrigation? yes( ) no( ). If yes, describe the method and frequency:\_\_\_
10. What is the principal source of labor?  
( )family, ( )exchange of labor with neighbors, ( )hired full-time, ( )hired part-time,  
( )other (specify)\_\_\_\_\_
11. Is the supply of labor a problem during production? yes( ) no( ).  
During harvest? yes( ) no( ). Explain\_\_\_\_\_
12. Laborers are: ( )highly skilled, ( )satisfactory, ( )poorly skilled.

13. Are attempts made to control shade? yes( ) no( ). Describe method/frequency of control. \_\_\_\_\_
14. Do farmers prune this crop? yes( ) no( )  
If yes, how? \_\_\_\_\_
15. Describe method, frequency, and adequacy of weed control. \_\_\_\_\_
16. How do farmers make the decision when to harvest the crop?  
( )Maturity ( )Market price ( )danger from theft  
( )Other (specify) \_\_\_\_\_
17. How is crop harvested? ( )Mechanically, ( )Manual labor, ( )Family labor,  
( )Other (specify) \_\_\_\_\_
18. What tools are used during harvest? \_\_\_\_\_
19. What is the average area (hectares, acres) planted by typical farmers?  
\_\_\_\_\_ minimum \_\_\_\_\_ maximum \_\_\_\_\_
20. Does the farmer grow the crop on land that is ( ) owned, ( ) rented, ( ) share-cropped,  
( ) communally farmed, ( ) other? \_\_\_\_\_
21. What changes in cultural practices might contribute most to an improvement in product quality? \_\_\_\_\_
22. What changes in cultural practices might contribute most to an increase in production? \_\_\_\_\_
23. What changes in cultural practices might contribute most to a decrease in per unit production costs? \_\_\_\_\_
24. Summarize the cultural practices which are likely to impact production, processing, postharvest handling, or marketing of product.
- 1.
  - 2.

**COMPONENT 09****Pests and Diseases**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

List all pests and diseases which impact upon the productivity or quality of the crop by order of importance. In each case, indicate economic or quarantine significance.

<u>Name of pest</u>	<u>Significance (Econ or Quar)</u>	<u>Name of disease</u>	<u>Significance (Econ or Quar)</u>
1. _____	_____	1. _____	_____
2. _____	_____	2. _____	_____
3. _____	_____	3. _____	_____
4. _____	_____	4. _____	_____

For each pest or disease listed above, complete the following questionnaire.

1. The following information pertains to a pest( ), or disease( ) or economic( ), or quarantine( ) significance.

2. Common name: \_\_\_\_\_

3. Scientific name: \_\_\_\_\_

4. The damage done by this pest or disease affects the following:

	<u>Yes</u>	<u>No</u>	<u>Describe negative impact</u>
- Quantity available for market	( )	( )	_____
- Quality of product	( )	( )	_____
- Price of product	( )	( )	_____
- Consumer demand	( )	( )	_____
- Other _____	( )	( )	_____

5. Technologies are available to prevent( ), eradicate( ), or control( ), the pest and/or disease, or are not available( ).

6. Costs of control are economically feasible( ), or not economically feasible( ).

7. In the case of export crops, in which foreign market(s) is this pest or disease of QUARANTINE significance? \_\_\_\_\_

8. What preharvest control methods are presently used for this pest or disease? \_\_\_\_\_

9. What postharvest control methods are presently used for this pest or disease? \_\_\_\_\_

10. What alternatives exist to control this pest or disease?  
 Preharvest: \_\_\_\_\_  
 Postharvest: \_\_\_\_\_
11. Does chemical treatment produce a residue hazard? yes( ) no( ). If yes, explain:\_\_\_\_  
 \_\_\_\_\_
12. Does chemical treatment affect other organisms beneficial to the yield and quality of the crop? \_\_\_\_\_
13. How do the farmers decide to spray for the pest or disease in question? (Does the farmer apply chemicals at the first sign of insects or disease or only after the crop is severely infested?) \_\_\_\_\_
14. Type of pesticide most commonly used? \_\_\_\_\_
15. With what frequency do farmers spray? \_\_\_\_\_
16. Who does the spraying (farmer, worker, co-operative, Ministry of Agriculture, other)?\_
17. Does the farmer consciously attempt to minimize his spraying costs? yes( ) no( )  
 If yes, how does s/he do this? \_\_\_\_\_
18. What type of equipment do farmers have for spraying? knapsack sprayers( ), tractor operated( ), airplane( ), other \_\_\_\_\_
19. What is the magnitude of the pest/disease damage with:
  - a. No control/treatment? \_\_\_\_\_
  - b. Optimum control/treatment? \_\_\_\_\_
  - c. Average farmer treatment? \_\_\_\_\_
20. Identify and describe any significant disorder to product caused by physiological and/or nutritional factors other than pests and diseases: \_\_\_\_\_
21. Summarize problems caused by pests/diseases or use of chemicals to control pests/diseases which affect the production, processing, postharvest handling, or marketing of the crop.
  - 1.
  - 2.
22. Other observations: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**COMPONENT 10****Preharvest Treatments**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Do the farmers in the region carry out any type of physical treatment to the crop prior to harvest which may affect production or its postharvest quality? yes( ) no( )

If yes, please describe each treatment:

a. Name of physical treatment: \_\_\_\_\_

b. Description of action taken: \_\_\_\_\_  
\_\_\_\_\_

c. Why is this action taken? \_\_\_\_\_

d. Who carries out the action? \_\_\_\_\_

e. When is the action carried out? \_\_\_\_\_

f. Description of the impact or results of the action taken (how is the quantity, quality, storage, shelf life, market value, etc., affected)?  
\_\_\_\_\_  
\_\_\_\_\_

2. Do the farmers in the region carry out any type of chemical treatment to the crop prior to harvest which may affect production or its postharvest quality? yes( ) no( )

If yes, please describe each treatment:

a. Name of chemical treatment: \_\_\_\_\_  
\_\_\_\_\_

b. Description of action taken: \_\_\_\_\_  
\_\_\_\_\_

c. Why is this action taken? \_\_\_\_\_

d. Who carries out the action? \_\_\_\_\_

e. When is the action carried out? \_\_\_\_\_

- f. Description of the impact or results of the action taken (how is the quantity, quality, storage, shelf life, market value, etc. affected)?

---

---

3. Are there recommended treatments which farmers are unaware of or do not use for some other reason? yes( ) no( )

If yes:

a. Name of treatment: \_\_\_\_\_

b. Purpose of treatment: \_\_\_\_\_

c. Why is it not used by farmers? \_\_\_\_\_

---

4. Identify and describe other preharvest treatments which might favorably affect postharvest quality.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

5. Summarize the problems resulting from preharvest treatments which may affect production, processing, postharvest, and marketing of the crop.

1.

2.

3.

4.

5.



## COMPONENT 11

## Production and Marketing Costs

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify and select different farming alternatives to be analyzed, e.g., alternative A could be 1 hectare size farms and alternative B could be 20 hectare size farms.
2. For each alternative, establish basic assumptions about how the farm is operated, e.g.:
  - a. Labor: small farm may use all family labor and minimum purchased farm inputs; larger farm may hire labor and use optimum level of recommended farm inputs.
  - b. Market: small farmer may sell all produce at farmgate while large farmer might export 60% of production
  - c. Product sales price: maximum, minimum, average
  - d. Product yield: high, low, average
  - e. Number of plants/hectare
  - f. Number of years productivity of perennials
  - g. Production or expected production
  - h. Intended market
  - i. Others
3. Identify all the cost components and calculate their contribution to the cost of a unit quantity of the product.
  - A. Capital investment:
    1. land premium
      - rent
      - taxes
    2. land clearing
    3. drainage
    4. fencing
    5. buildings
    6. vehicles
    7. irrigation equipment
    8. electricity
    9. farm equipment/machinery
    10. office equipment
    11. processing facilities
      - coldrooms
      - ripening room
      - table
      - weighing machine
    12. others
  - B. Operating and maintenance:
    1. rent
    2. road and drainage maintenance
    3. fencing maintenance
    4. vehicle maintenance
    5. facilities maintenance
      - water supply
      - insurance
      - building maintenance
    6. agriculture tool replacement
    7. fixed salary and wages
    8. administration and management
    9. costs of credit
    10. others

- C. Crop production costs:**
1. land preparation
  2. holiing
  3. planting
    - material
    - labor
    - fertilizers
    - replacement plants
  4. fertilization
    - labor
    - material
    - machinery
  5. irrigation
    - water
    - equipment
    - labor
  6. pest and disease control
    - labor
    - material
    - equipment
  7. weed control
    - labor
    - material
    - equipment
  8. bagging fruit on trees
    - material
    - labor
  9. pruning and training
    - labor
    - equipment
  10. harvesting cost
    - labor
    - boxes and baskets
    - equipment
  11. in-field transportation
    - labor
    - materials
  12. other production costs
    - pollinating agents
    - others

- D. Postharvest and marketing costs:**
1. cleaning, sorting, grading, and selection
    - material
    - labor
    - postharvest treatments
  2. packaging and wrapping
    - material
    - labor
  3. cooling
  4. storage
  5. loading/unloading
  6. transportation cost
    - field to packinghouse
    - packinghouse to port
  7. document & custom form
  8. custom fees
  9. freight charges
  10. handling
- E. Other costs**

## COMPONENT 12

## Crop Harvest

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Who harvests the crop? \_\_\_\_\_
2. Describe in detail the harvest operation: \_\_\_\_\_  
\_\_\_\_\_
3. Why is the crop harvested in this particular manner? \_\_\_\_\_  
\_\_\_\_\_
4. When is the harvest undertaken? Time of day \_\_\_\_\_
5. Under what conditions? Temperature \_\_\_\_\_ Relative humidity \_\_\_\_\_
6. Does the present method of harvest appear to affect: quantity of produce available for market( ), quality of produce available for market( ), value of produce available for market( )? Explain \_\_\_\_\_  
\_\_\_\_\_
7. Does the volume of produce unsuitable for market appear to be: high( ), medium( ), low( )? Describe the causes, e.g., size of product, weather damage, pest damage, disease damage, lack of soil nutrients, sun damage, harvest damage, others \_\_\_\_\_
8. Estimate percentage of crop suitable for market: \_\_\_\_\_ %
9. Identify and describe the harvesting tools: \_\_\_\_\_  
\_\_\_\_\_
10. Is all of the crop harvested at one time? yes( ) no( ). If no, why not and how is selection made for that part which is harvested? \_\_\_\_\_  
\_\_\_\_\_
11. Identify harvest seasons for each cultivar or variety of crop (if more than one):

<u>Cultivar</u>	<u>Months of harvest</u>	<u>No. months in crop cycle</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

12. Which, if any, cultivar produces off season? \_\_\_\_\_
13. Optimum harvesting parameters:  
Moisture content \_\_\_\_\_  
Color/appearance \_\_\_\_\_  
Tenderness/texture \_\_\_\_\_
14. Maturity index known: yes( ) no( ). If yes, describe: \_\_\_\_\_  
\_\_\_\_\_
15. What criteria are used by the pickers in selecting the product for harvest?  
\_\_\_\_\_
16. For the principal cultivar(s):  
What is a good yield per hectare under good growing conditions? \_\_\_\_\_ tons  
What is a good yield per hectare under average conditions? \_\_\_\_\_ tons
17. Sensitivity to mechanical damage during harvest: high( ), medium( ), low( ).
18. Sensitivity to dehydration: high( ), medium( ), low( ).
19. Summarize the problems occurring at harvest which may affect the processing, postharvest handling, or marketing of the product.  
1.  
2.  
3.  
4.  
5.
20. Observations:

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify the points in the postharvest system where some form of selection takes place.

<u>POINT IN THE SYSTEM</u>	<u>ACTION THAT TAKES PLACE</u>
_____	_____
_____	_____
_____	_____

2. For each action identified above provide the following information:

a. Name of action: \_\_\_\_\_

b. Time required for the action to take place: \_\_\_\_\_

c. Describe the action: \_\_\_\_\_  
\_\_\_\_\_

d. Who is responsible for conducting the action? \_\_\_\_\_

e. When is the action carried out? \_\_\_\_\_

f. Why is this action carried out? \_\_\_\_\_

g. Where is this operation carried out? \_\_\_\_\_

h. Is the activity carried out with laborers? yes( ) no( )  
If yes, how many? \_\_\_\_\_

i. Is the activity carried out with machines/tools/equipment? yes( ) no( )  
If yes, identify and describe: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

j. What criteria are used in this action?

	Yes	No	Describe
-product shape	( )	( )	_____
-product size	( )	( )	_____
-product weight	( )	( )	_____
-maturity	( )	( )	_____
-color	( )	( )	_____
-pest/disease damage	( )	( )	_____
-physical injury	( )	( )	_____
-mechanical injury	( )	( )	_____
-cleanliness	( )	( )	_____
-other _____	( )	( )	_____

k. Is this operation required to meet market demand?

yes( ) no( ) Explain: \_\_\_\_\_

l. What is (are) the probable end use(s) of culled product? \_\_\_\_\_

3. If the product is divided into different groups or categories at this point due to the selection process, identify the different categories and the approximate % of produce moving into each channel.

