


Helping Small Farmers Think About Better Growing and Marketing

A photograph showing three men in a lush, green field. One man on the left is wearing a light blue t-shirt and a cap, looking towards the camera. The man in the center is wearing a white t-shirt and is writing in a red notebook. The man on the right is wearing a blue and orange t-shirt and is holding a large bag of produce. They are surrounded by various green plants and vegetables. In the background, there are palm trees and a view of the ocean under a blue sky.

A Reference Manual



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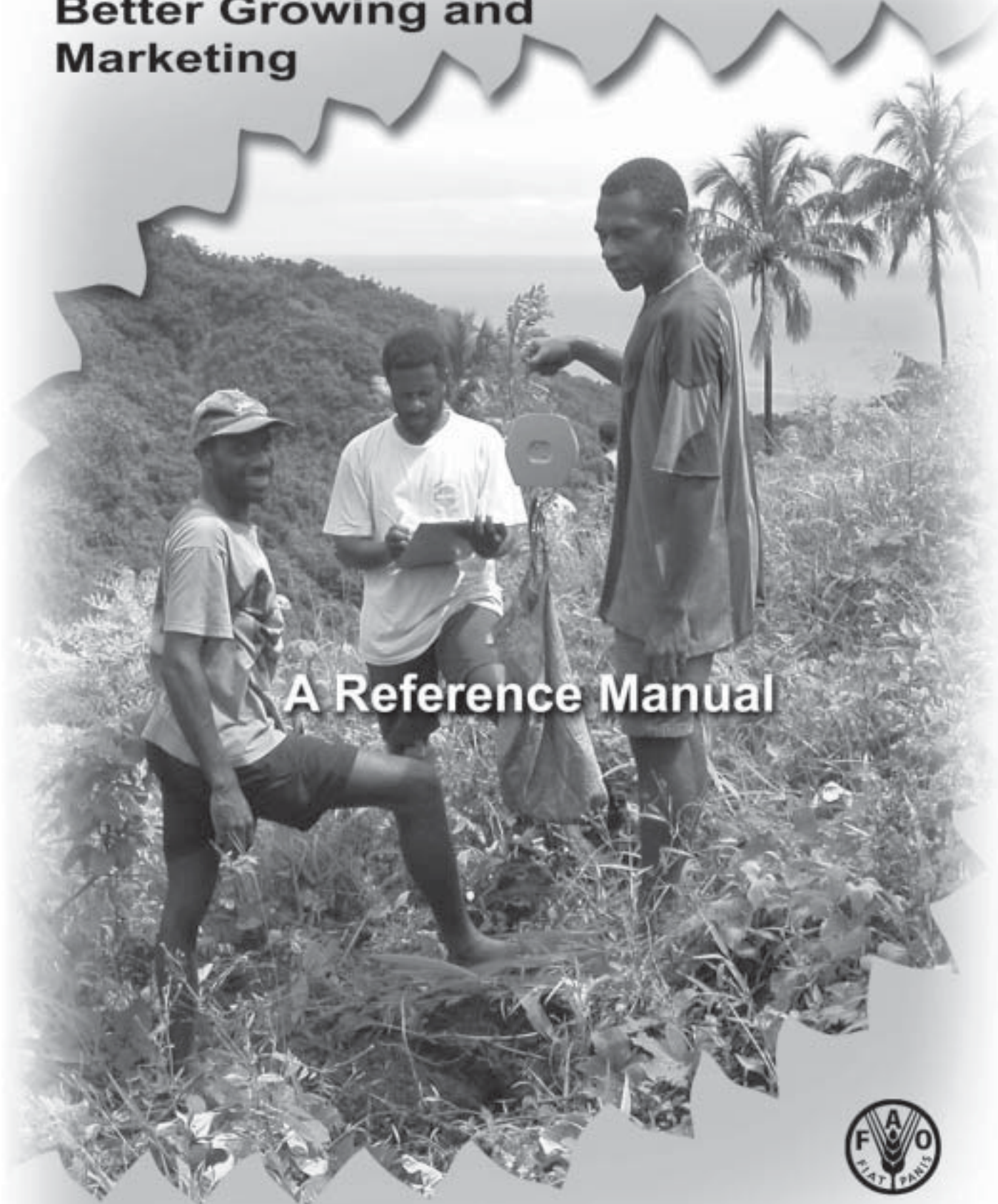
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Cover page photograph: Harvesting of sweet potato from a control plot on Pama Island, Vanuatu

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FAO Pacific Farm Management and Marketing Series 3

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FOREWORD

An important priority for most of the Pacific Islands Countries (PICs) is the enhancement of small farmer livelihoods. While there is a continuing need to provide appropriate rural infrastructure and services that will help enhance income and employment generating activities and increase both farm level production and productivity, there is also a pressing need to broaden and expand the different farming options and opportunities available to the small farmers. Small farmers can benefit from understanding farming as a business and, as a result, make a good livelihood based on the application of sustainable agriculture techniques, sound farm management, and good planning and marketing decisions. The challenge is to identify viable and profitable enterprises that will help to transform rural farming operations so as to change the perception of agriculture from one of being a subsistence provider to a viable and profitable business entity. This in turn may positively impact on young people and ensure that the small island countries in the Pacific Islands maintain a strong and productive agriculture sector. Ultimately this should result in improved nutrition and improved food security at all levels.

A review of the status of farm management in different PICs where the agricultural sector still plays a major role in the national economy was undertaken by FAO in 2002. Most farming families, particularly in Melanesia, are involved in semi-subsistence agriculture. In general these farmers largely lack the entrepreneurial and management experience to move into modern commercial farming, and these weaknesses have not been adequately addressed by the extension services. Furthermore, government extension workers have had little training in farm management and farm management specialists in Agriculture Departments have little direct contact with farmers.

The study findings confirmed that, as traditional farm household systems move towards more commercial market oriented farming, a critical need emerges. This need is for training in basic farm management, and assistance by local extension services in providing business support to farmers. This training and support includes farm record keeping, financial analysis and evaluation of profitability of farm enterprises, developing business plans, marketing of farm products and writing loan proposals. Also, when farmers change from traditional farming practices to a more market oriented approach to farming the importance of applying sustainable agriculture practices becomes even more critical. The issue of sustainability with its environmental, economic and cultural connotations has been incorporated in this manual

In order to develop extension material and training aids appropriate for the different user groups, the FAO Sub-Regional Office for the Pacific (SAPA) invited stakeholders from Government, the Private Sector and Non-Governmental Organisations (NGOs), involved in giving farm management and marketing advice, to help develop the outline and content of appropriate awareness creating and training and extension related materials. An initial workshop took place at the Vaisala Hotel on Savaii, Samoa, in November 2002. Based on the recommendations of the workshop and under contract with FAO, experts prepared draft material which was then reviewed in a second regional workshop. This workshop took place at the Sinalei Reef Resort on Upolu, Samoa, in September 2003 and was attended by the authors of the material and by consultants and NGO staff working directly with FAO projects in the Pacific.

FAO SAPA is grateful to member Governments, NGOs, the Secretariat of the Pacific Community and the EU funded Development of Sustainable Agriculture in the Pacific (DSAP) Project for allowing staff to participate in the two working sessions. Below the names of the individuals who participated in the two workshops are given together with their professional affiliation.

Vaisala Working Session, November 2002

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David Norman	FAO Consultant, Professor for Agricultural Economics, USA/UK

The participants of the second workshop provided detailed comments and suggestions on the draft materials that had been prepared as a result of the first workshop. The materials will be published under a “**FAO Pacific Farm Management and Marketing Series**”. The overall title of this series is “**Helping Small Farmers Think About Better Growing and Marketing**”. The series consists of five publications:

No. 1: An Introduction for Trainers and Specialists

No. 2: No Gud Bisnes Bagarup – Introduction for Field Extension Workers

No. 3: A Reference Manual

No. 4: A Training Aid and Exercises for Trainers

No. 5: Case Studies on Commercialisation of Small Farmers

When necessary in the training materials, we indicate the level of facilitators we are focusing on. For example No. 1 and No. 3 are designed primarily for extension and development officers and specialists while No. 2 is geared to field level extension and development workers. No. 4 and 5 are likely to be of interest to all type of facilitators.

This “Reference Manual” is the No. 3 of the FAO Pacific Farm Management and Marketing Series. Its content is based on material developed for FAO funded technical cooperation projects in Vanuatu, Palau, Fiji and Papua New Guinea as well as material prepared by the Agriculture Management, Marketing and Finance Service (AGSF) at FAO Headquarters, Rome. While all of the colleagues named above actively participated in the decision making process on what tools and topics to include and how to present it in the format of a manual, the contribution by **David Norman** was invaluable in the successful completion of the manual. David developed a first draft of the manual which then was screened by the “Sinalei Team”, amended, enriched by beautiful drawings prepared by **Taualei Mauga**, “scrutinized” by the “unforgiving” editor **Margaret Borden** before the material was compiled and converted into a printable page maker version by **Mats Arvidsson**.

This current manual is designed to help trainers and advisors guide small farmers in their efforts to grow and market their agriculture so as to earn more cash from their labor, their land and their capital. Paper No. 4 in the Series provides training aids and exercises on how to apply the tools introduced in this manual.

The manual is designed to be generic in nature and each user is encouraged to adapt the material for use in his or her country. We hope the manual will be regularly updated and remain a valuable resource material for many years to come.

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FAO PACIFIC FARM MANAGEMENT AND MARKETING SERIES TERMS

A number of non-technical terms are used frequently throughout the FAO Pacific Farm Management and Marketing Series. In order to avoid constant repetition, we have explained here what they mean in the context of these publications:

Facilitator. Trained individuals using an interactive approach to help farming families benefit from greater integration into the marketplace. This includes individuals from the public sector (field level extension workers and extension officers and specialists) as well as from non-profit or non-governmental organisations (field level development workers and development officers and specialists). Occasionally, the term may refer to individuals from commercial operations (such as firms selling inputs or buying farm products).

Farming Family. The household of the small farmer. "Farming family" is often used rather than the individual "farmer" for two reasons:

- To emphasise the close linkage between the family as the consumption unit and the farm as the production unit.
- To provide a blanket term for the decision-making role, since it is often impossible to define a single decision-maker for all farm-related matters. (For example, in some countries decisions on trees, cash crops and livestock are made by men and decisions relating to food crops are made by women.)

Growing. All of the activities done on a farm to improve a farm family's welfare, including: growing annual crops, perennials and tree crops; raising livestock; gleaning from the forest; value-adding activities (such as processing) carried out on the farm; and marketing-related activities done by the farming family.

Inputs. Resources that are used to produce products on the farm. These include land, labour (both hired and family), and non-labour inputs of various types (for example, planting materials, tools and equipment, artificial or inorganic fertiliser, and organic fertilisers such as manure, green manure, and seaweed). Inputs can be broken down in two ways as follows:

- Whether or not cash is involved in obtaining them. If they are paid for in cash, they are called **cash inputs** (for example hired labour, taro suckers for planting, or inorganic fertiliser) and if no cash is involved they are called **non-cash inputs** (such as family labour or planting materials not paid for even if they come from off the farm).
- Whether or not they are **external inputs**. In the FAO Pacific Farm Management and Marketing Series, external inputs refers to a specific type of cash input usually associated with agribusiness firms and what is often viewed as modern agriculture. They include items such as improved planting materials, inorganic fertiliser, pesticides of various types, mechanical equipment and tools, etc.

Off-Farm Activities. Activities undertaken by the farm family to improve their welfare that occur off the farm, such as working on farms of other farming families, hunting, fishing, making handicrafts, or working for wages.

Modern Agriculture. The type of agriculture usually associated with large fully commercialised farms. Monocropping is often practiced and farms tend to be highly specialised and heavily reliant on external inputs such as inorganic fertiliser, pesticides, improved crop varieties, and mechanical equipment.

Pacific. All the Pacific island countries and territories in the Pacific region, excluding large countries such as Australia and New Zealand.

Pacific Way of Life. The positive aspects of the traditional way of life in the Pacific. Great value is attached to fulfilling family and community obligations. The growing and sharing of food is an important part of the Pacific Way of Life, along with the use of the natural environment for many different things like clean water, building, and materials for weaving and medicine, and hunting.

Small Farmers. Farmers who market only part of their farm's production, as opposed to fully commercialised farmers. Other terms are often used in the Pacific for small farmers. These include semi-subsistence farmers (Fiji), small holder farmers (Vanuatu), market gardeners (Palau), small scale farmers and semi-commercial farmers.

Social Obligations. Obligations of various types are an important component of the Pacific Way of Life. In the Farm Management and Marketing Series, the term means commitments relating to religious activities, clan, community, traditional groups, and the extended family. These obligations are met in a variety of ways, with work, food and/or money.

Support Systems. The network generally required by farming families if they are to use new agricultural technologies and benefit from marketing more of their agricultural products. The two main components of the network of supports are:

- Means of purchasing inputs (credit, if needed) and access to knowledge about how to use the inputs, usually via facilitators
- Distribution and marketing systems to ensure:
 - External inputs required for the adoption of the improved technologies are available to purchase locally when they are required
 - A market is readily available for at least some of the products produced so that any loans can be paid back and/or external inputs can be directly purchased

Previously these support systems were often provided by government but with downsizing of government budgets they are increasingly being left to the private sector, both non-government (NGOs) and commercial organisations. Unfortunately in some areas of the Pacific support systems are not very well developed, partly because their presence and efficiency depends on good means of transport and communication.

Traditional Agriculture. The type of agriculture based on indigenous knowledge and techniques implemented by Pacific Island farmers over many generations. Soil fertility was traditionally maintained using very diverse cropping systems, crop mixtures, organic matter, shifting cultivation, and slash and burn techniques. No external inputs were used.

1. INTRODUCTION

There are many types of farming families in the Pacific. Their activities vary greatly not just by region—Melanesia, Micronesia or Polynesia—but even within the same country. Most of these differences can be attributed to the individual choices farming families make in three very important areas:

- the types and combinations of activities they undertake: This includes decisions such as the annual, perennial and tree crops the family will grow; the different types of livestock they will keep; and time they will spend on other activities such as fishing, working outside the home, and interacting with household members, extended family, and the community.
- the ways in which those activities are undertaken: For example, in the case of crop activities, some families choose to use improved crop varieties, others buy fertiliser, and some do both.
- the family's reasons for undertaking activities: Families may grow crops for consumption in the home, for fulfilling social obligations, to market for cash, or a combination of these purposes.

In addition to these complicated decisions, farming families can be differentiated in terms of the size of their farming operation. This is primarily defined in terms of the area of the farm or of the income received from farming.

These factors have an influence on where Pacific farming families operate on the continuum between being subsistence farmers (those that buy no farm inputs and sell no farm production) and being very commercialised in their operations (those that buy many of the farm inputs and sell most of their production). Farmers in the Pacific represent many different points on that

continuum. Undoubtedly, the majority of farmers (and farming families) in the Pacific today are found towards the subsistence end of the continuum. Those farmers are often referred to as small-scale or semi-subsistence farmers; that is, they may buy a few inputs for use on the farm and sell small amounts of their farm production. Another way of looking at the differences in the characteristics of small and fully commercialised farming families in the Pacific is given in Table 1.1.

The world today is very different from the way it was 50 years ago. Improvements in transportation, education, and communications (including telephones, radio, television, and the internet) mean that life is increasingly influenced by what is happening outside the farm, family and immediate community. Sadly, some of these changes may have a negative impact on the Pacific Way of Life. However, many of the changes are inevitable, so farming families need to be in a position to benefit from them rather than be hurt by them.

Box 1.1: The Pacific Way

The high value Pacific Islanders place on sharing and caring can be seen in their common greetings:

Samoa	“Talofa”
Fiji	“Bula vinaka”
Solomons, PNG, Vanuatu	“Wan Tok”
Palau	“Alii”
Cook Island	“Kia Orana”
Tonga	“Malo lelei”

All this means welcome and so much more. That's the Pacific Way.

Some of the most critical changes that Pacific farming families must cope with are economic. The major source of these changes are new governments' policies that:

- allow the market to decide what prices should be — that is, let a free market operate;
- reduce barriers to importing and exporting — that is, let free trade operate.

All farmers who buy household goods and farm inputs and sell some of their farm production are likely to be affected by the move towards free markets (known as market liberalisation) and free trade (or globalisation).¹ This manual aims to explain some analytical methods that will help farmers benefit from the trend towards commercialisation of their farming activities.

The challenge in developing this manual has been, given all the different types of farmers in the Pacific, whether one set of analytical tools can be suitable for all the different types of farmers on the small to commercial continuum. Given the characteristics indicated in Table 1.1, this may not be completely possible. Although the farming systems approach to development (FSD) does contain some analytical tools for financial analysis it also includes other tools designed to deal

¹ Perhaps better terms to use rather than free markets and free trade would be open markets and open trade. However, the conventional term used is “free.”

with issues relating to multiple goals and activities (often non-economic) which are undertaken without entering the marketplace.

Economic tools become more important the more commercialised a farming operation becomes. Figure 1.1 depicts what farmers need to be exposed to depending on where they are on the small to commercial continuum. Table 1.2 shows the relative importance of the different subject areas to the types of farmers near each end of the continuum.

Note that in Figure 1.1, two types of farm management (“traditional” and “modern”) have been indicated. The two basic definitions of farm management are:

- making the best use of available resources;
- using, managing and allocating resources.

The two definitions imply three things:

- There is a goal (or goals) in existence.
- There are resources that can be used or allocated.
- Those resources have more than one possible use.

Views about how broadly the concept of farm management should be defined have changed over time. Some have argued that FSD is very similar to farm management as it existed in high-income countries a century ago, which included both technical and economic components of using farm resources wisely [Norman, 2000].

Characteristic	Small Farmers	Commercial Farmers
Operation size	Small	Usually large
Family and farm linkage	Very close and interdependent	Less close and more independent
Likely level of formal education of major operator	Less	More
Goals	Multiple Profit less important	Fewer Profit more important
Farming activities (i.e., diversity)	Multiple and diverse	Fewer and more specialised
Dependency on market for:		
Buying inputs	Little	Much
Selling products	Some	Much
Dependency on biological cycle	Much	Less ^b

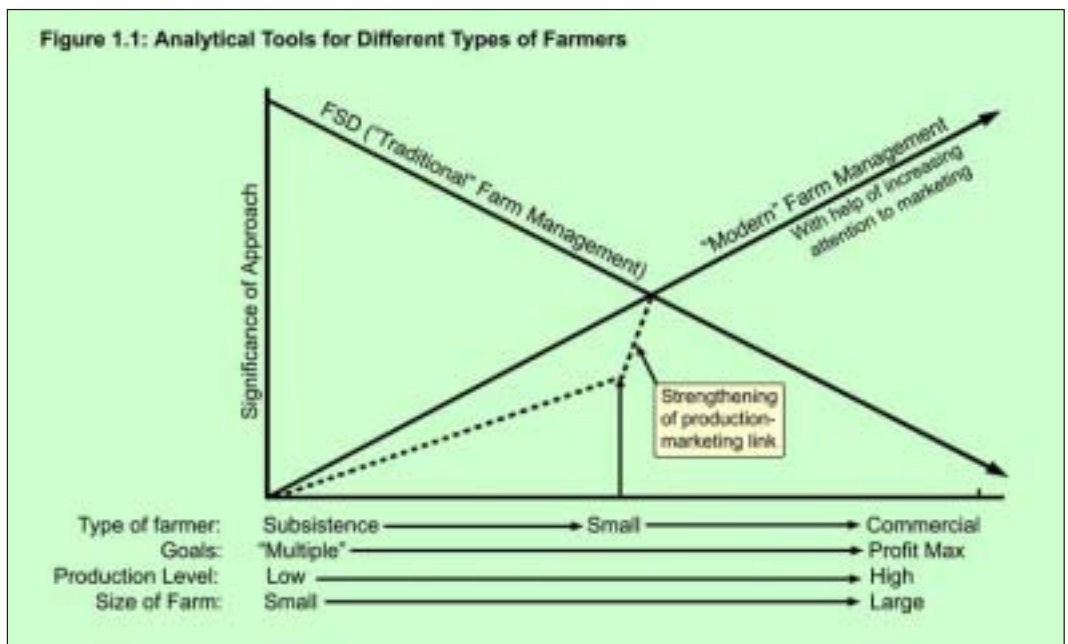
^a Purely subsistence farmers are now rarely found in the Pacific so they are not shown. Also some farmers are on the continuum between small and commercialised farmers and therefore have characteristics somewhere in between the two that are depicted

^b This depicts what usually happens rather than indicating what is desirable.

Box 1.2: Agriculture in the Pacific

“In spite of the continuing importance of agriculture in supporting the livelihoods of high proportions of the populations in the Pacific, a very large percentage of people still implement farming systems that are largely subsistence in nature. Samoa is no exception to this. For example, over 75% of the population is dependent on agriculture and its related activities for their main means of livelihood”.

Hon. M.T. Retzlaff, Minister of Agriculture, Samoa, 1995.



This manual refers to this approach as “traditional” farm management and uses the term interchangeably with FSD. However, in more recent years farm management has come to have primarily an economic meaning (in other words, in terms of maximising profit). In this manual, this approach is called farm management or alternatively “modern” farm management.



Table 1.2: Subject Areas Important to Helping Small and Commercial Farmers

Subject Area	Small Farmers	Commercial Farmers
Farming systems development	Very important	Not important ^a
Modern farm management	Increasingly important	Very important
Linking production and markets	Likely to be important	Less important
Marketing	Increasingly important	Very important

^a This is expressed as looking at it from the usual farmer's viewpoint. However if he or she is very concerned about ecological sustainability and the associated issue of diversification then a systems approach will be important.

With “modern” farm management, buying farm inputs and selling farm products becomes very important if a farming family wants to maximise profits from their farming operation. However, when nurturing small farming families as they move towards greater commercialisation of their farming operation, FSD (“traditional” farm management) plays a vital role. As this trend progresses among small farming families, improving the production-marketing link becomes progressively more important in connecting such families to the outside world so they are not exploited.

This manual is designed to help extension and development officers and colleagues train their field facilitators to help interested small farmers and farmer groups make decisions that will improve their income and, hopefully, their feeling of well-being. Armed with this knowledge, facilitators will be able to better advise farming families about how to consider changes to their traditional farming system, how the changes may affect them, and whether or not those changes will be good for them.

Since many other materials exist for helping commercial farmers and most of the farmers in the Pacific are small farmers, the emphasis in this manual is on the latter type of farmers. With this and Figure 1.1 and Table 1.1 in mind we have divided the content of the manual into five primary parts as follows:

- The farming systems approach to development (FSD) (Chapter 3).
- Farm management (Chapter 4).
- Marketing (Chapter 5).
- The production-marketing link (Chapter 6).
- Risk management (Chapter 7).

Details on the material presented in each of those parts are given in the introductory sections of those parts.

However, before those parts are presented, we devote a chapter (Chapter 2) to the facilitators who are encouraging and helping farmers to become more commercialised in their farming activities. Therefore, although as we indicated above, this manual is written primarily with these facilitators in mind we are hopeful that more educated farmers, and those who are more commercialised, will also be able to benefit from studying the manual.

Also in the manual appendices are devoted to:

- Role and techniques of facilitators (Appendix A).
- Examples of farm record forms (Appendix B).
- A list of useful references relating to the material presented in the manual (Appendix C).
- Definitions of the acronyms used in the manual (Appendix D).
- Definitions of the technical terms used in the manual (Appendix E) – these are bolded and italicised the first time they are used in the manual.
- An index (Appendix F).

In the manual liberal use has been made of material from other FAO sponsored papers and projects in the Pacific and elsewhere with which many of us have been associated. However, we have not always cited the references from FAO although all the references have been given in Appendix C. Nevertheless, we have given credit in the text to materials in the text taken from papers not written under the auspices of FAO.

2. THE CONTEXT AND ROLE OF FACILITATORS

The background information in this chapter provides the foundation for using the analytical tools presented in the manual. The three most important elements are:

- an understanding of the meaning of sustainable livelihoods and the importance of helping farming families and their communities attain them;
- an appreciation of the way in which farmers go about making decisions;
- what the “modern” approach to extension is, and how it came about.

2.1 SUSTAINABLE LIVELIHOODS

In most of the Pacific a great deal of importance is attached to family, community and other social obligations. The growing and sharing of food is an important part of the Pacific Way of Life, as is the use of the natural environment for many different things like the provision of clean water, building materials, materials for weaving, medicine, and hunting.

Small farming families must take into consideration the effect of the weather and the seasons on their growing. They must also consider the importance of meeting religious, social and community customs. The decisions they make about their agricultural activities are dictated by the need to provide food and supply the family's basic needs and also the importance of fulfilling the family's social obligations. This balancing act describes and defines the traditional culture of the Pacific.

The need for money is becoming increasingly important in the Pacific. School and church fees have to be paid in cash. In addition kerosene, clothes and other items are increasingly desired. To make money available for purchases, traditional farming families must sell part of their farm production or look for other means of earning money, such as selling handicrafts or paid employment. Before families make decisions about undertaking new ways of earning money, they need to think carefully about how these changes might affect other parts of their life.

An increased market orientation in rural areas is likely to have some beneficial results. These include employment creation, income generation, less migration to towns, and overall better living standards for rural people. Most importantly, agriculture is likely to become more productive throughout the country, resulting in improvement of food security for farming families and the country as a whole.

*Picture 1:
Taro, a major
food crop on
the Pacific
islands,
important for
traditional
ceremonies*



However, such developments usually result in changes in the ecological, economic and cultural environment as well, and these changes may not always be for the better. For example, in terms of agriculture, soil erosion, depletion of nutrients in the soil, and pest and disease pressures sometimes occur. Obviously, promoting a more market-oriented agriculture should not be done at the expense of the ecological environment; wherever possible, ecologically sustainable agriculture practices should be used and promoted. Another vital concept is the importance of sustainable livelihoods:

- Sustainable can be defined as being able to keep up the same standard into the future.
- Livelihood is a means of support, hopefully one that provides a satisfactory quality of life.

Therefore a **sustainable livelihood** is a means of support that can be done in the same way indefinitely into the future. When this term is applied to agriculture in the Pacific, sustainability has three important components:

- Agriculture must be undertaken in a way that is ecologically friendly. In other words, farmers should not farm the land in ways that will make it less fertile in later years. Future generations should be able to get just as much production, and preferably even more production, from that land.
- Agriculture has to be economically sustainable. Farmers need to learn to make a living from agriculture that is not dependent on government handouts in the long run. Over time, farmers should rely on the free market for obtaining their inputs and selling their products. The methods of financial analysis in this manual are very important in helping farmers progress toward economic sustainability.
- Agriculture should be culturally sensitive. Shared cultural values bind people together, determine the way people behave, and provide a type of security blanket or safety net in times of trouble. They help create the community ties and relationships that economists call **social capital**. Cultural values provide stability over time and should only change when society as a whole decides they should change. Unfortunately, in the past, this aspect of sustainability has often been ignored by development and donor agencies.

Although the term sustainable livelihood is not mentioned very often throughout this manual, the issue underlies its content. With proper safeguards, the analytical tools in this book can significantly contribute to the development of sustainable livelihoods. Facilitators must constantly remember the importance of encouraging the farmers and be sure not to advise the adoption of any strategy that might threaten sustainability.



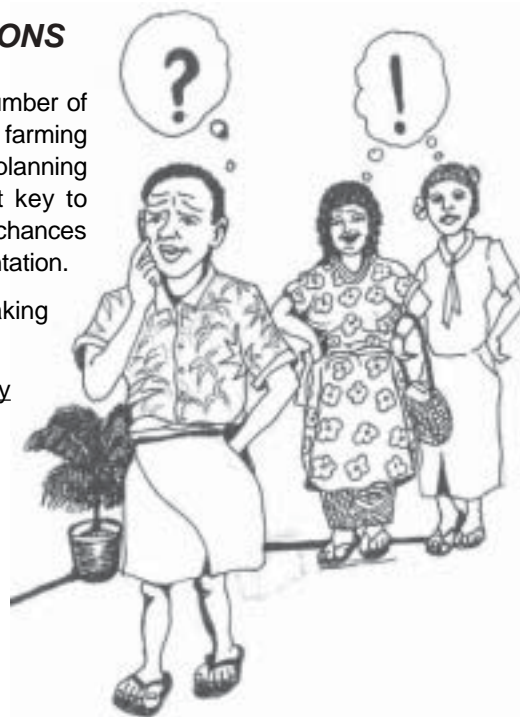
Picture 2:
Cleaning
carrots for
sale at
market

2.2 HOW FARMERS MAKE DECISIONS

In order to farm well, a farmer has to make a number of decisions. The facilitator can help by encouraging farming families to go through a systematic approach to planning their farming operations. This is an important key to improving farm management and improving the chances of farmers benefiting from a greater market orientation.

Figure 2.1 shows the steps in this decision-making process.

Step 1: Identify the issue and collect the necessary information. The first step of the process is to recognise the existence of the issue and why it exists. Identifying the issue will also provide information about current performance and provide the basis to assess alternative production systems. For example, if a farming family is not doing as well as their neighbours, the reason might be deficiencies in management skills or lack of information on new production techniques.

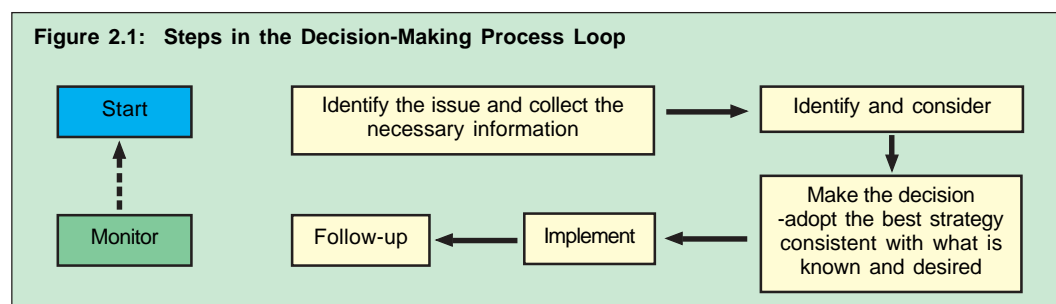


Step 2: Identify and consider different strategies. The best response to the issue might be, for example, to increase the quantity of chemicals purchased or to adopt alternative farming practices. The potential results of these responses should then be examined and evaluated to assess their likely impact on farm performance.

Step 3: Make a decision and adopt the best strategy. The farmer must choose which strategy is most likely to best meet the objectives. If all of the necessary information is not available, the farmer will have to make a judgement. The final decision therefore will frequently reflect the farmer's thinking about risk or what they think the risk of each of the alternatives is.

Step 4: Implement. Implementing the strategy is usually the responsibility of the farmer. Daily record-keeping is another important aspect of implementation.

Step 5: Follow up. After the first four steps have been completed, it is valuable to examine the results of implementing the strategy and also reflect on the whole decision-making process. In addition, both the farmer and the facilitator should check to make sure that the new plans are being followed and the new goals are being achieved.



The decisions a farmer makes can vary greatly both in terms of how quickly they have an impact and also how long-term their effects are. Examples are:

- **Short-term decisions:** daily activities such as sowing, weeding, application of manure and fertiliser, harvesting and storage, culling of stock, requesting visits by the vet, and artificial insemination activities;
- **Medium-term decisions:** cropping plans, the purchase of machinery and equipment, hiring more or less labour, using new crop varieties, and undertaking new animal stock feeding and selection methods;
- **Long-term decisions:** land use, farm size, purchase of land, and construction of buildings.

2.3 THE MODERN APPROACH TO TRAINING AND EXTENSION

In recent years there have been major changes in the approach to training and extension. As a result, if training workshops are to be successful and facilitators are to be effective in working with farming families, they often need to completely change their approach.

This section addresses the following topics:

- why and in what way the approach to training in general has changed;
- why this and other factors have influenced the approach to agricultural extension;
- the implications for facilitators and other trainers with respect to using this manual and presenting its content to others.

2.3.1 Changes in the Approach to Training

In the past, trainers attempted to teach simply by lecturing. However, in recent years, educational psychologists have come up with two sets of important findings.

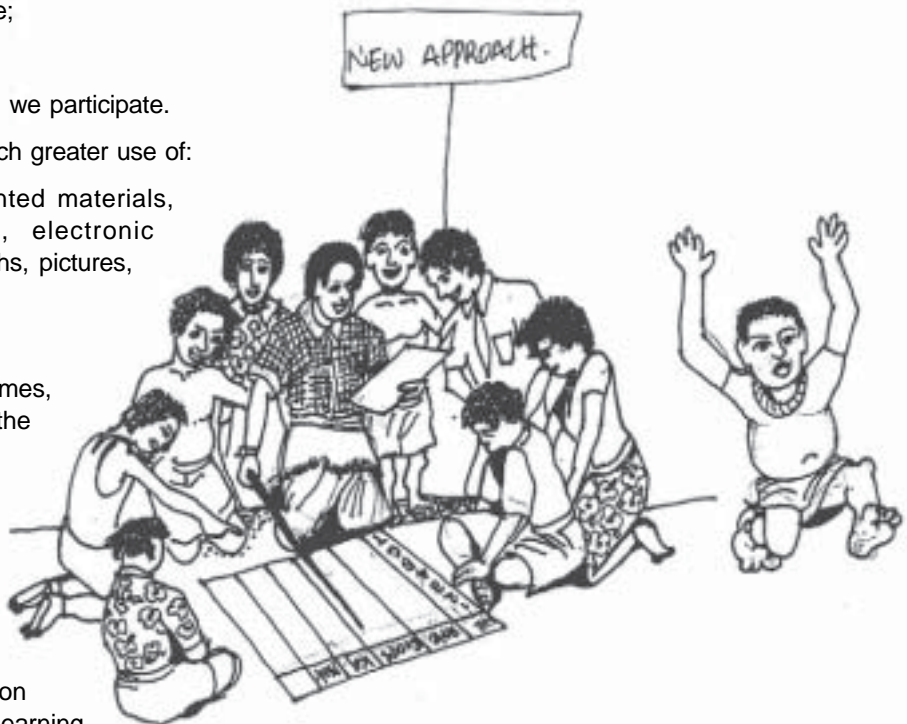
- They concluded that generally:
 - If one simply hears, one tends to forget;
 - If one sees, one tends to remember;
 - If one does, one is likely to know and understand.
- They suggest that we remember:
 - 10% of what we read;
 - 20% of what we hear;
 - 30% of what we see;
 - 50% of what we hear and see;
 - 70% of what we say;
 - 90% of the activities in which we participate.



Therefore, training today makes much greater use of:

- instructional aids such as printed materials, models, charts, specimens, electronic materials, boards, posters, graphs, pictures, leaflets, projectors, etc.;
- interactive discussion;
- activities such as role-playing, games, and visits to see examples on the ground.

Those being taught have shifted from being passive listeners to being active participants. Training is much more challenging for the teacher now since it requires a broader and more creative range of teaching techniques so that the person being taught will participate in the learning process in order to absorb and understand more.



2.3.2 Changes in the Approach to Extension

Why has the approach to extension changed? In part, it has been influenced by the changes in the approach to training in general.

Other factors have also played a role, including the desire to avoid failures on the part of extension staff, such as:

- inability to convince farmers to adopt relevant improved technologies;
- worse yet, allowing farmers to adopt technologies which were not completely compatible with their objectives or capabilities and therefore did not improve their situation.

Agricultural researchers and extension staff are also taking a new approach towards farmers and their inherent skills and knowledge, based on the recognition that:

- Farmers are able to survive, and often thrive, in complex and variable production environments.
- Many of the techniques farmers use are good and should be built on, rather than rejected, in the search for improved farming practices and technologies.
- Farmers are free agents and have the right to more of a say in what they are taught. They also have the right to be involved in evaluating the technologies that are being developed for them.
- Because of their knowledge, farmers can make useful contributions to the development and assessment of such technologies, increasing the chances they will be relevant and appropriate.
- Farmers can be very important unofficial facilitators through farmer-to-farmer extension — an important consideration given recent reductions in many countries' official extension services.

All of these factors have contributed to major shifts in the extension approach. Table 2.1 indicates a rough idea of the changes that are being suggested. Three important points to note are:

- The extension agent is no longer in absolute control but rather helps the farmer think through what might or might not be relevant. In other words, the extension agent no longer preaches “solutions” but instead helps the farmer consider different ways of doing things.
- The farming family is given power in controlling their own destiny and is an active participant in selecting and deciding on changes.
- The skills and knowledge required of the extension agent are much greater, including:
 - being a more skilled communicator;
 - having knowledge not only about technical matters but, because of agriculture becoming increasingly commercialised, having knowledge about economic matters such as:
 - ★ forming and operating farmer groups;
 - ★ modern farm management;
 - ★ marketing and value-adding;
 - ★ issues relating to accessing loans and grants.

Box 2.1: Changing the Approach to Extension

“The need to put the farmer first has been recognised in Papua New Guinea. The former approach, consisting of a linear one-way relationship from research to extension to farmers, is in the process of being replaced by a triangular relationship between farmers, extension, and research. The appointment of Research Extension Liaison Officers (RELOs) is designed to facilitate these interactive relationships”.

M. Woruba, Papua New Guinea.



Picture 3: Farmer managed taro multiplication plot in the Solomon Islands

2.3.3 The Changing Face of Extension

In simple terms, the complex task of a facilitator has two chief components:

- reducing the learning time it takes an individual farming family to accept and adapt a new idea or technique;
- increasing the number of farmers who understand and use the new ideas.

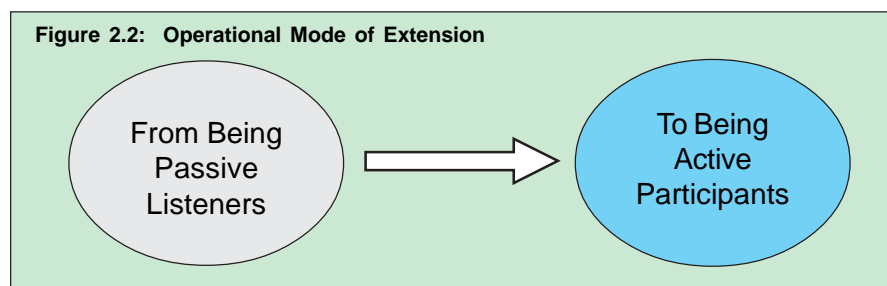
In the past, facilitators were concerned with the process of disseminating production information and focused primarily on what the farmer could grow. The advice the facilitator gave, which was primarily technical, allowed the farmer to increase his or her yield. This was considered to be the end goal for good extension.

However, today the demands on facilitators are much greater (see Sub-Section 2.3.2 and Table 2.1), including the need to provide not just technical information but also economic information.

Knowledge of the financial analysis tools and techniques presented in this manual will help facilitators go beyond helping farming families decide what technically they can grow and what production they can achieve. With these tools and techniques, facilitators will be able to help them assess what is profitable, what they can market, who will want to purchase it, and what payment they are likely to receive. The new emphasis on marketing-related issues may initially confuse some facilitators, but as this manual indicates, both farm management and marketing-related issues are critically important to improving the monetary incomes of small farmers.

Table 2.1: Comparison of the Former and Modern Approaches to Agricultural Extension		
Variable	Agricultural Extension Approach	
	Former	Modern
<i>Approach:</i>	Top-down	Interactive/two-way
Direction	Paternalistic	Participatory
Mode	Preaching and instructional	Dialogue through interaction
Relationship between facilitator and farmer	Unequal (facilitator to farmer)	Equal (partnership)
<i>Technologies/Options:</i>		
Number	Small	Large
Package/component emphasis	Package	Component
Flexibility	Little	Much
Concern about:		
Production	More	Some
Equitability	Less	More
Sustainability	Less	More
<i>Messages:</i>		
Degree of uniformity	High	Low
<i>Skills required:</i>		
Communication	Lower	Higher
Interpretation of situation	Lower	Higher
<i>Knowledge:</i>		
Breadth:		
Technical	Lower	Higher
Farm management	Same	Same
Marketing	Lower	Higher
Loan and grant awareness	Lower	Higher
Local	Unfortunately often low	Can be low because of participatory approach
<i>Likely result of extension effort:</i>		
Adoption	More	Less
Adaptation	Less	More

In addition, facilitators will only be effective if they are much more participatory in their approach, encouraging farmers to be active participants rather than passive listeners (Figure 2.2; see also Sub-Sections 2.3.1 and 2.3.2). This is likely to be particularly important in the case of small farming families, who tend to be less market-oriented. For this approach to succeed, facilitators must change their philosophy and also learn new techniques.



3. FARMING SYSTEMS DEVELOPMENT

The Farming Systems Approach to Development (FSD) is likely to be most appropriate when dealing with farming families working on small farms (see Chapter 1, including Table 1.1 and Figure 1.1). The purpose of this chapter is to indicate:

- the reasons why FSD can be helpful;
- what FSD is;
- how to undertake FSD, including some informal and participatory techniques.

This manual focuses on the issue of encouraging farmers to become more market-oriented, and is not designed to provide a comprehensive treatment of FSD. There are other publications that provide a much more detailed description of the approach. For example, for an approach developed for the South Pacific, see Norman, Umar, Tofinga and Bammann [1995] and for a more global approach see Norman, Worman, Siebert and Modiakgotla [1995].

3.1 THE REALITY OF THE SMALL FARMERS' ENVIRONMENT

The Pacific Way of Life has traditionally been associated with small rural communities where most families have farms on which they grow crops and trees, and maybe keep a few livestock and sometimes engage in off-farm occupations, particularly fishing. They used little or no purchased inputs and sold little or nothing in the market place; many families continue to operate this way today. Their farming systems were (and sometimes still are) largely self-contained and self-reliant, relying heavily on nature to maintain fertility through methods such as growing legumes and other crops together in mixtures, recycling biomass and organic matter, and fallowing land.

Box 3.1: Farming Decisions and Community Responsibility

In Fiji, even though farmers make their own decisions, the collective agreement of the extended family or the community usually supersedes any individual desire. When there is a village feast, beef and piggery farmers in the village will contribute by selling their livestock at a discount or even donating it for free. What matters most to these farmers is their social relationships and status rather than profit.

However, these farming families do not exist in a vacuum. Although they produce most of the food they consume, they live in close-knit communities with all the associated obligations. An important component of the Pacific Way of Life is associated with fulfilling social, community and religious obligations, sometimes with production from the farm. In addition, there are rules (mostly informal but sometimes formal) that community members must abide by, resulting in a defined system of acceptable and unacceptable behaviours.

However, in recent years these community structures, norms and beliefs have become, depending on one's perspective, changed, challenged, threatened or weakened by influences largely originating outside the community. In terms of farming systems these have involved the development of agricultural technologies that usually include:

- off-farm or external inputs (such as inorganic fertiliser and other chemicals, improved crop varieties, and livestock feed);
- support systems for the inputs: credit for purchasing and extension to facilitate adoption;
- distribution and marketing systems to ensure that:
 - external inputs required for the adoption of the improved technologies are locally available for purchase when they are required;
 - a market is available for at least some of the products produced so the farmer is able to pay for the external inputs, either directly or indirectly by paying back the loan.

Previously, these external institutions—the support, distribution and marketing systems—were developed, managed and controlled by governments, but increasingly they are now provided by the private sector, including non-governmental organisations (NGOs).

The degree and speed with which these institutions will become significant will depend on other influences such as:

- development of infrastructure, including roads, public vehicles and boats, and means of communication such as telephones;
- location, such as a nearby town providing an accessible market for the farm products;
- population density: the higher the population density the more likely the support, distribution and marketing systems will be cost effective.

Increasing population densities will accelerate the need to access external institutions, because many of the traditional means of maintaining soil fertility (including fallowing, practising slash and burn, or shifting cultivation) are dependent on a lot of land being available. Improved technologies (such as inorganic fertiliser and improved varieties of plants responsive to fertiliser) can often overcome such problems through increasing output per hectare of land. However, use of those technologies often involves buying inputs. These must first be available, and in addition require money, which has to be obtained through selling something (such as farm production).

Therefore, farming families and the communities they live in are operating under an ever-changing set of circumstances that force them to constantly re-evaluate their priorities, problems and opportunities. Changes in these groups or external influences (such as community structures, norms and beliefs, external institutions, and other influences), which together are sometimes called **exogenous (external) factors**, are mainly responsible for those changes.

The farming family has a certain quantity and quality of three types of inputs under their control: land, labour and capital. In traditional settings the **production unit** (the farm) and the **consumption unit** (the family or household members) are very closely linked because decisions on what to do on the farm are determined to a great extent by **endogenous (internal) factors** such as family goals, needs, capacity and managerial capabilities. These endogenous factors are often influenced by exogenous factors. For example, in traditional settings (often still present today) farming families have multiple goals (see Box 3.2).

The factors that determine what a farming family decides to grow are very complex, but the starting point is the **production environment** in which they operate. This consists of two basic components:

- **the biophysical (technical) element:** This consists of the characteristics of the soil, landscape and weather, which together determine what it is possible to grow (for example, it is too wet to grow date palms in the Pacific). In some cases, the biophysical element can be modified in a small way, such as adjusting the soil fertility (through adding fertiliser) or changing water availability (through irrigation), to change what can be grown.
- **the socioeconomic (human) element:** The final decision about what is actually grown is determined by the farming family as a result of taking into account their goals and the endogenous (internal) factors, both of which are influenced by the exogenous (external) factors.

The farming family's goals include producing enough from the farm to feed the family, producing the types of products that will result in a healthy family, and ensuring that they have some leisure time. In the Pacific, their goals also include fulfilling social obligations and helping the extended family system.

Box 3.2: Farming as a Way of Life or a Business?

Small farmers and their families have multiple goals because of the close linkage between the farm as a production unit and the family as a consumption unit. The farm is therefore viewed as part of the way of life for the family rather than purely as a business. Therefore, the goals are multi-dimensional and tend to be ranked in the following order of priority:

- farm household goals: providing enough food for the family, ensuring a healthy family, having a better educated family, and minimizing risk;
- community-related goals: fulfilling extended family, social and religious goals;
- business goals: wealth or profit maximisation at some minimum risk level.

The linkage between production and consumption tends to get progressively weaker the more commercialised the farm business becomes (for instance, when the farm uses hired instead of family labour or sells an increasing percentage of production from the farm instead of consuming most of it in the home). As a result, the business goal of profit maximisation becomes more significant. This does not mean that commercialised farmers are not concerned about household or family and community concerns, but these issues do not enter so much into deciding what to do on the farm on a daily basis. In other words, the farm becomes more of a business rather than a way of life.



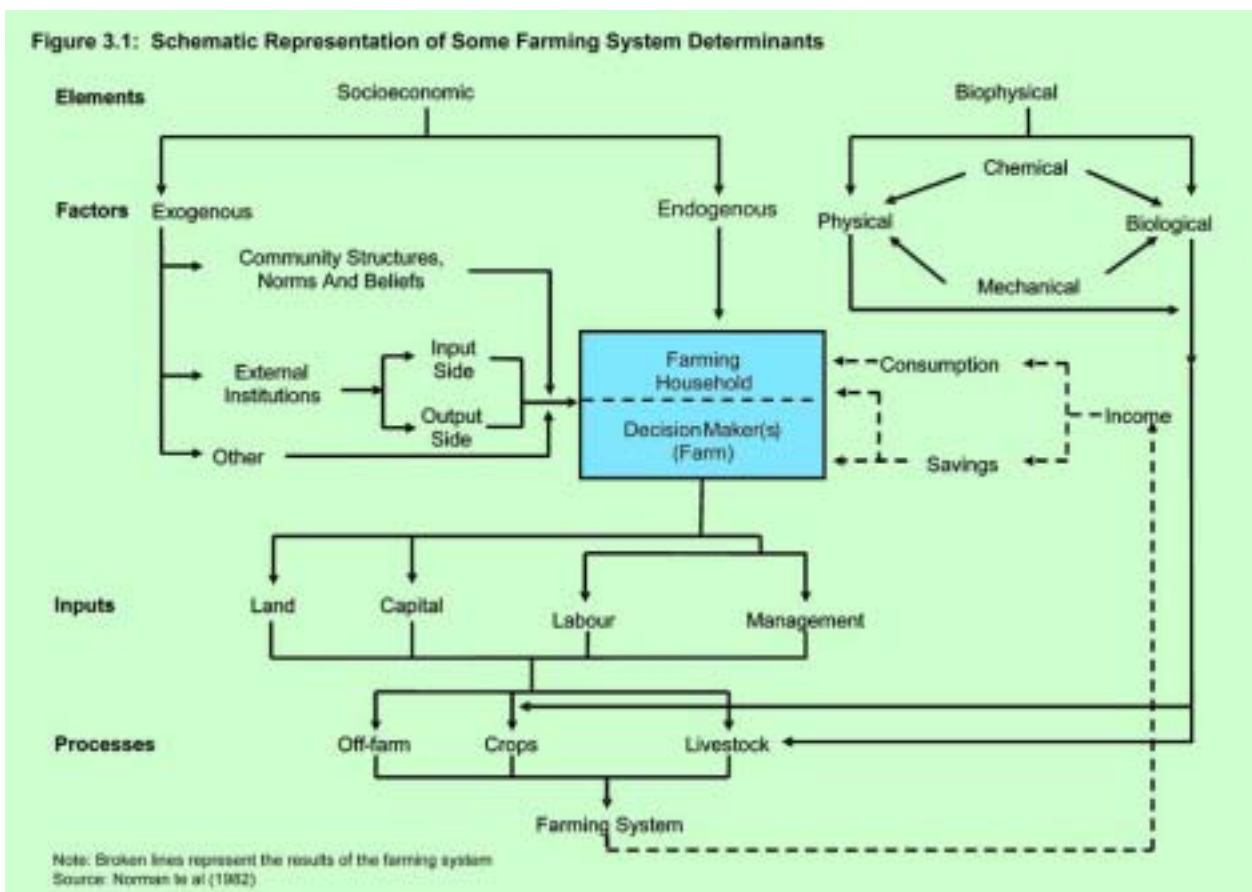
Picture 4: Farmer Jimmy in his traditional mixed farming plot in Vanuatu

In recent years, some of these obligations, which in a sense relate to community structures, norms and beliefs, have become weaker. At the same time, other external influences such as the need to obtain money for paying education fees, buying equipment for the home and purchasing farm inputs, have become stronger. Meeting these needs requires selling something (usually products produced on the farm), and profit maximisation becomes a more important goal, although usually in a way that is not too risky.

The farming family must take these multiple goals into account when deciding how to allocate their inputs (land, labour and capital) for producing crops and engaging in off-farm activities. When making those decisions, the family tries, with as little risk as possible, to ensure that those multiple goals are satisfied to the best possible extent. Typically, they do this by developing a combination of activities (crops, livestock and off-farm work) that use traditional technologies

requiring only inputs immediately available on the farm. But with the development of external institutions, opportunities begin opening up to buy external inputs (for example, inorganic fertiliser) and use improved technologies that can improve the quantity, quality and productivity of the inputs and therefore the production from the farming system. Such changes make it possible for small farming families to move from a system of what is popularly known as traditional agriculture to a system associated with so-called “modern” agriculture.

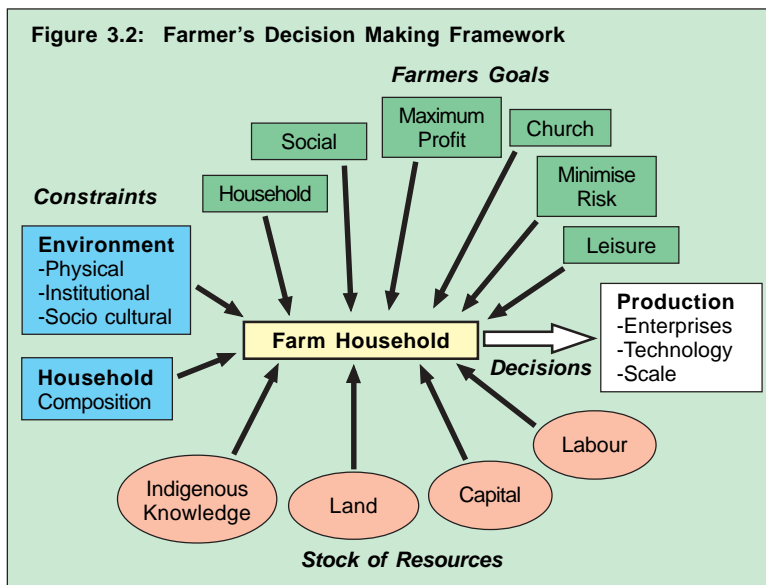
Figure 3.1 offers a diagrammatic form of what determines a farming system. An alternative way of looking at it is given in Figure 3.2.



This discussion indicates not just the complexity of the Pacific farming families' operating environment, but also that:

- Farming families do not operate in isolation from the outside world.
- The outside world is constantly changing.
- Outside influences play an important role in the decisions made by farming families.
- The goals that guide those decisions also change over time, in part because of outside influences.
- Non-economic goals are still important to most farming families in the Pacific.

However, as agriculture becomes more commercialised, farming will inevitably become viewed more as a business rather than a way of life, and economic goals, particularly profit maximisation, will become more dominant in decision-making. Box 3.3 provides an illustration of this from Palau.



Box 3.3: Farming, Goals and Financial Analysis in Palau

Agriculture has deep roots in Palauan society and is part of its social fabric. The vast majority of Palauan farming families are not highly commercialised, and they do not farm with the sole objective of maximising profit. Instead, they have multiple objectives, all of which tend to receive higher priority than financial profit. Their objectives for the food they grow, in rough descending order of importance, are:

- consumption for the immediate family;
- social obligations;
- custom, cultural and clan obligations;
- the extended family;
- maximum profit.

Because of this, financial analysis in terms of costs and returns may not be particularly relevant for the whole of the farm operation. Welfare in Palauan society cannot simply be determined as profits earned from selling home-produced agricultural goods. Instead, wealth is multidimensional and consists not only of the profits from selling home-produced agricultural production but also the goods produced to fulfil all the other objectives indicated above.

However, as time goes on two types of changes are occurring in Palauan society:

- Farmers are marketing increasing quantities of their agricultural production.
- Attitudes about social obligations (non-economic objectives) are slowly changing, sometimes resulting in adjustments to what are accepted as societal norms.

Financial analysis has two potential roles in this situation:

- Financial analysis is definitely relevant to the commercialised and marketed part of the farm's agricultural production. This portion is likely to increase over time.
- It may also have a role to play in the production of the products required to fulfil the other objectives farming families face. The degree to which this is the case will depend on how flexible societal norms are in terms of their fulfilment. For example, would it be possible to fulfil non-economic objectives through buying the necessary products using income from producing and marketing products that are highly profitable?

The point here is not that farming families should no longer be expected to fulfil all the objectives listed above, but simply to note that over time, providing it is socially acceptable, there may be other ways to fulfil non-economic objectives. As agriculture inevitably becomes more commercialised, proper financial analysis of what to produce, how to produce it, and how much to produce will clearly become increasingly important.



3.2 THE FARMING SYSTEMS APPROACH

The basic principles of the farming systems development (FSD) approach are to:

- involve farming families in identifying and prioritising problems and opportunities;
- help the farming family develop, evaluate and rank practical solutions to problems and take advantage of opportunities;
- if necessary, help create conditions that enable the preferred solutions and opportunities to be implemented.

A great deal of emphasis is placed on the empowerment of farmers and their families. The reasons for doing this are the farming family's:

- knowledge and expertise (indigenous knowledge): They have the best understanding of the complex production environments (biophysical and socioeconomic) in which they have to operate. Their involvement is needed to identify the problems they face and also to evaluate and prioritise the potential solutions and opportunities.
- understanding of what they want: Obviously, the family has the best idea of their goals, which can be particularly complex when the farm is viewed as part of the way of life rather than a business. Involving the family ensures that the identification of problems and the evaluation and selection of solutions and opportunities will best meet their goals.
- comprehension of what is required to ensure adoption: The family has the best idea of what support systems they will need (for example, skills training, availability of credit, external inputs and product markets) to adopt a solution or exploit an opportunity. Potential adopters of the changes are in the best position to indicate and prioritise what needs to be done.

Of course, the facilitator still has an important role to play in helping farmers and their families to adopt changes. But a participatory approach ensures that farmers and their families are more likely to be helped in a way that is relevant to them, therefore improving the efficiency and productivity of the facilitator's efforts. The facilitator can contribute in many ways, including:

- helping to sift, systematise and prioritise problems;
 - suggesting solutions and opportunities;
 - aiding in developing, evaluating and prioritising solutions and opportunities, particularly with respect to economic issues;
 - indicating whether the support systems required for the newly available opportunities exist or can be created.

Therefore the identification, evaluation and implementation of relevant changes require joint efforts from both the farming family and the facilitator. However, the power of the FSD approach is that the farming family is in control. This is a distinct change from the old approach, in which the facilitator simply told the farming family what to do, often resulting in faulty problem identification, irrelevant evaluation criteria, and inappropriate solutions and strategies.²

The FSD approach involves four specific stages:

- describing and diagnosing: understanding the current situation and identifying the needs and problems that exist;
- designing the response: identifying potential solutions to the most significant needs and problems; this step sometimes includes identifying potential opportunities (arising from changes in areas such as the external or exogenous factors as in the development of the Japanese market for Tonga-produced squash);

² The FSD approach began about 30 years ago when it was obvious there were not suitable, appropriate or relevant improved technologies for many small farming families in parts of the world where the production environments were very variable (for example, in terms of soils, slope) and usually poor (such as poor quality soils, lack of water). Therefore, it was argued that in these areas farmers needed to be involved in efforts to develop and evaluate potential appropriate improved technologies, and FSD was developed [Norman, Worman, Siebert and Modiakgotla, 1995]. Much has changed since then, and principles of FSD have also been applied to designing, developing and assessing relevant policies, support systems [Upton and Dixon, 1994] and ecologically sustainable agricultural practices [Norman and Douglas, 1994]. FSD has also become an important operational tool for general extension activities, particularly for NGOs and increasingly for government agencies. For further insights on the application of FSD in these areas see the references in Appendix C.

- **testing and evaluating:** assessing whether a potential solution or opportunity can:
 - help fulfil the goals of the farming family: will it improve their welfare?
 - be done with the inputs and managerial skills the farming families already possess or can access: is it compatible with the endogenous factors at their disposal (land, labour and capital), possibly complemented by access to certain exogenous factors (the ability to improve management skills, access credit to buy capital equipment, hire labour, purchase external inputs, etc.)?
 - be accommodated by the family's external influences: is it compatible with the external or exogenous factors that the farming family is facing or is likely to face (for example, are there community sanctions against doing certain farm activities, can rented land be devoted to specific crops, are external inputs available for purchase when they are required, is there a reliable market for selling the product produced, etc.)?
- **implementing and disseminating:** encouraging the actual adoption of the most promising solutions and opportunities; ideally, the success and impact of the adoption process should be evaluated, but unfortunately this is rarely done.

3.3 IMPLEMENTING THE FSD APPROACH

In implementing the FSD approach, it is important that both the farmer and the facilitator are jointly involved in all four of the stages of the FSD approach (see Section 3.2). The extent to which the facilitator is involved in the last stage (implementation and dissemination) will depend on the circumstances. If the farming family requires technical advice, the facilitator will obviously have some involvement; otherwise, the joint activity may become less important or visible. However, it is highly desirable for the facilitator to monitor what happens in order to obtain useful knowledge and insights that may help other farming families in similar situations.

Apart from that, the key issues in implementing the FSD approach, as far as the facilitator is concerned, are the following:

- Determining the best approaches and tools to use so that the interaction between the farming family and the facilitator is mutually satisfying, that a spirit of trust and mutual respect is established, and to the extent possible, that the farmer is in control of the decision-making process; these techniques are critically important in ensuring that information required for each of the FSD stages and the conclusions arising from them are valid and appropriate (see Sections 3.4 and 3.5).
- Increasing the impact, or what is sometimes called the **multiplier impact**, of the work of the limited numbers of facilitators; there are three possible approaches which can be used individually or in combination: working with groups of farmers (see Sub-Section 3.6.1), working with representative farmers (see Sub-Section 3.6.2) and producing extension leaflets for farmers (see Sub-Section 3.6.3).

3.4 OVERVIEW OF DATA COLLECTION METHODS

Collecting and analysing information takes time, energy and resources. Therefore, it is important to think through carefully what data are required, and then to collect the information in the least costly and painless manner possible while still ensuring valid results. To this effect, consider the following three observations:

- Ranking data (i.e., 1st, 2nd, 3rd, etc., known as **ordinal** data) is much cheaper and easier to collect than actual value data (i.e., 1, 2, 3, etc., known as **cardinal** data). Ordinal data is often sufficient for FSD activities, particularly with respect to non-economic concerns, and it is also much easier for small farmers to think in terms of ranking.
- Attitudinal (**qualitative**) data, rather than just numeric (**quantitative**) data, is critically important in trying to understand what farmers really want. Once again, this is likely to be even more important when helping small farmers, who are more likely to have non-economic reasons for many of the decisions they make about their farming-related activities. In addition, some qualitative information can be expressed as ordinal data, whereas quantitative information must always be expressed as cardinal data.

- Obtaining answers to questions often spontaneously leads to ideas about further questions. Therefore data collection and analysis can often be more insightful, productive and efficient when done to some extent simultaneously rather than if the analysis is done after the data has been collected. This has important implications for how the data and information are collected and who does the collection. (See Sub-Section 3.4.1 for more discussion on specific types of data collection).



3.4.1 Specific Types of Data Collection

The most common methods of collecting data in FSD work are surveys (direct interviews and questionnaires), direct observation, and direct measurement.

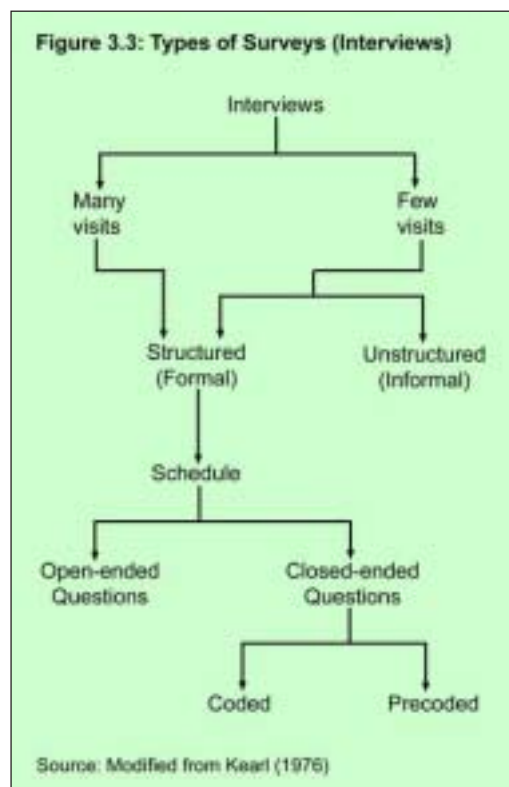
There are many types of surveys (see Figure 3.3). Note that:

- **Formal (structured) surveys** usually involve interviewing one person at a time. Alternatively, for more commercialised farmers, farm records might serve as a special type of structured survey.
- **Informal surveys** can be semi-structured or unstructured in character, and people can be interviewed individually or in groups.

Informal survey methods are now the most popular and important in FSD activities, particularly in dealing with non-economic issues (see introduction to Section 3.4). However, quantitative data becomes more important when dealing with economic issues. The characteristics of informal and formal surveys are compared in Table 3.1.

Other methods of data collection are:

- **Direct observation** of what farmers are doing is obviously very time consuming and expensive as well as very intrusive. Therefore it is rarely used in FSD work, and when it is used, it is usually used in combination with other methods.
- **Direct measurement** is associated with monitoring and trial activities, which are outside the subject of this manual. This method of data collection is also very expensive and time consuming. However, it is sometimes necessary when estimating profit (costs and returns), such as when measuring the area of land farmed or the amount of output generated. Methods for obtaining these measurements are discussed in Sub-Sections 4.1.2 and 4.2.1.



The quality and validity of any set of analysis and conclusions is dependent on the accuracy of the data collected. Bad data will result in invalid and misleading analysis and conclusions. The quality of the data and information depends on the collection method as well as the approach, competence and skills of the data collector. There is often a trade-off between the two because of the expense involved. Formal surveys can be expensive, but are usually more accurate if quantitative data is required. However, if the emphasis is to be placed on ordinal or qualitative data and information, a very highly skilled (and therefore expensive) data collector and analyst is required. These issues are discussed in Sections 3.4.2 and 3.4.3.

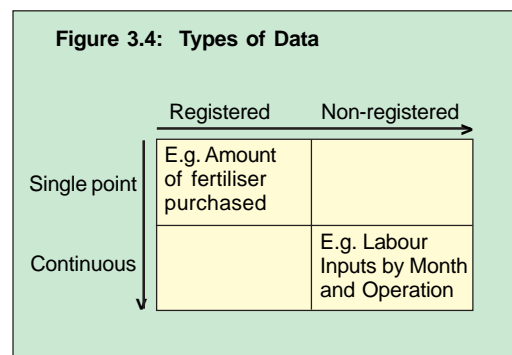
Characteristic	Informal	Formal
Background information required	Minimal	Substantial
Time allocation by researchers:		
Preparation	Less	More
Implementation	More	Less
Analysis and writing	Less	More
Total time	Less	More
Hypotheses:		
Required beforehand	Not essential	Essential
Created during	Yes	No
Implementation:		
Questionnaire used?	No	Yes
Interviewers	FSD worker(s)	Mainly data collectors
Potential for creativity and iteration	Maximum	Minimum
Potential for learning or verification	Mainly learning	Mainly verification
Potential for representative sample	Less likely	More likely
Potential quality of information:		
Attitudinal	Better	Poorer
Qualitative	Better	Poorer
Quantitative	Poorer	Better
Probability of:		
Sampling errors	Higher	Lower
Measurement errors	No difference	No difference
Use of statistical techniques in analysis	Little	Great

3.4.2 Evaluating Methods of Data Collection

Some factors influencing the method(s) used in data collection include the following:

- **what the data are being collected for:** When the data is being gathered to provide a general understanding of the situation, particularly when non-economic issues are being addressed, informal survey techniques are likely to be most relevant. However, when gathering economic data for use in calculations, formal surveys (particularly record-keeping) and direct measurement exercises are likely to be most valuable.
- **resources available for data collection:** The fact is that data-collecting resources are usually very limited. Therefore, as indicated above, difficult trade-off decisions need to be made between the following:
 - use of direct measurement, observation and formal surveys (particularly multiple-visit), all of which are expensive in terms of time;
 - informal surveys, which are expensive in terms of the skills required of the collector (usually the facilitator).
- **time available for undertaking the investigation:** Surveys, particularly informal ones, are obviously less time-intensive than direct measurement and multiple-visit formal surveys. This is relevant because data collection methods need to have a quick turnaround (in terms of results) once the data have been collected.
- **whether the farming system is complex or simple:** In order to achieve the necessary degree of understanding, direct measurement and observation may be more appropriate for complex systems (for example, year-round versus seasonal farming, mixtures versus sole stands of crops, etc.).

- how important it is to reduce two types of errors:
 - **sampling error:** Conclusions arising from working with specific farming families may not be valid for other farming families; in other words, they may not be a representative sample. This can be a problem when dealing with small numbers of farming families or many different types of farming families. Unfortunately, in FSD activities, reducing sampling error through larger samples increases the possibility of larger measurement errors.
 - **measurement error:** The likelihood of measurement errors depends on where the data collected falls on two sliding scales (see Figure 3.4):
 - ★ **how often the activity takes place:** Single point data occurs only once, such as putting fertiliser on a crop; continuous data occurs frequently, such as weeding a crop.
 - ★ **whether the activity is likely to be recorded or recalled:** Registered data, such as paying for fertiliser, is usually remembered or recorded; non-registered data such as harvesting a little cassava when the family wants to consume it, is usually not remembered.



Usually, measurement errors are lower with **single-point registered data** (because memory recall is usually good) and higher with **continuous non-registered data** (because memory recall is usually poor).

Based on this information, data collection methods can be roughly evaluated (see Table 3.2).

In practice, the conclusions are:

- No method of data collection is superior in all respects.
- Some methods of data collection are more expensive than others, which in turn implies that the more expensive methods should be used only when absolutely necessary.

In summary, the informal survey techniques are likely to be better suited for the complex issues facing small farming families, many of which are non-economic in nature. However, as farming becomes more commercialised and is treated more as a business, quantitative (economic) types of data will become increasingly important. In general, the formal educational level of more commercialised farmers (or members of their families) is likely to be higher, enabling someone in the family to keep farm records and simplifying the job of data collection for the facilitator.

Table 3.2: Evaluation of Data Collection Methods in Terms of Operational Constraints ^a					
Constraints	Strategies				
	Informal Survey	Formal Survey		Observation	Direct Measurement
		One/Few Visits	Many Visits		
Finances	1	2	3	6	6
Staff skills	6	3	3	6	5
Time required	1	1	5	6	6
Type of system:					
Simple	1	2	1	1	1
Complex	5	5	2	1	1
Errors:					
Sampling	6 ^c	1 ^b	3 ^b	5 ^c	5 ^c
Measurement:					
SPRD ^d	3	3	1	1	3
CNRD ^e	6	6	2	1	1

a. Evaluation of data collection strategies in terms of cost per unit with respect to various operations (1 = lowest cost per unit, 6 = highest).
b. Evaluated in terms of ability to reduce sampling error.
c. Evaluated in terms of ability to specify sampling error.
d. Single-point registered data.
e. Continuous non-registered data.

Source: Modified from Kears [1976].