For example:

Grade	% of Total	Destination
1st Grade	40%	Export
2nd Grade	35%	Domestic market
3rd Grade	15%	Agro-processing
Culls	10%	Animal feed
Total	100%	

4. What portion of culled product, if any, is a complete loss and does not generate any economic return? \_\_\_\_\_ % Explain \_\_\_\_\_

5. Identify any problems occurring at this point which may affect postharvest losses.

- 1.
- 2.
- 3.
- 4.
- 5.

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify the points in the postharvest systems where some form of inspection takes place.

<u>POINT IN THE SYSTEM</u>	<u>ACTION THAT TAKES PLACE</u>
_____	_____
_____	_____
_____	_____

2. For each action identified above provide the following information:

- a. Name of action: \_\_\_\_\_
- b. Time required for the action to take place: \_\_\_\_\_
- c. Describe the action: \_\_\_\_\_  
\_\_\_\_\_
- d. Describe the sampling procedure: \_\_\_\_\_  
\_\_\_\_\_
- e. Who is responsible for conducting the action? \_\_\_\_\_
- f. When is the action carried out? \_\_\_\_\_
- g. Why is this action carried out? \_\_\_\_\_
- h. Where is this operation carried out? \_\_\_\_\_
- i. Is the activity carried out with machines/tools/equipment? yes( ) no( )  
If yes, identify and describe: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

j. What criteria are used in this action?

(A) Quality control (packinghouse line)

	<u>Yes</u>	<u>No</u>	<u>Describe</u>
-product shape	( )	( )	_____
-product size	( )	( )	_____
-product weight	( )	( )	_____
-maturity	( )	( )	_____
-color	( )	( )	_____
-pest/disease damage	( )	( )	_____
-physical injury	( )	( )	_____
-mechanical injury	( )	( )	_____
-cleanliness	( )	( )	_____
-other_____	( )	( )	_____

(B) Plant quarantine (exporting and importing)

	<u>Yes</u>	<u>No</u>	<u>Describe</u>
-disease	( )	( )	_____
-pest	( )	( )	_____
-chemical residues	( )	( )	_____
-other_____	( )	( )	_____

(C) Customs

	<u>Yes</u>	<u>No</u>	<u>Describe</u>
-drug control	( )	( )	_____
-pest/disease	( )	( )	_____
-other_____	( )	( )	_____

k. Is this operation required to meet market demand? yes( ) no( )

Explain: \_\_\_\_\_  
\_\_\_\_\_

3. Identify any problems occurring at this point which may affect postharvest losses.

- 1.
- 2.
- 3.
- 4.
- 5.



**COMPONENT 14****Postharvest Chemical and Physical Treatments**

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NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

**CHEMICAL TREATMENT**

1. Is any chemical applied to the commodity during the postharvest stage?

yes( ) no( ) If yes, list the chemicals below:

Generic name: a. \_\_\_\_\_ Brand name: a. \_\_\_\_\_  
b. \_\_\_\_\_ b. \_\_\_\_\_  
c. \_\_\_\_\_ c. \_\_\_\_\_

2. For each chemical used, answer the following questions.

a. What is the name of the chemical? \_\_\_\_\_

b. Why is the chemical used? \_\_\_\_\_

c. Who applies the chemical? \_\_\_\_\_

d. When is the chemical applied? \_\_\_\_\_

e. Where is the chemical applied? \_\_\_\_\_

f. How often is the chemical applied? \_\_\_\_\_

g. How is the chemical applied (spray, dip, etc.)? \_\_\_\_\_

h. In what concentration is it applied? \_\_\_\_\_

- i. Does the use of this chemical represent a health hazard for workers?

yes( ) no( ); for consumers? yes( ) no( ). If yes, explain: \_\_\_\_\_

j. Costs of treatment? \_\_\_\_\_

Observations:

## PHYSICAL TREATMENT

1. Does this product receive any special physical treatment in the postharvest stage which affects its quality, shelf life, or marketability? yes( ) no( )

2. If yes, identify each type of physical treatment:

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

3. For each physical treatment, provide the following information:

a. Name of physical treatment: \_\_\_\_\_

b. Description of treatment: \_\_\_\_\_  
\_\_\_\_\_

c. Purpose of treatment: \_\_\_\_\_

d. Who undertakes the treatment? \_\_\_\_\_

e. When is the treatment done? \_\_\_\_\_

f. Where is the treatment undertaken? \_\_\_\_\_  
\_\_\_\_\_

g. What costs are involved in the treatment? \_\_\_\_\_  
\_\_\_\_\_

Observations:

4. Summarize the problems at this point which may affect processing or postharvest losses of product.

1.

2.

3.

4.

5.

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify the points in the postharvest system where packaging or repackaging occur:

	<u>Yes</u>	<u>No</u>	<u>Describe</u>
- on the farm	( )	( )	_____
- rural collection point	( )	( )	_____
- regional collection point	( )	( )	_____
- packinghouse	( )	( )	_____
- local market	( )	( )	_____
- wholesale market	( )	( )	_____
- cottage industry	( )	( )	_____
- agro-industry	( )	( )	_____
- supermarket	( )	( )	_____
- point of export	( )	( )	_____
- other _____	( )	( )	_____

2. For each instance where packaging takes place, provide the following information:

- a. Why is it necessary to package? \_\_\_\_\_
  - b. Who undertakes the packaging? \_\_\_\_\_
  - c. Where does the packaging take place? \_\_\_\_\_
  - d. When does the packaging take place? \_\_\_\_\_
  - e. How long does the packaging process take? \_\_\_\_\_
  - f. How is the product handled/packaged (describe)? \_\_\_\_\_
- 
- g. What type of packaging material is used? \_\_\_\_\_
  - h. Why is that particular packaging material used? \_\_\_\_\_

- i. What is the size of the package used?
  - dimensions (cm) \_\_\_\_\_ x \_\_\_\_\_ x \_\_\_\_\_
  - number of units of product per package \_\_\_\_\_
  - weight of package: gross \_\_\_\_\_ net \_\_\_\_\_
- j. Does the particular package have the mechanical strength to adequately protect the product during:

	<u>Yes</u>	<u>No</u>	<u>Comments</u>
- handling	( )	( )	_____
- transportation	( )	( )	_____
- stacking	( )	( )	_____
- storage	( )	( )	_____
- other _____	( )	( )	_____

k. Is the packaging material readily available? yes( ) no( )

1. Does the package meet the handling and marketing requirements in terms of:

	DOMESTIC MARKET		EXPORT MARKET		IF NEGATIVE
	Yes	No	Yes	No	Explain
- weight	( )	( )	( )	( )	_____
- size	( )	( )	( )	( )	_____
- shape	( )	( )	( )	( )	_____
- material	( )	( )	( )	( )	_____
- design	( )	( )	( )	( )	_____
- labelling	( )	( )	( )	( )	_____

m. Can the package be re-used? yes( ) no( )  
If yes, state the estimated number of times: \_\_\_\_\_

n. Who owns the package (container)? \_\_\_\_\_

o. If the containers are reused, explain the procedure. \_\_\_\_\_

p. What is the per unit cost of the package or container? \_\_\_\_\_

q. What is the cost of the labor involved in packaging? \_\_\_\_\_

3. a. Is cushioning material used? yes( ) no( )  
If yes, what type? \_\_\_\_\_  
Why that particular type? \_\_\_\_\_

b. Can the cushioning material be re-used? yes( ) no( )  
If yes, state the estimated number of times: \_\_\_\_\_

c. What is the cost of the cushioning material per container? \_\_\_\_\_

4. If produce is not packaged, why not? Not needed( ) Lack of knowledge( )  
Lack of materials( ) Not economical( )  
Other \_\_\_\_\_

5. Summarize problems which affect postharvest losses due to packaging or lack of:

- 1.
- 2.
- 3.
- 4.
- 5.

6. Observations

**COMPONENT 16****Cooling**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Does this product undergo cooling? yes ( ) no ( )  
If no, why not? \_\_\_\_\_  
\_\_\_\_\_

If yes, provide the following information:

2. What time of day is the product normally harvested? early morning( ), morning( ), afternoon( ), evening( ), anytime( )
3. What is the normal air temperature during harvest? \_\_\_\_\_
4. Is it considered important to precool this crop? yes( ) no( )  
Explain: \_\_\_\_\_  
\_\_\_\_\_
5. What method of cooling is used? standard cool room( ), hydro( ), icing( ), evaporative( ), forced air( ), air conditioning( ), other \_\_\_\_\_  
\_\_\_\_\_
6. How is cooling carried out (describe procedure and equipment used)?  
\_\_\_\_\_  
\_\_\_\_\_
7. How long after harvest is the cooling performed? 0-3 hours( ), 4-7 hours( ), 8-16 hours( ), 17-24 hours( ), more than 24 hours( ).
8. Where is the cooling carried out? on-the-farm( ), collecting center( ), packing center( ), market( ), other \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. Who performs the cooling? farmer( ), middleman( ), buyer( ), government( ), other  
\_\_\_\_\_  
\_\_\_\_\_
10. How long is the cooling period? \_\_\_\_\_ hours

11. What is the temperature range of the cooling medium? \_\_\_\_\_
12. Once cooled, is the product ever removed from the cool chain on its way to the final market? yes ( ) no ( ) Describe: \_\_\_\_\_  
\_\_\_\_\_
13. What are the costs of the cooling operation, per kg of produce? \_\_\_\_\_
14. Summarize problems identified at this point which may affect postharvest losses and/or marketing of the product.
  - 1.
  - 2.
  - 3.
  - 4.
  - 5.
15. Observations:

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify the points in the postharvest system where storage takes place.

	<u>Yes</u>	<u>No</u>	<u>Duration of storage (days)</u>
-on the farm	( )	( )	_____
-rural collecting point	( )	( )	_____
-regional collecting point	( )	( )	_____
-packinghouse	( )	( )	_____
-retail market	( )	( )	_____
-wholesale market	( )	( )	_____
-agro-industry	( )	( )	_____
-supermarket	( )	( )	_____
-export warehouses	( )	( )	_____
-container terminal (export)	( )	( )	_____
-government marketing board	( )	( )	_____
-import warehouses	( )	( )	_____
-other _____	( )	( )	_____

2. For each instance of storage identified, provide the following information:

a. Type of storage (from 1 above): \_\_\_\_\_

b. Who is responsible for the storage? farmer ( ), middleman ( ), gov't ( ), wholesaler ( ), retailer ( ), processor ( ), other \_\_\_\_\_

c. What is the purpose of storage? await shipping( ), await better market price( ), maintain quality( ), assemble larger volumes( ), other \_\_\_\_\_

d. Describe the storage facilities and equipment. \_\_\_\_\_

e. How long after harvest does the product normally go into storage (hours and days)? \_\_\_\_\_

f. How long is the holding period? \_\_\_\_\_

g) At what degree of ripeness/maturity is the product when it is normally placed into storage? \_\_\_\_\_

- h. How does the quality of produce change during the storage period? \_\_\_\_\_  
\_\_\_\_\_
- i. Is air temperature controlled in the storage environment? yes( ) no( ) Explain: \_
- j. What is the range of air temperature in the storage environment? \_\_\_\_\_
- k. Is humidity controlled in the storage environment? yes( ) no( )  
Explain: \_\_\_\_\_
- l. What is the range of relative humidity in the storage environment? \_\_\_\_\_
- m. Is the atmosphere in the storage facility modified( ), or controlled( )? Describe: \_
- n. Is the product normally stored by itself( ), or with other produce( )? If with other  
produce, specify what kind: \_\_\_\_\_
- o. Describe the type of container in which the product is packaged during storage. \_
- p. Who owns the storage facilities? \_\_\_\_\_
- q. Who operates the storage facilities? \_\_\_\_\_
- r. What is the cost of holding the produce? \_\_\_\_\_
- s. Is the storage facility operated efficiently? yes( ) no( )  
if no, explain: \_\_\_\_\_  
\_\_\_\_\_
3. Summarize storage problems which may affect postharvest losses.
- 1.
  - 2.
  - 3.
4. Observations:



NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify each point in the commodity system where the product undergoes movement from one point to another with the purpose of getting it to a new location.

Where transportation takes placeMethod of transport

- |    |                     |       |
|----|---------------------|-------|
| a. | from _____ to _____ | _____ |
| b. | from _____ to _____ | _____ |
| c. | from _____ to _____ | _____ |
| d. | from _____ to _____ | _____ |
| e. | from _____ to _____ | _____ |

2. For each case identified above, provide the following information:

- a. From \_\_\_\_\_ to \_\_\_\_\_
- b. Who is responsible for the transportation? farmer( ), middleman( ), wholesaler( ), retailer( ), government( ), other \_\_\_\_\_
- c. When is produce normally transported? early morning( ), morning( ), afternoon( ), evening( ), night( ), anytime( ).
- d. Method of transport? human( ), animal( ), motorcycle( ), truck( ), ship( ), airplane( ), other \_\_\_\_\_
- e. Describe the transportation process. \_\_\_\_\_  
\_\_\_\_\_
- f. Describe the containers used during this stage of transport. \_\_\_\_\_  
\_\_\_\_\_
- g. How is produce stacked during transport? \_\_\_\_\_  
\_\_\_\_\_
- h. Identify and describe any type of damage/bruising which occurs to the product during transport. \_\_\_\_\_  
\_\_\_\_\_

i. Identify the costs involved during this stage of transportation:

Type costs	Yes	No	Type unit	Cost/unit
-labor	( )	( )	_____	_____
-packaging	( )	( )	_____	_____
-animal rental	( )	( )	_____	_____
-vehicle service	( )	( )	_____	_____
-containers	( )	( )	_____	_____
-other _____	( )	( )	_____	_____

j. What is the duration of this stage of transport? hours \_\_\_\_\_  
 days \_\_\_\_\_

k. What is the distance covered? \_\_\_\_\_

l. Who owns the containers during this stage of transport? \_\_\_\_\_  
 \_\_\_\_\_

m. Who owns the product during transport? \_\_\_\_\_  
 \_\_\_\_\_

3. Summary of problems during transport which may affect processing, postharvest handling, or marketing.

- 1.
- 2.
- 3.
- 4.
- 5.