3.4.3 The Approach to Interviewing and Semi-Structured Interviewing

3.4.3.1 Interviewing Tips

Good relationships with farmers and their families are critical in collecting good data and information. Both the initial approach to the farmer and the relationship that develops over time are very important in creating a favourable environment for collaboration. Field facilitators should observe these lessons in order to develop good relationships:

- Remember that you are an outsider, and when starting to work in a new area, it is important to:
 - introduce yourself to the local leadership;
 - indicate what activities will be undertaken and to seek approval for doing them;
 - understand and respect the customs of the village.
- Cultivate a partnership with the farming family. (Avoid the condescending, paternalistic relationship that sometimes develops because of differences in educational levels and social status).
- Adopt the following tips for developing constructive interaction with the farming families [Rhoades, 1982]:
 - *Approach*: At first, keep a low profile, hold discussions when it is convenient for the farming family, and whenever possible, conduct interviews at the farm.
 - *Warm-Up*: Use a polite form of address. If necessary, make appointments to hold discussions. Take time to approach topics that you want to discuss and be prepared to talk on other topics of interest to the farmer. Indicate that you are there to learn and he or she is the expert.
 - *Dialogue*: Be natural and relaxed, let discussion flow, and be flexible with ordering of the questions. Use plain understandable language and terms farmers can relate to (for example, talk about yields in the same units farmers use); make sure questions take into account the cultural setting; avoid sensitive questions at first; and, if possible, obtain such information through indirect questioning. If the farmer can't answer a question, try rephrasing it. Don't ask questions that are too abstract. Observe farmers' reactions to questions, because these may reveal a great deal about their concerns or reservations. Remember that what people say and do may be different and record information in writing during the interview



Picture 5:
Monitoring
visit by
extension
staff to an on-
farm demon-
stration plot in
Middlebush,
Tanna Island,
Vanuatu

only if the farmer does not appear to be inhibited or suspicious. Also, if important, check information collected by rephrasing the question (i.e., use *triangulation*³). Finally, don't let the discussion last more than 30 to 45 minutes unless the farmer is talkative or is reluctant for you to leave.

- *Departure*: Bring conversation to an end when the topics have been discussed or the farmer can spare no more time. Thank the farmers for their time and depart respectfully.
- To ensure a high quality of interaction with the farming family it is important for the facilitator to accept the following points:
 - You are there to serve the farmers, not the other way around.
 - Farmers and their families have important obligations other than just talking to facilitators.
 - Never make promises to farming families that you cannot fulfil.
 - Giving incorrect information to farmers is much worse than saying "I don't know." The better answer is, "I don't know, but I will try to find out." Then follow up on it.
 - Participatory interaction implies that no one knows all the answers. Therefore it is better to say, "In our experience, this works more often than that." Don't guarantee that something always works.
 - Be punctual, honest, and well prepared, so that you don't lose credibility in the eyes of farmers. Also, be respectful and use good manners.
 - Remember it is important to listen to and, where possible, attend to farmers' problems quickly.
 - Good interactive relationships between facilitators and farming families will develop only if the farmers have confidence not only in the facilitator but also in themselves. Therefore, don't talk down to them.

Box 3.4: Interviewing Tips

Location is an important consideration for successful implementation of activities. Likewise, it is critically important to know, understand, and respect what behaviour is acceptable or expected in the location where FSD activities are planned. In the Cook Islands, for example, a useful time to meet with farmers is at social gatherings at the end of the week. And when initiating FSD activities in Samoa, village ceremonies are time-consuming but essential.

*Nga Takau, Cook Is. Sabati Solomona,
Cook Is. Paul Tomane, Samoa.*

3.4.3.2 Semi-Structured Interviewing

Semi-structured interviewing (SSI) is defined as "guided interviewing in which only the topics are predetermined and new questions and insights arise as a result of the shared discussions and visualised analyses" [Pretty, 1995]. Obtaining useful data and information from SSI requires considerable expertise and skill. "Helping Small Farmers Think About Better Growing and Marketing: An Introduction for Specialists and Trainers" (Part 1 of the FAO Pacific Farm Management and Marketing Series) is a good illustration of an approach to SSI. When undertaking SSI, Pretty [1995] has suggested the interviewer should pay attention to the following:

- Be informal and conversational, but make sure to carefully guide the conversation.
- Use visualisation and diagrammatic methods to encourage participation, develop rapport and improve the accuracy of the findings.
- Use a prepared interview guide or checklist if it is helpful.
- Generally, ask open-ended questions so that the respondents are free to answer however they want. Avoid directive questions that are worded in a way that indicates the desired answer. Explore new areas of questioning as the SSI develops.
- Appreciate that SSI generates hypotheses and propositions that require further testing.

³ Triangulation means cross-checking the responses on a particular topic by rephrasing the questions or getting the answer in another way (for example, from a different source).

- Carefully judge the responses to questions by considering their context, and use triangulation to cross-check.
- When appropriate, probe the responses and attempt to get beyond and beneath standard answers.
- Have a non-biased but sympathetic attitude when questioning and listen carefully, paying particular attention to body language. In addition, give farmers the opportunity to complete statements and offer responses without interruption.
- Record the interviews in detail either during the interview or immediately afterwards.
- Build a relationship in which the farmers are willing to answer in an open, honest and reflective manner. They should also be encouraged to ask questions of their own.
- Explain to the farmers how the information obtained from them will be used.

3.5 PARTICIPATORY LEARNING AND ACTION TECHNIQUES

For people with very little formal education, pictorial forms are an effective mode of communicating information. Activities can include drawing outlines and using objects or symbols to represent different places, events, and situations. These approaches, which are referred to as **participatory learning and action (PLA) techniques**⁴, provide a useful way of tapping the knowledge and expertise of farmers, and also provide a set of powerful tools for quantifying (or ranking) qualitative information (see Section 3.4 for more).

Important points for using PLA techniques include the following [Pretty, 1995]:

- Usually, they are best done with a group of farmers (or farming families) who, after discussion, have come to an agreement on the subject being considered.⁵ In undertaking such an exercise, care must be taken that:
 - The farmers involved are knowledgeable about the subject being discussed.
 - If the results are likely to differ by type of farmer (such as age group, sex or social status), the members of a group should be of the same type.
- The exercises are usually best drawn or constructed on the ground using local materials (such as stones, seeds, pieces of stalks, etc). Make sure the participants agree what the different materials mean. Alternatively, the group exercise can be done on a large piece of paper with a felt pen. During the exercise, be patient and avoid interfering. Let the farmers be responsible for constructing the diagram and implementing the exercise. Because farmers are the major participants in the activity and primarily interact amongst themselves, they are often enthusiastic and enjoy doing the exercise. After the exercise is over make sure everyone including you fully understand the diagram and the implications arising from it. If necessary, ask questions to clarify matters. If the diagram was done using local materials, copy the finished result onto paper, making sure the scale is not distorted during transfer.
- Keep a record of those people who dominate the process, and those who remain on the margins. Look for ways of bringing those people into the process, or divide the team and undertake the same exercise with both.

Box 3.5: PLA Techniques

The PLA techniques are best done in groups. However, the social and cultural connotations of the individuals in the group, particularly with respect to gender and relationships, must be carefully considered. For example, in some parts of Fiji, there is a taboo against older brothers and younger sisters communicating directly. In some places in Fiji, putting males and females together in a PLA group is a disaster, as culture restricts females from talking in meetings or discussions where there is a chief or a male of a certain rank present.

⁴ These are also more popularly known as participatory rural appraisal (PRA) techniques. However, in these training materials we have chosen to use the term PLA techniques since the objective of the approach is to gain understanding for the purposes of helping farmers and their families making decisions and planning action.

⁵ There is actually no reason why some of the techniques cannot be used with one person but the exercise is time consuming and may yield less representative and insightful results than if it is done by a group whose members are interacting with each other.

- If the results of a particular exercise are suspect, it may be worth repeating it with another similar group of respondents of the same characteristics. In effect this is a type of triangulation, although it is possible that the groups may produce different results if the issues are attitudinal and are not clear-cut.

The following sections describe some of the PLA techniques that are most commonly used in FSD. However, there are many other PLA techniques that also may be used.⁶

3.5.1 Specific Participatory Learning and Action Techniques⁷

3.5.1.1 Mapping and Modelling

- Purposes:

- developing a dialogue with groups of local people, since maps are usually non-sensitive and relatively easy to do;
- obtaining a picture of local perceptions of the local environment;
- exploring spatial patterns of resources of a village or farm in visual terms;
- documenting access and control arrangements concerning resources;
- creating a baseline reference for use in later discussions or work;
- empowering people to better understand and analyse their own conditions.

Mapping is a useful tool to explore issues relating to resources, social factors and wealth. Useful areas to map are the village's farms, residences, and points of major interest (such as wells, cooperatives, roads, rivers, etc.). Mapping also provides the opportunity to obtain the names of individuals farming each plot of land, the characteristics of the household living in each residence (for instance, gender of the household head, size of household, importance of off-farm work, whether traction is owned or borrowed, levels of health, education, wealth, etc.). Farm maps can include information on soil types, crops grown, etc. These exercises provide many benefits, including:

- a low-cost and quick way of getting a list of different types of farms, households, etc., which can be used for sampling purposes;
- an opportunity for group discussions on issues relating to the village environment, allowing the facilitator to identify trends, problems and opportunities.
- information that the facilitator can verify in transect walks (see Sub-Section 3.5.1.3), as well as in further discussions and direct observation.

- Process:

- The map can be prepared by a mixed group from the village or by different groups organized according to gender or age. The latter option provides an opportunity for comparing the perceptions of different types of villagers. For a specific farm, it can be done by the head of the family or by the family as a whole.
- For a group, the map is best drawn on the ground using available local materials. This encourages more participation, is visible to a larger group, and can generate lively discussion and interaction. Other possibilities to explore:
 - ★ For an historical perspective, ask participants to produce a second map depicting

⁶ Useful information on PLA methods is found in Program for International Development [1989, 1994], IIED [1992], Pretty [1995], and Pretty, Guijt, Thompson and Scoones [1995]. Organisations at the forefront in publishing PLA techniques are: the International Institute for Environment and Development (IIED), London, UK; the Institute of Development Studies (IDS), UK; the Program for International Development, Clark University, Worcester, Massachusetts, USA; the Forest, Trees and People (FTP) Network organized jointly by the Community Forestry Unit in FAO and the International Development Research Centre (IDRC); and the Information Centre for Low External Input Agriculture (ILEIA) in the Netherlands. Also, a number of CGIAR institutions have done some innovative work using PLA techniques, particularly the International Centre for Aquatic Resource management (ICLARM) and the International Centre for Agroforestry (ICRAF).

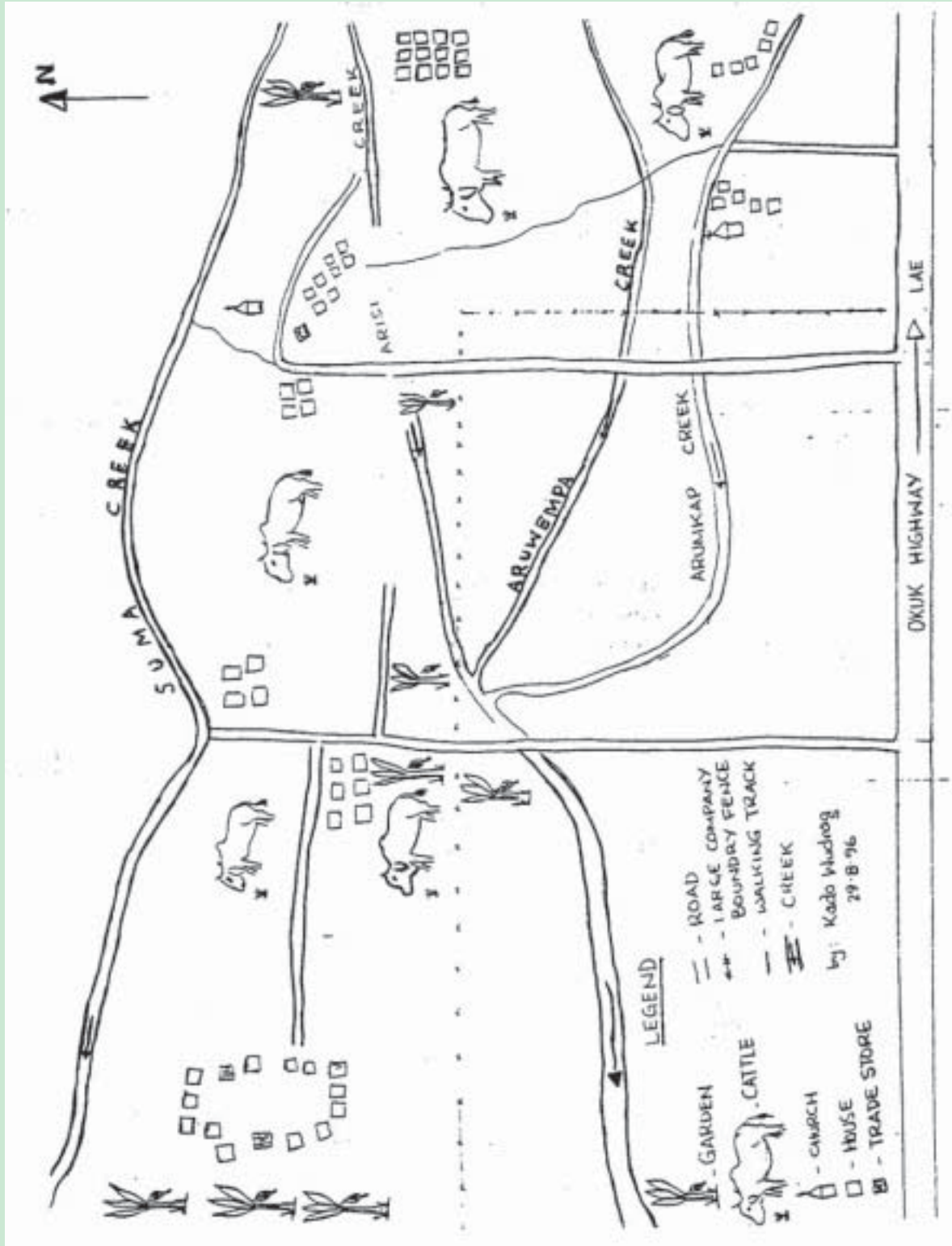
⁷ The material presented in this section draws heavily on a paper presented by Pretty at a 1995 PRA Training Workshop for the Fiji Ministry of Agriculture and Soil and Crop Evaluation Project [Pretty 1995].

conditions 50 years ago. Then ask the group to compare the two and find out what changes have occurred and why since then.

- ★ Ask participants to think about what they think the community will look like in the future and why.

The facilitator should record any relevant information generated during the exercises.

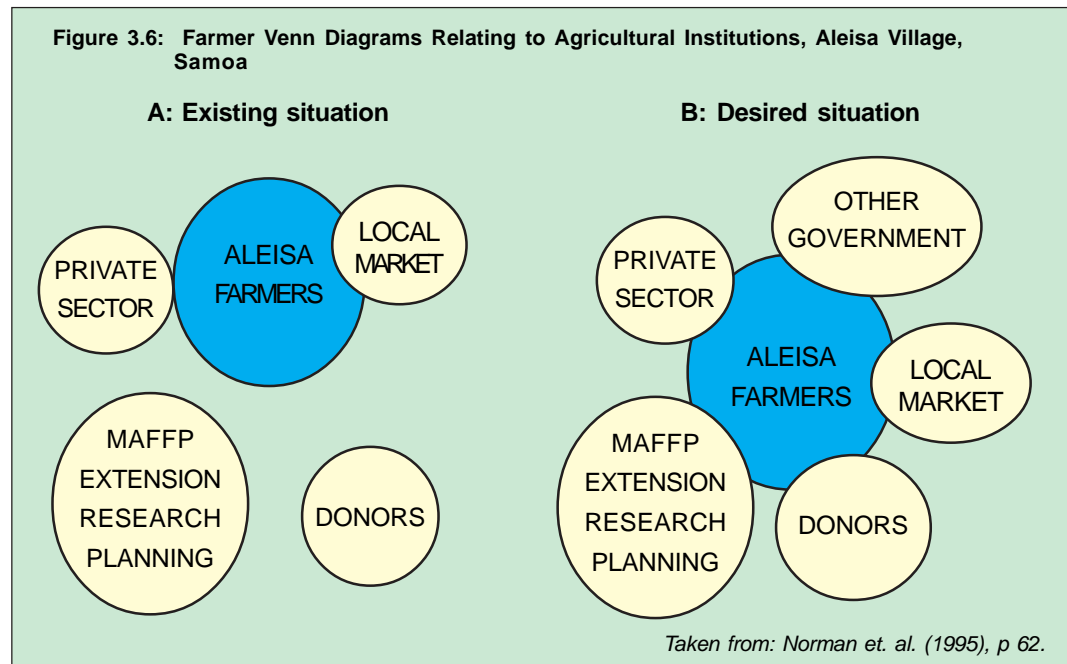
Figure 3.5: Map of Naramongi Village, Markham Valley, PNG, 1996



Taken from: Bammann et. al. (1996), Part I, P. 22.

3.5.1.2 Venn Diagrams

- Purposes:
 - indicating the key institutions, organisations and individuals in a community, the linkages between them, and their importance in decision-making;
 - highlighting gaps between organisations and the needs or opportunities for better communication;
 - identifying local—or simply different—perceptions of the roles of outside institutions.

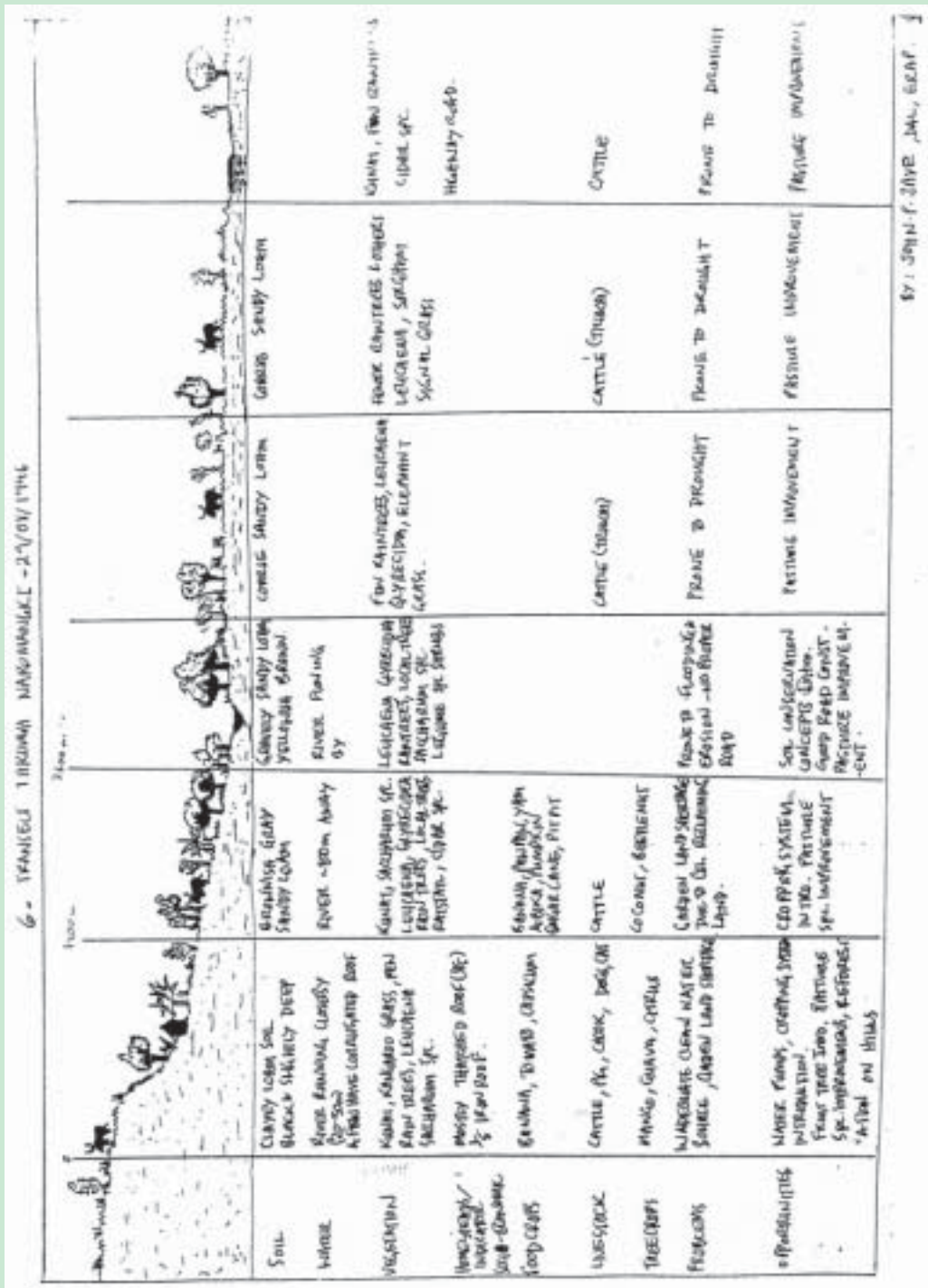


- Process:
 - The group should identify the formal and informal institutions and individuals (government or private) responsible for decisions in the community.
 - Use circles of differing size (drawn on the ground or on paper or cut out of paper) to represent each individual or institution. The size of the circle should indicate the importance of the institution to participants, not the size of the institution.
 - The facilitator should ask the participants to arrange the circles as follows:
 - ★ separated indicates no contact between the institutions;
 - ★ touching indicates information passes between institutions;
 - ★ small overlap indicates there is some cooperation in decision-making;
 - ★ large overlap indicates there is considerable cooperation in decision-making.
 - As another exercise, the facilitator should mark a boundary for the community or village on the ground or on paper, and ask participants to:
 - ★ Use large circles to represent institutions and organisations important to them or known to be effective in their community and smaller circles for those less important or failing in their work.
 - ★ Place circles representing institutions entirely outside the community (such as a government department that should be providing services) outside the community boundary, and place the circles representing those inside or working inside the community should be placed inside the boundary.
 - The final pattern of overlapping or distant circles should be used for further discussion about institutions and decision-making. For example, how has the situation changed in the past 10 or 20 years? What would the group members like to see happen in the future?

3.5.1.3 Transect Walk

- **Purposes:** A transect is a walk-about undertaken by the facilitator and the farmer group through a cross-section of land in a community that includes the greatest diversity of ecosystems, land use, etc. Thus it can help:
 - organise spatial data collected through direct observation and interaction with local people;
 - summarise the local conditions (slope, drainage, vegetation, soil type, land use, etc.), problems (e.g., soil fertility, diseases, erosion, etc.), potential solutions and opportunities for new activities;
 - verify information collected by other means (such as mapping exercises) and refine the understanding of the area and the interactions between the physical environment and human activities (biophysical and socioeconomic environments).

Figure 3.7: Transect Walk, Naromangki Village, Markham Valley, PNG



Taken from: Bammann et. al. (1996), Part I, P. 22.

- Process:
 - Review a map and use the line with the greatest diversity (for example, from a river bed up towards the hills or mountains). Don't always follow paths, tracks, contours or ridges. Discuss the proposed transect route with the local community and seek their agreement.
 - Try to arrange to be accompanied by willing local people, to offset the fact that facilitators are perceived as "outsiders".
 - Walk slowly, look carefully, record observations, and stop and talk to people met on the way. Don't lecture, and use the six "helpers" (what, when, where, who, why, how) for probing.
 - Use contrast comparisons to triangulate between locations. For example, at location A, ask how things differ from location B, then when you get to location B, ask how things differ from location A.
 - Draw the transect diagram, make notes on it, and cross-check it with local people.

3.5.1.4 Trend Analysis: Timelines (Historical Profiles) and Trendlines

- Purposes: Trend analysis shows quantitative changes in one or more variables over time within a community or village. It involves use of a historical perspective and provides a way of relating changes (crops and their varieties, land use and practices, etc.) and their causes to specific major events, which, in turn, can be related to specific years. Such trends, together with information relating to their causes, are useful for:
 - addressing issues of ecological sustainability;
 - designing solutions that will overcome undesirable trends;
 - providing some idea on how desirable trends can be encouraged;
 - helping farmers become more concerned about a problem (for example, decline in soil fertility).

Changes over time in a community can be represented using timelines (historical profiles) , trendlines and diagrams.

- **Timelines (Historical Profiles):** A timeline is an indication of significant events that have taken place over time in a particular community. It helps give local people an indication that outsiders are interested in learning about their lives. The process involves the following:
 - Assemble a group of elders and key informants — ideally about 8 to 12 members.
 - Decide on the time period to be covered. The period covered in the timeline can be determined by the age of the oldest informant.
 - Establish the major milestones in the community (floods, droughts, wars, independence, road construction, school construction, etc.) during the time period covered. Mark the milestones on the ground or on a large piece of paper. Use large sheets of paper and felt pens to make entries in big letters in the timeline.
 - Discuss and enter changes that have occurred (changes in farming systems, soil fertility, technology, food production, external help, policies, population, water and land availability, education, employment and income, etc.).
- **Trendlines:** These are used to record information similar to that found in timelines, but:
 - The period covered is usually shorter, for example, 10 to 40 years.
 - The exercise can be done with a number of different groups of people which differ in composition (for example, grouped by gender, wealth, position in the community, types of farming practiced, etc.).
 - An effort is made to get an idea of why changes have occurred and what needs to be done if the changes that have occurred are bad.

Such discussions can provide ideas on what the community's big problems are, what needs to be addressed, and what opportunities exist for the future.

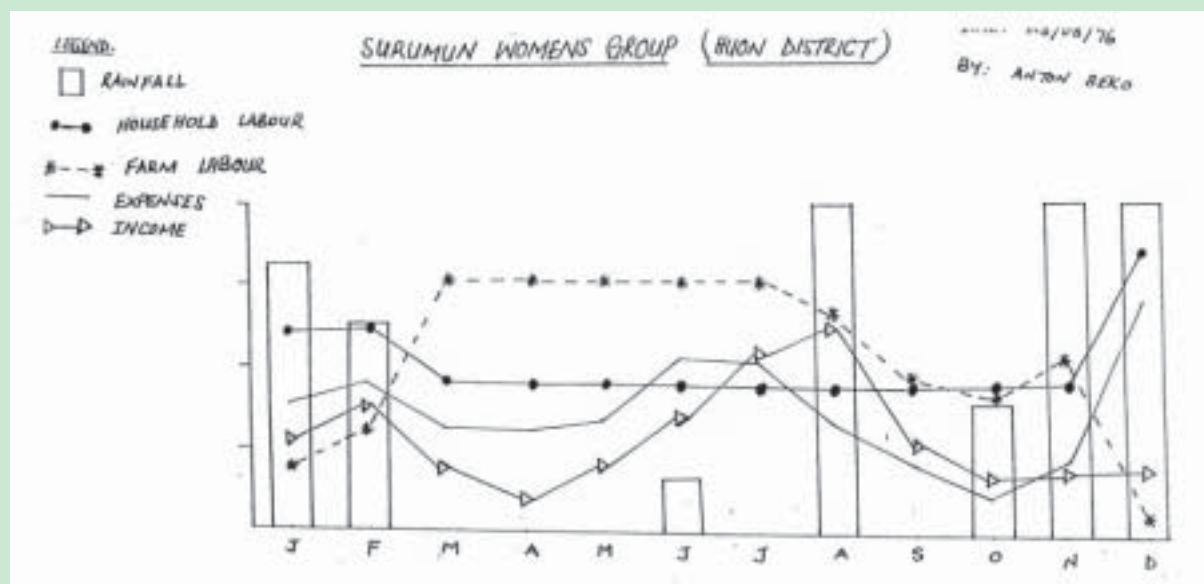
Table 3.3: Timeline for Kaiapit District, Papua New Guinea	
Time	Events
1886	Lutheran Missionaries arrived - came with food and livestock species, e.g. rice
1896	Arrival of Catholic Mission
1933	Arrival of first Whiteman to the Highlands
1937	Eruption of Matupit (Historical event outside of Kaiapit District)
1942 - 1945	Second World War
1952	Eruption of Mt. Lamington (Historical event outside of Kaiapit District)
1956	First Department of Primary Industries (DPI) Station established at Sangan
1956	Introduction of cash crops (coffee, cocoa, coconut) to the Kaiapit District
1966	Mutzing station was proposed to be an Agricultural College but due to a political decision it was brought up to the Highlands
1968	Atzera Cooperative was started
1970	Agricultural Development Bank funded first cattle project in the Mutzing area
1972	Agricultural Development funded first corn planting in the Mutzing area. It was not successful due to marketing situation - partly due to low intensive livestock (Monogastic production). The variety introduced was "Chivan"
1973	Self Government
1975	Political Independence
1976	Opening of Atzera Peanut Butter established by DPI and slowly taken over by People's Cooperatives
1979	Commenced sealing of Okuk Highway
1983	Grain Programme - Erap started
1988	Peanut Development Project
1992	Establishment of revolving fund with Agricultural Development Bank
1996	Farming Systems Development Approach (FSD) for sustainable agriculture

Taken from: Bammann et. al. (1996), Part II, P. 38.

3.5.1.5 Seasonal Cycle Diagramming

- **Purposes:** Seasonal cycle diagramming, analyses or calendars are a good way to identify:
 - seasonally varying information;
 - main activities, problems and opportunities through the annual or other (e.g., lunar) cycle, and key linkages between components;
 - months of greatest difficulty and vulnerability.

Figure 3.8: Seasonal Diagramme, Surumun, Huon District, Papua New Guinea



Taken from: Bammann et. al. (1996), Part II, P. 31.

Seasonal diagramming can be very useful in highlighting seasonal problems that need to be addressed and in helping to evaluate the relevance of potential solutions. This tool is particularly relevant for households that are very close to the survival level, which are likely to be more vulnerable to seasonal fluctuations, such as in food supplies, and less likely to be able to supplement their labour supplies at times of peak labour demand. Examples include: amount and distribution of rainfall; specific operations by crop; level and distribution of labour (overall, by gender, etc.) by crop and livestock enterprise, by total agriculture, off-farm, and domestic activities; level and composition of food consumption through the year; level and composition of animal fodder through the year; and economic information on monthly prices, input availability, market demand, etc. With these examples, levels should be expressed in relative terms by comparing one part of the year with another.

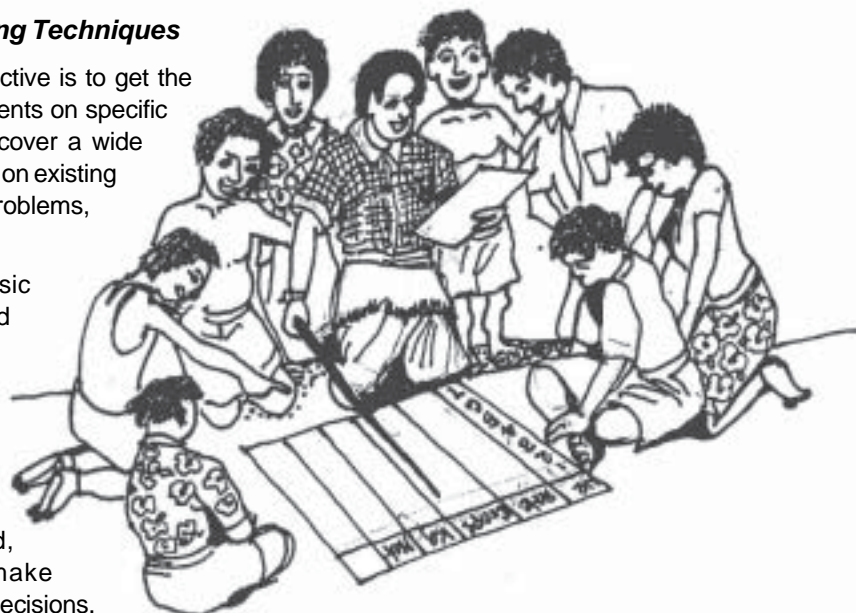
Box 3.6: Labour Flow

During the sugarcane harvesting season in Fiji, farmers have a hard time finding workers to hire. Men are especially difficult to hire, as most are already engaged in sugarcane harvesting. In other words there is a labour shortage everywhere in Fiji at that time.

- Process:
 - Begin the discussion about the months, cycles or seasons of the year, and ask the participants to put a marker on the ground to indicate each month. Do not impose your calendar, for example, they may wish to start at the beginning of the rainy season or some other time.
 - Explore changes in quantity and intensity of seasonally varying dimensions by using available materials (stones, sticks, seeds, berries, straw, etc.) in piles or lines; alternatively, draw directly on the ground, use chalk on a floor, or write with a pen on paper. Use a separate diagram for each topic. Use vertical lines to indicate the quantity or intensity: the longer the vertical line is in relation to another, the greater is the level or amount compared with the other.
 - For rigorous triangulation of quantitative information, ask a series of questions to compare one month with another. For example, what is the busiest month; what is the next-busiest month; how does that compare with the busiest month — is it half as busy or more, etc. Often the first visualisation is changed during the course of the analysis. Probe the findings with more detailed comparisons; for example, for a labour calendar, ask: Is this month really twice as busy as this other? Is the pattern shown for the year a typical one? Are there unusual and special years?
 - Record the diagram on paper and combine the information from several analyses or interviews to give a composite diagram to show linkages between different dimensions. Compare seasonal analyses produced by different groups in a community, for example, labour patterns of men and women, crop calendars of poor and wealthy farmers.

3.5.1.6 Ranking and Scoring Techniques

- Purposes: The major objective is to get the farmers to make assessments on specific topics. These topics can cover a wide range and involve opinions on existing situations, preferences, problems, opportunities and desires.
- The Techniques: The basic idea is to encourage and enable farmers to debate, decide, and prioritise the characteristics of different alternatives, and perhaps also indicate their preferred choice. The weighting is constrained, directing them to make judgements and trade-off decisions.



The major techniques we briefly describe are as follows:

- **Matrix Ranking and Scoring:** Useful for assessing: varieties and types of crops, livestock, fodder crops, and/or trees; different treatments in an experiment station trial; types of soil; and methods of soil and water conservation; etc. [Chambers, 1992]:
 - ★ Determine what you would like to rank or score (e.g., varieties of taro, different treatments in a tillage trial, etc.).
 - ★ Find one or more (ideally at least five) informants, preferably similar (same gender, same position in society, same type of farmer, etc.), who are knowledgeable and willing to discuss.
 - ★ Decide with them what to rank or score, for example, if they know nothing about a particular variety, it should not be included.
 - ★ Ask each participant individually what is good about each subject, what is bad about each one, and whatever else they think is relevant in the ranking and scoring exercise.
 - ★ List these criteria and make the negative ones positive. For example, “attracts pests” would become “does not attract pests”.
 - ★ Ask them to rank (1 = best, 2 = second best, etc.) or score (rating each out of 10, 5 or 3) each one. This could be done visually by drawing a matrix on the ground and asking farmers to select their preferences, for example, by distributing identical objects (e.g. stones) between the various choices.
 - ★ At the end, ask the informants to rank the items according to their preference if they could have only one. At that time, they are aggregating the different criteria according to some weighting system. It may also be useful to have the participants rank the importance of the different criteria by distributing the objects according to the relative importance of the different criteria. This could provide very useful information for researchers, especially if the criteria are in potential conflict with each other.



Picture 6:
Pair-wise
ranking exer-
cise in the
Markham
Valley, Papua
New Guinea

- ★ Additional points to note are:
 - Don't use your criteria. If you do so, clearly separate them from theirs.⁸
 - Don't lecture — listen and learn.
 - Probe for farmers' criteria.
 - Follow up on points of interest;
 - Try the same exercise with different sorts of people.
 - Experience has shown that ranking makes sense for up to about seven items whereas scoring is all right for any number of evaluation criteria.
- **Pairwise Ranking:** This is a simple method of getting farmers to rank problems, or solutions to a particular problem. It is a variant of the matrix ranking and scoring method.
 - ★ Ask the participants to list the problems relating, for example, to a particular crop enterprise.
 - ★ Write them on the top and left sides of a matrix so that each open square represents a paired comparison of the problems listed on the left and top sides of the matrix.
 - ★ The exercise is undertaken by getting the group of farmers to indicate for each pair which is the more important problem.
 - ★ When all the squares to the right of a diagonal from the top left to the bottom right of the matrix are completed, add up the number of times each problem appears.
 - ★ This effectively ranks the problems from the viewpoint of the farmers: The problem mentioned highest number of times is the biggest problem as far as the farmers are concerned.
- **Ranking by Voting/Buying:** This is an alternative method for ranking problems or solutions to a problem.
 - ★ Have the participants vote on what is the most important, second most important, third, fourth, etc. in a list of problems earlier identified.
 - ★ The number of votes each problem gets gives some indication from the participants' perceptions of the relative significance of the problem.
 - ★ Such voting could be done openly (such as through raising hands) or more secretly (such as through balloting).

A variant of this approach is:

 - ★ A "buying" exercise in which each farmer is given the same number of stones (for instance, 5) that they must use to "purchase" the most important of a number of options (problems, solutions, etc.).
 - ★ Participants can put all their "money" on one option or distribute it amongst more than one.
 - ★ The relative ranking of the different options is determined by the total number of stones participants have allocated to each option.
 - ★ Once again, the exercise can be done privately or publicly.
- **Wealth Ranking:** There are a number of ways to do wealth ranking [IIED, 1992]. A simple approach is:
 - ★ Have participants put cards containing names of individual farm households in different piles (for example, three to five) according to a consensus of their relative wealth;
 - ★ Ask participants for the criteria they used in the classification.
 - ★ The information regarding wealth also can be placed on a map.

⁸ There is nothing wrong, for example, in farmers evaluating vegetable varieties according to their own criteria and then evaluating them according to criteria provided by the vegetable plant breeders. If the two rankings are significantly different, then the breeders need to reconsider their selection criteria.

Another less sensitive way is to get the respondents to rank households according to various agreed criteria indicating prosperity (for example, tin roof, ownership of equipment including means of transport, etc).

3.5.2 Application of Informal Survey Techniques by FSD Stage

PLA techniques are extremely useful in FSD work. The informal survey techniques outlined in Sub-Section 3.5.1 ensure that farmers and their families become empowered and interactively participate in helping to systematically:

- analyse what they are doing;
- identify and rank their problems and opportunities;
- examine their solutions and opportunities;
- evaluate the potential impact and later, actual impact, of changes.

Table 3.4 indicates how the PLA techniques can be used in different stages of the FSD process. As indicated, they can be particularly useful in the descriptive/diagnostic and design stages but can also be very important in evaluating solutions or strategies and estimating impact.

Technique	Descriptive/ Diagnostic	Design	Testing	Dissemination/ Impact
Mapping	Yes			
Venn Diagrams	Yes	Yes		Yes
Transects	Yes			Yes
Trend Analysis	Yes	Yes		Yes
Seasonal Diagramming	Yes	Yes	Yes	Yes
Matrix Ranking	Yes	Yes	Yes	Yes
Pairwise Ranking	Yes	Yes	Yes	
Ranking by Voting or Buying	Yes	Yes	Yes	
Wealth Ranking	Yes	Yes		Yes

PLA techniques can help in a wide range of FSD activities, from drawing up profiles of farming families to determining the families' goals, risks, problems, solutions and potential options. The techniques are particularly useful when working with small farmers who market some products but view farming as a way of life and are motivated by non-economic objectives as well as economic ones. PLA techniques can help facilitators guide these families through the difficult trade-off decisions necessary to obtain a balance between the two sets of objectives.

3.6 INCREASING THE MULTIPLIER IMPACT OF FACILITATORS

In most countries in the Pacific, the number of small farming families per facilitator is becoming higher over time. Finding methods that will enable facilitators to help as many small farming families as possible is a critical challenge that is known as the multiplier impact or effect (see Section 3.3). Three techniques that can be used to help in improving this multiplier impact are:

- using farmer groups (see Sub-Section 3.6.1);
- working with a few farming families who in effect act as unofficial extension agents (see Sub-Section 3.6.2);
- producing and distributing extension leaflets (see Sub-Section 3.6.3).

Successful application of the multiplier impact does not require choosing only one of the above strategies in any one situation or country. There is potentially some overlap between the three different types of strategies. In fact, all three may be relevant for the many types of farming families found in the Pacific. For example, a farmer group might be an example of a facilitator working with a few farmers who then act as unofficial facilitators.

3.6.1 Using Farmer Groups

In the following sections we discuss the following:

- types of farmer groups (Sub-Section 3.6.1.1);
- advantages of having farmer groups (Sub-Section 3.6.1.2);
- issues relating to the operation of farmer groups (Sub-Section 3.6.1.3);

(For further detail on the economic and social roles of farmer groups, see Section 6.1).

3.6.1.1 Types of Groups

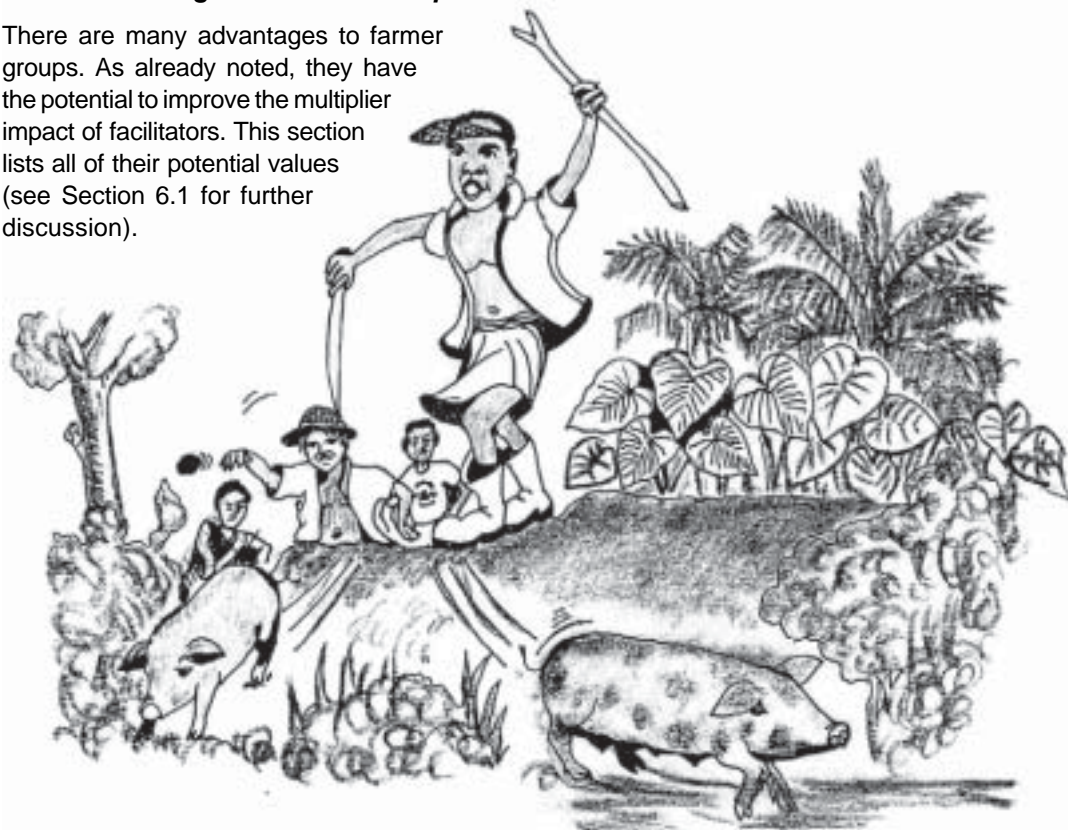
In this manual, the term farmer group refers to any group of farmers who come together for any purpose. More specifically:

- **Formal Farmer Groups** are usually formed as a result of an external stimulus for the purpose of collectively accessing some external service. Membership tends to be fixed or closed, and some form of collective action often occurs. Formal leadership is common, and sometimes a constitution is drawn up.
- **Informal Farmer Groups** are often formed spontaneously and usually have some common interest or purpose, but members often act individually. Membership initially tends to be fluid, although it tends to become more fixed the longer the group is in existence. Leadership is often not very well defined although over time it usually becomes more visible (for example, the emergence of a spokesperson). Sometimes these groups later become more formal in character and take on a life of their own.

When meeting with a facilitator to discuss strategies (for example, what crops to grow for the market based on an analysis of their farming systems), informal farmer groups are adequate, although formal farmer groups may also be appropriate. However, when economic activities are being undertaken by the group (see Section 6.1), formalized groups will usually be necessary. Generally speaking, groups in the Pacific with more traditional roles (for example, those whose roles relate to cultural or community security) also tend to be somewhat formalised although they are not always operated in a completely democratic or businesslike manner.

3.6.1.2 Advantages of Farmer Groups

There are many advantages to farmer groups. As already noted, they have the potential to improve the multiplier impact of facilitators. This section lists all of their potential values (see Section 6.1 for further discussion).



The major potential advantages of farmer groups can be divided into three major areas:

- For outside individuals (extension, developmental, and research) or organisations (government and non-governmental including NGOs or commercial firms, banks, etc.), farmer groups can:
 - improve their efficiency in working with farmers through providing a single point of contact for many farmers;
 - improve their effectiveness in working with farmers by providing the opportunity to train several farmers simultaneously;
 - save repeated explanations of activities and encourage collective feedback;
 - provide a rapid and cost-effective way of verifying and reinforcing findings from individual farmer contacts and disseminating of findings and other information;
 - increase the number of farmers that can be worked with and the number of different types of activities that can be implemented (for example, opening up the possibility of having group responsibility for paying back of loans or undertaking collective marketing of production);
 - provide a forum in which everyone involved in agricultural development (farmers, facilitators, researchers, planners, NGOs, and the private commercial sector) can interact together, which is increasingly being recognised as being important if efficient agricultural development is going to take place;
 - provide a good focal point for organizing activities (such as workshops and field days);
 - provide a useful way of collecting and exchanging information on all types of matters such as:
 - ★ issues that affect all farmers (such as local prices and opinions on development initiatives);
 - ★ controversial issues (such as subsidies and declining government support);
 - ★ trends (such as soil fertility, imports, and markets for products).
- Through engaging in common activities, individuals working in groups can:
 - combine and make the best use of their skills and resources;
 - exchange views and ideas and collectively choose the best options;
 - undertake activities together, making work lighter, easier, less risky and sometimes more enjoyable;
 - tackle common problems that cannot adequately be addressed at the individual level (for example, fruit flies, rats, water access, and watershed management);
 - increase their power of advocacy (such as lobbying for construction of a market place);
 - increase their bargaining power (for instance in the market place or in accessing loans and grants);
 - develop or strengthen personal relationships and sense of community and increase solidarity (what economists call social capital (see Section 2.1)).
- Farmer groups, like all types of groups, can provide a forum for members to:
 - share opinions and observations among themselves and to develop their own solutions to problems—after all, collective thinking often is more productive than independent individual thinking;
 - identify and seize opportunities and build assets;
 - teach other farmers—farmer groups can be a very effective extension tool;
 - increase the potential for meaningful interactive communication with an outside facilitator, as farmers are likely to be more vocal in expressing their opinions when they greatly outnumber the facilitator.

In addition to providing farmers with some immediate tangible benefits, farmer groups simultaneously empower members and develop their self-confidence in controlling their own lives. As just noted, farmer groups also have many benefits for outsiders (such as other agricultural development stakeholders). For these reasons, using the FSD approach and associated PLA techniques with farmer groups provides the facilitators with a very effective way of improving their multiplier impact in helping small farming families along the path to greater commercialisation without compromising the family's other priorities.

3.6.1.3 Issues Concerning the Formation and Functioning of Farmer Groups

When considering the formation and functioning of farmer groups, some of the most important issues to be considered are as follows:

- Groups should have an objective, but too many objectives can detract from the group's effectiveness.
- Groups should meet regularly to maintain cohesion and solidarity and facilitate the fulfilment of their objective(s).
- Whether the groups should be formal or informal and consist of similar or different types of farmers will depend on local circumstances.⁹ Formalised groups are likely to be more important for economic related activities. Although informal groups are generally suitable for FSD related activities stimulated by facilitators¹⁰ such activities could also be implemented with groups that are more formalised and have come together for another purpose (such as community-related or for economic purposes). For the purpose of implementing the types of FSD activities discussed in this part of the manual, it is important to have groups whose members have similar characteristics. This is because different types of farmers are likely to have different goals, problems, solutions, and opportunities. In fact it is also likely that formal groups devoted to economic activities are likely to operate most effectively if its members are similar rather than different in terms of characteristics. Tensions often arise when farmers differ significantly in terms of characteristics. This is because the bigger and more influential farmers are likely to benefit more than the more disadvantaged farmers and in fact may even exploit the latter. How much this is likely to be a problem will differ from one situation to another. The disadvantage of groups of farmers with similar characteristics is that the opportunity for cross-fertilisation of ideas between farmers is reduced, although because they are similar the ideas may be more relevant.
- The size of group should not be too large, because it will inhibit interactive communication and/or collective action. The maximum size depends on local circumstances; generally, any group above about 30 farmers is likely to inhibit meaningful interaction and/or collective action. Usually about 20 members in a group is optimal.

Informal groups for FSD work are best formed by asking for volunteers at village meetings. Logistical and operational issues may require subdividing the volunteers into more than one group, for example by geographical location, position in the hierarchy, resource level, etc. (Issues relating to the formation and functioning of formal groups with primarily economic objectives can be found in Section 6.1).

3.6.2 Farmers as Unofficial Facilitators

Another way facilitators can attempt to increase their multiplier impact is by working with a few farming families who are thought to be representative of (in other words, who have similar characteristics to) many other farmers.¹¹ These families would then be encouraged to pass on what they have learned to other farmers who are in situations similar to their own.¹² Farmers often

⁹ Similar types of farmers would be those that have similar or comparable characteristics (e.g., the resources that they have are about the same in quantity and quality, similar status or ranking in the community, same gender). Different types of farmers would consist of those farmers that differ significantly (e.g., small and large farmers, semi-subsistence or semi-commercial and commercial farmers, farmers with status and those without status, influence and/or power, men and women farmers, etc.).

¹⁰ There is little justification for forming formal groups only for the purposes of FSD-related activities.

¹¹ A possible method for instructing these representative farmers is through farmer field schools (FFSs) that are often promoted by FAO.

¹² Farmers are most likely to be able to adopt changes that have already been adopted by farmers with similar characteristics. They are also more likely to be willing to listen to their clan leaders and copy them if they can (in other words, if their characteristics are not very different).

believe that the best and most reliable source of information is fellow farmers who are in similar situations to their own and share similar experiences, production environments, problems and opportunities. For these reasons, this method of increasing the multiplier impact of facilitator activities is potentially very effective as well as cheap. Facilitators may find some of the representative farmers in farmer groups they have worked with (see Sub-Section 3.6.1). The success and effectiveness of the unofficial facilitator approach will depend on three factors:

- how similar the other farming families are to the farming family acting as an unofficial facilitator; if the families do not share many similarities, some of the advice given may be misleading and/or create more problems for the farming families on the receiving end;
- how effective the unofficial facilitators are in communicating and relaying messages;
- how much use can be made of extension leaflets; written materials can improve the quality and effectiveness of interaction between literate unofficial facilitators and recipient farmers, and such materials also increase the potential for each recipient farmer to do some analysis of their own rather than relying exclusively on the relaying of information and messages.



3.6.3 Producing and Distributing Extension Leaflets

When there are literate individuals in farming families, the written word can be very helpful in aiding farmers to analyse their own situation and decide what is best for them. Extension leaflets, preferably in the local language, have long been an effective outreach tool for facilitators. This method is likely to become increasingly useful as farmers become more literate and more commercialised in their farming operations. To date most of the extension materials available for the Pacific have dealt with technical subjects (such as how to grow taro, using improved technologies on corn, etc.). However, there is no reason why extension materials on the types of topics discussed in this manual could not be produced. In fact such examples are now becoming available. For example, in Palau, the Bureau of Agriculture and FAO have recently produced two extension booklets, one on farming as a business [Bureau of Agriculture, 2003B] and another one on marketing [Bureau of Agriculture, 2003A]. Vanuatu has also produced a draft extension booklet on farming as a business [DARD, 2003A]. Also, Tonga has produced one on gross margins [MOAF, 2001]. Others in the Pacific are in preparation, for example, in Vanuatu [DARD, 2003B]. However, in general, as indicated above, extension leaflets are best suited to dealing with topics that relate to treating farming more as a business. They are more difficult to produce on the issues relating to the less commercialised end of the agricultural production spectrum where intensive interaction between the farmers and the facilitator is necessary to determine priorities, problems, solutions and opportunities.

3.7 CONCLUDING COMMENT ON THIS MODULE

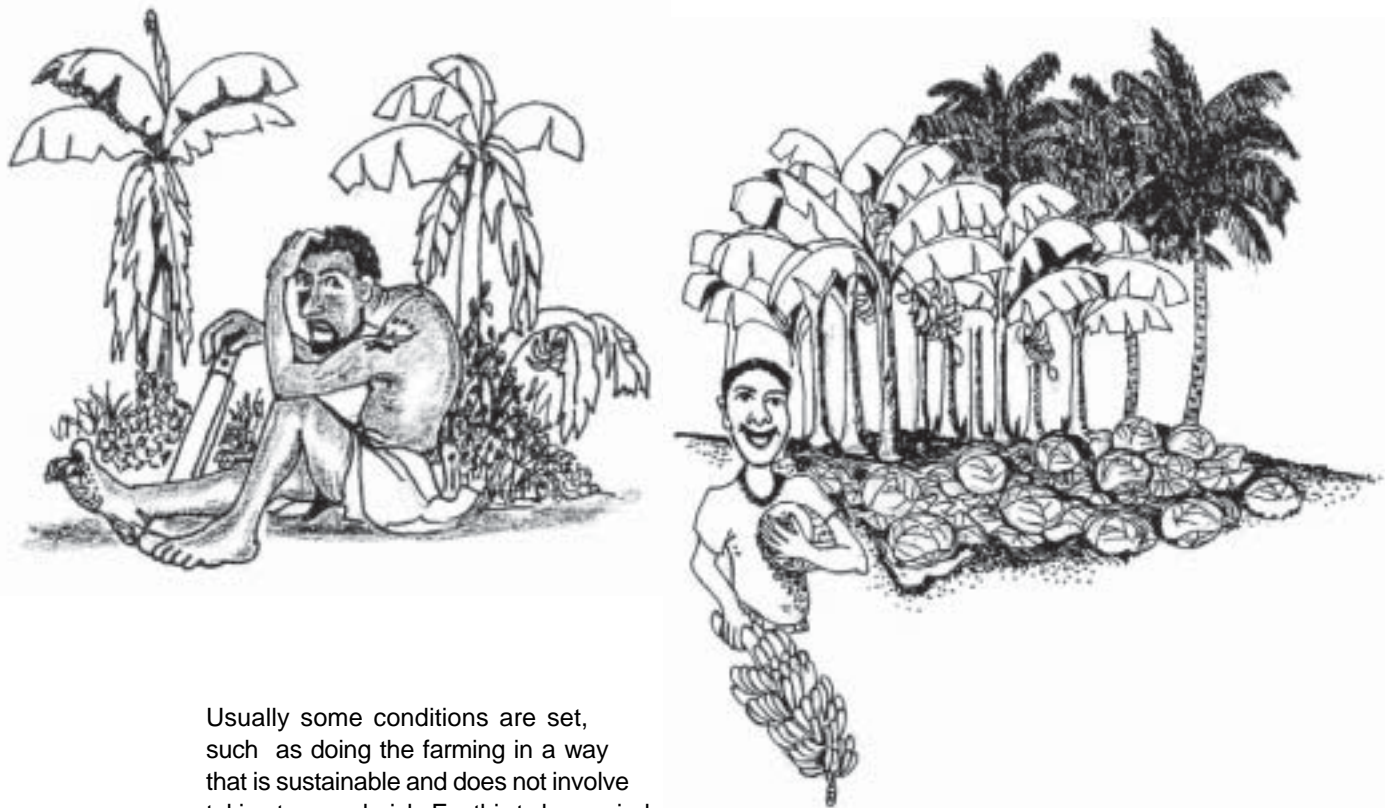
In many respects, this is the most complex module in the manual. It is complex because small farming families have multiple objectives and very limited quantities and qualities of resources. As a result they have relatively low levels of living, resulting in a need to avoid risk. Dealing with this complexity requires a special interdisciplinary set of tools, namely FSD. The analytical challenges of coming up with appropriate and acceptable strategies are great and require time and skill. These demands, coupled with the lack of formal education of many small farming families and the specific on-site circumstances of most of the solutions, requires hands-on involvement of facilitators.

For this reason, increasing the multiplier impact of facilitator activities is a critically important issue. This chapter has described three potential methods for achieving this. It is possible that all three can be used simultaneously, but realistically, for farming families near the subsistence end of the agricultural production spectrum, the farmer group approach is likely to be most applicable. The other methods (using farmers as unofficial extension agents and producing and distributing extension leaflets) are likely to become more useful as farming families become more literate and commercialised in their farming operation.

Logistically and analytically, the issues relating to helping farmers become easier as they become more literate and they move along the agricultural production spectrum in becoming more commercialised. In other words, helping farmers becomes easier from an analytical viewpoint when farming is treated more as a business, and the link between farming and the family becomes weaker. While for some this is a desirable trend, for others there are question marks since as farming becomes more exposed to, and influenced by, what is happening in the outside world, the Pacific Way of Life is likely to weaken.

4. FARM MANAGEMENT

Farm management is concerned with planning and evaluating the use of farm resources. As farmers become more commercialised in their farming operations and farming is treated more like a business, “modern” farm management (see Figure 1.1) becomes critically important. The guiding principle of “modern” farm management is to maximise the return from farm resources.



Usually some conditions are set, such as doing the farming in a way that is sustainable and does not involve taking too much risk. For this to be carried out effectively, the farming family and anyone helping them (such as the facilitator) needs to have a sound understanding of the:

- quantity and quality of farm and household resources;
- farm production environment;
- available production technologies;
- markets in which products will be sold.

This chapter introduces the major analytical tools of “modern” farm management including:

- estimating the costs, value, and production of an enterprise (such as growing taro or cassava), including the requirements for cash, labour and other resources during the production cycle;
- calculating the gross margin of an enterprise, which gives a crude estimate of its “profitability”;
- evaluating the potential value of making small adjustments in the farm business (for example, changing the method of producing a particular enterprise or changing to another enterprise) with the help of planning tools, especially partial budgeting;
- estimating net farm income;
- whole farm budgeting and planning.

4.1 ESTIMATING COSTS OF PRODUCTION

Why is it necessary to estimate the costs of production? Consider the situation of a farming family that is producing a crop (for example, sweet potatoes) for the market. The family wants to know whether they will get back the money that it cost them to produce the crop. Alternatively, the farming family wants to know the price they need to receive for a certain amount of produce in order to cover their costs of production. Of course, the family also wants to know whether all of the time and effort they put into growing the crop—preparing the field, planting, weeding and harvesting—was worthwhile.

When farming families get more involved in producing for the market they may also want to know whether they can make more money from their land and effort by growing and marketing a different crop (such as yam instead of sweet potatoes). To get a satisfactory answer, it is necessary to understand what the costs of production are. Once the price the product being produced can be sold for is determined, the return from producing it can be estimated and compared with other farms or an alternative crop.

To calculate the costs of production, the farmer (together with the facilitator) must complete the following steps:

- define the enterprise (Sub-Section 4.1.1);
- estimate the size of the plot the product enterprise is being grown on (Sub-Section 4.1.2);
- estimate the quantity of inputs used (i.e., seeds, fertilizer, pesticides, labour) (Sub-Section 4.1.3);
- estimate how much the different inputs cost (also Sub-Section 4.1.3).

Once this information is assembled and a sense of what the resulting production is worth has been established, a so-called crop budget is prepared in order to calculate the gross margin. The gross margin provides an idea of the financial performance of the specific enterprise. (See Section 4.5 for information on using gross margins for planning and decision-making purposes).

4.1.1 Defining an Enterprise

Defining a crop enterprise in the Pacific is a challenge because:

- Crops are often grown in mixtures.
- Crops are grown the whole year round.

Under these constraints, the best compromise is usually to define the enterprise in terms of the major crop being grown on the plot (such as “taro-based enterprise”). In Papua New Guinea for example, the major root crops grown for the market are Irish potato and sweet potato. However, since they are often grown in mixtures, any costs of production relating to the minor crops will also need to be included in the estimation of the cost of production of an Irish or sweet potato-based enterprise. Similarly the value of production of those minor crops will also need to be included when estimating the return from those enterprises.

An additional issue is how an enterprise is being implemented. For example, one farming family may use an improved variety of sweet potato plus inorganic (artificial) fertiliser for a crop while another farming family uses a more traditional variety and no fertiliser for the same kind of crop. Therefore the **technologies** for the sweet potato enterprise differ for the two farmers. Sometimes economists call these two different farm activities. A **farm activity** is a specified method of implementing a particular farm enterprise [MOAF, 2001]. In any analysis it is important to specify the technology being used since this will influence the inputs used and the return obtained. If the technologies adopted by two farmers differ greatly the costs and value of production (and therefore the return) from that enterprise are also likely to be different. However, to make things simpler, this manual will refer to different farm activities with respect to a particular enterprise as different technologies.

4.1.2 Estimating Plot Size

Farmers often do not know the area of the land they are using to produce crops. This makes it difficult to calculate how well the farmer is doing since inputs (such as planting materials and fertilisers) and crop outputs need to be calculated per unit area of land. Likewise, without knowing the measurements of the farmer's area, it is not possible to find out how well the farmer is doing compared to their neighbours or whether they could make more money by growing a different crop on the same area of land.

In the case of a livestock enterprise, it is not necessary to estimate the farming family's area of land unless the animals are kept on designated pasture land.

Estimating area is a major challenge. Four possible methods, in increasing in the level of effort and complexity, are covered in Sub-Sections 4.1.2.1 through 4.1.2.4.¹³ Additional measuring methods exist, however these are methods that require nothing more than a measuring tape.

4.1.2.1 Title Method

When determining the area of a farm or plot, the first question to ask the farmer is whether they have title to the land (or, if they are renting the land, if the landowner does). If so, the figure in the title can be used to estimate the area of the enterprise. (For example, if only about half the titled land is devoted to the enterprise, divide the measurements provided by the title in half.)

Farmers who do not have a title for the farm or plot may still provide an estimate of the area of their farm. Unfortunately, without a title there is no assurance that the information they provide is accurate. In addition, farmers will often give an (incorrect) answer in order not to lose face.

4.1.2.2 Number of Plants Method

With some crops, especially roots and tubers, farmers sometimes have a good idea of the number of plants they have planted. This information can be used to calculate the area if:

- The facilitator is confident that the farmer really knows the number of plants planted.
- The farmer uses standard plant-spacing (in other words, a uniform space left between rows and between the plants in each row).

An example of this method is given in Box 4.3. In actual fact, farm or plot area could also be calculated after planting using this method if the total numbers of plants are estimated.

Box 4.1: Calculation of Yield Per Unit of Area

The yield per unit of area is a very important part of determining the gross revenue. However, field observations revealed that farmers' estimation of the size of their farming area was highly incorrect. Most of the farmers expressed size in terms of ratio to a rugby field, but their estimates turned out to be distorted. To help ensure accuracy, facilitators should assist farmers in carrying out actual measurement of the area. This one-time effort will facilitate accurate calculations per unit of area whether related to yield, production costs or gross margin analysis.

*M. Iqbal, FAO Consultant,
Papua New Guinea.*

Box 4.2: Estimating Plot Size

Farmers often do not know the size of the area they are using to produce crops. Determining this information is difficult not only for farmers but also for facilitators. Based on experiences in training farmers in Fiji's Namosi province, we learned that the easiest way to measure a plot is by using the number of plants method. This works well for dalo (taro) in particular. Farmers may not be able to easily quantify the area planted, but they always know the number of suckers planted.

¹³ One further point about measuring plot sizes: if determining the gross margin of a specific plot is the sole objective, then measuring its size is not necessary; collecting information on costs and returns will give an idea as to whether a profit or loss is being made. However, if gross margins from enterprise plots of different sizes are to be compared, then there is no alternative to having an idea of the sizes of the different plots that are to be compared and then adjusting the costs and returns figures to a common size for each plot.

4.1.2.3 Field with a Simple Shape

If neither the title method nor the numbers of plants method are possible, it will probably be necessary to measure the area of the plot directly. This is relatively easy to do if the field has a shape similar to those shown in Figure 4.1. (The equations in Figure 4.1 can also be used for calculating the area of the fields once the lengths of the sides have been measured.)

Note that the pace of an adult male often approximates one metre. However, using a tape measure is more accurate if one is available.

4.1.2.4 Fields with an Irregular Shape

Unfortunately, measuring a field with an irregular shape (see Figure 4.2) is a fairly complex undertaking. The best approach is as follows:

- Measure the lengths of the sides A through F by using straight lines and the “give and take” approach—if some of the plot is outside the line, compensate by a similar amount on the inside. To accomplish this, it is helpful to:
 - Put stakes at each of the corners for identification purposes.
 - Draw a rough sketch of the field and enter the lengths of each side.
- Measure the distance of the longest diagonal across the field (i.e., AE) and enter the information on the sketch map.
- Divide the plot up in a way that enables triangles, rectangles or trapeze shapes to be formed using the line AE to operate from. However make sure the lines that are drawn go from one of the corners (e.g., B, C, D and F in Figure 4.2) and join the line AE at 90°. ¹⁴

Box 4.3: Calculating Area of Plot from Numbers of Plants Planted

Assume:

Number of plants planted = P
Spacing between plants within the row = W metres
Spacing between rows = B metres

Area planted in:

Square metres = $W \times B \times P$
Hectares = $(W \times B \times P) / 10,000$

For example, in the case of cassava:

500 plants were planted
Space between plants within rows was 0.3 metres
Space between rows was 1.00 metres

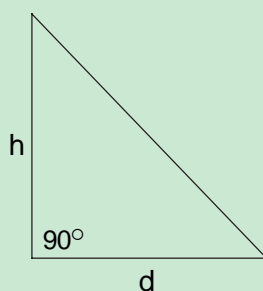
Therefore area planted in:

Square metres = $0.3 \times 1.0 \times 500 = 150$

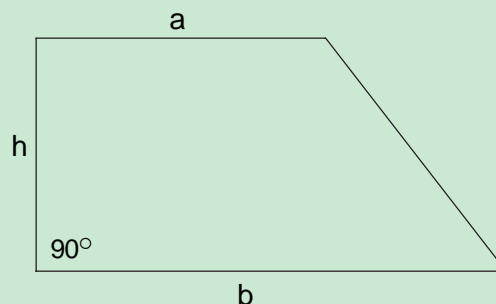
Hectares = $150 / 10,000 = 0.015$

Note: 1 hectare = 10,000 square metres.

Figure 4.1: Measuring Areas of Different Shapes



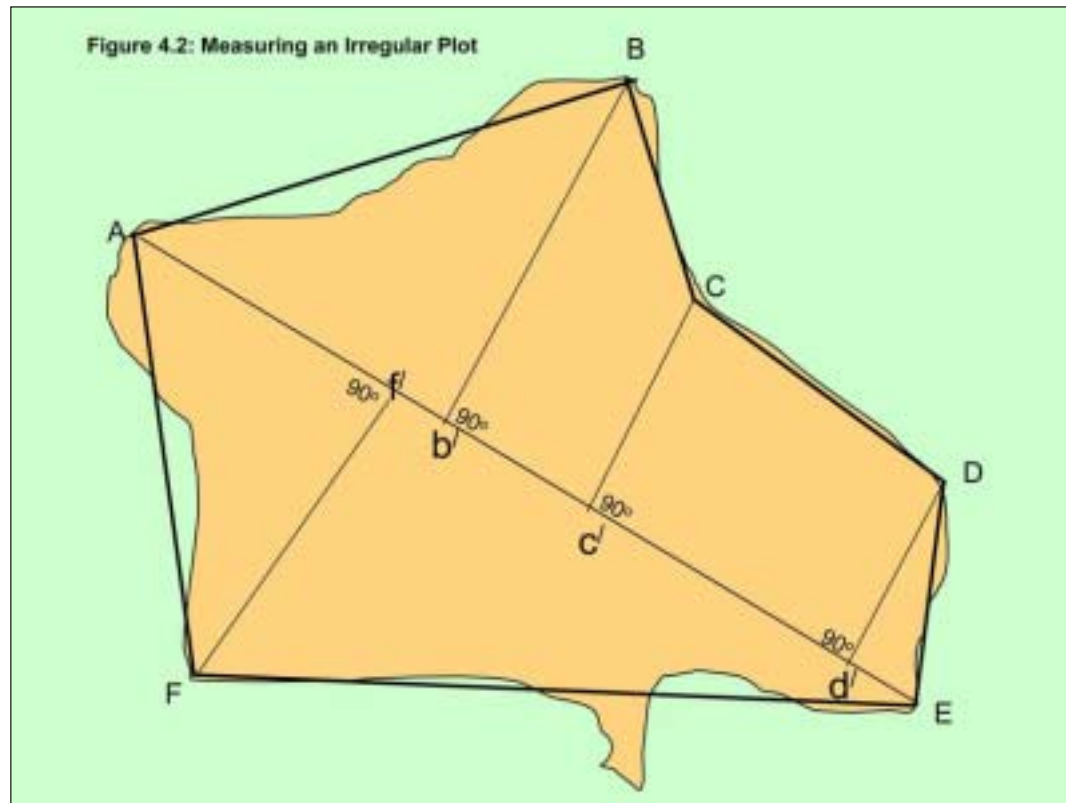
$$\text{Area} = (d/2)h$$



$$\text{Area} = (h/2)(a+b)$$

$$\text{Area of rectangle or square} = (\text{length})(\text{width})$$

¹⁴ A trapeze must have two opposite sides that are parallel to each other. This will always be the case if, as described, lines from the corners are drawn in such a way that they join the diagonal AE at right angles. Therefore the lines on the diagonal AE relating to the trapeze areas in Figure 4.2 are equivalent to the “h” line on the trapeze in Figure 4.1.



- Measure the lines that have not yet been measured and enter this information on the sketch map.
- The rest of the calculations can be done on paper provided all the lines are measured and the distances are entered on the sketch map.
- In the example, the following areas were created:
 - Triangle ABb'.
 - Trapeze BCc'b'.
 - Trapeze CDd'c'.
 - Triangle DEd'.
 - Triangle AfF.
 - Triangle Ff'E.
- To determine the area of the entire plot, calculate the area of each of the smaller areas (triangles and trapezes) using the formulas in Figure 4.1:¹⁵
 - Area of triangle ABb' = $(A b'/2)(Bb')$.
 - Area of trapeze BCc'b' = $(c'b'/2)(Bb'+Cc)$.
 - Area of trapeze CDd'c' = $(cd'/2)(Cc'+Dd')$.
 - Area of triangle DEd' = $(d'E/2)(Dd')$.
 - Area of triangle AfF = $(Af/2)(Ff)$.
 - Area of triangle Ff'E = $(f'E/2)(Ff)$.
- Finally, add these smaller areas together to get an estimate of the total area.

¹⁵ In Figure 4.2 the lines equivalent to the 'h' line in Figure 4.1 must always be at right angles. This will always be the case as long as the lines from the corners to the diagonal are drawn correctly, according to the instructions.