4. Observations:

**COMPONENT 19****Delays or Waiting**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify all those points in the postharvest system where delays or waiting occur.

	<u>Yes</u>	<u>No</u>	<u>Describe</u>
-on the farm	( )	( )	_____
-during transport	( )	( )	_____
-at packinghouse	( )	( )	_____
-at wholesale market	( )	( )	_____
-at retail market	( )	( )	_____
-at processing factory	( )	( )	_____
-at supermarket	( )	( )	_____
-at airport	( )	( )	_____
-at seaport	( )	( )	_____
-other _____	( )	( )	_____

2. For each instance of delay or waiting, provide the following information:

- Point in system where delay or waiting occurs (from 1 above) \_\_\_\_\_  
\_\_\_\_\_
- What is the cause of delay? \_\_\_\_\_
- Who is responsible for the delay? \_\_\_\_\_
- How long is the normal delay at this point? minutes \_\_\_\_\_ hours \_\_\_\_\_  
days \_\_\_\_\_
- What can be done to reduce the time of the delay? \_\_\_\_\_  
\_\_\_\_\_
- How is the product protected at the point of delay? \_\_\_\_\_  
\_\_\_\_\_
- What are the environmental conditions for the product at the point of delay? direct sunlight or shade \_\_\_\_\_, temperature \_\_\_\_\_, relative humidity \_\_\_\_\_, air movement \_\_\_\_\_, other debilitating environmental conditions: \_\_\_\_\_  
\_\_\_\_\_

h. Describe how the delay or waiting may affect the quality of the product (changes in appearance, texture, aroma, flavor, weight loss/gain, disease development, etc.). \_\_\_\_\_  
\_\_\_\_\_

i. Does the delay affect the price of the produce? yes( ) no( )  
If yes, explain: \_\_\_\_\_  
\_\_\_\_\_

3. Summarize those problems caused by delays/waiting which may negatively affect processing, postharvest handling, or marketing.

- 1.
- 2.
- 3.
- 4.
- 5.

4. Observations:

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

- | <b>1. <u>Operation name</u></b> | <b><u>Point in food system where operation occurs</u></b> |
|---------------------------------|---|
| _____                           | _____   |
| _____                           | _____   |
| _____                           | _____   |
| _____                           | _____   |

2. For each operation, provide the following information:
- a. Name of operation. \_\_\_\_\_
  - b. Describe what takes place. \_\_\_\_\_
  - c. Who executes the operation? \_\_\_\_\_
  - d. Where is the operation carried out? \_\_\_\_\_
  - e. When is the operation carried out? \_\_\_\_\_
  - f. Why is it done in the present manner? \_\_\_\_\_
  - g. What is the impact of this operation on quality or quantity of the product? \_\_\_\_\_  
\_\_\_\_\_
  - h. How could this operation be improved? \_\_\_\_\_  
\_\_\_\_\_

3. Identify and describe all problems related to these operations which can affect processing, postharvest handling, or marketing of the product.
- 1.
  - 2.
  - 3.
  - 4.
  - 5.

4. Observations:

**COMPONENT 21**

**Agroprocessing**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Does the produce undergo any type of processing or semi-processing at any point in the postharvest system? yes( ) no( )

IF NO, ANSWER THE FOLLOWING QUESTION  
IF YES, GO TO QUESTION #3

2. Is there any possibility over the medium or long term for developing a processing industry for this crop? yes( ) no( ) If yes, explain (type of industry, principal constraints, etc.): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Where does the processing take place? on the farm( ), home industry( ), plant- sized industry( ), market( ), supermarket( ), other \_\_\_\_\_

4. What percentage of the produce arriving at the point of processing is culled before the processing begins? \_\_\_\_\_% What is the destination of the culled produce? \_\_\_\_\_

5. What type of processing is carried out?

	Yes	No	Observations
-canning in glass jars	( )	( )	new ( ) used ( ) _____
-canning in metal cans	( )	( )	_____
-dehydration/drying	( )	( )	_____
-making jam & jelly	( )	( )	_____
-candying	( )	( )	_____
-pickling	( )	( )	_____
-juicing	( )	( )	_____
-slicing in brine	( )	( )	_____
-concentrating	( )	( )	_____
-freezing	( )	( )	_____
-other _____	( )	( )	_____

6. What percent of the national production is processed in this form? \_\_\_\_\_%

7. What percent of the production in the geographical area under study is processed in this form? \_\_\_\_\_ %
8. How does processing facilitate marketing? \_\_\_\_\_  
\_\_\_\_\_
9. Is the estimated demand for the processed output greater than( ), equal to( ), or less than( ), the supply?
10. Intended market for processed output: \_\_\_\_\_ % export, \_\_\_\_\_ % domestic
11. Why is the product processed?  
 to satisfy consumer demand (import substitution)  
 to reduce postharvest losses  
 to extend shelf-life  
 other (specify) \_\_\_\_\_
12. Does the processor contract for raw materials? yes( ) no( )  
 If no, what guarantee does the processor have to receive adequate supply of raw materials? \_\_\_\_\_  
 \_\_\_\_\_
13. What are the principal constraints to processing?  
 insufficient raw materials  
 lack of packaging materials  
 high costs of raw materials  
 high costs of other inputs (specify) \_\_\_\_\_  
 insufficient energy  
 expensive energy costs  
 lack of qualified labor  
 antiquated equipment/machinery  
 other (specify) \_\_\_\_\_
14. Observations:

**NAME OF DATA COLLECTOR:** \_\_\_\_\_ **TEL:** \_\_\_\_\_

**TITLE:** \_\_\_\_\_ **INSTITUTION:** \_\_\_\_\_

1. Identify the different types of intermediaries involved with the marketing of the product under study.

**Type of intermediary**

**Brief description**

**Local collectors/traders:**

\_\_\_\_\_

\_\_\_\_\_

**Wholesalers:**

\_\_\_\_\_

\_\_\_\_\_

**Retailers:**

\_\_\_\_\_

\_\_\_\_\_

**Government buyers:**

\_\_\_\_\_

\_\_\_\_\_

**Institutional buyers:**

\_\_\_\_\_

\_\_\_\_\_

**Exporters:**

\_\_\_\_\_

\_\_\_\_\_

**Agroprocessors:**

\_\_\_\_\_

\_\_\_\_\_

**Others:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. For each type of intermediary identified in 1, provide the following information:

a. Describe the principal functions of this type of intermediary. \_\_\_\_\_

b. How does the intermediary carry out these functions? \_\_\_\_\_

c. Where are these functions carried out? \_\_\_\_\_

d. When are these functions carried out? \_\_\_\_\_



- e. Other persons involved in carrying out these functions? \_\_\_\_\_
  - f. Why are these actions carried out in the present manner? \_\_\_\_\_
  - g. What facilities, equipment, vehicles, etc., does the intermediary use to carry out the activities? \_\_\_\_\_
  - h. What is an average sized operation for this type of intermediary (tons of product handled per calendar year)? \_\_\_\_\_
  - i. How could the handling of this product be improved? \_\_\_\_\_
  - j. Would improvement in handling increase costs for the operation? yes( ) no( )
  - k. If yes, can this cost be passed on to consumers? yes( ) no( )
  - l. What are the principal constraints for this intermediary which affect the efficient handling of the product? \_\_\_\_\_
- 
3. Are there any ethnic groups which specialize in marketing? yes( ) no( )  
If yes, how does this affect:
- a. Quality \_\_\_\_\_
  - b. Price \_\_\_\_\_
  - c. Cost \_\_\_\_\_
4. If possible, collect the following information from each type of intermediary:
- a. How is price determined? \_\_\_\_\_
  - b. Who determines the price? \_\_\_\_\_
  - c. Is product quality a problem? yes( ) no( )
  - d. Is obtaining sufficient volume a problem? yes( ) no( )  
Explain: \_\_\_\_\_
  - e. What tricks do farmers use when selling produce to intermediaries (e.g. adding foreign material, placing best produce on top, etc.)? \_\_\_\_\_
- 
5. Summarize problems relating to intermediaries which affect postharvest handling and/or marketing and/or processing.
- 1.
  - 2.
  - 3.

**COMPONENT 23****Market Information**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Is statistical price information available for the commodity under study?  
yes( ) no( )

2. If yes, for what calendar years? \_\_\_\_\_

<u>Type of price information available</u>	<u>Frequency of Information</u>			
	<u>daily</u>	<u>weekly</u>	<u>monthly</u>	<u>yearly</u>
Farm gate	( )	( )	( )	( )
Wholesale	( )	( )	( )	( )
Retail	( )	( )	( )	( )
Export	( )	( )	( )	( )

4. Has a seasonal price index been prepared for this crop? yes( ) no( )

5. If a seasonal price index exists, which are the months of the year when prices are lowest? \_\_\_\_\_ highest? \_\_\_\_\_

6. During those months when prices are lowest, are the low prices due to:

	<u>Yes</u>	<u>No</u>
- decline in consumer demand	( )	( )
- favorable growing conditions/excess supply	( )	( )
- poor production planning/excess supply	( )	( )
- increase in imports	( )	( )
- reduction of exports	( )	( )
- trade regulations	( )	( )
- increase in supply of substitutes	( )	( )
- other _____	( )	( )

7. During those months when prices are highest, are the high prices due to:

	<u>Yes</u>	<u>No</u>
- increase in consumer demand	( )	( )
- poor growing conditions/scarcity	( )	( )
- poor production planning/scarcity	( )	( )
- reduction in imports	( )	( )
- increase of exports	( )	( )
- trade regulations	( )	( )
- decline in supply of substitutes	( )	( )
- other _____	( )	( )

8. Does data include information on different qualities? yes( ) no( ) on different cultivars? yes( ) no( ) on quantities entering the market? yes( ) no( )

9. In what type of market are prices highest?

Describe for whom prices are higher

- public market ( ) \_\_\_\_\_
- supermarket ( ) \_\_\_\_\_
- agro-industry ( ) \_\_\_\_\_
- exporters ( ) \_\_\_\_\_
- institutions ( ) \_\_\_\_\_
- government buyers ( ) \_\_\_\_\_
- other \_\_\_\_\_ ( ) \_\_\_\_\_

10. In the markets mentioned above, do prices vary due to quality differences? yes( ) no( ) If yes, in which markets? \_\_\_\_\_

11. Is there reliable information about product supply on domestic markets? yes( ) no( ); on overseas markets? yes( ) no( )

12. If yes, for what period of time?  
 -indicate calendar years for which supply information exists: \_\_\_\_\_  
 -is the information on a monthly( ) or yearly( ) basis?

13. What is the source of the supply information? \_\_\_\_\_

14. Is the supply information reliable( )? questionable( )? a guess( )?

15. Provide following price information for year: \_\_\_\_\_

	<u>Low price</u>		<u>High price</u>	
	<u>\$ per unit</u>	<u>Month</u>	<u>\$ per unit</u>	<u>Month</u>
Farmgate	_____	_____	_____	_____
Local market	_____	_____	_____	_____
Wholesale	_____	_____	_____	_____
Retail	_____	_____	_____	_____
Export	_____	_____	_____	_____
Other _____	_____	_____	_____	_____

16. Summary of price-related problems which may affect postharvest losses.

- 1.
- 2.