4.1.3 Estimating or Measuring Inputs and Output in Relation to Area

4.1.3.1 The Principle

Since collecting data takes time and costs money, it is very important to only collect data that will be useful—in this case, in estimating the costs of production of an enterprise. However, there are two complications in determining these costs. These are as follows:

- **estimating the costs of variable and fixed inputs:** The starting point for estimating costs is to estimate the amounts of inputs used in producing the products. These inputs consist of:
 - **Variable inputs:** The levels of these inputs vary with the level of production. They go up as production goes up and down as production goes down. For example:
 - ★ *labour inputs*
 - ★ *non-labour inputs* such as fertiliser, green manure, seeds and cuttings, pesticides, herbicides, fuel for operating mechanical equipment, etc.
 - **Fixed inputs** (or overhead inputs such as rent of land, paying off the loan on a piece of equipment, etc.): The levels of these inputs do not change with the level of output. They are not considered in this manual (apart from Section 4.8) because it is often difficult to divide fixed input costs into different enterprises, and gross margin analysis does not take them into account. Fixed inputs only become significant in more commercialised agriculture when farmers have farm buildings, tractors and other mechanical equipment (such as rototillers and weed eaters).
- **estimating the value of non-cash inputs:** When a farmer makes the transition from subsistence to small farm agriculture, not all inputs used have a monetary value. Instead much more emphasis tends to be placed on non-cash inputs (such as organic manure instead of purchased inorganic or artificial fertilizer and use of family labour instead of hired labour), which are used instead of inputs purchased with cash. For these reasons, comparing the “profitability” of similar crop enterprises implemented by a small farmer and a commercialised farmer may give very misleading conclusions because the cash costs of small farmers are likely to be much lower. However, often those non-cash inputs have value because they could have been used for something else. Their value is what economists call an **opportunity cost**. It is important to assign a value to these non-cash inputs when calculating “profitability”. The following guidelines are useful for this purpose:
 - In the case of family labour: The going rural minimum wage is usually considered a fair estimate of the worth of that labour.
 - In the case of non-cash inputs (such as manure): If a commercial value for the product is known in the local area, this can be used. If not, the input is considered to be free.

4.1.3.2 Data Collection Procedure

Two types of data need to be collected. These are as follows:

- **background and plot information:** This includes information such as:
 - biophysical data such as rainfall, soil type, slope or position of the plot, history of the plot, etc.;
 - socioeconomic data such as age and sex of farmer, size of farm, land tenure of the plot where the crop enterprise was located, etc.

This information is useful in indicating the conditions under which the results occurred. This can be important in:

- explaining differences in the results obtained from different plots (on the same farm or from different farms) of the same enterprise;

Box 4.4: Financial Analysis on Small Farms and Commercial Farms

Financial analysis is easier on commercialised farms because inputs are usually purchased (i.e., are cash inputs) and all the production from the farm is marketed. In contrast, on small farms, many of the inputs are provided from within the family and farm (e.g., using family labour rather than hired labour, using inorganic green manure instead of artificial inorganic manure). Because such non-cash inputs are only available in limited quantities they have value and it is highly desirable that a value is put on them. Similarly much of the farm production is eaten by the family and also is used to meet social obligations. Once again such production has a value since it could have been marketed. Therefore we need to accommodate such non-cash inputs and non-marketed production in any financial analysis with the help of the opportunity cost principle.

- possibly giving some hints on the conditions under which the enterprise works best.
- specific enterprise information: This involves collecting information necessary for calculating the cost of production, value of production and gross margin of the enterprise. Types of data necessary include the following (see also introduction to Section 4.1):
 - physical data including production and by-products;
 - socioeconomic data, which are necessary to undertake financial analysis, including:
 - ★ non-labour inputs (cuttings, seeds, chicken manure, etc.);
 - ★ labour inputs by type of operation (weeding, pruning, etc.) and type (family or hired);
 - ★ prices of inputs and value per unit of output.

Box 4.5: Traditional Agriculture in Vanuatu

There are two primary reasons that farmers in Vanuatu maintain traditional cropping techniques: the absence of cash, and a lack of knowledge about “modern” and intensified cultivation techniques. Currently, little or no external inputs are used, and a shift toward more intensified agriculture would be based on external inputs such as inorganic fertilizer and additional tools besides the common bush knife. These are largely out of reach because the sale of market produce brings only a small amount of cash to farmers. With this limitation, the challenge for facilitators is to promote more intensive traditional food production systems that do not have high cash costs: improved cultivars, mulching, incorporation of animal manure and maybe the introduction of more advanced hand tools such as hoes. An additional concern is the difficulty transporting from the gardens to the main roads. A possible solution may be a greater use of horses.

F. Waback, Vanuatu.

The two types of data are closely related to each other and need to be used together to assess the value of the enterprise. For example, if the enterprise involves an improved early variety, then yield may not be so relevant because the yield of the new variety may be less than that of the traditional variety. However, the higher price obtained for the produce may more than make up for the reduction in yield. In such a situation, financial analysis may be a better indicator of the performance of the enterprise.

Measuring variable inputs takes time, resources and skill. To be efficient, it is important to determine whether it is worth the effort and commitment. The principle on which to base that decision is as follows:

- If it is likely to be important in explaining the value of physical variables (such as yield) or is important in financial analysis, then measurement is important.
- If this is not the case, then don't measure.

4.1.4 Farm Information and Input Data Collection

For information to be complete and therefore useful, it has to be collected in a systematic way. The best way to do this is through the use of forms. Data can be grouped together in the forms so that the farmer and the facilitator can easily analyse the data and draw useful conclusions. The facilitator has to agree with the farmer who is going to collect the information.

Ideally a farmer should keep the records and collect the data him or herself or give the task to one of the family members (e.g., a daughter or son who is going, or has gone, to school).¹⁶

However, if this is not possible, an alternative approach, but much less desirable approach would be for a facilitator to get some information on costs or returns of an “average” farmer in the district he or she is working in. This could be done by sitting with a group of farmers with similar characteristics (see Sub-Section 3.6.1.3), and discussing the entries for the different forms for an “average” plot of the enterprise. However, once again we emphasise this is only a second best option but could possibly help stimulate the interest of farmers in record-keeping.

¹⁶ There have in fact been efforts in some countries for people to keep simple records by using more pictorial type approaches. However, for all the types of data and analyses expected in this manual, this would probably be rather difficult to do.

In Appendix B there are examples of the types of forms for collecting the necessary data about the farm or plot and inputs used, together with details on how to complete them. Four types of forms are used for this purpose.¹⁷ These forms are as follows:

- **Background and Farm Information Form** (Table B2.1). This is information that needs to be collected only once per production cycle of the enterprise.
- **Labour Activity Data Form** (Table B2.2). This indicates by date and for the enterprise, the labour operations undertaken and the amount, type and cost of labour hired. Obviously this needs to be completed every time an activity is carried out on the enterprise.
- **Non-Labour Inputs Form** (Table B2.3). This indicates by date the inputs, other than labour, applied to the enterprise. This form needs to be completed every time an input other than labour is applied to the enterprise.
- **Price Information Form** (Table B2.4). This gives information on prices of inputs and products for which no such information appears on in the other forms. This needs to be completed at the end of the production cycle for the enterprise.

When a facilitator, or the farmers, start working with the forms and begin to develop the feeling the forms are too complicated or time consuming, think carefully about the following before giving up on them:

- Perhaps one could just record all the information in a notebook and achieve the same result. The problem is that you may forget to record some vitally important information. By using forms or specially printed note books, the chances of forgetting something are greatly reduced, because the data recording system is laid out (i.e., systematised). The more complete and accurate the information collected is, the more valid, reliable and potentially valuable will be the financial analysis that can be undertaken using the data.
- Obviously the layout and even the content of the forms can be modified by the facilitator, or even the farmers, to make them better suited to the local situation. However, be very careful not to lose valuable information that may be useful in later analysis.
- It may seem that some of the information, particularly on the Background and Farm Information Form (Table B2.1) is not necessary. However, eventually it would be highly desirable that a central database be developed in each Pacific country that would contain numbers of cases of the costs of production, value of production, and gross margins of different enterprises, without of course being linked to the names of specific farmers. This would make it possible for you (i.e., the advisor) and farmers to compare specific results on the costs of production, value of production, and gross margins of specific enterprises with the average for that enterprise in that database (see Section 4.9). This could help in indicating reasons for any differences in the results. This in turn may give some idea on what needs to be done to improve performance in the future on specific farms.

4.2 ESTIMATING PRODUCTION AND ITS VALUE

Estimating production or yields from an enterprise is often a difficult job because farmers:

- do not usually harvest all their production at once, particularly in the case of root crops;
- often stagger production to avoid gluts and provide consistency;
- do not keep records of their production.

There are two possible approaches for getting estimates of production (Sub-Section 4.2.1). We have chosen to call them:

- The direct approach — this is the much preferred approach.
- The indirect approach — this is the last resort approach.

We discuss each of these before concluding with a brief comment on estimating the total revenue and value of production (Sub-Section 4.2.2).

¹⁷ Analogous forms could be designed for livestock if records on a livestock enterprise were to be collected.

4.2.1 Estimating Production

4.2.1.1 Estimating Production: The Direct Approach

Farmers often harvest in standard-sized baskets and sometimes know the weight per basket. They also sometimes know the number of baskets harvested in the last week. Therefore by far the best approach to estimating production, if the farmer uses a standard sized basket, and knows the weight of the contents, would be for the farmer to keep records of the number of units he or she harvests from the enterprise. If one knows the total number baskets harvested and the weight per basket it is then possible to get an estimate of total production. A simple form for recording such information is given in Appendix B (Table B2.5: Number of Units of Crops Harvested and Sold). Details for completing this form are also given in Appendix B (Section B2.5). Once again this form is only an example — it could be modified to fit the local situation.

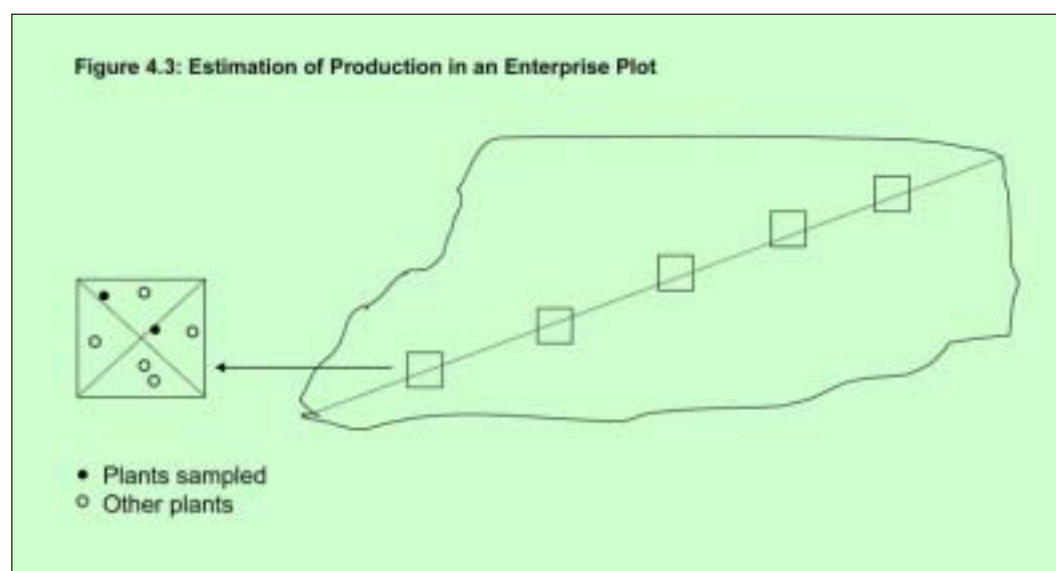
Picture 7:
Sweet potato
harvest for
the market
near Port
Vila, Vanuatu



4.2.1.2 Estimating Production: The Indirect Approach

If it is not possible to use the direct approach to estimating production described in the last section (Sub-Section 4.2.1.1) a more complicated and time consuming method would be to do the following:

- Mark out with pegs square areas at equal distance along the longest diagonal of the enterprise plot, well before harvest (see Figure 4.3). With reference to these squares:



- The size of the squares is to be determined by the main crop (i.e., usually taro, cassava or sweet potatoes) if there is a mixture. The sizes proposed are as follows:
 - ★ sweet potatoes and non-root crops: 2 metre by 2 metre squares
 - ★ other root crops: 4 metre by 4 metre squares
- The number of squares for the enterprise will be determined by the size of the plot. The number proposed is as follows:
 - ★ 0.10 hectares or above: 5 squares;
 - ★ 0.05 to 0.09 hectares: 4 squares;
 - ★ Less than 0.05 hectares: 3 squares.
- Count the number of plant stands of the different crops in the square areas and find the average number of stands of each crop per square area. This can then be used in calculating the number of plant stands of each crop for the enterprise.
- Harvest two plants of each crop per square and calculate the average weight per plant of each crop. Select the two to harvest by taking one plant of each crop, which is closest to each of the diagonals in the square.
- Calculate the total weight of each crop from the enterprise by multiplying the average number of plants per square for each crop by the average weight per plant of each crop harvested from that plot. At this point it is easy to express production from each plot in per hectare terms.

An example of estimating production using the indirect approach to production estimation is given in Sub-Section 4.2.1.3.

4.2.1.3 Example: Production Estimation with the Indirect Approach

Suppose:

- The main crop is cassava although there are a few stands of other crops
- The size of the plot with the enterprise is 0.125 hectares.

The process of estimating the production of cassava from the plot involves the following steps:

- Mark five squares of 4 metres by 4 metres (i.e., 16 square metres) using pegs placed at equal distance from each other along the longest diagonal of the plot well before the cassava is ready for harvest.
- Do a stand count of the different crops in each of the squares shortly before the harvest of the main crop, cassava. For example, assume the numbers of plant stands of the different crops per square in the enterprise are as in Table 4.1a. The table shows how to calculate the number of plants of the three different crops in the plot and per hectare.

Table 4.1: Calculating Production of Crops by Enterprise and Hectare				
Table 4.1a: Calculating the Number of Plants Per Plot and Per Hectare				
Variable	How to Calculate	Number of Plant Stands in the Square		
		Cassava	Taro	Sweet Potato
Square number: 1		20	1	2
2		18	0	3
3		20	1	1
4		15	2	1
5		17	1	3
Total number	Total number = A	90	5	10
Av. number plants/square	Av. plants/square = A/5 = B	18	1	2
Total plants in enterprise plot	0.125 has = 10,000 * 0.125 = 1,250 sq. m. Plants in plot = ((B/16)*1,250) = C	1,406	78	156
Total plants in enterprise plot/ha	Plants/ha = ((B/16)*10,000) = D	11,250	625	1,250

- Harvest two plants of the main crop per square and estimate the average weight per plant. For example, assume the weights of production of the two plants for each square in the enterprise in Table 4.1b. The table shows how to calculate the total production of the main crop from the plot and per hectare. The same approach should be used for the minor crops that have economic value.

Table 4.1b: Calculating the Production Per Plot and Per Hectare of Cassava			
Variable	How to Calculate	Production Weight of Cassava (Kgs) ^a	
		Plant 1	Plant 2
Square Number: 1		3	2
2		3	2
3		2	4
4		2	2
5		3	2
Total weight (kgs)	Total weight (kgs) = E	25	
Av. weight (kgs)/plant	Av. weight/plant = E/10 = F	2.5	
Total plants in plot	Plants in plot = C from Table 4.1a	1,406	
Total plants in plot/acre	Plants/ha = D from Table 4.1a	11,250	
Total production (tonnes) from plot	Production from plot = (F*C)/1,000	3.52	
Total production in tonnes/ha from plot	Production/ha from plot = (F*D)/1000	28.12	
a. Exactly the same approach can be used for the minor crops in the cassava-based mixture (see Table 4.1a) if so desired.			

4.2.2 Estimating Total Revenue and Value of Production

Once estimates of total production are known it is relatively easy to translate that into monetary value terms. We need to do that to be able to use the production information in the financial analysis to be described later (see Section 4.4).

Obviously if all the production is sold you would know that value in terms of total money made or what is called **total revenue** (number of units sold multiplied by the price per unit sold).

However, it is likely that some of the production from the enterprise plot on which financial analysis will be conducted has not yet or will not be sold. Therefore a **value of production** has to be estimated by adding together the following two components:

- the total revenue obtained from what was actually sold;
- the estimated value of production from the production that:
 - was consumed by the family;
 - was given away to friends and relatives and to fulfil social obligations;
 - is in store (i.e., not yet sold, consumed or given away).

The sum of these would be valued at a rate per unit for which you think it could have been sold at from the home (i.e., using a price/unit that would exclude any marketing costs).

The term **gross income** is sometimes used. In the context of this manual, gross income is used interchangeably with the term value of production.

4.3 CONCLUDING COMMENT ON ESTIMATING INPUTS AND OUTPUT

Most farmers particularly small farmers do not keep farm records on farm inputs and output. However, such data are essential if meaningful and relevant financial analysis is going to be possible. Therefore we have spent a great deal of time and space in this manual in discussing the mechanics of collecting data on inputs (Section 4.1) and output (Section 4.2). Because such data from crop enterprises (i.e., the major focus of this manual and in fact of most farmers in the Pacific) need to be related to an area, we have also devoted some effort to describing how to estimate plot sizes (Sub-Section 4.1.2).

Obviously if a farming family keeps farm records and knows the area of their plot(s) there is no need to worry about the information so far presented in this module on farm management. Instead attention can be focused only on the analytical sections (Sections 4.4 to 4.8) following this section. However, as just indicated this is unlikely to be the case for the vast majority of farmers being focused on in this manual (see introduction to Chapter 1).

In summary in collecting input and output data the most important thing to remember is to be systematic. As far as input related data are concerned you need to collect four types of data. Each one is important. You may need to begin gathering information by estimating the size of the plot farmed. There may also need to be an estimation of production. As we indicated, you need to be aware that several crops may be grown in a single plot, but again this should not be a problem. If all the crops grown, major and minor, have an economic value, they should be added together to get an estimation of the total value of production from the plot. Remember this value of production also includes not only the product(s) sold but also includes a value for all the production that has not been sold. Again by being systematic and following the methods outlined earlier, you will eventually arrive at a value for the production from a crop enterprise plot.

Farmers need to be encouraged to record as much information as possible and, for this purpose, it might be a good idea to provide them with the necessary forms or a pre-printed note book.

Once we have the necessary data we can then focus on using it for analytical purposes. In the following sections we focus on:

- Analysing the “profitability” of the enterprise with the help of gross margin analysis (Section 4.4).
- Planning with the help of partial budgets (Section 4.5).
- Looking at how sensitive the results of gross margins and partial budgets are to changes in the values of the variables using sensitivity analysis (Section 4.6).
- Looking at labour and cash flows (Section 4.7).
- Estimating net farm income and an introduction to whole farm planning (Section 4.8).

4.4 CALCULATION OF THE GROSS MARGIN

The easiest type of financial analysis for small farmers to do is what is called gross margin analysis. It is a useful tool for the farmer who wants some idea of how “profitable” the enterprise is. The word “profitable” is deliberately put in inverted commas because although gross margin analysis, as indicated earlier (see Sub-Section 4.1.3.1), does take into account variable costs it does not take into account so-called fixed costs. True or real profit is only found when both variable and fixed costs are subtracted from the value of production (see Section 4.8).



Therefore **Gross Margin = Value of Production — Variable Costs**

4.4.1 Definitions of Key Terms Used in Gross Margin Analysis

Before discussing the steps on how to calculate gross margins, it is important to understand the definitions of some of the most important technical terms used. Therefore let us emphasize these once more.

- **Gross Margin** is the gross income (i.e., value of production) minus variable costs, expressed in terms of an input. For example, in the case of crops it is often expressed in per hectare terms. Gross margins are calculated for specific enterprises.

- Gross Income or Value of Production is production expressed in monetary terms (e.g., kina, vatu). This therefore consists of not only the product (i.e., the main crop) that has been sold, but also an estimated value of that product that has been consumed, given away (e.g., ceremonial gifts) or bartered, and also the value of the product produced on that plot that is still in the farm household store. It also includes the value of by-products, if they have value and the value of production of other minor crops in the mixture (i.e., if it is a crop mixture).
- Fixed Costs are costs that have to be paid whether or not production takes place. This means that they are types of expenses that cannot be avoided, no matter what is grown or raised and cannot easily be allocated directly to any particular enterprise. The services that fixed inputs provide last for more than one production cycle (e.g., one main crop of taro or some other main crop is a production cycle). Fixed costs can be divided into three broad categories:
 - land, buildings and finance costs;
 - machinery depreciation;
 - other costs that have to be met whether or not production takes place.
- Variable Costs are costs that vary according to the level of production (i.e., increase as production increases and decrease as production decreases), and can be easily associated with specific enterprises. The services variable inputs provide usually only last for one production cycle. Some variable inputs are paid for (i.e., are cash inputs) and some are not paid for (i.e., are non-cash inputs). Valuing non-cash inputs requires use of the opportunity cost principle. The cost of any choice (e.g., of using some resource for a given purpose) is given by the value of the best alternative use forgone. For example, in our analysis, the cost of family labour on the farm is what it could have earned if it was used in some way off the farm (e.g., as hired labour).

Examples of variable costs of a crop enterprise would be:¹⁸

- *Hired Labour*: This can be physical or mechanical. It covers labour brought in from outside the farm. It is used for tasks that require doing at times when there is insufficient family labour available (e.g., special weeding operations, assistance with pineapple harvesting, banana sorting before marketing).
- *Seed and Other Planting Materials*: This is usually bought but may be a mixture of purchased and home-grown seed and planting materials. Home-grown seed will have been kept since the previous production cycle and will need to be valued at the value it could have been sold for.
- *Fertiliser*: Inorganic artificial fertiliser is normally bought. Animal or farmyard manure, compost, green manure, and seaweed may also be used and could have a value because of the nutrients in it replaces some or all of those in artificial or inorganic fertiliser. However, if there is no market for it, it can be valued at zero.
- *Sprays*: This includes any chemicals or biological agents used to control weeds, pests or diseases affecting the crop.
- *Sundry Crop Expenses*: This covers any miscellaneous costs. For example, packing materials and marketing group membership fees.

The variable costs of a livestock enterprise may be:

- *Hired Labour*
- *Feed*: This includes feed whether bought or transferred from other enterprises on the farm (e.g., maize produced in the farm and used in preparing a ration for animal feed).
- *Veterinary Fees and Medicines*: This covers all expenditures for animal health, mainly veterinary practitioner's fees and medicines. Prophylactic doses of mineral or vitamins intended to ensure health of intensively reared stock (e.g., pigs or poultry) would also be included here.

¹⁸ Here only production costs are included but as discussed shortly (Sub-Section 4.4.3.3), marketing costs relating to selling the production are also a legitimate expense (see example of variable costs relating to a livestock enterprise that follows this one).

- *Livestock Transport:* If the amount of produce to be transported is considerable, a transportation company may need to be contracted. Often for small amounts, farmers prefer to take their own animals to market.
- *Sundry Livestock Expenses:* This would include items such as ear tags for animals' identification and bedding.

4.4.2 Steps in Doing Gross Margin Analysis

There are a number of steps involved in setting up a gross margin. The specific steps in setting up the gross margin for the enterprise, which requires information and data collected earlier (Sections 4.1 and 4.2), would be as follows (Table 4.2):

- Complete the identification information about the enterprise plot as indicated in the first three rows of the table.
- Record the area of the plot [A].
- Record the gross income or value of production for the plot. For this, enter the following:
 - Estimate the following for the total production of the main crop produced, and also preferably any minor crops in the mixture that were harvested during the production cycle of the main crop:
 - ★ the numbers of units sold and price per unit received.
 - ★ the numbers of units still possessed that have not yet been sold or will not be sold and valuing them at a rate per unit for which they could have been sold at from the home (use a price per unit from which any potential marketing costs have already been subtracted).^{19 20}
 - the number of units that have been eaten, given away or bartered, and what it would have cost to buy them per unit;
 - an estimated value of any by-products produced from the plot that could have been sold from the home (e.g., cuttings).
- For each of the above:
 - Multiply each entry in the 'Nos. of Units' column by the entry in the 'C/Unit' column²¹ and write the result in the 'Total' column [B].
 - Add the entries in the [B] column above the [C] cell and enter the result in cell [C]. This is the total estimated value of production (i.e., gross income).
- Itemise the different non-labour variable inputs (i.e., material inputs) used directly in the plot (e.g., chicken manure, planting material) and for each input, record the numbers of units used, the cost/unit, and therefore calculate the total variable cost for that input (i.e., by multiplying the entries in the previous two columns). There are two types of non-labour variable inputs to include:
 - Those paid for: cash non-labour variable inputs. These are obvious and easy to include because cash was paid for them (e.g., inorganic or artificial fertiliser, seeds purchased for planting). Any costs relating to marketing the production sold should also be included here (see Sub-Section 4.4.3.3).
 - Those not paid for: non-cash, non-labour variable inputs. If some of the inputs were free but had value in the sense they could have been bought or sold then a value (i.e., cost) should be estimated (i.e., imputed) for them. Examples could be planting materials obtained from within the farm, green manure, etc.
- Total cost of non-labour variable inputs can then be calculated by adding together all the items in the cells in the 'Total' column [B] under the 'Non-Labour' input line and above cell [D] and enter the result in cell [D].

¹⁹ Note that that the first item above where the price per unit received has been entered it is quite likely that there will be marketing costs and these will need to be subtracted in the variable cost part of the gross margin table.

²⁰ These could be units eaten, given away, bartered and/or still be in stock.

²¹ C refers to the currency — it could therefore be kina, vatu, etc.

- Enter the units of labour (i.e., preferably hours) and the total number of units of hired and family labour on the plot in the 'Units' and 'Nos. of Units' columns. If necessary use Table 4.2b to help in coming up with the total numbers. Both hired labour and family labour need to be considered because:
 - Labour is the major input used on small farms since little use is made of mechanical power and equipment and use of non-labour variable inputs, particularly those paid for with cash, are very limited.
 - Hired and family labour are substitutes for each other.

Table 4.2: Calculation of a Gross Margin					
Table 4.2a: The Gross Margin for an Enterprise					
Name of the enterprise: _____					
Location of enterprise: _____				Year of enterprise estimation: _____	
Name of the farmer: _____					
Item	----- Size of Plot: _____ Has [A] -----				C/0.1 Ha [B]/([A]0.1)
	Units	Nos. of Units	C/Unit	[B] Total C	
Gross Income:					
Total Gross Income [C]:				[C]	
Variable Costs:					
Non-labour costs:					
Total non-labour costs:				[D]	
Labour costs:					
Hired		[E]		[F]	
Family		[G]		[H]	
Total Variable Costs:					
Total including family labour [I = D+F+H]				[I]	
Cash costs [J = D+F]				[J]	
Gross Margins:					
For plot (imputed) [K = C - I].....				[K]	
Per 0.1 ha (imputed) [L = ((K/A)(0.1)).....					[L]
Per labour hour [M = (C-D)/(E+G).....				[M]	
Per C cash cost [(K+J)/J].....				[N]	

Table 4.2b: Labour by Operation on the Enterprise						
Labour Operation	Units (Hrs. or Days)	Number of Units			Labour Cost	
		Family	Hired Labour	Total	Cost/Unit	Total
Total Units and Cost						

The total hours of hired labour and its total cost are entered in cells [E] and [F]. Although it is relatively easy to put in a cost per unit of hired labour, and therefore to calculate the total cost of hired labour, it is more difficult in the case of family labour. To estimate (i.e., impute) a cost for this we use the opportunity cost concept and assume that the family labour could work as hired labour and therefore the value of family labour per unit of input (i.e., preferably per hour) is what it would cost to hire it. Therefore this value, which is entered in the 'C/Unit' cell for family labour is multiplied by the number of units worked in cell [G] and the total imputed cost for family labour entered in cell [H].

- Two types of total variable costs are then estimated as follows:
 - The total variable cost including the imputed cost of family labour is calculated by adding together the entries in cells [D], [F] and [H] and the amount entered in cell [I].
 - The actual cash variable costs are calculated by adding together the entries in cells [D] and [F] and entering the result in cell [J].²²
- Find the imputed gross margin for the enterprise by subtracting total variable cost including a value for family labour used (i.e., the amount in cell [I]) from the gross income or value of production (i.e., amount in cell [C]) and entering the result in cell [K].
- To help in comparing returns from different plots of the same enterprise, another column has been added in the table where the figures can be converted into 0.1 hectare terms (i.e., by dividing the entries in column [B] by the size of plot in hectares [A] and multiplying by 0.1. The reason for using 0.1 hectare (i.e., the column including cell [L]) is because of the small size of many of the plots operated by small farmers and hence the difficulty of visualising a hectare. If the imputed gross margin is positive, it indicates the enterprise is "profitable", and if the gross margin from one plot with that enterprise is higher than another plot with the same or different enterprise, the former plot is better in financial terms, at least in per unit area (e.g., hectare terms). If the figure is negative then it would indicate a loss is being made.

If this is complicated enough one can stop the analysis at this point. However, there are other types of analysis that can be done and which also give some interesting results. Farmers have limited amounts of land, labour and cash available. Commercially oriented farmers who want to make as much "profit" as possible, should try to make the return from each unit of the most limiting input as high as possible. Therefore:

- If land is the scarcest input as far as they are concerned, then they should try and make the gross margin/hectare as high as possible. Therefore the calculation we just did above is sufficient.
- If however labour is more limiting in their farming operation then they may be interested in making the return per unit of labour as high as possible. In that case a small additional calculation is needed as shown in Table 4.2a. The gross margin for the plot is calculated with just non-labour cash variable costs subtracted (i.e., the amount in cell [C] minus the amount in cell [D]) and the result is then divided by the number of labour units (e.g., hours) spent on the plot (i.e., the sum of the amounts in cells [E] and [G]). The result is entered in cell [M]. The higher the return in C/unit of labour in cell [M] the better is the return per unit of labour. If the return per unit labour is higher than the going hired labour wage rate then this is good indicating that allocating labour to the enterprise is greater than would be obtained from working as a hired labourer. On the other hand if the return per unit of labour is less than the going wage rate it would imply that it would be better to use the labour elsewhere (e.g., work as a hired labourer).
- Finally if there is very limited availability of cash to spend on inputs for the plot it would be important to try and make the return per C spent as high as possible. The return can easily be calculated simply by dividing an adjusted imputed gross margin from the plot (i.e., the sum of the actual variable cash costs (i.e., cell [J]) and the imputed gross margin (i.e., the amount in cell [K]) by the actual variable cash costs (i.e., amount in cell [J]) and entering the result in cell [N]. Once again the higher it is the better.

²² In actual fact using the term actual cash variable costs is not strictly correct because it does include a value for non-cash non-labour variable inputs that could have been purchased. However, it is a convenient and simple term to use.

4.4.3 Additional Issues Concerning Gross Margin Analysis

The above discussion is simply an introduction to the complexities of gross margin analysis. The only way to learn it properly is to practice using it. An empirical example of the approach is provided in Sub-Section 4.4.4. Three other issues will be addressed first:

- production cycle differences (Sub-Section 4.4.3.1);
- labour (Sub-Section 4.4.3.2);
- marketing costs (Sub-Section 4.4.3.3).

4.4.3.1 Production Cycle Differences

Different crops can differ greatly in the length of their **production cycles**—that is, the time taken from planting to produce a harvested crop. The best way to illustrate this is with an example. Supposing a farmer grew both taro and sweet potato on similar sized plots and then compared the gross margins. To be fair it would be good

to compare the combined gross margins for two crops of sweet potato with one crop of taro because the production cycle of taro is about twice as long as that of sweet potatoes (9 to 10 months compared with 4 to 5 months). Therefore, on a particular piece of land it would be possible to grow two crops of sweet potatoes in the time it took to grow one crop of taro.

Box 4.6: Gross Margin

Most small farmers in the Pacific do not have a good sense of the gross margin of their farming operation. The primary reason is that generally they are not able to differentiate farm expenses (their variable cost) from family expenses. For the same reason, they also tend to have little understanding of the difference between their total revenue and their profit.

4.4.3.2 Handling Labour

Labour is the major input used by small farming families in implementing enterprises. Unfortunately it is also one of the most complicated inputs to handle in any financial analysis because such types of farmers rely greatly on family rather than hired labour. Sub-Section 4.4.2 suggests putting a value on family labour by costing it at the hired wage rate. However, an alternative and perhaps easier approach is to avoid imputing a value to such labour: this can be done by subtracting the total non-labour variable costs from the total gross income and dividing the total by the total number of units of family and hired labour. In terms of Table 4.2a this would be calculated as follows: $[(C-D)/(E+G)]$; the same number appears in cell [M].

As indicated earlier if the return per unit of labour proves to be higher than the hired wage rate, then doing that enterprise is better than working as a hired labourer. If it is less, then the desirability of continuing working on that enterprise is questionable since working as a hired labourer would be more remunerative.

Such considerations are important if the amount of labour available is limited and reliable hired labour opportunities exist. However, there may also be other reasons for growing that enterprise other than simply maximising “profit”. When labour is the most limiting input, this is achieved when the return to labour is maximised. Remember, however, that small farmers have multiple goals and therefore basing a decision simply on maximising “profit” may not be desirable.

4.4.3.3 Dealing with Marketing Costs

In conventional gross margin analysis, costs of marketing the products are often omitted. (Marketing is discussed in Chapter 5). For most small farming families, the main marketing cost consists of transporting the product to the place of sale. However, it can also consist of other expenses relating to marketing the product such as purchasing the containers for transporting the product, renting a stall at the market if they sell the product themselves, etc. There are two ways of dealing with marketing costs as far as gross margin analysis is concerned. These are as follows:

- Using the **farm gate price** as far as estimating the gross margin is concerned. This involves taking the price per unit received at the point of sale (i.e., the market) and subtracting the cost per unit associated with the marketing process. This is often used in conventional gross margin analysis.
- Using the price received per unit of product at the point of sale (e.g., market) and subtracting under the variable cost part of the gross margin work sheet the costs associated with the marketing process (such as any packaging costs, transport costs, rent of market stall, value of any labour devoted to the marketing process, etc). Any production that is not sold (i.e.,

eaten by the family, in store, used for meeting social obligations, etc.) is valued at what the farming family would have been paid for it had they sold it at the farm (i.e., the farmgate price). This is the approach presented in this reference manual.

4.4.4 Example: Gross Margin Calculation and Result Interpretation

Table 4.3 shows an example of the gross margin of a cassava plot.²³ The example indicates the cassava plot was highly profitable (i.e., \$193.00 in cell [K]). The results also indicate that the return per hour of family labour, per hour of hired labour, and per dollar of cash costs was also favourable (see results in cells [M] and [N]).

A figure for the gross margin per 0.1 acre has also been calculated (\$643.33). The objective of this is to have the potential for comparing the gross margins from other plots of cassava or another crop with that of this cassava plot. Doing this requires comparing the results from plots of the same size hence the reason for converting the figure for 0.03 acres to 0.10 acre so it can be compared with other plots whose figures have also been adjusted to being expressed in terms of 0.10 of an acre.

Note that transport costs with marketing some of the tubers have been included under the variable costs, and the market price received for the tubers sold is higher than the estimated farm gate price for tubers not sold.