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. What percent of total national production of this product is sold on the domestic market?  
 \_\_\_\_\_% export market? \_\_\_\_\_%

2. What percent of the production in the geographical area under study goes to the domestic market? \_\_\_\_\_% export market \_\_\_\_\_%

3. Which consumers purchase the product in domestic and export markets.

	<u>Domestic market</u>	<u>Export market</u>
-low income consumers	_____ %	_____ %
-medium income consumers	_____ %	_____ %
-high income consumer	_____ %	_____ %
Total(%)	100	100

4. Indicate ethnic group consumption of this product:

<u>Ethnic group</u>	<u>Domestic market</u>	<u>Export market</u>
_____	_____ %	_____ %
_____	_____ %	_____ %
_____	_____ %	_____ %
Total(%)	100	100

5. For each important consumer group identified above, provide the following information for the applicable questions:

- a. Preferred cultivar? \_\_\_\_\_
- b. Preferred size? \_\_\_\_\_
- c. Preferred color? \_\_\_\_\_
- d. Desired flavor? \_\_\_\_\_
- e. Desired texture? \_\_\_\_\_
- f. Preferred degree of maturity? \_\_\_\_\_

- g. Preferred type of package? \_\_\_\_\_
- h. Desired number of units/products per package? \_\_\_\_\_
- i. Consumer willingness to accept pest or disease blemishes?  
will accept( ) will not accept( )
- j. Which of the following is most important to this consumer group: quality( ) or price( )?
- k. How sensitive is this consumer group to fluctuations in product prices?  
( ) very sensitive (small price increase decreases consumer purchases)  
( ) moderately sensitive  
( ) slightly sensitive  
( ) not very sensitive (large price increase won't decrease amount purchased)
- l. Desired product characteristics for religious, cultural, and medicinal uses:  
religious: \_\_\_\_\_  
cultural: \_\_\_\_\_  
medicinal uses: \_\_\_\_\_  
other: \_\_\_\_\_
6. Summarize the characteristics of consumer demand which are most likely to affect the marketability of the product in question.
- 1.
  - 2.
  - 3.
  - 4.
  - 5.
7. Observations:

**COMPONENT 25****Exports**

NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Name of crop to be exported: \_\_\_\_\_  
Variety/cultivar/clone: \_\_\_\_\_
  
2. Characteristics of external demand:
  - a. For each potential export destination (e.g., UK, Japan, USA, or Germany) complete the following information:
    - preferred cultivar \_\_\_\_\_
    - preferred size \_\_\_\_\_
    - preferred weight \_\_\_\_\_
    - preferred color \_\_\_\_\_
    - desired flavor \_\_\_\_\_
    - acid/brix ratio \_\_\_\_\_
    - preferred texture \_\_\_\_\_
    - preferred degree of maturity \_\_\_\_\_
    - desired packaging \_\_\_\_\_
    - pest control requirements \_\_\_\_\_
    - disease control requirements \_\_\_\_\_
    - chemical residue limits \_\_\_\_\_
    - grades & standards used \_\_\_\_\_
    - other desired crop characteristics (e.g., due to religious or cultural preferences) \_\_\_\_\_
  
  - b. Is this market very susceptible to:
 

	<u>Yes</u>	<u>No</u>	<u>Explain</u>
- changes in price	( )	( )	_____
- changes in quality	( )	( )	_____
- changes in supply	( )	( )	_____
  
  - c. What trade barriers exist, or regulations are required, in the importing country?  
\_\_\_\_\_
  
  - d. What is the total volume of the product imported during the previous calendar year by country of destination? \_\_\_\_\_
  
  - e. What volume of product was imported from this study area by the country of destination during the last year? \_\_\_\_\_  
and the previous four years? \_\_\_\_\_

3. Characteristics of Supply:

Total national production over last five years

<u>Years</u>	<u>Tons</u>	<u>Value(\$)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

4. Principal constraints which limit exports:

<u>Type constraints</u>	<u>Yes</u>	<u>No</u>	<u>Describe problem</u>
- market information	( )	( )	_____
- insect problems	( )	( )	_____
- disease problems	( )	( )	_____
- climatic problems	( )	( )	_____
- postharvest handling problems:			
infrastructure	( )	( )	_____
technology	( )	( )	_____
technical assistance	( )	( )	_____
funds	( )	( )	_____
other _____	( )	( )	_____
- transportation problems:			
sea transport	( )	( )	_____
air transport	( )	( )	_____
- insufficient volumes	( )	( )	_____
- trade barriers	( )	( )	_____
- delays in payments	( )	( )	_____
- other _____	( )	( )	_____

5. Potential competition:

a. Which are the principal competing countries for this same market?

b. What actions must be taken to compete favorably with these countries?

- with respect to quality: \_\_\_\_\_
- with respect to supply: \_\_\_\_\_
- with respect to price: \_\_\_\_\_
- shipping methods: \_\_\_\_\_
- market research and development: \_\_\_\_\_
- market information: \_\_\_\_\_
- market promotion: \_\_\_\_\_

6. Can the farmers/intermediaries meet the external demand requirements with respect to:

	Yes	No	Comments
- proper cultivar/variety	( )	( )	_____
- product size	( )	( )	_____
- product weight	( )	( )	_____
- color	( )	( )	_____
- flavor	( )	( )	_____
- texture	( )	( )	_____
- maturity	( )	( )	_____
- freedom from pests	( )	( )	_____
- freedom from disease	( )	( )	_____
- appearance	( )	( )	_____
- quarantine controls	( )	( )	_____
- health regulations	( )	( )	_____
- trade restrictions	( )	( )	_____
- packaging requirements	( )	( )	_____
- product quantity	( )	( )	_____
- product quality	( )	( )	_____
- price	( )	( )	_____
- others: _____	( )	( )	_____
_____	( )	( )	_____

7. Summary of principal problems with respect to exports.

- 1.
- 2.
- 3.
- 4.
- 5.

8. Observations:



NAME OF DATA COLLECTOR: \_\_\_\_\_ TEL: \_\_\_\_\_

TITLE: \_\_\_\_\_ INSTITUTION: \_\_\_\_\_

1. Identify each step (operation) in the marketing channel (for the product being studied), from the point of harvest to sales, and present them in a list. Consider such aspects as: harvest, selection, grading, packaging, cooling, transport, processing, wholesaling, retailing, exporting, and others.
2. Prepare a list of all the different types of participants involved in the marketing of the product in question, considering: farmers, farmer organizations, rural traders, intermediaries, wholesalers, retailers, supermarkets, agro-processors, marketing boards, government institutions, transport companies, cool storage suppliers, packing house operators, customs, port personnel, and others.
3. For each participant in the commodity system, identify respective postharvest and marketing costs which affect the price of the commodity, considering such things as: labor, materials, equipment, chemical and physical treatments, vehicles, transportation fees, storage, processing, cooling services, packaging, grading/sorting, inspection, custom fees, technical assistance, and others.
4. From point of harvest to retail, list the operations (steps in marketing channel) in the order in which they occur. For each operation, list the respective participants, type of cost, and the respective cost. For example:

<u>Operation</u>	<u>Participants</u>	<u>Cost Items</u>	<u>Costs</u>
Harvest	Traders Pickers	Supervision	\$8.00/day
		Picking, selection	\$0.06/kg
Packing	Packers	Labor	\$0.01/kg
		Cushion material	\$0.04/kg
		Cartons	\$1.35/kg

# **ANNEX 2**

## **Example Questionnaires for Collecting Information on Public Sector Institutions, Farmer Organizations, and Development Projects**

# Annex 2-A

## Format for the collection of information on public sector institutions affecting agricultural commodity systems

---

1. Name of the institution: \_\_\_\_\_  
Relevant subdivisions: \_\_\_\_\_

2. Names/titles of key persons within the institutions who directly or indirectly affect the commodity system of interest, and how:

<u>Name/Title</u>	<u>How person makes impact</u>
ex: Sammy Jones/Project Officer	formulated potato project
_____	_____
_____	_____

3. List staff who work with or in some way affect the product of interest:

<u>Type staff</u>	<u>Number</u>	<u>Functions impacting product</u>
ex: entomologist	2	control of fruit flies
_____	_____	_____
_____	_____	_____

4. Total amount of institution's budget in most recent year:

Allocated: \$ \_\_\_\_\_ Spent: \$ \_\_\_\_\_

5. Percent of budget which affects the commodity of interest: % \_\_\_\_\_

6. Identify institutionally provided infrastructure, equipment, materials, etc., which somehow affect the product of interest:

<u>Description of item</u>	<u># Units</u>	<u>Location/other information</u>
ex: cold storage	2	southwest region
_____	_____	_____
_____	_____	_____

7. Identify and describe ongoing projects by this institution which affect the commodity:

<u>Name of project</u>	<u>Begin date</u>	<u>End date</u>	<u>Cost</u>	<u>Source of \$</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

8. Identify and describe planned projects by this institution which will affect the commodity:

<u>Name of project</u>	<u>Begin date</u>	<u>End date</u>	<u>Cost</u>	<u>Source of \$</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

9. Summarize principal institutional actions and activities which affect the product of interest (repeat for each action/activity):

Action/activity #1: \_\_\_\_\_  
Effective dates: from \_\_\_\_\_ to \_\_\_\_\_  
Description: \_\_\_\_\_  
\_\_\_\_\_

10. Summarize services provided by the institution which affect the commodity system (repeat for each service):

Service #1: \_\_\_\_\_  
Type service: ex: price information, credit, training  
Description: \_\_\_\_\_  
\_\_\_\_\_

11. Summarize principal institutional constraints affecting the product (repeat for each constraint):

Constraint #1: \_\_\_\_\_  
Description of constraint: \_\_\_\_\_  
\_\_\_\_\_  
Impact of constraint (how it affects product): \_\_\_\_\_  
\_\_\_\_\_

12. Other observations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Annex 2-B

## Information on farmer organizations

---

1. Name of farmer organization: \_\_\_\_\_
2. Year founded: \_\_\_\_\_
3. Address/location: \_\_\_\_\_
4. Name(s) and position(s) of key person(s): \_\_\_\_\_  
\_\_\_\_\_
5. Number of active members (most recent year): \_\_\_\_\_

6. Type of products handled: \_\_\_\_\_
  7. Product sales most recent year (tons and \$value): Year: \_\_\_\_\_
- | <u>Product</u> | <u>Domestic</u> |              | <u>Export</u> |              |
|----------------|-----------------|--------------|---------------|--------------|
|                | <u>Volume</u>   | <u>Value</u> | <u>Volume</u> | <u>Value</u> |
| _____          | _____           | _____        | _____         | _____        |
| _____          | _____           | _____        | _____         | _____        |

8. Types of service offered to members (for product being studied):
- | <u>Type Service</u>    | <u>Yes</u> | <u>No</u> | <u>Comments</u> |
|------------------------|------------|-----------|-----------------|
| - credit               | ( )        | ( )       | _____           |
| - technical assistance | ( )        | ( )       | _____           |
| - information          | ( )        | ( )       | _____           |
| - farm inputs          | ( )        | ( )       | _____           |
| - spraying             | ( )        | ( )       | _____           |
| - processing           | ( )        | ( )       | _____           |
| - marketing            | ( )        | ( )       | _____           |
| - storage              | ( )        | ( )       | _____           |
| - transport            | ( )        | ( )       | _____           |
| - other _____          | ( )        | ( )       | _____           |

9. Identification of infrastructure/equipment/materials, etc. which may impact upon the product of interest:
- | <u>Description</u> | <u># Units</u> | <u>Location/other information</u> |
|--------------------|----------------|-----------------------------------|
| ex: trucks _____   | 3 _____        | _____                             |
| _____              | _____          | _____                             |
| _____              | _____          | _____                             |

10. Briefly describe the relevant experiences of the farmer organization in the production, postharvest handling, marketing, processing, or distribution of the product of interest.

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---

11. Identify and describe linkages/relationships with other organizations (public, private, bilateral, international, etc.)

- a. Other farmer organizations: \_\_\_\_\_  
b. Public sector institutions: \_\_\_\_\_  
c. Support organizations: \_\_\_\_\_  
d. Donor organizations: \_\_\_\_\_  
e. Others (specify): \_\_\_\_\_

12. Identify and describe ongoing projects impacting the product:

<u>Name of project</u>	<u>Begin date</u>	<u>End date</u>	<u>Cost</u>	<u>Source of \$</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

13. Identify and describe planned projects which will affect the product:

<u>Name of project</u>	<u>Begin date</u>	<u>End date</u>	<u>Cost</u>	<u>Source of \$</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

14. Principal institutional constraints impacting product (repeat for each constraint):

Constraint #1: \_\_\_\_\_  
Description of constraint: \_\_\_\_\_  
Impact of constraint (how it affects product): \_\_\_\_\_

15. Principal operational constraints impacting product (repeat for each constraint):

Constraint #1: \_\_\_\_\_  
Description of constraint: \_\_\_\_\_  
Impact of constraint (how it affects product): \_\_\_\_\_

16. Observations: \_\_\_\_\_

## Annex 2-C

### Inventory of development projects and activities affecting the commodity system

---

1. Prepare a list of all projects and activities which may affect the product being studied.
2. For each project or activity, answer the following questions:

a. Name of the project or activity: \_\_\_\_\_  
\_\_\_\_\_

b. Beginning date: \_\_\_\_\_ Ending date: \_\_\_\_\_

c. Sponsoring institution: \_\_\_\_\_

d. Total cost: US \$ \_\_\_\_\_ Local \$ \_\_\_\_\_

e. Objectives: \_\_\_\_\_  
\_\_\_\_\_

f. Status: ( ) ahead of schedule, ( ) on schedule, ( ) behind schedule

g. Principal constraints affecting project: \_\_\_\_\_  
\_\_\_\_\_

h. Expected impact on the product being studied: \_\_\_\_\_  
\_\_\_\_\_

3. For each project activity, identify the technical personnel associated with the product of interest.

<u>Name</u>	<u>Area of expertise</u>	<u>Time to be in country</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