Table 4.3: Calculating the Gross Margin for a Cassava Plot, Palau, 2002					
Table 4.3a: The Gross Margin for a Cassava Plot, Palau, 2002					
Name of the enterprise: <u>Cassava Plot</u> Year of enterprise estimation <u>2002</u>					
Location of enterprise: <u>Airai</u> Name of the farmer: <u>Jim</u>					
Item	-----Size of Plot: 0.03 Acres [A] -----				\$US/0.1 Acre [B]/([A]0.1)
	Units	Nos. of Units	\$US/Unit	[B] Total \$	
Gross Income:					
<i>Tubers sold</i>	<i>Lbs</i>	400	0.60	240.00	
<i>Tubers not sold</i>	<i>Lbs</i>	50	0.50	25.00	
Total Gross Income [C]:				[C] 265.00	
Variable Costs:					
Non-labour costs:					
<i>Fertiliser</i>	<i>Bags</i>	1	15.00	15.00	
<i>Transport</i>	<i>Trips</i>	2	6.00	12.00	
Total non-labour costs:				[D] 27.00	
Labour costs:					
Hired	<i>Hours</i>	[E] 18.00	2.25	[F] 40.50	
Family	<i>Hours</i>	[G] 2.00	2.25	[H] 4.50	
Total Variable Costs:					
Total including family labour [I = D+F+H]				[I] 72.00	
Cash costs [J = D+F]				[J] 67.50	
Gross Margins:					
For plot (imputed) [K = C - J].....				[K] 193.00	
Per 0.1 ha (imputed) [L = ((K/A)(0.1)).....				[L] 643.33	
Per labour hour [M = (C-D)/(E+G).....				[M] 11.90	
Per C cash cost [(K+J)/J].....				[N] 3.86	

²³ This data was kindly provided by the Senior Horticulturist at the Bureau of Agriculture in Palau.

Labour Operation	Units (Hrs. or Days)	Number of Units			Labour Cost	
		Family	Hired Labour	Total	Cost/Unit	Total
<i>Planting</i>	<i>Hour</i>	2.00	2.00	4.00	2.25	9.00
<i>Weeding</i>	<i>Hour</i>		5.00	5.00	2.25	11.25
<i>Fertiliser</i>	<i>Hour</i>		5.00	5.00	2.25	11.25
<i>Harvesting</i>	<i>Hour</i>		6.00	6.00	2.25	13.50
Total Units and Cost	<i>Hour</i>	2.00	18.00	20.00	2.25	45.00

4.4.5 Concluding Statement

Calculation of gross margins is relatively easy to do. However, it is important to recognize that gross margin is not a true measure of the “profit” of an enterprise since it only takes into account variable costs and not fixed costs. However, it avoids the problem of having to allocate fixed costs among the different enterprises. Most small farming families in the Pacific have very little invested in farm buildings and equipment, so their levels of fixed costs tend to be very low. Therefore, for these farmers, gross margin analysis gives a relatively good estimate of true profit.

4.5 PARTIAL BUDGET ANALYSIS

Partial budget analysis is a simple farm-planning tool for assessing the potential “profitability” of making a specific small change in the farm business. For example, the results of a crop demonstration on a farmer’s farm may have suggested that the technology or technological package being demonstrated is “profitable” and therefore potentially attractive. Partial budget analysis then can quickly give some idea of whether it is likely to be financially attractive for the farmer to adopt it. The analysis can be done quickly and easily by facilitators and literate farmers.

4.5.1 When and Why to Use Partial Budget Analysis

It is not always easy, or even feasible, to collect information on all the inputs and outputs for an enterprise or technology. Fortunately partial budgeting does not require this to be done. This planning tool requires only information (expressed in monetary terms) about those output and inputs that will actually change as a result of small adjustments in the farm business.

Partial budget analysis is well suited for evaluating changes of the following types:

- changing the size of a specific enterprise as a result of changing another enterprise;
- substituting one technology or enterprise for another;
- changing one enterprise on a plot (e.g., changing a plot from cassava to dryland taro).

The partial budgeting analysis approach can be used in assessing many technology and enterprise type changes, although any required investment that provides services over more than one production cycle (e.g., a rototiller) needs to have its cost allocated proportionally to each production cycle which will occur during its expected lifetime.

There are a number of situations, however, where the use of partial budget analysis is not recommended. Three of them are as follows:

- when considering introducing a brand new enterprise (i.e., crop or livestock);
- when the improvements being considered will require major changes in organisation of the farm and its resources;
- when the actual overall “profitability” of the technologies and/or enterprises being compared, needs to be calculated.

4.5.2 Definitions of Key Terms Used in Partial Budget Analysis

Additional terms that need defining in addition to those introduced earlier with reference to gross margin analysis (see Sub-Section 4.4.1) are as follows:

- **Partial budget analysis** is concerned with evaluating the financial consequences—expressed in terms of “profit”—of changes in technologies or enterprises that affect only part of the farm. Consequently, it is sometimes called **partial profit budget analysis**.
- **Sensitivity analysis** is the process of changing the value of one or more of the variables, in this case in partial budget analysis, and determining how sensitive the results are to such changes.
- A **breakeven budget** is drawn up to estimate the value of the selected variable (e.g., price per unit of the product or input, number of units of output or input) at which the gains and losses are equal (i.e. the net change equals zero). The value that is determined in this way is called the **breakeven value**.

4.5.3 Check List of Steps in Partial Budget Analysis

There are a number of steps involved in partial budget analysis when comparing two specific technologies for a particular enterprise or two different combinations of enterprises. Note that it is good for the facilitator to record as much detail as possible (e.g., weights, costs per unit, etc.) not only to help trigger the memory at a later date but also to be able to adjust one of the variables and redo the analysis to see if the results change significantly.

A step-by-step approach to partial budgeting is as follows (Table 4.4):

- Write down exact details concerning the change being considered (e.g., for a technology, whether or not to feed supplement to a pen-fed pig, and for an enterprise, whether to reduce the area devoted to growing Chinese cabbage in favour of growing more cucumbers).
- List the potential *gains* of the change in terms of units, price per unit, and total value of the item. Once again these need to take into account two components as follows:

Table 4.4: A Partial Budget Layout		
Change Being Considered:		
Gain or Loss	Description	\$
Gains		
Added Returns:		
Subtotal		
Reduced Costs:		
Subtotal		
Total Gains [A]		
Losses		
Reduced Returns:		
Subtotal		
Added Costs:		
Subtotal		
Total Losses [B]		
Net Increase or Decrease [A-B]		
Value Cost Ratio [A/B]		
Other Considerations:		

- the *added returns* that would be obtained from the proposed change;
- the *reduced costs* (i.e. costs saved) that would occur as a result of the proposed change.

Then add them together to get an estimate of the potential total gain from adopting the change— Row [A].

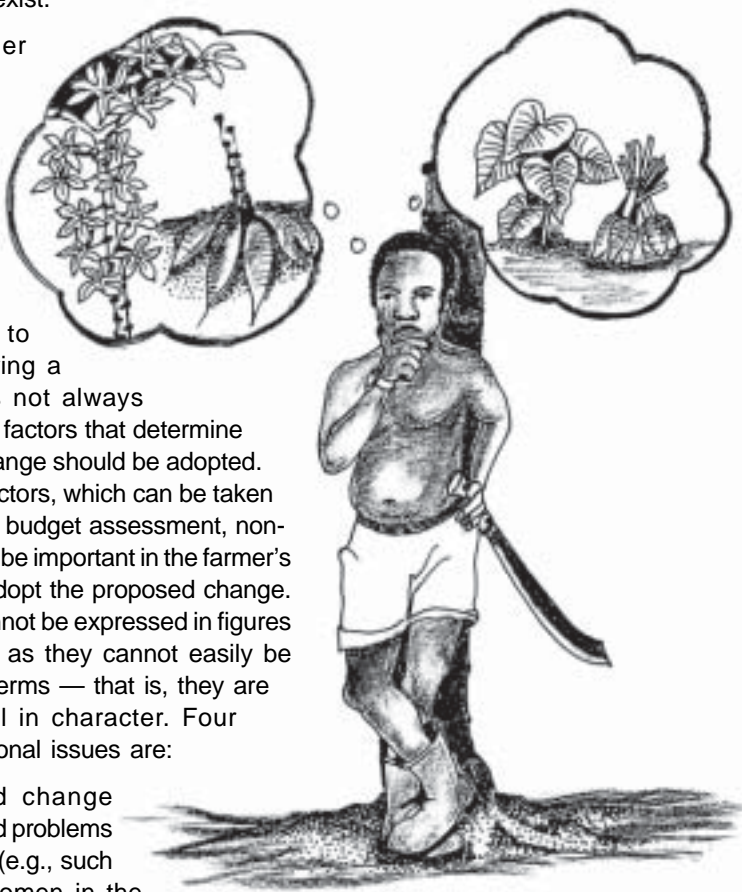
- List the potential *losses* (i.e., costs or losses) of the change in terms of units, price per unit, and total value of the item. These need to take into account two components, as follows:
 - The *reduced returns in gross income* that would occur in adopting the proposed change;
 - The *added costs* that would be incurred from adopting the proposed change.

Then add them together to estimate the potential total loss from adopting the change — Row [B].

- Subtract the potential total loss from the potential total gain to estimate the potential net gain or loss [A-B]. If the figure is positive there will be a potential net gain from adopting the change. However, if the figure is negative there will be a potential loss from adopting the change.
- Divide the total gain by the total loss to obtain what we call the **value cost ratio** (VCR) — [A/B].
 - If the VCR has a value of more than one, then the proposed change shows a positive net change (i.e., “profit”).
 - However, the VCR goes one step further in indicating the extent of any potential gain. For example, a VCR of 1.20 means that the proposed change would pay for itself and return another 20% in additional earnings to land, labour and capital owned by the farmer.
 - A VCR of 1.50 to 2.00 is considered good unless there is high inflation rate or a high risk is involved — as is the case with perishable vegetables or root crops or a situation where marketing problems exist.

- Finally record any other consideration outside the partial budget analysis that might be important in determining whether the proposed change is attractive and feasible — that is, the so-called non-monetary factors. It is important to remember when preparing a partial budget that it is not always possible to include all the factors that determine whether the proposed change should be adopted. In addition to monetary factors, which can be taken into account in the partial budget assessment, non-monetary factors can also be important in the farmer's decision on whether to adopt the proposed change. Some of these factors cannot be expressed in figures (i.e., quantitative) terms, as they cannot easily be expressed in numerical terms — that is, they are qualitative or attitudinal in character. Four examples of these additional issues are:

- Does the proposed change create internally related problems for the farming family (e.g., such as increased risk, women in the family having to work harder) and are these acceptable given the potential benefits? A primitive idea of the degree of risk can be done with the help of sensitivity analysis (see Section 4.6).



- Assessing the implications for changes in the type, nature, amount, and composition (i.e., both seasonal and by gender and/or age) of the work to be done. For example, the work required to adopt the proposed change may be concentrated at the time of year when the family is already very busy and/or may require more work by women who are already very busy. Labour flow profiles can be very helpful in assessing whether this is likely to be an issue (see Sub-Section 4.7.1).
- Does the farming family possess the necessary management skills to adopt and benefit from the change? If the proposed change consists of a number of components, adoption may require more skill and knowledge (e.g., on timing of operations, maintenance and repair of equipment, etc.). If the family does not possess such knowledge or skill, or they cannot ensure they will be able to acquire it, they may not benefit from adopting the change.
- Does the proposed change require extra reliance on external factors and are these likely to be available? An obvious example is whether the necessary, externally purchased inputs are likely to be available. Related to this, is the issue of the availability of money when required. For a major expenditure (e.g. buying a piece of equipment or investing in some other type of capital item) this may require obtaining a loan. However, even for smaller items, cash flow related constraints may be a problem. Assessing the extent of this potential problem can be done using a cash flow profile analysis (see Sub-Section 4.7.2). Another common problem area concerns potential demand for the product that is likely to result from the change — either from the farm family itself or in the marketplace. It is important to know whether the price is likely to stay the same and will be reliable, when determining how attractive it will be for the family to adopt the change.

Given the above examples, it is only reasonable to make a recommendation on whether or not a proposed change should be adopted after all the monetary (i.e., analysed via partial budget analysis) and non-monetary factors have been explored and evaluated.

4.5.4 Example: Partial Budget Calculation and Result Interpretation

Table 4.5 illustrates a partial budget relating to livestock to determine whether to raise improved hybrid-strain ducks rather than the native Malaysian ducks (Amir and Knipscheer, 1989). The hybrid ducks require more feed, labour and water, which all add costs, but this is offset by the heavier weight of hybrid-strain ducks compared with the Malaysian ducks. This gives an additional return when expressed in value terms. At the same time the heavier ducks produce more manure, which has some value as a by-product and therefore should be included as an extra return, while the additional feed required results in money being obtained from selling the empty bags that contained the food. The result of the partial budget analysis indicates that switching from raising Malaysian to hybrid ducks would appear to be more “profitable”, but would give a relatively unimpressive VCR of about 1.08.

An important point to note about the calculation in Table 4.5 is that two types of the same product (i.e., ducks) are being compared. Therefore two approaches can be used in calculating the partial budget:

- It is possible to put the added weight of the hybrid ducks in the “Added Returns” part and to estimate the remaining components in the “Added Returns” and “Added Costs” sections on that added weight. That is the approach used in Table 4.5.
- An alternative approach is to include the total weight of the hybrid ducks in the “Added Returns” part and calculate the other items in the “Added Returns” and “Added Costs” sections of the table based on that inclusion. In that case, the total weights of the Malaysian ducks would have to be included in the “Reduced Returns” section of the table and the other items in the “Reduced Returns” and “Reduced Costs” parts of the table would have to be calculated in relation to that.

The alternative approach (i.e., the one not shown in Table 4.5) would need to be used if the farmer was considering changing, for example, from sweet potatoes to taro on a particular plot. In that case, the longer production cycle of taro would mean that one crop of taro would need to be compared with two crops of sweet potatoes (see discussion in Sub-Section 4.4.3.1).

Other non-monetary factors could also influence the anticipated results in Table 4.5, for example:

- Is the quality of the meat, as far as consumers are concerned, the same for both the hybrid and the native Malaysian ducks? If consumers potentially prefer the Malaysian ducks, this would result in reducing the price of the hybrid duck meat, hence reducing the added returns. If this was the case, the reduction in revenue received from switching away from Malaysian ducks would need to be taken into account under the “Reduced Returns” section.
- If the hybrid and Malaysian ducks differ in the susceptibility to ill health, adjustments would be required. If the Malaysian ducks tend to be less healthy, this would be taken into account in the “Reduced Costs” section; if hybrid ducks tend to be less healthy, the information would be included in the “Increased Costs” section.
- Will the hybrid ducks breed or will it be necessary to buy ducklings all the time? If this is a problem, sometimes then it would be necessary to put the cost of such purchases under the “Added Costs” section of the table.

Table 4.5: A Partial Budget Comparing Hybrid Ducks with Native Malaysian Ducks (M\$)		
Change Being Considered: Raising hybrid-strain ducks instead of native Malaysian ducks.		
Gain or Loss	Description	\$
Gains		
Added Returns:		
<i>Added weight of hybrid ducks</i>	<i>235.73kgs at \$3.25/kg</i>	<i>766.12</i>
<i>Additional feedbags (resale)</i>	<i>21 bags at \$1.15/bag</i>	<i>24.15</i>
<i>Manure</i>	<i>31% of body weight: 235.73kgs body weight at \$0.05/kg</i>	<i>3.65</i>
Subtotal		<i>793.92</i>
Reduced Costs:		
Subtotal		<i>0.00</i>
Total Gains [A]		<i>793.92</i>
Losses		
Reduced Returns:		
Subtotal		<i>0.00</i>
Added Costs:		
<i>Additional feed required by hybrid ducks</i>	<i>873.03kgs at \$0.83/kg</i>	<i>724.61</i>
<i>Extra labour required for raising hybrid ducks</i>	<i>\$10.79 worth</i>	<i>10.79</i>
<i>Extra water required for raising hybrid ducks</i>	<i>\$3.00 worth</i>	<i>3.00</i>
Subtotal		<i>738.40</i>
Total Losses [B]		<i>738.40</i>
Net Increase or Decrease [A-B]		<i>55.52</i>
Value Cost Ratio [A/B]		<i>1.08</i>
Other Considerations: <i>See discussion with respect to this particular example in the text</i>		

4.5.5 Concluding Statement

Partial budget analysis can be useful in evaluating the potential financial feasibility of small changes in technologies and/or enterprises in the farm business. It is important, however, to bear in mind that whether or not a farmer decides to adopt the change will also depend on other considerations (e.g., being able to handle the seasonal demands of labour and cash) as well as other factors of a non-monetary nature. It is also important to remember that partial budget analysis only indicates whether the proposed change is more or less “profitable” compared with no change. This does not indicate whether the proposed change is actually “profitable”. Determining whether the change results in returns greater than variable costs requires the use of gross margin analysis.

The evaluation methods introduced in this instructional manual are a good starting point. Additional types of analyses that could be useful are to look at the following:

- How risky is the change likely to be? One simple way of determining this is to vary the yields, price of the output, and/or costs of inputs and to see if the gross margin still stays positive (i.e., the technology is profitable). This is sensitivity analysis, which is described in more detail in Section 4.6. Risk management is also addressed in a more general way in Chapter 7.
- Is the change technically feasible given the inputs at the family's disposal? This can be examined with the help of labour flow profiles and cash flow profiles, which look at whether there is potentially sufficient labour and cash available at different times of the year to make it possible to use the proposed technology or technological package effectively (see Section 4.7).
- Is the necessary support system present? This means being sure that the inputs that have to be purchased are potentially available when they are required and that there is a reliable market for marketing the products produced.

4.6 SENSITIVITY ANALYSIS

Farmers and facilitators are likely to be interested in knowing how sensitive the net changes relating to the proposed adjustments are to changes in the price received for the product or the costs of the different inputs, or even changes in the physical coefficients (in other words, production). This can easily be determined with the help of sensitivity analysis, which can be done on both gross margins and partial budgets. The analysis involves changing the variable of interest and recalculating the gross margin or partial budget and the resulting net change. In a sense, it is a very crude measure of risk, especially if you vary the factors that are most likely to vary in reality. If, as a result of the recalculation, there is a negative result (negative gross margin in the case of gross margin analysis and net decrease in the case of partial budget analysis), then there may be some risk involved with the proposed change.²⁴

Sometimes, it is useful to create a breakeven value for the variable being investigated. This involves creating a breakeven budget, in which the net change equals zero. The principle behind calculating a breakeven value is to:

- decide which variable to change (for example, price or cost per unit, number of units of output);
- change the values of the variable in the gross margin or partial budget analysis, and the values of any other variables related to it, in such a way that the net change becomes zero.

Examples of sensitivity and breakeven analysis based on material presented earlier are given in Table 4.6. Comments on the figures are as follows:

- Table 4.6a shows the results of sensitivity analysis based on the cassava gross margin example from Palau. Note that the \$193.00 in the table is the imputed gross margin for 0.03 acres of cassava that appears in Table 4.3. Sensitivity analysis was done using different prices for the cassava tuber and different costs of hired labour as indicated in Table 4.6a. The results of the calculations, as expected, indicate that as the price received for tubers went down and the cost of hired labour went up, the gross margins went down. However, at the range of prices used, the gross margin was still positive, which is good. The results of the breakeven analysis in the same table indicate that the price received for cassava would have to go very low (assuming nothing else changes) or the cost

Box 4.7: Sensitivity Analysis

Frequently, the price of agricultural produce changes depending on the season. For example, in Fiji, the main pineapple season runs from November to January. During this high season, a dozen sells for F\$5-6. During the off-season, however, a farmer can sell a dozen for F\$10. While this higher price is appealing, farmers need to be aware of the risks and costs associated with growing pineapple for the off-season. Sensitivity analysis helps farmers work out their return, balancing the added profit of the high season price against additional costs (such as using fruiting initiating hormones) needed during the off-season.

²⁴ Calculations on sensitivity and breakeven analysis are very easily done on a computer using a spreadsheet.

of hired labour would have to go very high (once again, assuming nothing else changes) before the gross margin dropped to zero (there was no “profit”). Therefore in terms of the variables considered and the figures used, cassava appears to be quite an attractive crop.

- Table 4.6b shows the results of sensitivity analysis based on the hybrid duck partial budget example in Table 4.5. Note that the \$55.52 in the table is the net increase of changing from native Malaysian to hybrid ducks that appears in Table 4.5. Sensitivity analysis was done using different prices for the hybrid ducks and different costs of feed as indicated in Table 4.6b. As expected, the calculations indicate that as the price received for hybrid ducks meat went up and the cost of feed went down, the gross margins went up. However, note that if the price received for hybrid duck meat went down and/or the cost of feed went up, the net gain was replaced by a net loss (note the minus signs in the table). This indicates that the results were quite sensitive to changes in the price received for hybrid duck meat and the cost of feed. The results of the breakeven analysis in the same table indicate that the price received for hybrid duck meat would not have to drop very much (assuming nothing else changes) or the cost of feed would not have to increase very much (once again assuming nothing else changes) before the gross margin dropped to zero (there was no “profit”). Therefore in terms of the variables considered and the figures used, changing to hybrid duck production does not appear to be a very attractive proposition.

Table 4.6: Examples of Sensitivity Analysis			
Table 4.6a: The Gross Margin for a Cassava Plot, Palau, 2002 (Table 4.3)			
Cost/Hour of Hired Labour (\$)	Price/Lb of Tuber (\$)		
	0.40	0.60	0.80
2.00	117.50	197.50	277.50
2.25	113.00	193.00	273.00
2.50	108.50	188.50	268.50
Breakeven Value Estimate (i.e., Gross Margin is \$M0.00)			
Held Constant		Breakeven Value	
\$0.60/lb of tuber weight		\$12.97/hour cost of hired labour	
\$2.25/hour cost of hired labour		\$0.12/lb of tuber weight	

Table 4.6b: Partial Budget Comparing Hybrid Ducks with Native Malaysia Ducks Table 4.5)			
Cost/Kg of Feed (\$M/Kg)	Price/Kg of Added Weight of Hybrid Ducks (\$M)		
	3.00	3.25	3.50
1.00	-151.83	- 92.90	- 33.97
0.83	- 3.41	55.52	114.45
0.60	197.38	256.31	315.25
Breakeven Value Estimate (i.e., Net Gain is \$M0.00)			
Held Constant		Breakeven Value	
\$M3.25/kg of hybrid duck added weight		\$M0.89/kg cost of feed	
\$M0.83/kg cost of feed		\$M3.02/kg of hybrid duck added weight	

4.7 EVALUATING RESOURCE FLOWS FOR PLANNING PURPOSES

Resources, particularly labour and cash, can be thought of in two ways. At any one point in time we have a certain amount of family labour and cash available. However, they have no value in the production process until they are put to use. For example, family labour is used in crop or livestock operations, and cash is used for purchasing inputs or for hiring labour. For small farming families, the *flow* or use of labour and cash during different parts of the production cycle of crops and livestock can be a major constraint. Labour and cash requirements for undertaking different crop and livestock enterprises can vary greatly during different parts of their production cycles,

and small farming families often don't have easy access to loans to overcome cash shortages for buying inputs and/or hiring labour. For this reason, it is very important to evaluate any planned changes in enterprises on the farm in terms of labour and the cash they may require.

4.7.1 Labour Flows

4.7.1.1 The Concept

Labour is usually in short supply on farms, especially during certain periods of peak activity. If labour is hired the costs normally represent a high percentage of the total production costs. It is essential therefore to plan carefully the use of labour inputs to make sure there will be enough to do all the work.

If farmers decide to change the crops they are growing or to change livestock enterprises, then they will need to be sure they have enough time and family members or hired labour to do the work. Labour requirements at very busy periods (such as at transplanting, weeding or harvesting labour bottleneck periods) can sometimes be met through hiring part-time or casual labour. Farmers, even small farmers, often have insufficient full-time family labour to cover all their labour requirements throughout the year. If they do have enough family labour, then they are likely to have excess labour at other times of the year when farm work is less demanding.

Therefore it is necessary to consider the peaks and troughs of seasonal labour demands on the farm as a whole in relation to the family labour that is available. In order to do this it is necessary to estimate the monthly labour requirements for the various crop and livestock enterprises on the farm. Thus a **labour profile** is constructed. The labour profile shows in a table or graph form the seasonal labour requirements of each enterprise on the farm and illustrates the total labour demand of all enterprises in each month of the year. The procedure for constructing a labour profile is as follows:

Box 4.8: Managing Labour Flow

In Fiji's Ra province, where the Fiji Water factory and Yaqara Pastoral Company are located, farmers are finding it difficult to hire sugarcane cutters. Young men consider harvesting the sugarcane a tough job, and are opting for easier and less strenuous employment. In order to attract these young men, farmers are offering very attractive wages and other motivational benefits.

- Calculate the **person-days** or **person-hours** required²⁵ for each enterprise in total. Obviously the larger the size of the enterprise, the greater the amount of labour that will be required (e.g., 0.1 hectare of Irish potatoes will only require 25% of that required for 0.4 hectares).
- Break down the total person-days or person-hours for each enterprise into monthly requirements and then add them together for each month.

From the above labour profile, the **monthly labour flow** can be calculated as follows:

- Enter the family person-days or person-hours available each month in another column.
- Subtract the required person-days from the available ones. If the figure is positive, there will be a surplus of labour that month; if the figure is negative, then labour needs to be hired.

The trough labour periods (months when there is surplus labour) can be used for allocating general farm maintenance, building and equipment repair, etc. Normally, 15% of the total person-days or person-hours worked are considered sufficient for these purposes. This helps smooth out the monthly labour demand and reduces the need to hire casual labour in any given month.

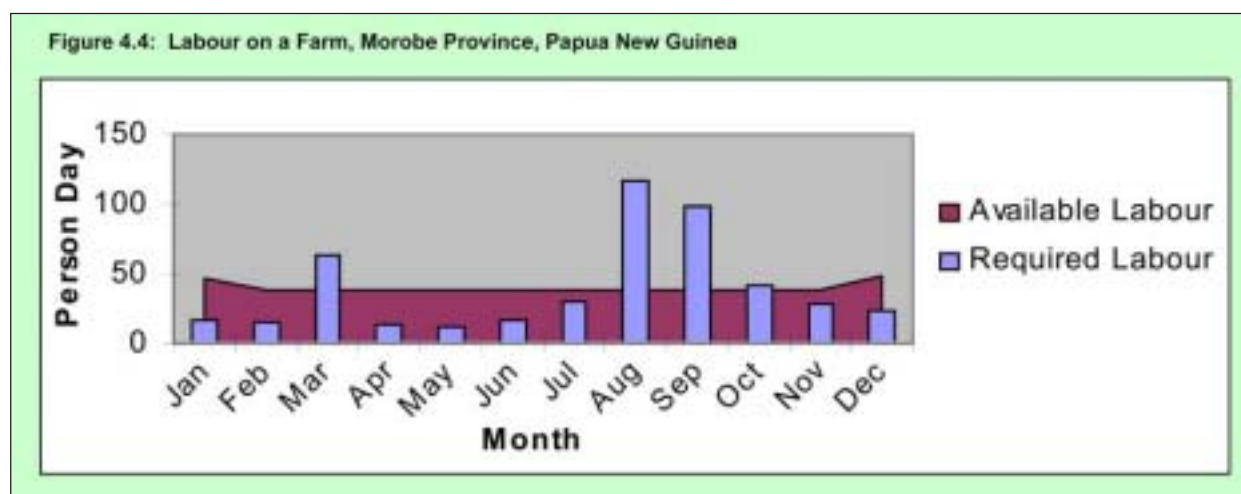
4.7.1.2 Example: Monthly Labour Flow

An example of the total farm labour requirements for a small farm in Morobe Province in Papua New Guinea can be found in Table 4.7. The table shows that the total available person-days on the farm (485 person-days) exceeds the number of days required to carry out all the scheduled

²⁵ Person-days or person-hours are defined as the total time worked by people expressed in days or hours without distinguishing individuals by gender or age. Some would argue that for some tasks men are more productive than women and for others the reverse is true. Certainly very young and old people are less likely to be productive than those in between. However, adjusting for such differences becomes a controversial issue and we have decided not to do so. However, if certain important tasks are very gender specific it may be desirable to separate the labour profiles for men and women.

operations (473 person-days). Table 4.7 and Figure 4.4, which is based on the table, indicate that monthly family labour availability is constant throughout the season except for the beginning and end of the year. The farmer can plan to do less urgent general farm work operations in low farm activity months such as December to February and April to June. If some operations have to be done at a specific time and there is a shortage of available labour on the farm for that month, preparing a labour profile lets the farming family know in advance that they will need to hire labour to meet the agricultural demands that month. The need to hire labour will also affect the amount of money the farming family needs to have to pay labour wages. Such a planning exercise helps alert the farming family to the demands on the farm's cash reserves.

Table 4.7: Labour on a Farm, Morobe Province, Papua New Guinea								
Month	Person Day Requirements for Month					Person Days for Month		
	Banana	Irish Potatoes	Sweet Potatoes	Water Melons	General Farm Work	Requirement	Availability	Surplus or Deficit
January	0	0	0	0	16	16	47	31
February	0	0	0	0	15	15	39	24
March	0	4	40	19	0	63	39	-24
April	3	9	0	2	0	14	39	25
May	5	0	4	2	0	11	39	28
June	0	0	0	0	16	16	39	23
July	0	30	0	0	0	30	39	9
August	18	40	32	26	0	116	39	- 77
September	24	33	33	9	0	99	39	- 60
October	25	8	5	3	0	41	39	- 2
November	4	7	12	6	0	29	39	10
December	0	0	5	3	15	23	48	25
Total	79	131	131	70	62	473	485	12



4.7.2 Cash Flow Analysis

4.7.2.1 The Concept

Cash flow analysis in farm planning can be used to help evaluate the performance of the farm business enterprises, as well as to evaluate the efficiency of alternative decisions that affect farm business activities. The cash flow is primarily a tool to monitor the liquidity of the farm. It can assist in the monitoring of the expenses and cash inflows and can tell the farmer whether he or she has sufficient funds to pay for farm expenses at any given time.

The concept of cash flow is simply the flow of money into a farm from sales and/or income earned from them and the flow of money out of the farm in the form of purchases. The difference between the inflows and the outflows is known as **net cash flow**.

$$\text{Net Cash Flow} = \text{Cash Inflow} - \text{Cash Outflow}$$

The major difference between family labour flows and net cash flow is that, unlike family labour, a surplus of cash from an earlier period can be carried over to finance expenses in a later period. For a farm that is running as a business, to operate in the medium to long-term, it must generate a positive cash flow. More cash must flow into the business than flows out. If not, the farm's borrowings and associated interest costs will continue to increase and eventually the farm business will fail.

To run a farm as a business enterprise, funds must be available at the needed time in order to pay for the purchase of materials, transport of produce, services, hiring labour, etc. Therefore, a cash flow plan should be prepared before starting to implement changes.

In most cases a farming family has more than one enterprise. This means they will have to monitor the cash flow for several enterprises. It is also recommended that the farming family keep a daily record of total cash expenses and cash received in a simple "cash book". At the end of the month someone in the farming family can transfer the entries into the more formalized cash flow records in order to have a good idea about their expenses and cash income over time. When this has been done for some time, the family will have a good idea of what is happening to net cash flow.

An example of the approach to estimating net cash flow is given in the next section (Sub-Section 4.7.2.2).



4.7.2.2 Example: Net Cash Flow

A simple example looks at a sweet potato enterprise and prepares a cash flow chart of this single enterprise (see Table 4.8) based on entries in a simple cash book (Table 4.9). The minus (-) sign indicates that money is flowing out of the farm. The plus sign (+) means money is flowing in. The minus figure for a month indicates the amount of additional cash needed for a particular month.

Expenses and Income (Kina)	Month 1	Month 2	Month 3	Month 4
A. Start up Expenses:				
Hired labour for cultivation	-8.40			
Planting material	0			
Fencing	0			
B. Operating Expenses:				
Fertiliser	-80.00	-80.00		
Labour for:				
Planting				
Weeding	0	0		
Fertiliser application	0	0		
Harvesting, etc	0			0
Transport to market				-52.00
C. Income:				
Tubers sold				+588.00
Total:				
Cash flow	-88.40	-80.00		+536.00
Cumulative cash flow	-88.40	-168.40	-168.40	+367.60

a. The cash flow only extends over a four month period because the production cycle for sweet potato lasts only for that length of time.

Date	Particulars (For What)	Cheque No.	Amount In Kina	
			Received	Paid
20 Jan 02	15 hours of hired labour for planting sweet potatoes			8.40
22 Jan 02	1 bag of fertiliser for sweet potato plot			80.00
10 Feb 02	1 bag of fertiliser for sweet potato plot			80.00
10 Apr 02	Paid private motor vehicle for 2 trips to market in town			52.00
10 Apr 02	In cash from a supermarket in town		588.00	

a. By the way this cash book only includes expenditures and revenues for the sweet potato exercise. It could in fact include cash outflows and inflows for all enterprises.

A farming family who starts to grow sweet potatoes will need kina 88.40 in the first month and kina 80.00 in the second month. This means at least kina 168.40 has to be available before the farming family can hope to get some return from selling the sweet potatoes. If the family does not have the funds available, they will have to look for credit or a short term loan in order to be able to start growing. The farming family should always keep some money set apart for unforeseen expenses and emergencies during the production cycle.

The smart farming family knows that they cannot use all the cash inflow from month 4 for family consumption. Some will need to be reinvested in the farm, in order to start the next production cycle of an enterprise.

4.7.3 Concluding Comment

The available labour profile graphically illustrates the fixed nature of farm family labour (Figure 4.4). This manual argues that all labour, including family labour, can be considered a variable input if it can be directly attributed to a specific enterprise. To summarise, for practical purposes, the farmer should regard his or her labour availability as being fixed, but for the purposes of calculating gross margins for any particular enterprise, labour should be considered to be variable.

The net cash flow profile differs from the labour profile in the sense that unlike family labour cash saved from one period (e.g., month) can be carried over to, and used in, the next period.

Therefore use of cash is more flexible than that of family labour. Constraints in the use of family labour can be addressed in two ways:

- first, by hiring labour with the help of cash;
- second, by changing the way in which tasks relating to specific enterprises are undertaken. There are two methods for achieving this:
 - through increasing the productivity of family labour via mechanisation;
 - through adjusting the timing of operations relating to the specific enterprise in order to avoid labour bottleneck or peak periods (e.g., planting earlier or later).

Labour and net cash flow profiles can be used for planning exercises relating to single enterprises or all of the farm's enterprises together (i.e., the whole farm).

In the case of whole farm planning such an exercise can be useful since not all enterprises have the same production cycles and similar monthly demands relating to labour or cash. For example:

- Cash received from selling production from one enterprise can be used for purchasing planting materials for another enterprise.
- The peak labour periods for different enterprises are likely to differ. Therefore implementing a number of enterprises rather than just concentrating on one can help smooth out the farm's monthly labour profiles.

Labour and net cash flow profiles can also be useful for single enterprises especially if the farming family is considering a small change (for example, changing the technology for a particular enterprise or changing from one enterprise to another). If the labour or net cash flow profile is likely to change significantly then this could provide a signal for investigating the proposed change

further to determine whether it is feasible and/or desirable. At that point it would be necessary to look at the labour and cash flow profiles for the whole farm to see whether the proposed change places less or greater strain on the labour demands at labour peak periods and on cash demands when cash availability is most constrained. If either or both situations are likely to be worse because of the proposed change then the change is likely to be less desirable or feasible than if neither is likely to occur.