## **ANNEXES 3 through 10**

- Annex 3** Summary of the production process for starfruit in Malaysia, 1988
- Annex 4** Magnitude of losses relating to preharvest factors for starfruit in Malaysia, 1988
- Annex 5A** Flow diagram of actions taken in the postharvest system for starfruit, Malaysia, 1988
- Annex 5B** Flow diagram of actions taken in the postharvest system for tomatoes, Bani, Dominican Republic, 1977
- Annex 6A** Movement of starfruit in the postharvest system, Malaysia, 1988
- Annex 6B** Movement of salad tomatoes through a traditional marketing system, Dominican Republic, 1975
- Annex 7** Summary of the postharvest system for starfruit, Malaysia, 1988
- Annex 8A** Market prices, marketing costs and margins for Julie Mangoes, St. Lucia, July 1988
- Annex 8B** Marketing margins for Julie Mangoes, St. Lucia, July 1988
- Annex 9** Product specifications for Malaysian starfruit in four importing countries, 1988
- Annex 10** Recommended production environment for selected fruit crops



# Summary of the production process for starfruit in Malaysia, 1988

## ANNEX 3

ACTION	WHO TAKES ACTION?	WHAT ACTION IS TAKEN?	HOW IS ACTION DONE?	WHEN IS ACTION DONE?	WHY IS ACTION DONE?	WHERE ACTION TAKEN?
Land preparation	farmer contractor	land is plowed	with tractor	before holling	control weeds and loosen soil	farm
Lining and holling	farmer contractor	lining & staking for 6 x 6 m; dig hole 60 x 60 x 60 cm; 10 kg chicken dung/hole	lining: manually; holes dug by hand or machine	1-2 weeks before planting	- -	farm
Planting material	farmer nursery (private & gov't)	bud grafted; plants prepared or purchased		order: > 3 mos. before planting; prepare: 9 mos. before planting	- -	farm and nursery
Planting	farmer hired labor	basal fertilizer CIRP 200 g/hole	manually without shade	at onset of rainy period	planting during wet weather enhances plant establishment	farm
Fertilizer application	farmer hired labor	NPK 15:15:15 (Year 1) NPK Mg 12:12:17:2 (Year 2 on) organic manure	manually	4-5 split applications per year	require high fertilizer input	manually broadcast around drip line
Irrigation	farmer	regular irrigation	manually with hose or bucket; aprinkler/drip	daily during drought	sensitive to water stress; fruit quality affected	base of tree

# ANNEX 3 (continued)

ACTION	WHO TAKES ACTION?	WHAT ACTION IS TAKEN?	HOW IS ACTION DONE?	WHEN IS ACTION DONE?	WHY IS ACTION DONE?	WHERE ACTION TAKEN?
Pest & disease control	farmer hired skilled labor	fruit bagging and covering; spray with insecticides or spot spray with protein baits	fruit are bagged manually 2-3 weeks after flowering; insecticides/bait sprays applied with knapsack or power sprayers	bagging at 2-3 weeks after flowering (4-5 cm); insecticides/bait spraying before bagging & one week before harvest	unprotected fruits are 100% damaged by fruit flies and up to 60% by borers; flower moths reduce fruit set up to 80%	farm
Weed control	farmer hired labor	mechanical and/or chemical	circle or clear weeding	as necessary	to reduce pest infestations and competition for nutrients	farm
Pollination	farmer	reared honey bees to improve pollination; graft clones with high pollen production	1 beehive per acre; 1 graft per tree	pollination is continuous	the B10 clone appears to be self-fertile; experience with cross pollination shows increased fruit set and production	on the tree
Pruning & training	farmer hired labor	excessive water shoots removed; branches trained to grow horizontally	manually cut; branches weighed down with strings & weights	pruning water shoots as necessary; pruning to control height at 4-5 years; continuous training	facilitates bagging & harvesting; remove unproductive water shoots	on the tree
Thinning & bagging	farmer hired skilled labor	select & maintain one good fruit per inflorescence	manually bag for pest & disease control	thin to leave one well formed fruit/cluster; bag 2-3 weeks after flowering	produce good quality (uniform, big size & clean) fruits	on the tree
Harvesting	farmer hired labor	bagged fruits are handpicked		60-65 days after fruit set; in the morning	to get turgid fruits; to enable packing and transport in the afternoon	farm

Source: Malaysian Agricultural Research and Development Inst., 1988, pp. 33-34.

## ANNEX 4

### Magnitude of losses relating to preharvest factors for starfruit in Malaysia, 1988

OPERATIONS	INSIGNIFICANT		SIGNIFICANT		VERY SIGNIFICANT	
	Qty	Qnty	Qty	Qnty	Qty	Qnty
1. Land preparation	nd	nd				
2. Lining & holing	nd	nd				
3. Planting material			<3%	<3% <sup>a</sup>		
4. Planting	x	x				
5. Fertilizer application					x	x <sup>b</sup>
6. Irrigation			x	20% <sup>c</sup>		
7. Pest & disease control					up to 100%	up to 100% <sup>d</sup>
8. Weed control			x	x <sup>e</sup>		
9. Pollination			x	x <sup>f</sup>		
10. Pruning & training			x	x <sup>g</sup>		
11. Thinning & bagging			x	x <sup>h</sup>		
12. Harvesting & infield handling	x	x				

Qty = Quality; Qnty = Quantity; nd = not determined

- a - There is no quality control for planting material; therefore, cultivars other than B10 may be included, leading to variation in fruit size, quality and yield. Certified planting material should be used so that fruit quality is maintained.
- b - Starfruit responds very well to fertilizer application. An optimal fertilizer program enhances yield levels. Inadequate fertilization leads to a large decrease in productivity.
- c - Loss estimated for one dry period a year affecting a season of flowering and fruiting (5 season/year). Starfruit is sensitive to waterstress. Periods of water shortage can result in reduced flowering and fruiting. Irrigation can overcome this problem.
- d - Fruit flies can cause severe damage (up to 100%) to the fruits. Bagging is essential to produce high quality, insect-free fruit. Unbagged fruits are damaged by insects and are of inferior quality. Bagging ensures high quality fruits. However, bagging is extremely labor intensive and may limit the area of cultivation of the crop.
- e - Weeds compete with the crop for nutrients. Circle or clean weeding is necessary to control weeds.
- f - Cross pollination is necessary to ensure fruit set and quality for cultivar B10. Honey bees are efficient pollinators and are recommended at the rate of one hive per acre.
- g - Starfruit has to be regularly pruned and trained to maintain a tree height and shape that facilitate bagging and fruit selection.
- h - Thinning is carried out to select one fruit per floescence to increase individual fruit size and quality.

Source: Malaysian Agricultural Research and Development Inst. 1988, pp. 35-36.

# ANNEX 5A

## Flow diagram of actions taken in the postharvest system for starfruit, Malaysia, 1988

DETAILS OF FUNCTION	FUNCTIONS' O T I D S	TEMP.	DISTANCE	TIME	OBSERVATIONS
Harvest	○ T I D S				picking fruit by hand
Put in container	○ T I D S				by hand
Remove bag	○ T I D S				by hand
Pack field container	○ T I D S				by hand
Wait at field point	○ T I D S				
Transport infield	○ T I D S		1/2 km	15 min	by hand, wheel barrow, motorcycle, lorry
Wait at collection point	○ T I D S			up to 6 hours	
Load into lorry	○ T I D S				by hand
Transport to packinghouse	○ T I D S		up to 6 km	1 hour	
Wait for unloading	○ T I D S			up to 6 hours	
Unload	○ T I D S			15 min	by hand
Weigh transactions	○ T I D S			30 min	
Wait for sorting	○ T I D S			up to 6 hours	
Sort	○ T I D S				separate fruit by market
Clean	○ T I D S				with brush
Size	○ T I D S				visual - small, med, lg
Grade	○ T I D S				visual - by market
Wrap each fruit	○ T I D S				wrap with paper
Put each fruit into CFB	○ T I D S				vertical, stem end down
Weigh, check net weight	○ T I D S				3.5 kg, 15 kg

# ANNEX 5A (continued)

DETAILS OF FUNCTION	FUNCTIONS* O T I D S	TEMP.	DISTANCE	TIME	OBSERVATIONS
Close carton	O T I D S				by hand
Label, size, no.	O T I D S				
Store	O T I D S	5-10° C		up to 3 days	packinghouse; coldroom
Transport to port/airport	O T I D S	air-conditioned 5-10° C	60 km.	1 hour	store in container
Stack into containers	O T I D S			3/4 hour	carton arrangement
Inspect at customs, plant quarantine	O T I D S			3/4 hour	carton arrangement
Seal container	O T I D S				
Wait at container terminal	O T I D S			up to 4 days	
Transport to importing port	O T I D S			few hours - 3 weeks	
Unload at importing port	O T I D S			3/4 hour	simultaneously
Inspect at customs, plant quarantine	O T I D S			3/4 hour	simultaneously
Load into truck	O T I D S			3/4 hour	simultaneously
Transport to warehouse	O T I D S				
Store at warehouse	O T I D S				
Transport to wholesale market	O T I D S				
Store at wholesale market	O T I D S			Hong Kong up to 2 days	do not know for other markets
Wholesale	O T I D S			Hong Kong up to 2 days	
Transport to Retail market	O T I D S			Hong Kong up to 1 day	
Store at Retail market	O T I D S				
Retail	O T I D S				

Source: Malaysian Agricultural Research and Development Inst., 1988, pp. 39-40.

\* O: Operation T: Transport I: Inspection/classification D: Delay S: Storage

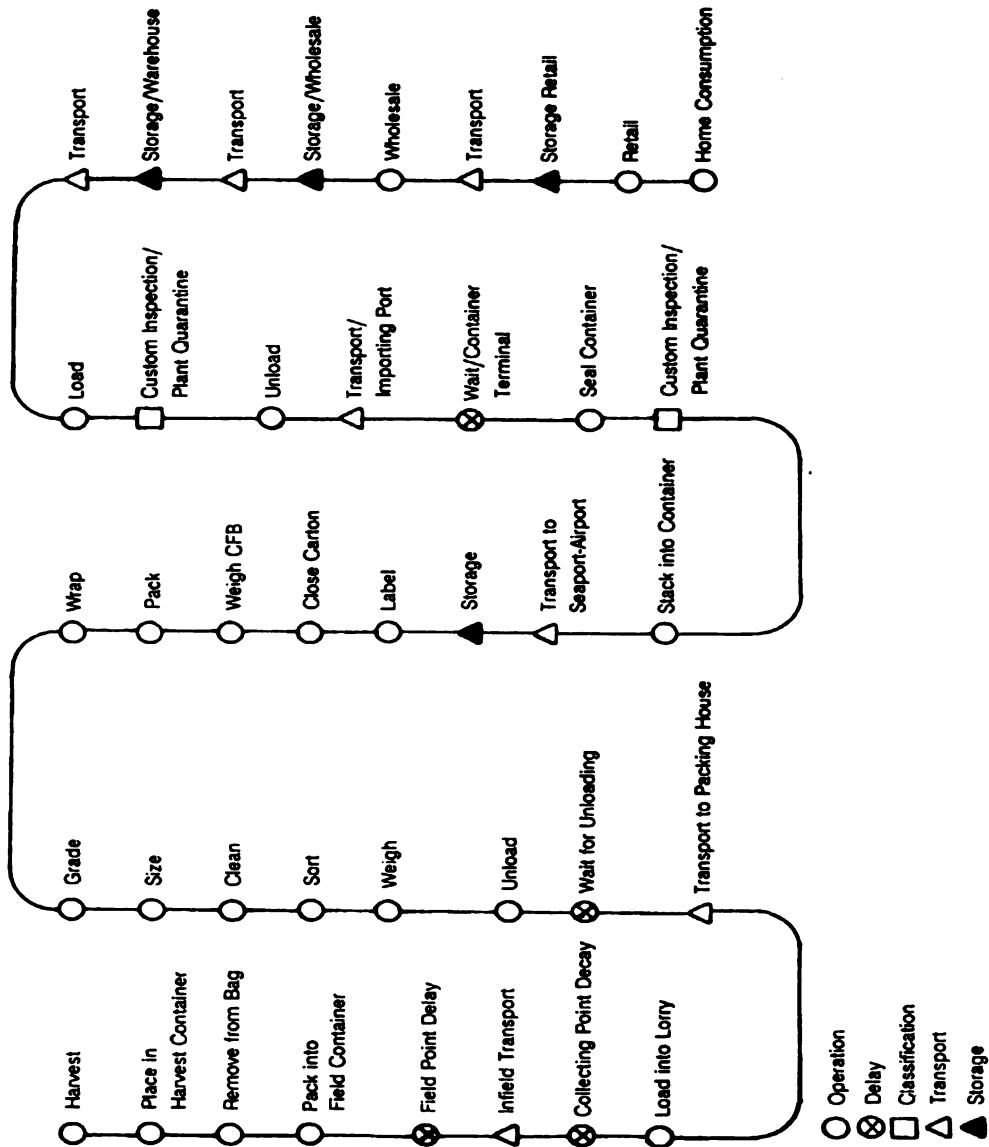
# ANNEX 5B

## Flow diagram of actions taken in the postharvest system for tomatoes, Bani, Dominican Republic, 1977

DETAILS OF FUNCTIONS	FUNCTIONS O T I D S	TEMP	DISTANCE	TIME	OBSERVATION
Tomato picked from plant	○ T I D S				
Tomato placed in 5 gallon tin	○ T I D S				Tomato thrown in bucket
Tomato remains in can until container filled	O T I ● S			5 minutes	Approximate 5 minute delay
Container carried to packing area	O T I D S		50 M	5 minutes	Usually located under tree near fields
Container emptied	○ T I D S				Tomatoes dumped in pile 2 feet high
Tomato awaits packing	O T I ● S	85° F			From 15 minutes to three hours
Tomatoes selected/packed in home-made wooden containers 80-90 lbs	O T I D S			15 minutes	Small, deformed and damaged removed
Full crates carried to waiting point for truck	O T I D S		30 M	2 minutes	Shaded areas, crates covered with grass
Crates wait for truck	O T I ● S			10 hours	From afternoon to late night
Crates loaded on truck	○ T I D S			1 minute	Handled roughly
Crates transported to Capital	O T I D S	90° F	40 km	1 hour	
Crates unloaded at market place	○ T I D S	90° F		15 minutes	