4.8 WHOLE FARM PLANNING

As farmers become increasingly commercialised, the concept of whole farm planning becomes increasingly relevant. As small farming families move toward treating farming as a business rather than a way of life, welfare will increasingly be measured in monetary terms. Once monetary income becomes the dominant goal, measuring net farm income and paying increased attention to whole farm planning become increasingly valuable. This section on “modern” farm management shows how net farm income can be calculated and also provides a brief introduction to whole farm planning. Whole farm planning exercises are usually best planned jointly by the facilitator and the farmer. In addition, agricultural economists, particularly those specialising in the area of “modern” farm management, can be very helpful in such planning exercises. In order to estimate net farm income and undertake whole farm planning exercises, farmers need to have a good set of farm records. Unfortunately, these are often lacking. Nevertheless, as farmers become more commercially-oriented their farm record-keeping will improve.

4.8.1 Estimation of Net Farm Income

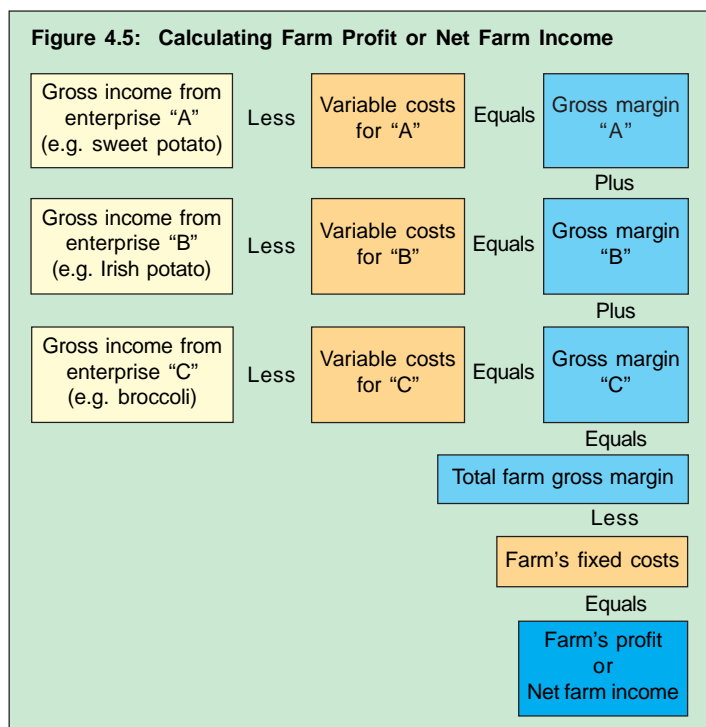
Small farmers differ from large commercial farmers in the closeness and importance of the link between the farm as a production unit and the household as a consumption unit. In the case of a small farmer, household expenditure and cash-related variable costs of production come out of the household cash reserves. Nevertheless business criteria can be used to analyse performance of smaller farms that are well along the route to commercialising their farming system. It is necessary to be clear about the purpose of the analysis, especially when the farm is considered part of the support system for the household.

There are several ways to measure farm income. Building on the definitions of variable and fixed costs, gross income and gross margin given in earlier sections of this module, the method of estimating **farm profit** or **net farm income** is shown in Figure 4.5.

Note that the profit estimated here is a true measure of the profit (i.e., therefore no quotation marks) of the farm business because fixed costs are now subtracted. This profit or net farm income is used for family living expenses and for payment of religious and school fees and other non-farm expenses. The amount left after family living expenses and taxes have been paid may be used for investing back in the farm business (e.g., buying equipment, for meeting cash-related variable costs, etc.).

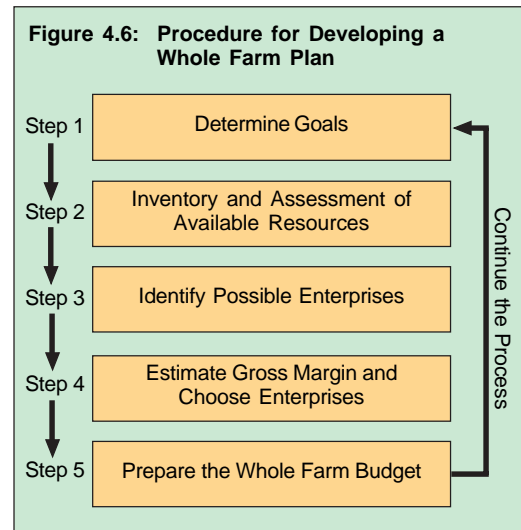
4.8.2 Developing a Whole Farm Plan

Farm planning is an outline or summary of the resources available and the type and volume of production the farmer wishes to do. It may have sufficient detail to include fertiliser, seed, and chemical application rates and actual feed rations for livestock, or it may simply list the enterprises to be carried out and their levels of production.



As shown in Figure 4.6, the planning procedure involves five steps. Below each step is discussed in more detail:

- **Formulate Goals and Objectives:** Identify the farming family's goals. From this information, determine what the family wants to grow and/or raise, and obtain a preliminary idea of how they want to do this.
- **Inventory of Available Resources:** Prepare an inventory of the quantities and quality of the farm resources (e.g., land including crops and livestock, natural and human resources, buildings, machinery, etc.). In this process, identify problems related to important assets such as land and erosion. The assessment process may also indicate actual problems and/or weaknesses in management of the business, due to, for example, excessive debt, large variable costs, depreciation and use of labour, land tenure arrangements, etc.



- **Identify Possible Enterprises:** The results of the resource inventory exercise will help in indicating what crop and livestock enterprises are potentially possible. The budgeting unit for each possible enterprise needs to be defined which typically would be 1 hectare for crops and 1 head for livestock. Next, the input requirements per unit of each enterprise need to be defined. For example, the resources needed to look after one beef cow might be 1.6 hectares of pasture, 5 hours of labour, and 120 units of operating capital (e.g., vatu). Ideas about the different possibilities for the farm may come from family or community discussions, planning tool exercises, advice of facilitators, etc. As a result, a preliminary action plan can be put together.
- **Estimate Gross Margins and Choose Enterprises:** Estimate the income and variable costs per unit for each of the possible enterprises. Usually a farm plan is for one year, and expenditures related to land, machinery, and buildings are considered fixed costs. In essence, family labour can also be considered a fixed input or cost. Therefore, in the short-run, maximising gross margin is equivalent to maximising profit, or minimising losses, because the fixed costs are constant. Gross margin calculation requires the best estimates of output for each enterprise and expected selling prices, as well as the amounts of the different inputs required and their purchase prices.
- **Prepare the Whole Farm Budget:** This is the last step in the planning process. The starting point for a whole farm budget is the revenue and variable costs used for working out the enterprise gross margins. These values can be multiplied by the number of units of each enterprise in the plan to get an initial estimate of total anticipated revenue and variable costs. Other income associated with the farm business (such as part-time work, government contributions, etc.) can also be added. Other expenses such as fixed costs associated with buildings, machinery and equipment repairs, depreciation, interest payments on loans, etc., which do not appear in the enterprise budgets (i.e., gross margins) but are part of the whole farm budget, should be subtracted to get an idea of the expected net farm income. One potentially useful check at this point would be to look at the potential labour and net cash flow profiles for the plan to see if they are feasible, given the constraints faced by the farmer.

4.9 CONCLUDING COMMENT ON THIS MODULE

Good “modern” farm management starts with good farm records. Inaccurate data will result in poor planning. Planning exercises are likely to give better and more accurate predictions if the farm record-keeping has been comprehensive, methodical and systematic. Hence at the beginning of this farm management module we placed a great deal of emphasis on keeping farm records.

The farming family can use this information to make financial comparisons between various enterprises. Gross margin analysis is the easiest financial analytical tool to compare the returns

from different crop and livestock enterprises. Obviously, the more commercialised farmers become the more they want to maximise their monetary profit and hence the more they want to maximise the monetary return from their limited land, labour and capital resources.

Hopefully in the future, countries in the Pacific will develop databases of gross margins for many different crop and livestock enterprises. For example, in Tonga data on standard gross margins already exist for many crop enterprises [MOAF, 2001]. Such information on gross margins can potentially serve at least three purposes:

- Farmers can compare their results on gross margins for specific enterprises on their own farms with those in the database. If their own results are poorer, they may be able to get some hints on improving the returns from that enterprise on their own farms.
- Facilitators can use the data as a benchmark for comparing with results obtained by specific farmers. If necessary, the database may help facilitators guide farmers toward improving returns from a specific enterprise.
- Both farmers and facilitators can use the information for planning and evaluating possible changes on specific farms.

Although this chapter covers a lot of ground, it is still only an introduction to the complexities of gross margin analysis, budgeting and planning. Some useful publications for further study are Dillon and Hardaker [1993], McConnell and Hardaker [1997], and Norman [2002]. The material has been kept fairly simple because it is primarily focused on helping small (semi-commercial) farming families. Therefore, for example, because monetary variable costs and the amount of equipment and buildings (fixed costs) tend to be very low for such types of farmers, this manual omits issues relating to the opportunity cost of cash used for variable inputs, depreciation on equipment, and interest on credit. Those issues will be much more important on large commercialised farms, which is why farmers of that type need also to consult other references such as referenced above.

5. MARKETING

As agriculture becomes more commercialised, marketing issues become increasingly important for farmers. Two types of markets are important for commercial farmers: the need to purchase inputs from off the farm and, even more importantly, the issue of marketing their farm production off the farm.

This chapter primarily focuses on product marketing. However, it is worth emphasising that the adoption of most improved technologies requires the purchase of external inputs (such as improved crop varieties, inorganic fertiliser, pesticides, herbicides, etc.). If for some reason farmers do not buy those inputs, or do not use them wisely, then the amount of products produced for the market and the profitability of that production will be reduced. Reasons for farmers not buying the necessary inputs could be many, for example if:

- farmers are not convinced about the potential value of using such inputs;
- farmers do not have the expertise or skills to use the inputs properly, therefore reducing the return from purchasing them;
- farmers do not have the cash available for purchasing the inputs when they are required;
- the inputs are not available when they are required;
- the inputs are not available in small enough units for small farmers to buy.

Issues relating to marketing products are very important for farming families since understanding the marketing process and using that knowledge in marketing produce can have a very major impact on the profitability (or net farm income) of a farm. Facilitators can play a vitally important role in helping farmers benefit from marketing their products. This chapter covers the following topics:

- marketing and why it is important (Section 5.1)
- how supply and demand affect product prices (Section 5.2)
- marketing channels (Section 5.3)
- marketing costs and marketing margins (Section 5.4)
- value adding (Section 5.5)
- obtaining marketing advice and information (Section 5.6)
- doing basic market research and developing a marketing plan (Section 5.7)

A final important point needs to be emphasised: Small farming families who are just starting to market some of their production suffer from two major disadvantages. These are as follows:

- A lack of knowledge about the marketing process: Individuals and organisations providing the marketing function can potentially take advantage of small farmers, reducing the profitability and hence the incomes of farmers. This chapter is designed to indicate how farmers can benefit from marketing some of their farm production.
- A lack of power or influence in the marketing process: There are many small farming families in relation to the relatively few people involved full-time in the marketing process itself. In addition there are often deficiencies in terms of infrastructure (such as roads, boat systems, communication systems, formal markets). Together these factors mean individual farmers often have little control over the prices they will receive for their products. Therefore they have to accept the price they are offered and consequently are **price takers**. For this reason, the priority is on increasing the farmers' power in the marketplace. Knowledge about the marketing process (the subject of this chapter) can help, but there are also other strategies such as strengthening the production to marketing link (see Chapter 6).

5.1 WHAT MARKETING IS AND WHY IT IS IMPORTANT

5.1.1 Why Marketing is Important

In subsistence agriculture, farmers feed their families and perhaps to some extent their neighbours through social obligations of various types. The families' and communities' tastes are well understood and issues relating to transport and storage are of little importance. However, populations are growing rapidly in the Pacific and more and more people are living in towns. This means that the distances between where the food is produced and where it is consumed have increased. Farming families need to be able to provide food on a regular and reliable basis to the consumer markets. This also means that over time farmers will probably become more specialised in the enterprises they implement.

To accommodate these changes, small farming families need to become skilled not only with respect to the farm production process but also in the area of marketing. The term "marketing" is deliberately used instead of "selling". *Selling* implies that the farmer enters the market place with little thought or knowledge about the market. This is likely to occur when a small farming family wants to dispose of surplus farm production after family consumption and social



obligation needs are fulfilled. *Marketing*, on the other hand, implies a more deliberate strategy involving the farmers planning what they produce based on some knowledge of what consumers want. As small farming families become more commercialised and want to maximise their returns, they need to become more market-oriented rather than remaining sellers. The former is necessary if they are to maximise their returns from entering the marketplace.

However, it is important for marketing to be done in a manner that is sensitive to community, cultural and social viewpoints and values. In other words, farmers should maintain their values when entering the marketplace. (An obvious example is that farmers should not produce and market marijuana.) However, the importance of maintaining values has other dimensions related to the positive characteristics of the Pacific Way of Life. In the past, nutritious and balanced diets based on farm-produced products was the norm. But now, as individual incomes become increasingly monetised, there is an unfortunate tendency to buy unhealthy food items (such as mutton flaps and corned beef). Another concern is that traditional methods for maintaining long-range soil fertility should not be sacrificed for increasing short-term production. The end goal is that small farming families should enter the marketplace without compromising their traditional value system.

Marketing is the process by which the space between the producer and the consumer is bridged. The process involves transportation and sometimes storage combined with techniques for minimising product losses and maintaining the quality of produce. Sometimes the marketing process also involves **adding value** through grading, packaging and/or processing the product.

The production to marketing chain is a two-way process. Produce flows from the rural areas into the towns and cities, and money and market information flows back to the farmers. As tastes in the town and city markets change, farmers can utilise this market information to adjust the types of products and methods of producing.

In vegetable farming in particular, farmers' financial viability depends as much on their business and marketing skills as on their technical expertise. For example, in Papua New Guinea, high-value crops such as broccoli or spring onion are often critically important in determining the

welfare of small farming families. This marketing chapter is a response to the need for small farmers to acquire knowledge about, and skills with respect to, the marketing process.

Small and large farms differ in several respects. In the Pacific, small farms are likely to be semi-commercial while larger farms are likely to be more commercialised. An understanding of the strengths and weaknesses of both small and large farms (see Table 5.1) based on what we call SWOT analysis²⁶ can help facilitators decide on ways they can help small farmers. See Section 5.6 and Chapter 6 for more discussion on ways facilitators can help.

Table 5.1: Strengths and Weaknesses of Small (Semi-Commercial) and Large (Commercial) Farms	
-----Small (Semi-Commercial) Farms -----	
<p><i>Strengths:</i></p> <ol style="list-style-type: none"> 1. Plenty of labour (i.e., family labour) in relation to other resources - hence suitable for labour intensive enterprises (e.g., crops that require transplanting, pruning and/or multiple hand-harvesting) 2. Good for crops requiring intensive management 3. Good growing for and servicing small specialised markets (e.g., direct sales) 	<p><i>Weaknesses:</i></p> <ol style="list-style-type: none"> 1. Need to generate high incomes from small areas 2. Formal education levels often low - hence difficulty in obtaining information, money and support 3. Weak negotiating skills and power base 4. Highly risk averse and need income stability
-----Large (Commercial) Farms -----	
<p><i>Strengths:</i></p> <ol style="list-style-type: none"> 1. Good for mechanised, large-scale agricultural production of enterprises such as sugar cane, cattle, etc. 2. Can handle enterprises requiring large capital investments 3. Able to sell products in large volume to major buyers, often using own transport 	<p><i>Weaknesses:</i></p> <ol style="list-style-type: none"> 1. High fixed costs 2. Poor at mobilising and controlling labour 3. Low labour input per unit area necessitates avoiding time-consuming activities. 4. Prices in commodity markets (e.g., kava, coffee, cocoa) are determined by buyers

5.1.2 Defining Marketing

Marketing can be defined in many different ways. There are three definitions most relevant for this manual:

- **the retail definition:** *Marketing involves finding out what your customers want and supplying what they want at a profit.* This definition provides us with two important implications:
 - First, that the whole marketing process has to be customer-oriented. Production must supply customers with what they want or need. This is the only reason people spend their money.
 - Secondly, that marketing is a commercial process and is only sustainable if it provides all those participating in it with a value and/or profit.
- **the classic definition:** *Marketing is the series of services relating to moving a product from the point of production to the point of consumption.* This emphasises that agricultural marketing is achieved by a series of processes, including harvesting techniques, grading and sorting of crops, and the packing, transport, storage, processing, distribution and selling of products. These are the mechanics of marketing.
- **the comprehensive definition:** *Marketing is the series of activities involved in making available services and information which influence the desired level of production relative to market requirements and the movement of the product from the point of production to the point of consumption.* In addition this definition includes services that can be provided by the facilitator, such as providing information and advice. This definition is also used by FAO.

²⁶ This involves in a group of people discussing issues with respect to a particular topic in terms of strengths (S), weaknesses (W), opportunities (O), and threats (T). In the example in Table 5.1 the O's and T's are not included.

5.1.3 The Most Important Elements of Marketing

Building on the marketing definitions given in Sub-Section 5.1.2, there are four important elements in the marketing process:

- **prioritising the customer:** Marketing begins with the customer, not the product. Knowing what the customer needs or wants is essential.
- **process of selection:** The farmer needs to have an idea who to sell the product to. This will determine how and where the produce is marketed.
- **promotion:** The farmer is selling something that other people want to buy. Naturally, it is helpful to let them know that the product is available and of good quality.
- **trust:** Good marketing occurs when the customers trust the farmer. The customers should feel they are not being cheated and they are getting value for their money.

In thinking about these elements, farmers need to ask themselves about the six Ps:

- **people:** Who are the customers? What do they want or need? In addition, which members of the farming family are actually going to market the product? They need to be friendly, efficient and knowledgeable about the product.
- **plan:** How is the product going to reach the selected customers? What are the steps?
- **product:** What product is going to be marketed? This should be decided by the farming family in consultation with the facilitator. Is the family producing what the customer wants? What services (for example, a cooked product), if any, are requested by the customer?
- **place:** Where is the product going to be marketed?
- **price:** What price will the product be offered on the market for?
- **promotion:** How are people going to be informed that the product is being offered for the market?

The answers to these questions require seeking information and advice (usually from facilitators), doing market research and development of a marketing plan. These steps are discussed further in Section 5.6. Other relevant topics are how market prices are determined (Section 5.2), identifying ways in which products can be marketed (Section 5.3), and associated marketing costs (Section 5.4).

5.2 MARKET PRICE DETERMINATION

5.2.1 Supply and Demand

Most governments today have stopped setting the prices at which farm inputs can be purchased and farm products can be sold. Instead, they are allowing market forces to determine market prices. In other words, the governments are allowing a free or open market to operate.

In a free market, prices for inputs and products are determined by supply and demand.

- **Supply** is what producers are willing to market at a certain price.
- **Demand** is how much consumers are prepared to buy at the market price.



In theory, as the price of a product goes up, the quantity supplied rises and the quantity demanded falls. Likewise, when the price goes down, the quantity supplied falls and the quantity demanded rises.

For agricultural produce, *demand* is affected by a number of factors, the most important being:

- the price of the goods;
- the tastes, preferences and culture of consumers;
- the number of consumers;
- the consumers' income level;
- competing prices of related local and imported goods;
- the range of alternative goods available to consumers.



Considering these factors, it is understandable that when the market price of a product drops, more people are likely to buy it (and to buy more of it); quantity demanded will rise. Conversely, if the product's price is high, fewer customers will purchase the product (or they will buy less of it); quantity demanded will fall.

Supply is also affected by a number of factors, the most important being:

- the price of the product on the market;
- the price of inputs and costs of production;
- technological factors;
- the climate and weather conditions;
- storage possibilities;
- packaging possibilities (for example, extended-life packaging, plastic boxes, etc.).

The lower the market price, the smaller profit margin the producers can claim and the smaller the supply they are likely to produce. On the other hand, the higher the price, the greater the profit margin and the higher the supply they will produce, all other things being equal.

Box 5.1: Setting Prices

In Vanuatu, production of crops is influenced by the demand and prices experienced in the previous cropping season. Prices of traditional crops don't change much. Women report that the price for a bundle of dry coconuts at the market is the same today as it was twenty years ago.

The price of a traditional basket filled with e.g. sweet potatoes depends on size. The size of the basket is determined by counting the leaflets of the coconut fronds used to make the baskets. There is a common agreement on prices to prevent competition. Women who lower their prices in order to sell off their produce face sanctions, especially from their own village. But if a woman sells something only she offers, she can decide on the price more freely.

V. Schwanz, FAO Marketing Consultant, Vanuatu.

5.2.2 Price Fluctuations and Changes

Market price fluctuations can cause major problems for farmers marketing their products. If prices for their products are high they will obviously be very happy, but if market prices are low then they may make a loss and even have insufficient income to feed their families. Therefore some understanding of what causes these changes in market prices can be very important

5.2.2.1 Short-Term Price Fluctuations

Prices for perishable products often fluctuate significantly, sometimes on a daily basis and even within the period of one day. The main causes of short-term price changes of fresh produce are:

- the amount of produce on sale in the market on a particular day and the quantities sold in the previous few days;
- short-term demand changes;
- the prices of competing products.

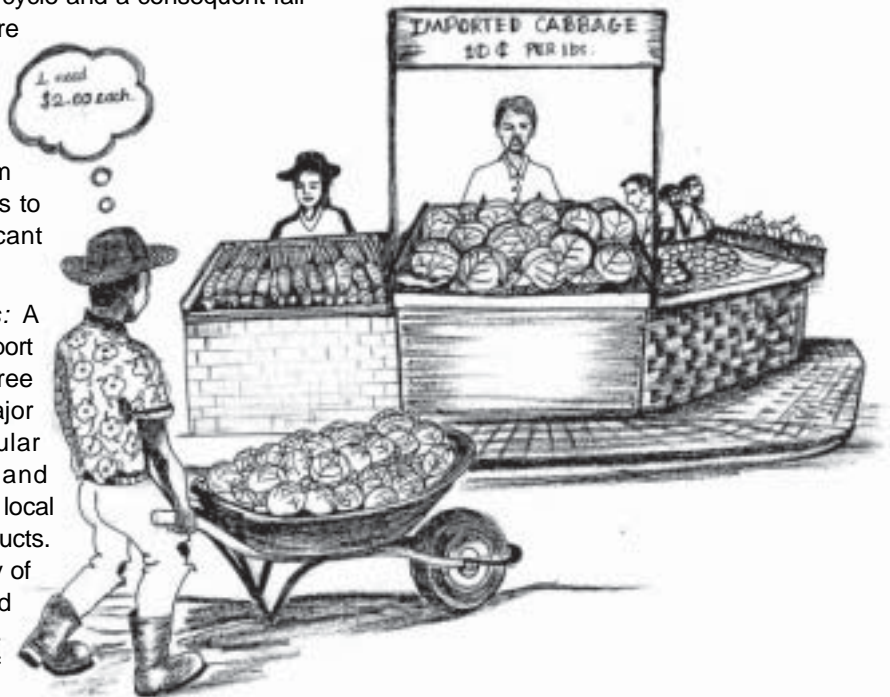
Consider the following example on the price of pineapples:

- As a general rule, prices in markets are closely related to the quantities arriving at the market on any particular day. Thus, if a national market receives 1000 kgs of pineapples on a Monday and the wholesale buying price is 50 vatu/kg, it can be expected that if 1000 kgs arrive in the market on Tuesday the buying price will be much the same. However, this may not always be the case. For example, for one reason or other (for example, bad weather or a transport strike) there may have been no pineapples delivered to the market at the end of the previous week. This will have created a shortage and prices on Monday will go up as retailers will compete to buy pineapples to sell to consumers who have run out. By Tuesday, it will be clear that the supply is back to normal, and market prices may well go down, even though the quantity supplied is the same.
- If only pineapples are available in the national market, then the prices will be fairly high. However, in the following days other fruit may also become available. Retailers, and hence consumers, will then have a choice between, for example, pineapples and mangoes. Thus, although the quantity of pineapples delivered to the market may stay the same, the price will go down, because some people who would have bought pineapples will now switch to other fruit, especially if it is cheaper. In order for the agents to sell all the pineapples delivered to the market they will have to lower prices.

5.2.2.2 Long-Term Price Changes

There are four main elements influencing long-term²⁷ prices for food: supply, demand, the time of year, and people's tastes (including other factors such as health concerns, convenience, etc.). The interrelationship between supply and demand and prices for foods is, in most countries, quite complex. A change in the price of one product can affect the demand and, in turn, the price of a different product. In general, however, supply is likely to fluctuate much more than demand and thus supply changes will normally have a greater impact on prices than demand changes. Consider the following details on the four influencing elements:

- **supply:** In the case of perishable produce which cannot be stored, the main impact on prices is the seasonality of production and when the crop in the main producing areas reaches maturity. Other factors affecting supply include:
 - *how much was planted:* If prices in one production cycle are bad, farmers often respond by planting less in the next cycle. This leads to lower production and higher prices, encouraging more planting in the following cycle and a consequent fall in prices. Successful farmers are sometimes those who do the opposite to what is being done by other farmers.
 - *weather:* Extreme weather, from inadequate rains to high winds to El Niño, can have a significant effect on production levels.
 - *imports and trade policies:* A change in the government's import policy (such as adopting a free trade policy) can have a major impact on supply of particular products on the market and therefore influence the prices local farmers receive for their products. For example, the vast majority of foods in Palau are imported and their comparatively low prices damp the local production of these foods (such as eggs).



²⁷ In this case, long-term refers to a period of at least one year.

- *storage*: If the product can be stored, the farming family has the option of selling immediately or storing in the hope that prices will rise later in the season. Farmers' decisions about how much to store and how much to market will depend on their need for money after harvest, on the price, and on their knowledge of likely price trends. If farmers market a large proportion of their crop immediately after harvest, this will inevitably increase the supply and lead to lower market prices.
- *demand*: Demand is influenced by the market price. If the market price is high consumers will reduce their purchases. However, for staples such as roots and tubers and for other important crops, it is more difficult to make significant reductions in the quantities consumed as prices rise. If prices go up people may eat slightly less, and they may also be more careful about how much they cook in order to waste less. They may continue to buy the same quantities but buy a lower quality. They may also buy other products that they see as being of better value, if such products exist, such as rice. If the market price is low consumers will probably increase their consumption, buy better quality and be less careful about avoiding waste. But a person can only eat only so much taro, so consumers who can already afford adequate quantities will not increase their consumption by much in response to lower prices. Instead, they are likely to use the money saved on staple foods to buy larger quantities of fruits, vegetables or animal products than they would normally consume.
- *time of the year*: There tend to be seasonal price patterns for most crops, particularly annual crops. Therefore, there are certain times of the year when there will likely be a glut of certain crops. Farmers who can avoid the glut periods in production of annual crops by staggering their planting and harvesting can benefit from higher market prices outside those glut periods.
- *taste and other factors*: Changing tastes can influence the demand and hence the market price farmers receive for their products. For example, increasing health concerns may result in a reduction of the consumption of certain goods (for example, corned beef). Also needs may change over time, for example, when the female head of the household starts working outside the home, there is an increased demand for convenience, processed, and semi-prepared foods.

5.2.2.3 Concluding Comment

A good *market information service*²⁸ should be in a position to provide information not only about prices (both short-term fluctuations and long-term trends) but also about the supply of farm products. Unfortunately in most Pacific countries such services do not generally exist. Reasons for this are:

- There is no agency collecting or estimating information on farm product prices and supplies.
- In a few countries, formalised markets where price data might be collected relatively easily do not even exist (Palau, for example); in others (such as Vanuatu), they are still relatively new.
- Communication systems for disseminating price and supply information (e.g., telephones and radio) are often still relatively poor.

Facilitators who advise farmers on marketing need to be aware of this deficiency and be wary of urging farmers to devote too much effort to perishable products whose prices can fluctuate rapidly and significantly.

5.3 MARKETING CHANNELS

When marketing a particular product, the farmer must not only take into consideration how much it cost them to produce it but also the costs of getting it to the market where they market it (see Section 5.4 for more) . An important factor in the marketing costs is the **marketing channel** (or **marketing chain**). This can be defined simply as the sequence of stages involved in transferring produce from the farm to the consumer. The marketing chain obviously influences the marketing costs – the further we move down the chain away from the farm the higher will be the marketing costs. To accurately understand the price a farmer will receive for a product, the farmer and the facilitator need to know which stage of the marketing chain the price refers to.

²⁸ For more information see FAO (1997) and Shepherd (2000).

5.3.2 Specific Marketing Channels

This section briefly describes the major types of marketing channels—farm gate, farm stall, produce or urban market, auction, contract, communal, and door-to-door—along with a brief description of the advantages and disadvantage of each.

5.3.2.1 Farm Gate Marketing

As the name implies, this is marketing done by the farmer at the place where the product is produced — from the “farm gate”. Consumers come to the farm to buy produce (see Figure 5.1). Examples include the sale of vegetables from a farmer’s garden, the sale of eggs from an egg production unit, and the sale of pigs directly from the farm. There is generally no limit to the type of produce that may be marketed in this manner, as long as there are willing buyers. Farm gate marketing is found, for example, in Palau and Fiji.

Advantages of farm gate marketing:

- no transport costs;
- can be marketed by the farming family, thus costs are reduced;
- better suited to the small-scale farmer.

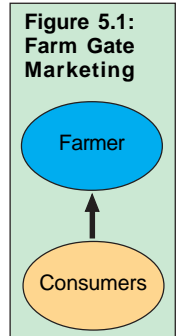
Disadvantages of farm gate marketing:

- farming family must accept the local price for their produce which may be lower;
- farm may not be well located to market the product.

Farm gate marketing is common in the small farming sector and accounts for a good amount of marketing as far as root crops, vegetables, and livestock are concerned. However, once the local market’s demand is supplied, the farmer has to look to more distant markets.

5.3.2.2 Village (Farm Stall) Marketing

This channel (see Figure 5.2) is a further development on marketing from the farm, as it goes some way towards taking the product to the consumer. At the most simple level, a farm stall may

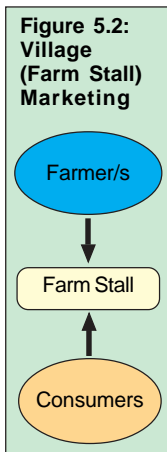


Box 5.2: Farm Gate Marketing

A few years ago, Timoci left his position as an agricultural extension officer and began farming his father’s leasehold land in Toga, just outside of Suva. With his experience of working as an agricultural officer, he knew to concentrate on root crops such as cassava and taro and a bit of leafy vegetables, all of which have a ready market. Interestingly, most of his produce is bought directly from his farm by middlemen and he does not have to go to the Suva market to sell. In the last two years, Timoci has managed to build himself a four-bedroom concrete house and has bought a three-tonne truck, achievements he could not have attained while working for the government.



Picture 8: Village Market on Tanna Island, Vanuatu



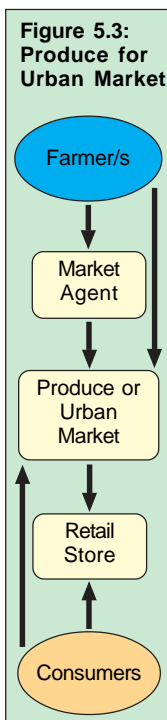
be operated by a farming family or farmer group marketing their own produce. Eventually, an individual may operate a stall on behalf of local farmers or farmer groups. Generally the products marketed in a farm stall are perishables such as fruits and vegetables, although “processed” foods such as pickles, jams and cooked cassava are also suited to this type of marketing. Such a type of marketing is commonly found in Fiji.

Advantages of farm stall marketing:

- Larger markets can be exploited.
- Farmers can take advantage of more favourable prices.
- Price fluctuations are generally small.

Disadvantages of farm stall marketing:

- Transport of the produce may be difficult.
- The quality of the produce may need to be higher as the consumer in the market may be fussier.
- A constant supply of produce must be available to satisfy the needs of the market.
- Farmers must be flexible on pricing the produce.



5.3.2.3 Produce or Urban Marketing

Urban marketing (see Figure 5.3) takes place in produce or urban markets set up in larger centres mainly for the marketing of vegetables and fruit. They have traditionally catered for the commercial fruit and vegetable producer and, in turn, supply the larger urban centres. These markets are found throughout the Pacific island region, with the exception of Micronesia.

The quantity of supply of a particular grade of produce has a marked effect on the price obtained in produce markets, due to the nature and supply and demand. Worldwide, the system with sales by market agents on commission is now the most common method of trade. With this system, the farmers or farmer groups send their produce to the agent at the market, who tries to obtain the highest price for them.

Advantages of urban marketing:

- Farmers and farmer groups (see Section 6.1) can take advantage of higher prices in times of short supply, if they have produce available.
- The market is able to market large quantities of farmers’ produce.
- The farmers can employ the services of an agent to perform the task of marketing.

Picture 9: Market vendor at Honiara Central Market, Solomon Islands



Disadvantages of urban marketing:

- Market information is important to enable farmers to make the right decisions, and this often does not yet exist (see Section 5.6).
- Prices fluctuate.
- Markets are often far from the point of production.
- To get the right price, the time of harvesting is critical.
- Quality, packaging and presentation are very important and produce must conform to accepted grade and packaging standards.
- The farmers will need to be confident that they can cover the higher marketing costs, including the agent's commission.

5.3.2.4 Auction Marketing

With auction marketing (see Figure 5.4), the farmer offers livestock for sale and a buyer offers a price for the animals. The seller may decide whether or not to accept the price offered by the buyer. The prices received on stock sales are not fixed, and to a large extent reflect the supply and demand position both locally and within the entire market. Such a type of marketing is found in Fiji. Advantages of auction marketing:

- Promotion is done on behalf of the farmers or farmer groups.
- Payment by buyer is guaranteed.
- The market is larger than the local market.
- Small farmers can participate in these sales.

Disadvantages of auction marketing:

- The seller may not get the price that they want for the animal.
- Prices may be lower than the usual "market" price.

5.3.2.5 Contract Marketing²⁹

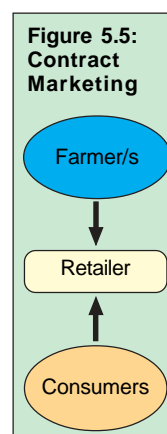
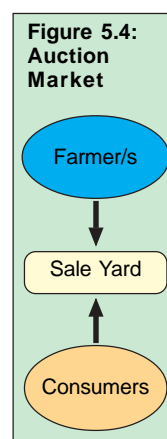
With contract marketing (see Figure 5.5) the farmer markets directly to the retailer. Agreements are often done between large producers of perishable goods and large retailers. These retailers are sometimes fairly flexible in the volume they receive to ensure good publicity as supporters of small farmers, but they will not compromise on quality. Facilitators can assist farmers by helping them make contact with possible retailers and also by guiding them through the negotiations. Farmer groups often sign contracts with retailers. An example of this type of marketing is found in Papua New Guinea, and in Palau and Fiji, where contracts are increasingly being negotiated with supermarkets.