# ANNEX 6A

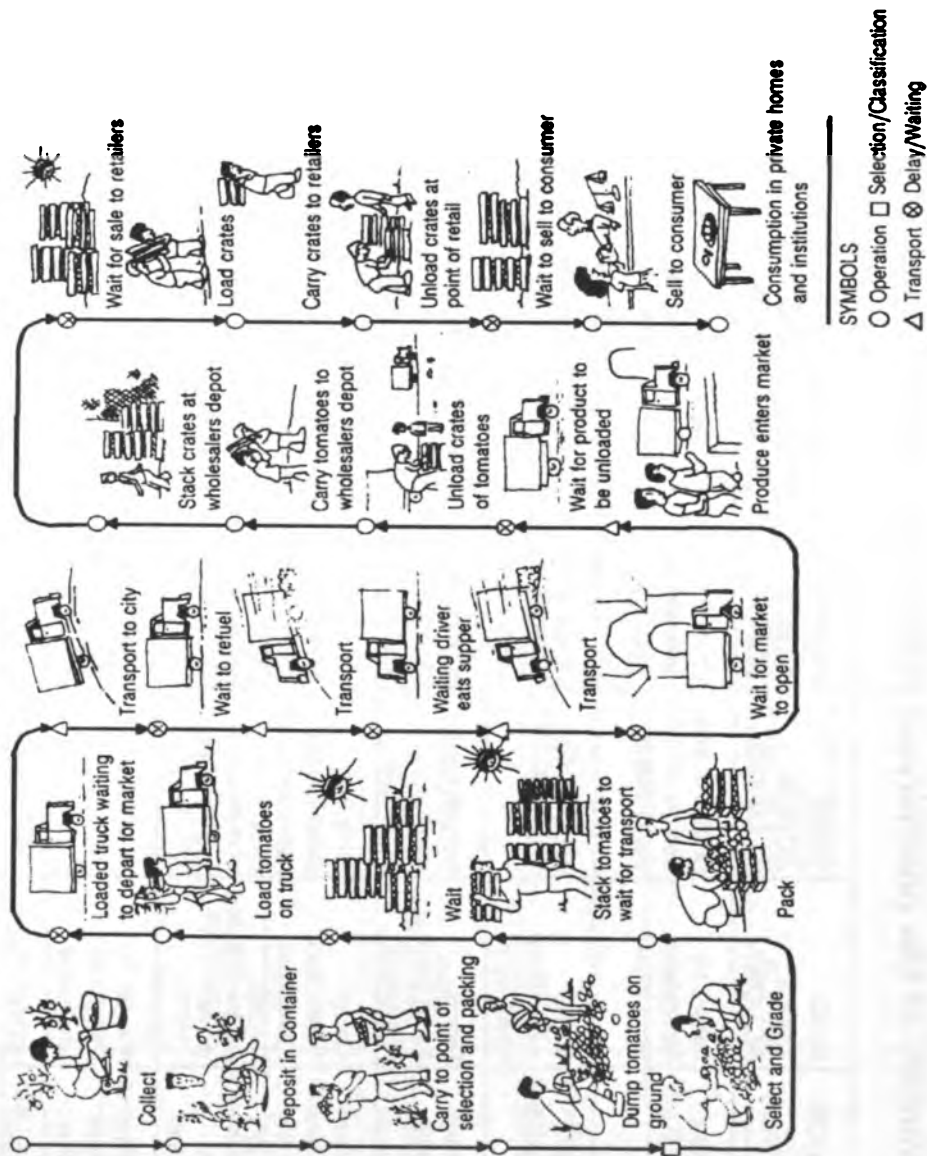
## Movement of starfruit in the postharvest system, Malaysia, 1988



Source: Malaysian Agricultural Research and Development Institute., 1988, p. 38.

# ANNEX 6B

## Movement of salad tomatoes through a traditional marketing system, Dominican Republic, 1975



Source: Secretaria de Estado de Agricultura, 1977, p. 204.



## Summary of the postharvest system for starfruit, Malaysia, 1988

# ANNEX 7

ACTION	WHO TAKES ACTION?	WHAT ACTION IS TAKEN?	HOW IS ACTION DONE?	WHEN IS ACTION DONE?	WHY IS ACTION DONE?	WHERE ACTION TAKEN?
Harvest	farmer family labor hired labor	pluck fruit from tree; put in basket	Local & export color index 2 to 4	morning	comfortable for workers, suitable for market, fruit turgid	farm
In-field collection	farmer family labor hired labor	gather fruit to one point	collect in containers, keep under shade	morning	collect qty. to handle before packing	farm
On-farm packing	farmer family labor hired labor	remove bags; arrange in containers	arrange tightly, breadthwise, with paper lining	morning	easy handling minimizes damage	farm
On-farm transport	farmer family labor hired labor	carry field container to collection point	manually with wheelbarrow, motorcycle, lorry	late morning	gathering of fruit to one location	farm
Packing for local market	packer (laborer) farmer	sort those not meant for export	manually packed in CFB	anytime	facilitate transport	packinghouse on farm
Transport to local market	farmer middlemen wholesaler	convey the produce	container in motorcycle, lorry	morning	to sell produce	road
Transport to export market	shipping line	load in container (air, sea)	by air, sea	anytime according to schedule	for export	at port (sea, air)

## ANNEX 7 (continued)

ACTION	WHO TAKES ACTION?	WHAT ACTION IS TAKEN?	HOW IS ACTION DONE?	WHEN IS ACTION DONE?	WHY IS ACTION DONE?	WHERE ACTION TAKEN?
Auction sale	wholesaler	auctioning	best offered price in Hong Kong market	early morning	best profit	auction market at wholesale market
Collection for retail	In Hong Kong; retailer supermarket	display on yam leaves; display in chilled cabinet	arrange for best view; price marking/lb	10:00 am to midnight	to sell best appearance	retail outlets supermarkets
Sale to consumer	retailer buyer	allow buyers to select according to preference	bargain fixed price	10:00 am to midnight	change ownership, buyers desire to eat	retail outlets
Transport to packinghouse	middleman, packinghouse operator	take produce from farm to packinghouse	farmer's or rented lorry delivers to market; motorcycles Export: lorry	late morning to afternoon	market or packinghouse away from farm	suburbs
Unloading at packinghouse	laborer	unload manually from vehicle	separate poor quality fruit, export good fruit for operations	afternoon and evening	collection and change ownership	packinghouse
Packing for export	packer (laborer)	sort, clean, size, grade and box	manual	anytime	unitization, transport, protection	packinghouse
Storage for export	exporter	store produce at ambient, coldroom air-con	stored in CFB	anytime	waiting for enough qty, waiting for transport	packinghouse coldroom complex, port container

Source: Malaysian Agricultural Research and Development Institute, 1988, pp. 41-42.

## Annex 8A

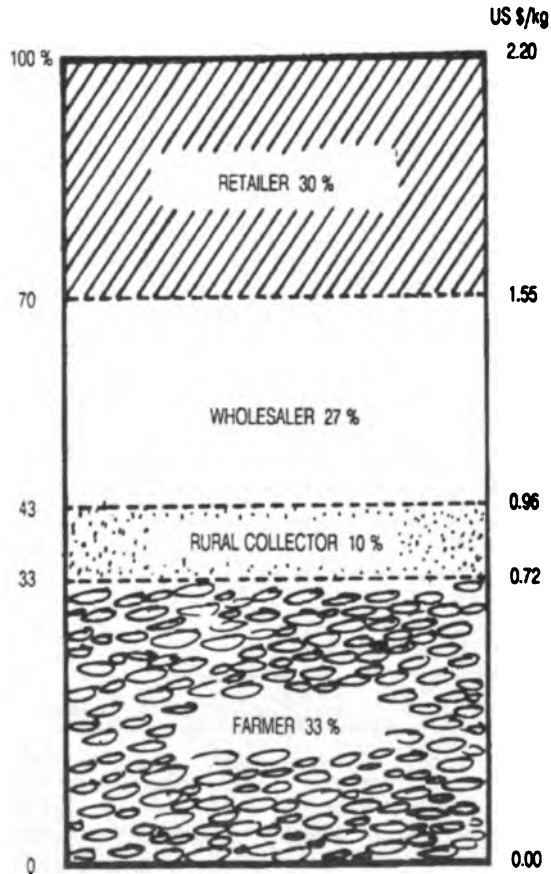
### Market prices, marketing costs and margins for Julie mangoes, St. Lucia, July, 1988

POINT IN MARKET CHANNEL	MARGINS \$/kg	PRICES \$/kg	PRICE INDEX RETAIL PRICE = 100
<b>Retail:</b>			
Average sales price		2.20	100
Profit	0.20		9
Wage	0.15		7
Costs	0.30		14
Purchase Price		1.55	70
<b>Wholesale:</b>			
Average sales price (urban market)		1.55	70
Profit	0.12		5
Wage	0.15		7
Costs	0.32		15
Purchase Price		0.96	43
<b>Collection:</b>			
Average sales price (rural center)		0.96	43
Profit	0.09		4
Wage	0.03		1
Costs	0.12		5
Purchase Price		0.72	33
<b>Farmer:</b>			
Sales Price (farm gate)		0.72	33
Profit	0.16		7
Wage	0.06		3
Costs	0.50		23

# ANNEX 8B

## Marketing margins for Julie mangoes, St. Lucia, July 1988

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## ANNEX 9

### Product specification for Malaysian starfruit in four importing countries, 1988

CHARACTERISTICS	EEC*	HONG KONG	SINGAPORE	MIDDLE EAST
Preferred cultivar	B10	B10	B10	na
Preferred size	small	med/large	med/large	small
Preferred wt (kg)	.15 - .22	.30	.30 - .40	.15 - .22
Preferred color	25 - 50% yellow	orange	orange	na
Flavor desired	sweet & sour	sweet	sweet	sweet
Texture desired	non fiber	non fiber	non fiber	na
Preferred degree of maturity	1/4 ripe	3/4 ripe	3/4 ripe	na
Preferred package	CFB	CFB	CFB	CFB
Units/product per package	24	70	70	na
Preferred wt of package	3.5 kg net	15 kg net	15 kg net	na
Minimum requirements:				
-pest control	X	X	X	na
-disease control	X	X	X	na
-appearance	clean	clean	clean	na
-level of chemical residue	na	na	na	na
-others	na	na	na	na
Other desired characteristics	na	na	na	na

X = unspecified minimum requirements

na = not available

\* European Economic Community

Source: Malaysian Agricultural Research and Development Inst., 1988, p. 56.

*A Commodity Systems Assessment Methodology*

# ANNEX 10

## Recommended production environment for selected fruit crops

CROP	TEMP FOR BEST QUALITY		WATER REQUIREMENTS		WIND		SOIL			
	min/degrees C	max/degrees C	Ave. tree/day (liters)	mm/yr and special conditions	Tolerance max speed km/hour	Common damage	Best Type	pH	Main constraints	Adaptability to different soil types
Mangoes	25 to 31		210	1000 - 2000mm well distributed. Requires dry season of 4-6 months. Best color in dry areas (<600mm/yr) with complementary irrigation	<40	defoliation fruit/flower drop; broken twigs recuperation: very good	Almost any	5.5 - 7.5	water logging, salt	very wide
Papaya	15 to 30		15	1000 - 1500mm well distributed	<10	flower/fruit drop; fruit scars; burned leaves snapping topping recuperation: poor	deep, rich, light, well drained	6.0 - 8.0	water logging, salt, shallow soils	moderate
Plantain	25 to 30		30	1500 - 2500mm well distributed	<10	shredded leaves snapping topping	deep, well drained, loamy	5.5 - 7.5	water logging, shallow soils	moderate
Starfruit	5 to 30		145	1000 - 2000mm well distributed	<30	defoliation fruit/flower drop; breaking/ splitting branches; recuperation: fair	deep, well drained	5.0 - 6.5	water logging, salt	wide
Passionfruit	15 to 30		15	1000 - 1500mm alternate wet/dry seasons	<25	defoliation fruit/flower drop and/or abortion "bending" trellises recuperation: poor	deep, well drained	6.0 - 6.5	water logging, salt	wide

Source: La Gra, Jerry, and Rafael Marte. 1987, pp. 323.

# **ANNEX 11**

## **Checklist of Potential Problems in a Commodity System**

# ANNEX 11

## Checklist of potential problems in a commodity system

Commodity: \_\_\_\_\_ Indicate whether the analysis is being undertaken on a: ( )national; ( )regional; or ( )local basis.

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
<b>Pre-Production Considerations</b>		
<b>Agricultural Sector Policies:</b>		
- institutional organization	( )	
- salaries, urban or rural	( )	
- taxes:import or export	( )	
- price policies	( )	
- credit policies	( )	
- land reform policies	( )	
- natural resource management	( )	
- irrigation policies	( )	
- production and distribution of planting material	( )	
- farm input supply	( )	
- technology	( )	
- farmer organization	( )	
- marketing policies	( )	
- agro-processing policies	( )	
- import policies	( )	
- export policies	( )	
- Incentives:	( )	
. tax	( )	
. financial	( )	
. other _____	( )	
<b>Public Sector Institutions (Identify institutions):</b>		
- political instability	( )	
- leadership	( )	
- deficient planning	( )	
- management skills	( )	
- insufficient staff	( )	
- poor quality staff	( )	
- staff motivation	( )	



NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- deficient equipment	( )	
- lack of operating capital	( )	
- weak services:		
. information	( )	
. credit	( )	
. research	( )	
. extension	( )	
. training	( )	
. technical assistance	( )	
. product standards	( )	
. coordination	( )	
. others _____	( )	
<b>Private Sector Organizations (farmers, intermediaries, exporters, others):</b>		
- legal structure	( )	
- public sector control	( )	
- leadership	( )	
- unclear role & functions	( )	
- small active membership	( )	
- low level member commitment	( )	
- members widely scattered	( )	
- communication	( )	
- lack of resources	( )	
- management skills	( )	
- insufficient staff	( )	
- staff skills	( )	
- staff motivation	( )	
- job description or terms of reference	( )	
- poor planning	( )	
- decision-making	( )	
- poor follow-through	( )	
- monitoring of staff	( )	
- financial management	( )	
- communication	( )	
- marketing policy	( )	
- pricing policy	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- filing system	( )	
- office space	( )	
- inadequate equipment	( )	
- inadequate materials	( )	
- Information deficiencies:		
. supply of produce	( )	
. markets	( )	
. prices	( )	
. farm input supply	( )	
. credit alternatives	( )	
. production packages	( )	
. proper postharvest handling of produce	( )	
. communication with members	( )	
- others _____	( )	
<b>Ecological Conditions which Negatively Affect the Commodity:</b>		
- latitude/sunlight	( )	
- altitude	( )	
- soil	( )	
- rainfall	( )	
- wind	( )	
- temperature	( )	
- relative humidity	( )	
- other _____	( )	
<b>Infrastructure/Equipment Limitations:</b>		
- roads non-existent	( )	
- roads in poor condition	( )	
- irrigation systems	( )	
- storage facilities	( )	
- marketplaces	( )	
- packing houses	( )	
- packing equipment	( )	
- packaging materials	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- airports	( )	
- sea ports	( )	
- tractors or other equipment	( )	
- others _____	( )	
<b>Planting Material:</b>		
- deficient infrastructure	( )	
- lack of proper equipment	( )	
- lack of technical know-how	( )	
- unavailability to farmers	( )	
- poor quality plants	( )	
- others _____	( )	
<b>Problem Characteristics inherent to Crop:</b>		
- seasonality	( )	
- height of plant/tree	( )	
- other growth characteristics	( )	
- susceptible to pests/diseases	( )	
- short shelflife of product	( )	
- poor storage capabilities	( )	
- color	( )	
- flavor	( )	
- size	( )	
- shape	( )	
- quantity of fruit set	( )	
- others _____	( )	
<b>Production Related Problem Areas:</b>		
- climatic constraints	( )	
- soil constraints	( )	
- land constraints	( )	
- water related deficiencies:		
. too little water	( )	
. too much water	( )	
. inadequate irrigation systems	( )	
. poor water management	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- seeds/planting material:		
. unavailable	( )	
. poor quality	( )	
. expensive	( )	
- credit:		
. unavailable	( )	
. difficult to access	( )	
- farm inputs:		
. unavailable	( )	
. poor quality	( )	
. high costs	( )	
- lack of technical know-how with respect to:		
. farm management	( )	
. integrated pest management	( )	
. crop establishment	( )	
. crop maintenance	( )	
. pruning	( )	
. training	( )	
. spraying	( )	
. weeding	( )	
. fertilization	( )	
. pollination process	( )	
. water management	( )	
. large scale cultivation	( )	
. other _____	( )	
- labor:		
. unavailable	( )	
. inefficient	( )	
. high cost	( )	
- actual farming system:		
. limits yields	( )	
. affects crop quality	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- pests/diseases:		
. effect on marketability	( )	
. lack of control method	( )	
. excess use of chemicals	( )	
. requirement of too much labor	( )	
. expense of control	( )	
- high costs/production	( )	
- others _____	( )	
<b>Harvest Related Problem Areas:</b>		
- larceny	( )	
- stage of maturity unknown	( )	
- lack of technical know-how	( )	
- inadequate tools/equipment	( )	
- poor harvesting practices	( )	
- labor:		
. unavallable	( )	
. poorly skilled	( )	
. high costs	( )	
- height of trees	( )	
- closed canopy	( )	
- other _____	( )	
<b>Postharvest Handling Problems:</b>		
- rough on-farm handling	( )	
- poor field containers	( )	
- poor in-field sanitation	( )	
- scarce labor	( )	
- poorly trained labor	( )	
- lack of shade	( )	
- improper stacking	( )	
- rough loading/unloading	( )	
- on-farm transport	( )	
- delays at ports	( )	
- poor roads	( )	
- chemical treatments	( )	
- washing	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- cleaning	( )	
- sizing	( )	
- grading	( )	
- precooling	( )	
- packaging:		
. unavailable	( )	
. insufficient strength	( )	
. high cost	( )	
. poor packing facilities	( )	
. quality/weight controls	( )	
. improper labeling	( )	
- quality control	( )	
- wrong temperature	( )	
- wrong humidity	( )	
- lack of technical know-how	( )	
- high costs of handling	( )	
- lack of infrastructure	( )	
- other _____	( )	
<b>Agro-Processing Limitations:</b>		
- raw material:		
. small volumes available	( )	
. lack of continuous supply	( )	
. poor quality	( )	
. high costs	( )	
- imported inputs(jars,etc)	( )	
- lack of facilities	( )	
- deficient or outdated equipment	( )	
- poor product development	( )	
- high production costs	( )	
- low quality output	( )	
- lack of technical assistance	( )	
- lack of operating capital	( )	
- lack of market development	( )	
- other _____	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
<b>Markets and Marketing Problems:</b>		
- markets:		
. lack of market development or promotion	( )	
. small and/or specialized market niche	( )	
. limited to particular time of year	( )	
. quarantine restrictions	( )	
. other restrictions or trade barriers	( )	
. taxes, duties, etc.	( )	
. strong competition	( )	
. controlled by interest groups	( )	
. local/regional politics	( )	
. difficulty in obtaining payment	( )	
. other _____	( )	
- product:		
. lack of product development	( )	
. quality poor	( )	
. volumes small	( )	
. prices too high	( )	
. lack continuous supply	( )	
. collection system	( )	
. lack of quality control	( )	
. other _____	( )	
- transportation:		
. unavailable	( )	
. irregular	( )	
. limited space	( )	
. freight costs too high	( )	
. insurance expensive	( )	
. other _____	( )	
- information:		
. supply statistics	( )	
. market intelligence	( )	
. poor analysis	( )	
. other _____	( )	

NATURE OF PROBLEM	IF PROBLEM AREA INDICATE WITH (X)	DESCRIBE HOW PROBLEM AFFECTS QUANTITY, QUALITY, PRICE, OR AVAILABILITY OF PRODUCT
- technical assistance	( )	
- means of verification unavailable in importing country	( )	
- difficult collection of payments	( )	
- delays with documentation	( )	
- port facilities poor	( )	
- other _____	( )	
<b>Pricing and Consumer Demand Problems:</b>		
- imports sold at lower price than domestic supply	( )	
- irregular supplies to meet consumer demand	( )	
- high costs to consumers	( )	
- consumers lack familiarity with product	( )	
- product poorly presented	( )	
- characteristics of consumer demand unknown	( )	
- other _____	( )	

**NOTE:** There are approximately 250 potential problems listed here which can impact upon the quantity of product produced or its quality, price or availability. Due to the participants' lack of experience it may be difficult for them to understand how some of the potential problems listed above may impact the product. A useful classroom exercise is to dedicate approximately two hours going through the list as a group effort. Participants and instructors alike can make suggestions as to how a certain "potential problem" may impact the product. This is a good way to stimulate group discussion and to transfer experiences between the different participants.



# **ANNEX 12**

## **Project Profiles for Papaya in Barbados**

# ANNEX 12

## Project profiles for papaya in Barbados

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If one applies the information from the Barbados papaya example to the profile outline presented in Chapter 5, it is possible to generate at least two project profiles. These are based primarily on the objectives and expected outputs included within circles #1 and #2 shown in Figure 5.3. Since both projects are complementary, and form part of the same overall strategy, they will have the same Goal or General Objective.

Based on the information contained in circle #1 of Figure 5.3, Profile #1 has been prepared. Profile #2 is based on the information encompassed in circle #2 of the same figure.

### Profile #1

**Title:** Institutional development for fruit production.

**Definition of underlying problem:** Due to the absence of disease resistant planting material, poor cultural practices brought about by the lack of a governmental policy in favor of commercial fruit production, and poor institutional services, fruit production in Barbados is low. This results in a high level of fruit imports and almost no fruit exports.

**Goal:** Increase the domestic supply and exports of good quality fruit from Barbados.

**Specific objective:** Improve the production and marketing services available to fruit producers in Barbados.

#### Expected outputs:

1. Improved planting material introduced for papaya and other fruits.
2. Research program established to maintain the quality of planting material.
3. Technical packages developed for the production, postharvest handling, and marketing of papaya and other fruits.
4. Effective mechanisms established for the production and distribution of planting material.

5. Staff in the planting material production unit trained.
6. Effective system implemented for the distribution of farm inputs.

**Activities:**

1. Import and reproduce improved varieties of planting material of selected fruits.
2. Research proper production, postharvest handling and marketing techniques and initiate validation activities.
3. Prepare and reproduce technical packages for distribution to extension agents and farmers.
4. Establish pest- and disease-free nurseries for planting material.
5. Train Ministry of Agriculture agronomists and research staff in proper techniques for the production of planting material.
6. Set up the organizational structure through farmers' organizations for the distribution of farm inputs and planting material.

**Expected duration:** This project will have a duration of three (3) years.

**Estimate of costs:** (US\$)

<u>Type expenditure</u>	<u>Estimated cost</u>
- import of plant materials	\$ 3,000
- preparation of tech-packs	40,000
- establishment of nursery	120,000
- training	20,000
- technical assistance	25,000
- miscellaneous	<u>21,000</u>
Total	229,000

**Implementing agency:** Ministry of Agriculture

## **Notes:**

As pointed out earlier, the nine elements included here represent the minimum information that should be included in a project profile. Some persons prefer to include other elements, such as **Justification** and **Strategy**.

Often, there are special conditions which might justify the execution of the project. There might include such things as changing market trends, positive or negative ecological conditions, good leadership potential, or availability of complementary support. Under **Justification** one should identify those items which emphasize the importance of the project.

**Strategy** is the description of how the project implementors are going to achieve the expected outputs identified in the project profile. In the description of strategy one should answer such questions as: Who is going to do what? When? and How? The activities are an essential part of the strategy.

A brief analysis of how the information presented in Profile #1 relates to the information presented in Chapter 5 results in the following:

<b><u>Element</u></b>	<b><u>Explanation</u></b>
<b>Title:</b>	Relates to specific objective but is more general.
<b>Definition of underlying problem:</b>	Is a summary of the problems found in the upper portion of the problem tree.
<b>Goal:</b>	Relates to overall strategy and is the same for all projects falling within the same strategy. Was defined considering all the objectives in the higher levels of the objective tree.
<b>Specific objective:</b>	Was taken from the top objective in circle #1 of Figure 5.3 Has been reworded.
<b>Expected outputs:</b>	Were obtained from the lower levels of the objective tree (Figure 5.3). They have been reworded.
<b>Activities:</b>	Are a logical extension of the expected outputs. They are the specific actions which have a cost element and must be implemented to achieve the desired outputs.

**Estimate of costs:** By analyzing each one of the activities it is possible to identify the goods and equipment, finance, and manpower necessary to implement each activity. (Project finance does not include costs of goods, materials, or personnel but only those funds used as cash.) Manpower inputs are quantified as man-months and their value can be estimated. Given this breakdown of needs, a preliminary rough estimate of total costs can be made.

**Expected duration:** Based on an analysis of the activities and a realistic assumption of the time required to effectively execute all of them.

**Executing agency:** Is usually the institution or agent most interested in or most capable of executing the project.

## **Profile #2**

**Title:** Improving the productivity and quality of papaya in Barbados.

**Definition of problem and/or justification:** Papayas are presently (1988) produced on a very small scale due to disease problems and market uncertainty. Production is scattered throughout the island. Farmers tend to let their plants grow naturally with little or no use of chemicals to control pests and disease problems. Irrigation and windbreaks are generally not good during production. Access to agricultural credit is difficult for small farmers, and little or no facilities or equipment are available for proper postharvest handling of fruit.

**Goal:** Increase the domestic supply and exports of good quality fruit from Barbados.

**Specific objective:**

1. Improve production/postharvest practices of selected fruit (papaya) farmers.
2. Facilitate access to agricultural credit and the necessary infrastructure for the production of good quality papaya.

**Expected outputs:**

1. A minimum of 50 fruit farmers trained in the proper methods and techniques of papaya production.
2. An effective mechanism established for small farmers to access credit from the agricultural development bank.
3. At least 10 irrigated papaya farms in operation.
4. Adequate postharvest handling facilities and equipment operating in major production zones.

**Activities:**

1. Training of farmers in proper production and postharvest handling practices for papaya.
2. Establishment of credit facility for fruit farmers within the national Agricultural Development Bank.
3. Technical assistance for the design of irrigation systems and postharvest handling facilities and equipment.

**Expected duration:** This project will have a duration of five (5) years.

**Estimate of costs:** (US\$)

<u>Type expenditure</u>	<u>Estimated cost</u>
- training costs	\$ 25,000
- fruit production credit	3,000,000
- technical assistance	200,000
- miscellaneous	<u>322,000</u>
Total	3,547,500

**Executing agency:** Agricultural Development Bank

# **ANNEX 13**

## **The Logical Framework**



# ANNEX 13

## The Logical Framework

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An interdisciplinary team carrying out a thorough description of a commodity system will be able to identify the priority problems in each component of the system (see Chapter 5), and with these, establish objectives which will lead to a project profile (see Annex 12). Since most people have limited experience writing projects, or profiles of projects, there is a need for a method of determining whether the project profile is logically conceived or not. The **logical framework format** is a valuable tool which does just that.

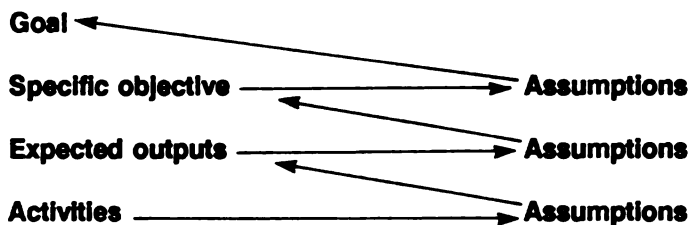
The **Logical Framework** (Rosenberg & Posner, 1979) was developed for the United States Agency for International Development as a tool to help conceptualize a project and analyze the assumptions behind it. Since the development of the **Logical Framework**, it has been adopted, with various adaptations (GTZ, 1983), by a large number of bilateral and international development organizations. The **Logical Framework** has proven extremely valuable for project design, implementation, monitoring, and evaluation.

As was seen in the preparation of the project profile, there is a logical interrelationship between the overall Problem, the Goal, the Specific Objective, the Expected Outputs, and the Activities. The **Logical Framework** facilitates an analysis of these interrelationships and their relationships with the surrounding environment.

From the analysis of the project profile (see Annex 12), it is evident that there is a logical interrelationship as follows:



However, projects cannot be considered in isolation since they are affected in one way or another by the surrounding environment, people, institutions, politics, climate, and others. Since most of these external factors are outside the control of the project, certain assumptions have to be made. Some assumptions can be derived from the **Objectives Tree**. Given these assumptions, a more realistic graphical portrayal of the situation is the following:



The assumptions should be worded as a positive condition (agricultural policy will be changed to favor fruit crops; farmers will have access to credit). Only important assumptions which are likely to occur should be included. Those which are almost certain to occur or almost certain not to occur should be avoided.

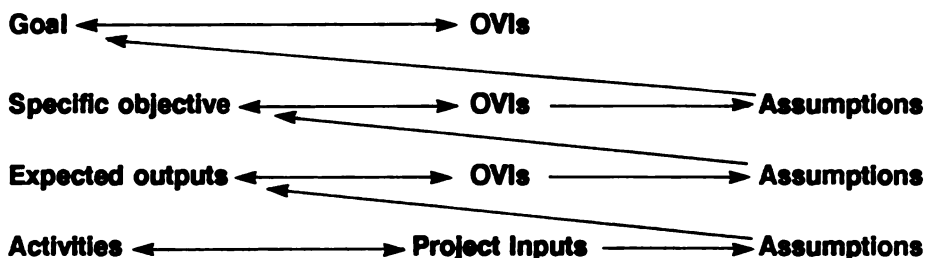
If the assumptions related to the activities to be implemented prove correct, then the next higher levels, expected outputs, is achieved. Similarly, if the assumptions corresponding to expected outputs prove correct, then the specific objective will be achieved. Finally, if the assumptions corresponding to the specific objective are correct, then the final goal will be achieved. In the case of the assumptions corresponding to the goal, these, when achieved, will sustain the goal over the long term. This demonstrates the vertical logic contained in the Logical Framework.

But how does one know if they have achieved the next highest level or not?

To answer this question, the Logical Framework includes Objectively Verifiable Indicators (OVIs). These OVIs specify the evidence which will tell you if an expected output, specific objective, or goal is reached. They define target and support groups (who?); quantify (how much?); qualify (how well?); set times (by when?); and determine location (where?). As an example:

- Indicator:** small farmers increase crop yields
- Quantify:** 300 farmers with less than 5 acres of land increase production by 25%
- Qualify:** quality of product is equal to or better than 1988 harvest
- Time frame:** July 1988 to December 1989
- Location:** Southeast Agricultural District

The details in the indicators permit outsiders to measure to what degree the objectives have been achieved. Thus, they provide a basis for monitoring and evaluation. To be objectively verifiable, the OVIs must permit different persons using the same measuring process to obtain the same results independently. Inserted into the matrix, the Logical Framework continues to expand as follows:

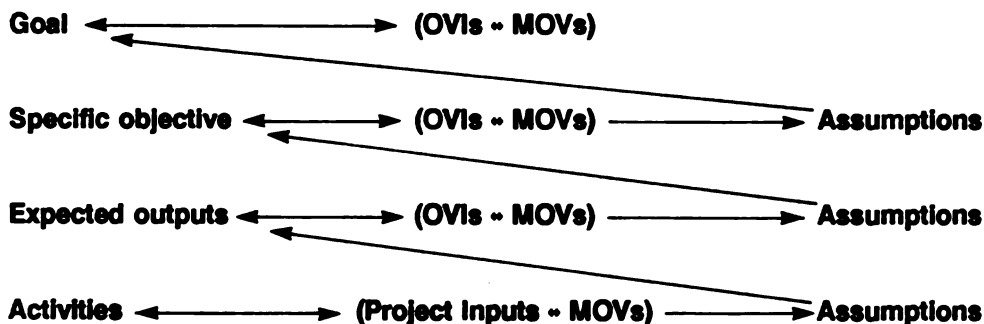


To use the indicators, a source of information to verify each indicator should also be identified. In other words, what is the evidence that the objectives have been met? In the **Logical Framework**, this column is referred to as the Means (Source) of Verification (MOV). The MOVs should identify: what information to collect? In what form? who is to collect it? and with what frequency? In selecting the sources of information, some important questions to ask are:

- Is the information available on a regular basis?
- Is the information reliable?
- Is the cost of collecting information within budget?
- Are there persons available to collect information?

If there are no reliable sources to verify the indicator, then other verifiable indicators must be found.

With the addition of the column for MOVs the **Logical Framework** is complete as shown below. The relationships indicated by the arrows are the logic of the framework. It is important to note that the assumptions are outside the control of the project but must be recognized as influencing its outcome.



The **Logical Framework** is sometimes referred to as a **Project Planning Matrix (PPM)**. It provides in a one or two page format a summary of a project:

- **Goal/Specific objective** answers the question why a project is being proposed.
- **Expected outputs** tell what the project is expected to achieve.
- The **Activities** specify how the project is going to achieve the desired results.
- The **Assumptions** identify which external factors are crucial for the success of the project.
- The **OVI**s specify how the success of the project can be determined.
- The **MOV**s identify where the information required to assess the success of the project can be found.

Once a project has been introduced into the **Logical Framework** and analyzed for its logical consistency, it can be considered acceptable for submission to potential donors. The following, as an example, is the Barbados paw paw project (Annex 12, Profile #1) placed in a **Logical Framework** format.

## Logical Framework (Project Planning Matrix - PPM)

Project Title: Institutional development for fruit production

Country: Barbados

Estimated Duration of Project: 18 months

Date PPM prepared: September 9, 1989

Summary of Objectives/Activities	Objectively Verifiable Indicators	Means/Source of Verification	Important Assumptions
<p><b>Goal:</b> Increase the domestic supply and exports of good quality fruit from Barbados</p>	<p>National production and exports of paw paw and two other priority fruits will increase by 10% between July 1989 and July 1992</p>	<ol style="list-style-type: none"> <li>1. Ministry of Agriculture national production statistics.</li> <li>2. Ministry of Trade export statistics.</li> </ol>	<ol style="list-style-type: none"> <li>1. Market prices will remain favorable.</li> <li>2. Satisfactory marketing infrastructure will be in place.</li> </ol>
<p><b>Specific Objectives:</b> Improve the specific production and marketing services available to fruit producers in Barbados.</p>	<ol style="list-style-type: none"> <li>1. Annual increases in the number of farmers in Barbados growing fruit on a commercial scale.</li> <li>2. Improved institutional structure for services in credit, technical assistance, research, nurseries, and distribution of farm inputs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ministry of Ag. annual survey of farmers.</li> <li>2. Comparison of organizational charts and number of employees in key divisions of Ministry of Ag. each year: 1989, 1990, 1991, 1992.</li> <li>3. Annual budgets of Ministry of Ag.</li> </ol>	<ol style="list-style-type: none"> <li>1. Agricultural policy will be modified in favor of fruit crops.</li> <li>2. Fruit farmers will have access to credit and technical assistance.</li> </ol>

<p><b>Expected Outputs:</b></p> <ol style="list-style-type: none"> <li>1. Improved planting material available.</li> <li>2. Established research.</li> <li>3. Tech-packs for paw-paw and other fruit.</li> <li>4. Effective mechanism for production and distribution of planting material.</li> <li>5. Well-trained MOA staff.</li> <li>6. Effective system for distribution of farm inputs and planting material.</li> </ol>	<ol style="list-style-type: none"> <li>1. Number of farmers receiving improved planting material.</li> <li>2. New research structure and full staff in operation.</li> <li>3. One tech-pack published each year 1990-1992.</li> <li>4. Same as #1.</li> <li>5. Noticeable increase in the productivity of MOA staff in research and at nurseries.</li> <li>6. Three farmer organizations with input supply centers and planting material.</li> </ol>	<ol style="list-style-type: none"> <li>1. Interviews with farmers.</li> <li>2. Ministry of Ag. budget and annual reports.</li> <li>3. Published documents.</li> <li>4. Interviews with farmers.</li> <li>5. Periodic evaluations of staff members.</li> <li>6. Annual reports of each farmer organization documenting volume of sales through input outlets.</li> </ol>	<ol style="list-style-type: none"> <li>1. MOA must prioritize crops and facilitate imports of plant material.</li> <li>2. MOA to restructure research/extension divisions.</li> <li>3. MOA to hire graphic arts specialist.</li> <li>4. Extension agents will coordinate closely with farmer organizations.</li> <li>5. Additional necessary staff will be hired.</li> <li>6. Complementary project to strengthen farmer organizations financed.</li> </ol>
<p><b>Activities:</b></p> <ol style="list-style-type: none"> <li>1. Import/reproduce improved varieties of fruits.</li> <li>2. Research &amp; validation of production/ postharvest.</li> <li>3. Prepare/distribute tech-packs.</li> <li>4. Establish pest/disease free nurseries.</li> <li>5. Train MOA staff in proper techniques for production of planting material.</li> <li>6. Develop distribution program through farmer organizations for farm inputs and planting materials.</li> </ol>	<ol style="list-style-type: none"> <li>1. Cost of materials and transportation - \$3000.</li> <li>2. Cost of inputs - \$6000; technical assistance - \$20,000.</li> <li>3. Publications - \$20,000.</li> <li>4. Equipment - \$45,000; materials - \$75,000.</li> <li>5. Technical assistance - \$25,000; per diem - \$8,000; materials - \$7,000.</li> <li>6. Training - \$9,000; travel costs - \$6,000; materials - \$5,000.</li> </ol> <p><b>TOTAL: \$229,000.</b></p>	<ol style="list-style-type: none"> <li>1. Vouchers.</li> <li>2. Vouchers, contracts.</li> <li>3. Vouchers, contracts.</li> <li>4. Vouchers.</li> <li>5. Contracts, vouchers.</li> <li>6. Vouchers.</li> </ol>	<ol style="list-style-type: none"> <li>1. Planting material can be imported.</li> <li>2. Adequate MOA staff will be assigned to research.</li> <li>3. Sufficient resources to hire consultants and editing service.</li> <li>4. Full support from MOA, allocation of land and staff.</li> <li>5. Active participation in training of MOA staff.</li> <li>6. Full-time managers working in three farmer organizations.</li> </ol>