Advantages of contract marketing:

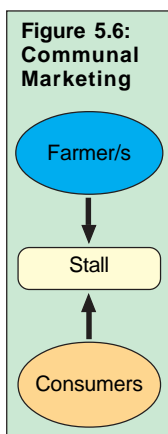
- Marketing margins can be reduced, meaning that the farmer can obtain a higher price for the product.
- In some cases, the volume of sales is guaranteed to the farmers.

Disadvantages of contract marketing:

- The farmers must have sufficient produce of acceptable quality to supply the customer or retailer.
- The quality of the produce must be consistently high.
- If the farmer cannot meet the needs of the retailer, they will have to buy produce from other farmers to make up the order of quantities required.



²⁹ For more information on contract marketing and farming see FAO (2001).



5.3.2.6 Communal Marketing

Communal marketing is when a number of farming families or a formal farmer group market collectively (see Figure 5.6). For example, a farmers' association may get together and jointly market their crop in a formal market. This form of marketing is one of the basic principles of woman's' clubs, who usually market their handicrafts collectively. Palau has examples of this type of marketing.

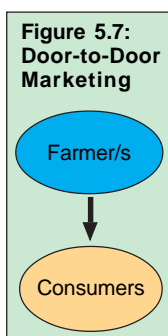
Advantages of communal marketing:

- wider market;
- better prices and smaller price fluctuations;
- builds solidarity among farmers.

Disadvantages of communal marketing:

- transport may be costlier and more difficult;
- quality needs to be higher;
- constant supply is needed;
- prices must be flexible.

A variation on communal marketing that is not yet found in the Pacific but has potential to work well in the region is community-supported marketing. In this system, a farmer or group of farmers supported by a neighbourhood or community agrees to provide produce at a set price (or, alternatively, a proportion of yield) based on the degree to which the community has supported their costs of production.



5.3.2.7 Door-to-Door Marketing

With door-to-door marketing, farming families market their produce directly to consumers (see Figure 5.7). There is generally no limit to the type of produce that may be marketed in this manner, as long as there are willing buyers. Examples of countries where this type of marketing is found are Vanuatu and Palau.

*Picture 10:
Distribution
truck for
door-to-door
marketing in
the suburbs
of Port Vila,
Vanuatu*



Advantages of door-to-door marketing:

- can be sold and promoted by the farmers themselves;
- marketing margins can be reduced, meaning a higher price for the product can be obtained.

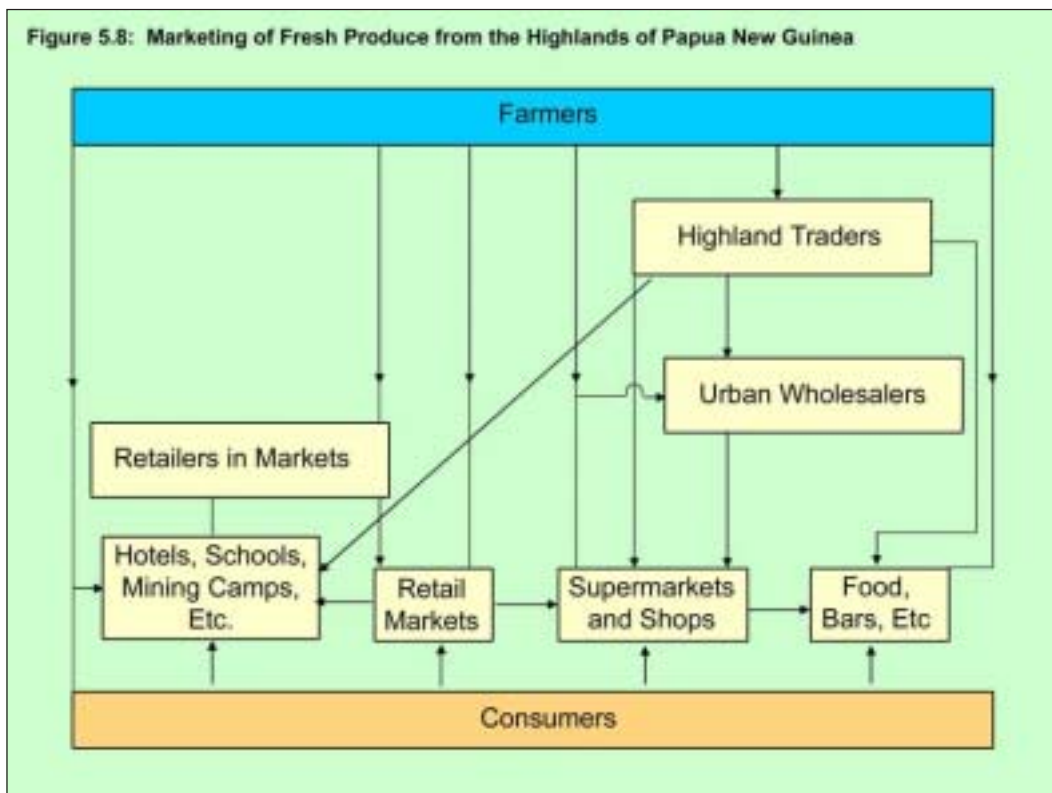
Disadvantages of door-to-door marketing:

- transport is essential and may be difficult or expensive;
- may lead to “cut-throating” (destructive competition);
- time required for marketing may be longer than if the farmer sold through other channels.

5.3.3 Example: Marketing Channels

An example of the complexities of marketing chains is given in Figure 5.8, which illustrates how fresh vegetables produced in the Papua New Guinea Highlands reach consumers, primarily in the urban areas, in a number of ways. The marketing channels for farmers in this particular case include many elements of the types described in Sub-Section 5.3.2, including:

- marketing directly from their farms to the surrounding communities;
- supplying processing units such as box lunch makers, bakeries, and breweries;
- supplying various retail outlets, construction companies, fishing companies, etc.;
- marketing through farm or market stalls;
- entering into contract market arrangements, such as government feeding programmes, schools, hospitals, retail contracts, hotels, restaurants and tourist outlets.³⁰
- receiving support from a neighbourhood or community and supplying produce at a set price;
- adding value to their produce and then marketing products through the various marketing channels mentioned above.



³⁰ The facilitator can help by brokering these contracts on behalf of groups of farmers, who may lack the confidence and expertise to do so.

5.4 MARKETING COSTS ³¹

All transfers of produce involve some form of marketing activity. Also all such activities involve costs. At its simplest level, the cost involved may be the time it takes the farmer to walk to a nearby market and stay there until all their vegetables are marketed. At the most complex level, a product may be stored for lengthy periods, transported long distances and processed several times before reaching the form in which it is finally marketed.

The costs involved with marketing—or the reason the price of a product in a shop or retail market is often much higher than the price paid to the farmer—are not always fully understood. It's easy to understand that traders or processors spend money on transport or packaging, but there are many other less obvious costs also. Because these costs are not always visible, those doing the

Box 5.3: Marketing Constraints for PNG Produce

In Papua New Guinea, farmers' direct sales to supermarkets are very small. It includes Irish potatoes, cabbage, carrots, celery, cauliflower, and Mandarin oranges. Despite the fact that labour in PNG is cheap, the cost of transportation from production areas in the Highlands to supermarkets in Port Moresby is exorbitantly high, and poor roads often cause damage to the produce quality. Most of the fresh produce found in PNG supermarkets is imported from Australia and New Zealand, which are able to offer good quality, consistent supplies and competitive prices.

A. Shepherd, FAO Marketing Economist, Papua New Guinea.

marketing are often accused of making too much profit. People look at prices paid to the farmers by traders and after comparing them with the prices consumers pay for the same product, come to the conclusion that the farmers and consumers are being exploited. Sometimes, of course, traders do make very high profits but many times they make small profits or even losses. Clearly, unless they make an overall profit, traders will not want to continue in business. This is bad for both consumers and farmers. In addition, because many small farmers market their production themselves it is important for them to understand the costs involved in the marketing process.

Generally, the more complex and lengthy the marketing chain, the higher the marketing costs are. Because of transport costs, a farmer who lives 5 kilometres from a market will normally receive a higher share of the final price than one who lives 20 kilometres away. A farmer marketing a perishable crop such as tomatoes is likely to receive a lower share of the final price than the farmer marketing a non-perishable crop such as pumpkins because some of the crop may be rotten by the time it reaches the market. In comparing farmer and consumer prices, we need to be fully aware of all the costs involved.

5.4.1 Types of Marketing Costs

Some of the more important costs in the marketing process are associated with:

- product preparation and packaging:
 - the movement of produce from the farm to the farm gate or house;
 - all the costs associated with packaging.

It is worth noting that while packaging is a major cost, the costs of trying to save money on packaging can be much greater. Poor quality packaging may increase losses due to product damage. It may also make the product less attractive, reducing the price that buyers are prepared to pay.

- product handling: At every stage in the marketing chain, produce has to be packed and unpacked, loaded and unloaded, put into store and taken out again. Each individual handling cost will not amount to much, but the sum total of all such handling costs can be large.
- transport costs (see Box 5.4): Once packed, the produce is then transported. This transport

Box 5.4: Calculating Transport Costs

Assume that there are 40 metres³ of space available in the truck being used and that it costs 200 kina to hire the truck.

A container of 0.2 metres³ holds 8 kg of eggplants and a container of 0.4 metres³ holds 10 kg of green peppers.

Then the transport cost for eggplants per container and per kilogramme is:

$$K200 / (40 \text{ metres}^3 / 0.2 \text{ metres}^3) = K1.00 \text{ per container}$$

$$K1.00 / 8 \text{ kg} = K 0.125 \text{ per kg}$$

The transport cost for green peppers per container and per kilogramme is:

$$K200 / (40 \text{ metres}^3 / 0.4 \text{ metres}^3) = K2.00 \text{ per container}$$

$$K2.00 / 10 \text{ kg} = K0.20 \text{ per kg}$$

³¹ For more information on marketing costs and how to calculate them see Shepherd (1996).

cost can involve boats, trucks, private motor vehicle (PMV), etc. Sometimes transport costs are a simple matter to calculate because the farmer or trader pays a set price per kilo to the transporters. Other times produce is carried on a “per container” basis or farmers may hire a complete truck and transport a variety of crops. (It becomes difficult to calculate a farmer’s or a traders’ actual transport costs if they own their own vehicles. It is best then to calculate the cost based on how much it would be to rent a similar vehicle.)

- **product losses** (see Box 5.6): Losses are common with agricultural produce marketing. Even if nothing is actually thrown away, products may lose weight in storage and transit. Losses as high as 10% per day can occur under tropical conditions. The treatment of losses in marketing cost calculations can be quite difficult. In particular, produce which is bought but not sold can still incur costs such as packaging, transport and storage. Even if there are no quantity losses, there can still be quality losses, and this is reflected in the price at which produce is sold.
- **storage costs** (see Boxes 5.7 and 5.8): Storage is an important cost for many products. The main purpose of storage is to extend the availability of produce over a longer period than if it were sold immediately after harvest. (As indicated previously, storage is often not a major issue in the Pacific because of the crops produced and the non-seasonality of crop production.) Storage costs vary depending on the expense of building and operating the store and are also based on the capital used to purchase the produce which is stored.
- **processing costs** (see Box 5.9): Processing is a way of adding value to the product finally sold to the consumer and is often an important marketing cost. For example, taro and cassava are often processed by grating and cooking before they are sold. Processing costs can vary according to the efficiency of the organisation doing the processing, the processing facility’s throughput, and the frequency of its operation. It will also vary according to the organisation’s costs, which depend on factors such as fuel costs, depreciation costs, import duties, taxes and wages. As farming becomes more commercialised, processing is increasingly done off the farm by someone other than the farming family or farmer group. However, farmers can attempt to reduce their

Box 5.5: Transportation Cost in Solomon Islands

In the Solomon Islands north Malaita district, the rate farmers are charged for transporting produce to market varies depending on the crop’s value. Taro brings a relatively high price and makes a good profit for farmers, so transport operators believe that they should also make a good profit. They charge a higher rate for transporting taro: a 20kg bag costs \$10 for the 3 – 4 hour trip on the back of the truck. For a 20kg bag of rice or sweet potato, the price is just \$2 – 5. A similar situation is happening with Cocoa beans because the price is high right now; the truck and ship operators have increased their freight charges.

Box 5.6: Calculating the Cost of Product Losses

Assume that, at 10 percent loss levels, 2kg of green peppers purchased by the trader from the farmer results in 1.8kg available for sale to consumers. The trader buys green peppers from the farmer at K5.00/kg and marketing costs are K2.00/kg for the green peppers originally purchased. The selling price of green peppers is K9.00/kg. Then the costs are:

2kg purchased at K5.00/kg = K10.00

2kg packed and transported at K2.00/kg = K4.00

Total costs = K10.00 + K4.00 = K14.00

Sales revenue or K9.00 x 1.8 kg = K16.20

Thus the margin to the trader = K2.20

The value of produce lost or cost of product loss is 0.2kg x K9.00 = K1.80

Box 5.7: Calculating Storage Costs

Assume that a warehouse is hired for 120 days of the year at a total cost of K600 and that the weighted average contents are 250 bags. Then the storage cost is:

K600/120 days = K5.00 per day

K5/250 bags = K0.02 per bag per day

Box 5.8: Calculating Storage Costs over Time

Assume that a trader buys potatoes at K10 per bag and keeps them in store for 4 months.

To do this he or she has to borrow money at 12% per year.

K10 x 0.04 (12% per year over 4 months) = K0.40 per bag

A realistic calculation of storage costs per bag for the potatoes is:

Storage charge for 120 days at K0.02 per day (see Box 5.7) = K2.40

Interest charge of K0.40 per bag = K0.40

Total cost per bag = K2.80

marketing costs, and in doing so add value, by processing the product themselves (see Sub-Section 5.5.2). For example, in Box 5.9, a farmers' group might grate the cassava themselves rather than paying someone else in the marketing chain.

- **capital costs:** Capital costs may not be very visible but are important. To operate, a trader may have to borrow money from the bank. The interest paid on that money is a cost. If a trader uses his own money, then he has to consider the interest he could have received on it (or the opportunity cost of using it; see Sub-Section 4.4.1).
- **fees and commissions:** Commissions and fees are often a part of marketing costs. For example, in Palau, people using some stores as marketing outlets have to pay commissions of 15%.

Box 5.9: Calculating Processing Costs

Assume that a cassava grating operation converts cassava at a rate of 70 percent (0.70) and has saleable by-products equal to 25 percent (0.25) of the field weight. Processing costs per kilo of cassava have been calculated at K0.30 per kilo on the basis of the grater's total annual costs divided by the number of kilos of cassava processed. The buying price of the raw cassava is K2.25 per kilo and the by-products have a value of K0.15 per kilo.

Then the processing cost per kilo of the cassava is:

One kilo of cassava purchased = K2.25

Processing costs for 1kilo x K0.30 = K0.30

Total cost per kilo = K2.55

Less the by-product revenue of 1 kilo x 0.25 x K0.15 = K0.04
= K2.51 per kilo

The break-even selling price/kg of grated cassava is calculated as follows:

$K2.51 / 0.7 = K3.59$

Grated cassava is actually being sold for K3.70 per kilo

Therefore the profit per kilo is of grated cassava is:

$K3.70 - K3.59 = K0.11$ per kilo

5.4.2 Concluding Comment

This discussion has shown that marketing costs can be many and varied. The price paid by the eventual consumer is not just the amount of money paid out to the farmer for their produce. There are also costs involved in getting it to consumers in the form that it's purchased in. There must be fair profits for all of the people doing the marketing and processing. The total percentage of the final retail price taken up by the marketing function is known as the **marketing margin**. Sometimes the marketing margin can be quite a high percentage and this may sometimes be used to argue that farmers, consumers, or both are being exploited. However, high margins can often be fully justified by the costs involved. Without an understanding of those costs and how they are made up, it is impossible to know whether margins are reasonable or not.

One marketing cost that tends to become more significant as income levels increase is processing costs. In other words, processing costs contribute an increasing percentage of the marketing margin. Consumers increasingly wish to buy products that are convenient for immediate consumption. In the past, any processing tended to be done before the product left the farm. This job is increasingly being captured by those involved in providing the marketing functions. Whether the processing function can be recaptured by the farmers themselves is explored in Sub-Section 5.5.2.

5.5 FARMERS ADDING VALUE

Every marketing function comes at a cost, and processing is one of those cost components. Individuals and organisations in the private sector do not provide those functions unless they obtain a profit from providing that function. Therefore, it is only worth developing strategies to enable farming families to add value themselves if these strategies will improve the farmers' profitability and incomes. The main ways of improving the value of agriculture and especially horticulture products are careful harvesting and post-harvest handling; an additional possibility is on-farm processing by the farming family or, more likely, a farmer group.

5.5.1 Harvesting and Post-Harvest Handling Advice

The way some perishable agricultural crops and most horticultural crops are handled at and after harvest can be important in maintaining their value. Adoption of improved harvesting and post-harvest techniques are relatively easy and often do not cause additional costs. The farming family simply needs to be made aware of the potential benefits from adopting them. By promoting the ideas given in this section, facilitators can potentially gain a lot of credibility in farming communities! The goal is to avoid the four main types of mechanical damage which cause reduction of produce value: cuts, compression, impact and vibration.



- **Harvesting:** The timing, technique and conditions at harvesting can significantly affect prices. Consider these points:
 - **harvesting prices:** With some crops, harvesting can be undertaken early to take advantage of high-priced opportunities (e.g., cabbage harvested as spring greens, young carrots sold in bunches, green plums and Irish potatoes). Exploiting these short-term market opportunities require close linkages with the market.
 - **harvesting and crop maturity:** Shelf life and long-term storage is affected by the maturity of the crop at harvest. The storage characteristics of root vegetables are generally improved by only harvesting fully mature crops. (Examples include sweet potatoes, cassava, taro, radishes, garlic, and yams.) Some fruit have to be harvested when they are not completely ripe in order to transport them to distant markets. This is particularly true of fruits that are not suitable for long-term storage and need their shelf life maximised. (Examples are bananas, pineapples, mangoes and avocados.) However, the most important consideration is to avoid damaging the product at harvest time and to prevent exposure to heat or sun.
 - **optimal harvesting stage:** The optimal harvesting stage for most crops will depend not only on the climate and distance to the market, but also on growing conditions and the variety being grown and the growing conditions. In specific cases, when new distant markets are being explored, experiments should be carried out to find the best stage to harvest fruits, by sending samples at different degrees of ripeness and assessing which is most favoured. For example, in the case of fruits that are suitable for long-term storage (such as apples, pears, citrus and grapes), there are significant differences between cultivars, growing regions and sometimes season with regard to the optimal harvesting time. If long-term crop storage could significantly improve the farming families income, facilitators should consult experts for further information.

- harvesting, handling and quality: Growers often fail to understand the effect their harvesting and handling has on the quality of the produce in the market. Once a fruit is plucked from a plant or a root or leaf vegetable is harvested, it is cut off from its source of food and, most importantly, water. The effects of poor treatment normally show themselves some days later, when the produce is being presented for sale or is in storage. Poor treatment has two effects: firstly, the price is reduced; secondly, the long-term reputation of the production area is diminished, again tending to result in lower prices.
- time of day harvesting is done: Ideally, harvesting should take place when the temperature is the coolest and the plant is most turgid (or, in other words, when the plant has the highest moisture content). This is in the early morning. Harvesting time also has to accommodate labour availability, and when collection will take place, to minimize the time produce is left standing in the field.
- harvesting techniques: Methods of harvesting can play an important role in the quality of the produce harvested as well as the health of the farm's plants.
- field containers: Damage is often caused by moving sacks through the field, or when transferring produce from one container to another. If possible, produce should be harvested into the container in which it will be stored or transported. Baskets or boxes with sharp or rough edges should either be avoided or lined with paper or leaves.
- harvesting system: With highly perishable produce, damp cloths can be used to give protection against the sun's heat. Field containers should be removed to a shaded area as soon as possible. Some leafy vegetables may be sprinkled with water at intervals to maintain leaf crispness. Field assembly points, such as a shade house made out of natural materials or a canvas tent, should be used in order to keep the produce cool and to allow ventilation.

Note that in general, the quality of fruit and vegetables cannot be improved after harvest. However, the more careful the handling, the slower is the deterioration in quality. Containers must be emptied carefully to minimise drop heights and fruit-to-fruit damage. In addition, harvesting containers should be periodically cleaned.

- Post-harvesting handling: Important issues that will help maintain or increase the prices farmers receive after harvesting:
 - curing and drying:
 - trimming and sorting: Provided the market wants graded produce and is prepared to pay for it, selection and grading is justified. Buyers may specify grading standards, particularly in the export market where international standards may be enforced.

Picture 11:
Joint family
action to
prepare sweet
potatoes for
Port Vila
Market,
Vanuatu



- packaging and presentation: The two main functions of packaging are to help prevent mechanical damage and to sort the produce into an acceptable size for the market and for handling. Good packaging can also enhance the attractiveness of the produce.
- storage: Produce can be stored for both short-term and long-term purposes:
 - ★ *Short-term storage* is used to provide flexibility in marketing, such as when awaiting transport or when buyers are not immediately available. Most horticultural crops are perishable and can only be stored for a few days. Only rarely is it worth storing crops of this nature in the hope of higher prices. Storage will reduce quality and shelf life. It is costly and, in most instances, when the produce is withdrawn from storage, it has to compete in the market against freshly arrived produce,
 - ★ A few crops are adapted for *long-term storage*. These can be held in stores well beyond the normal harvesting period. In turn, higher prices can normally be obtained and greater volumes of produce sold. Often in the case of cold storage, the successful stores are located in urban areas. This is more practical because it allows produce to be released immediately on to the market in response to high prices. In addition, the storage facility can be used for other crops and products throughout the year (for example, apples in the winter, citrus in the summer and for other products such as butter year-round).



Picture 12: Processed food packed for tourist market, Koror airport, Palau

Facilitators can often help improve *on-farm storage* practices by showing growers improved techniques. In addition, it is useful to demonstrate the different results obtained from recommended storage systems and the storage systems normally used by the farmers. Open days provide a good opportunity for these demonstrations, and photographs can help in illustrating such differences.

- transport: In the Pacific, most farmers who do not sell to traders transport their produce to market in hired vans or pick-ups or pay someone with a PMV. The grower will be given a fixed price for exclusive use of the transport or the PMV owner will charge by the basket or bag. Unfortunately, this is often not the most efficient and safest way to get the produce to the market without damage. Farmers who make investments in transport usually buy small trucks or pick-ups. Their unit costs of transport are therefore generally higher than when hiring space in a larger lorry or a PMV, but farmers having their own vehicles have certain advantages such as:
 - ★ being able to transport produce immediately to the market after harvest;
 - ★ potentially reducing damage to the product during transport;
 - ★ hiring out transport services to neighbouring growers;
 - ★ having the flexibility to be more opportunistic as to where to sell the product (for example, farmers' market, or direct sales to retailers or catering clients).

Adoption of improved harvesting and post-harvest techniques are relatively easy and often do not cause additional financial costs to farmers. They simply need to be made aware of the potential benefits from adopting them. Through promoting the ideas given in this section the facilitator can potentially gain a lot of credibility in farming communities!

5.5.2 On-Farm Processing

Processing is a very common way of adding-value to products. Unfortunately, when agriculture becomes more commercialised, farmers (particularly small farmers) tend to lose control of the agricultural product processing component. However, because small farmers are still dominant in the Pacific, there is still the potential for on-farm processing opportunities to be realized.

Value adding through on-farm processing of farm-produced products can benefit farmers by:

- increasing the profit margins of the enterprises they are implementing;
- reducing marketing costs through capturing the processing marketing function;
- reducing market transport costs per unit weight and volume as a result of the processing process itself;
- increasing the shelf life of the product, therefore increasing the possibility of it being marketed at a time when the prices are higher;
- gainfully employing family or farmer group labour;
- reducing the transport costs if the improved product has a local market (for example, cassava cake might find a ready market in the community and thereby reduce the farmer's marketing costs dramatically).

Table 5.2 shows examples of some of the value-adding activities which farmers and farmer groups can carry out.

Table 5.2: Possible Value-Adding Activities for Farmers	
Product	Value-Adding Activities
Bananas	Grading, packaging, drying, cooked, making into chips
Coconuts	Making into brooms, syrup, milk, candy, jam
Eggs	Grading and packaging, fertilising
Fruits	Candying, fermenting
Nuts	Candying, roasting
Pork	Slaughtering, slicing
Root crops:	Bagging and transporting to markets, making into crisps and snacks
Cassava	Frying, burning, grating and wrapping with or without banana added; making into dough, moonshine, candy, pudding, or starch
Taro	Burning, baking, making into pudding,
Taro leaves	Baking, making into soup or sweet sauce
Vegetables	Grading, packaging and transporting to end user or market; drying, semi-preparing, bottling, candying
Note: Farmer grading of almost all products can add value to the produce.	

Section 6.1 explores how value-added activities play an extremely important role for farmer groups, such as by:

- improving access to enough farm-produced products to justify the costs involved in purchasing processing equipment;
- increasing their group's influence and power in the marketplace.

5.6 SEEKING MARKETING ADVICE AND INFORMATION

Probably by now most readers of this module are convinced that marketing farm produce can be quite a complex operation. If the farming family is careful and knowledgeable they can benefit greatly from marketing their produce. On the other hand, there is also the potential for them to lose money if they don't give the marketing function the attention it deserves.

In fact, discussions with farmers often result in a long list of problems relating to marketing their produce. For example, in Table 5.3 there is a list of marketing-related problems that came out of a workshop in Palau. Market information deficiencies are often ranked as the most important problem in marketing. The lack of current price information causes problems for farmers who want to market some of their production. This obviously makes it difficult to develop sensible farm plans. As a result there are frequent surpluses on the market, depressing prices. A produce market would help in sorting out problems with reference to marketing and in providing an easy way to assemble market price information. However, a produce market still does not exist in some of the Pacific countries such as Palau.

Problem	Score ^b
They lack market information	24
There is a lack of expertise and information and also a shortage of extension and development officers to convey information	20
Farmers produce low volumes and there are often quality problems with their produce as well, leading to poor returns	20
Government support minimal	20
Market flooding	16
Often a lack of local marketing outlet infrastructure (e.g., a lack of road-side stalls)	15
They lack the technical know-how on packaging and grading	13
Inconsistent supply of farm products	10
There is little contact between producers and buyers	8
There is sometimes a lack of transport, but more often the farmers are unable to afford the fees charged and/or cannot obtain financing to, pay the fees	6
They lack storage facilities and pack-houses	5
Prices of equivalent imported items are low	4
They continue to experience discrimination in some marketing channels	2

a. These were problems expressed at an FAO sponsored Bureau of Agriculture workshop held in Palau in 2002.

b. Farmers and facilitators at the workshop were each asked to rank the five most common marketing problems. Their first one was given five points, the second four points and so on. The scores of each of the participants for each of the problems were added together.

This section provides the basic knowledge needed to help field or village facilitators and advise farmers on how to use market information. In order to do this it is necessary for facilitators to understand:

- why farmers need information and how they can use it;
- what the available sources of information are;
- how to interpret and make use of prices and market information.

It is important to identify the most practical ways in which facilitators can assist farmers. Emphasis is on using current information for short-term marketing decisions and also long-term or historical information for decisions about what and when to produce.

5.6.1 Why Farmers Need Information

Farmers increasingly have to take greater responsibility for marketing their agricultural produce. At the same time, they also have the opportunity to supply a wider range of products. Whether they are seeking to sell their usual products or to market new ones, they need to have information about markets and prices, such as:

- Who and where the buyers are, how they can be contacted, what the conditions of their businesses are, and their preferences for varieties, packaging and delivery, etc.

- Current prices (and the current supply), which can help the farmers decide whether to market their products immediately or wait in the hope that the price will rise; if the farmers are selling to the local trader, knowing this information will help them to decide if the trader's price is reasonable.
- Historical price data over a number of years, which helps farmers make decisions about the profitability of new ventures such as growing new crops, growing existing crops out of season, or producing higher quality products.

Farmers can use this kind of market information to:

- reduce the risks associated with marketing: Knowing prices helps them decide whether it is worth sending their produce to the market.
- decide where to market: For example, to help them in deciding what market channel to use and where to market it.
- check on the prices they are getting: Market information can help give them some idea as to whether, for example, they are negotiating well with traders, the quality of their products compared with that of other farmers, whether their agents in wholesale markets are getting good prices for them, etc.
- decide whether or not to store: Farmers, for example, can store some products for several months if they think the price will go up.
- decide whether to grow "out-of-season" produce: By doing so farmers may be able to profit from the higher prices that often exist at such times.
- decide whether to raise different enterprises or change the technology(ies) used: Market information may indicate this is worth considering but before doing so farmers will need to calculate whether it is likely to be profitable to do so.

5.6.2 Sources of Market Information

In most of the Pacific countries government-run market information services (MIS) may not be the main source of market information for farmers. Some countries still do not have such services and, where an MIS is operating, it often provides inadequate information. Small farmers often rely more on word-of-mouth information from other farmers and from traders.³² With improvements in telecommunication systems, many larger farmers are beginning to seek information by phone, directly from the major markets. More general sources of market information in some but not all of the Pacific are:

- Government-Run Market Information Services: Where they exist (e.g., Samoa) they usually have the following characteristics:

- They are independent and thus are likely to be unbiased.
- They provide information over a number of years.
- They provide information that can be used to help farmers get better prices and plan for production, such as what to plant or when out-of-season production can be advantageous, but such information:
 - ★ does not always reach the smaller farmers;
 - ★ may not be up-to-date or may be made available too late to be of any use;
 - ★ may not be very accurate;
 - ★ generally provides little in the way of analysis.

Box 5.10: Market Information

In Fiji, farmers who plant pineapple have a steady source of income. However, the price for the crop fluctuates throughout the year, according to the season and availability. A few years ago, pineapple farmers in Vanua Levu (Fiji's second-biggest island) were experiencing a very low market price for their pineapple. At the same time, however, the pineapple price in Viti Levu (the largest island) was at its high because of the low supply. If farmers in Vanua Levu had known this information, they could have made good use of the opportunity.

³² Other people may also be able to provide useful information. For example, it has been suggested that in the Highlands of PNG, the most frequent source of market information are probably *wantoks* living in or coming back from the main cities (e.g., Lae and Port Moresby).

- Traders often have up-to-date information, but are unlikely to disclose it because they want to buy products as cheaply as possible and sell them as expensively as possible.
- Other farmers can be an important source of information about local markets, but they may not have an accurate idea of the prices they received, and in fact may exaggerate prices they received.
- Other sources include:
 - facilitators;
 - non-governmental organisations (NGOs);
 - agro-processors.

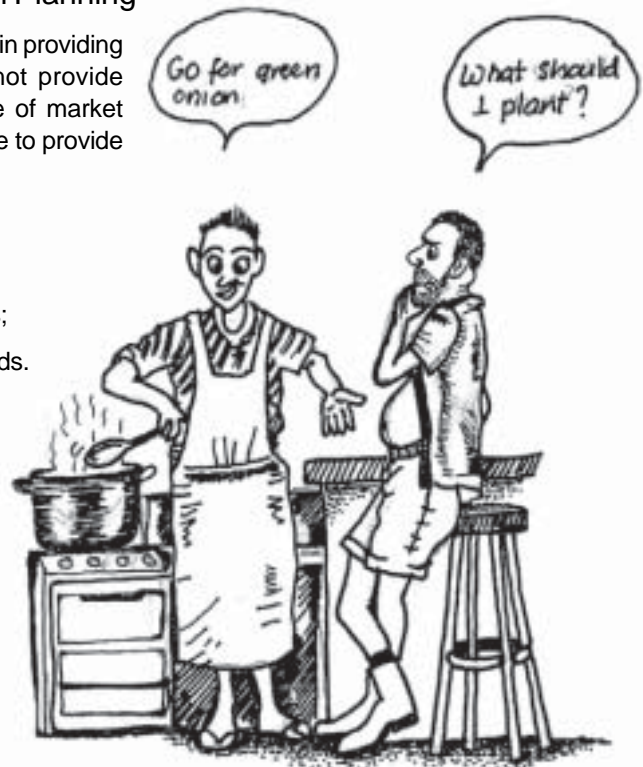
5.6.3 Using Market Information for Production Planning

Although facilitators can potentially play an important role in providing market information, this is of little value if they cannot provide production-related advice that will enable the best use of market information. Examples of topics facilitators should be able to provide information on are:

- undertake new enterprises:
 - how to grow them;
 - how to estimate their potential costs and returns;
 - where to get the necessary inputs including seeds.
- producing out-of-season enterprises:
 - techniques for producing them;
 - how to estimate their potential costs and returns.
- harvesting and post-harvest operations;
- methods and costs of on-farm storage;

The facilitator's role in these concerns would be to help farming family:

- decide whether to grow new crops and when to grow them;
- decide whether to grow existing crops at different times of the year;
- decide whether or not to store;
- calculate possible gross margins and/or profits based on likely prices;
- prepare a production and a marketing plan (see Sections 4.8 and 5.7).



5.6.4 Concluding Comment

This section demonstrates the importance of good market information in helping farmers make good production decisions. The facilitator can play a critically important role in both areas and in ensuring that the farming family links the two. For example, if the farming family intends to produce for the market, it is critically important that the production decision (i.e., what, when and how to produce) takes into account what the market “wants”. Sometimes the facilitator can provide an additional tangible role in helping farmers link production and marketing, for example, working with:

- traders and bankers to ensure that the necessary inputs and credit are available when required;
- traders to ensure transport for marketing the products is available;
- buyers to negotiate or secure markets on behalf of the farming family.

A word of warning: growing a new crop requires perception, insight, analysis and courage. “A marketing trend means that somebody has identified a market opportunity and begun to exploit it. However, all marketing opportunities are limited in scope; the gap in the market gets filled, and then overfilled in the course of time. The people who make money out of those trends are those who start them, not those who follow them. Those who try to jump on a bandwagon when it is moving fairly fast are liable to fall off and get hurt.” [Broadbent, 1985].

5.7 DEVELOPING A MARKETING PLAN

The more commercialised a farming family’s operation becomes the more they need a marketing plan. The key elements of a successful marketing plan are to know the:

- customers: their likes, dislikes and expectations;
- competitors: their strengths and weaknesses.

By doing so, farmers can develop a marketing strategy that will allow them to produce and sell to customers, to better understand competitors and to identify changes in the marketplace that can affect the farm’s profitability.

The purpose of the marketing plan is to:

- define the market (in other words, to identify the customers and competitors);
- outline a strategy for attracting and keeping customers;
- identify and anticipate change and as a result make the necessary adjustments.

A farming enterprise will not succeed simply because the farmer wants it to succeed. It takes careful planning and a good understanding of the marketplace to develop a strategy that will ensure success. Facilitators can be very useful in helping farmers develop their marketing plans.

5.7.1 Developing a Marketing Plan

Generally, the first and most important step in understanding the market is to study it through a process known as marketing research. Marketing research should provide answers to a number of questions. Based on the findings a marketing plan for a product can be developed. The key questions are:

- What product do the customers need or want?
- Can a demand for the product be created?
- Is this product in constant demand?
- How many competitors provide the same product?
- Can the farmer effectively compete in price, quality and delivery?

The facilitator should review the marketing plan to ensure that it answers these questions. If the plan does not answer the questions, it will need to be modified. Alternatively, a strategy will need to be developed that will provide a means for answering them.

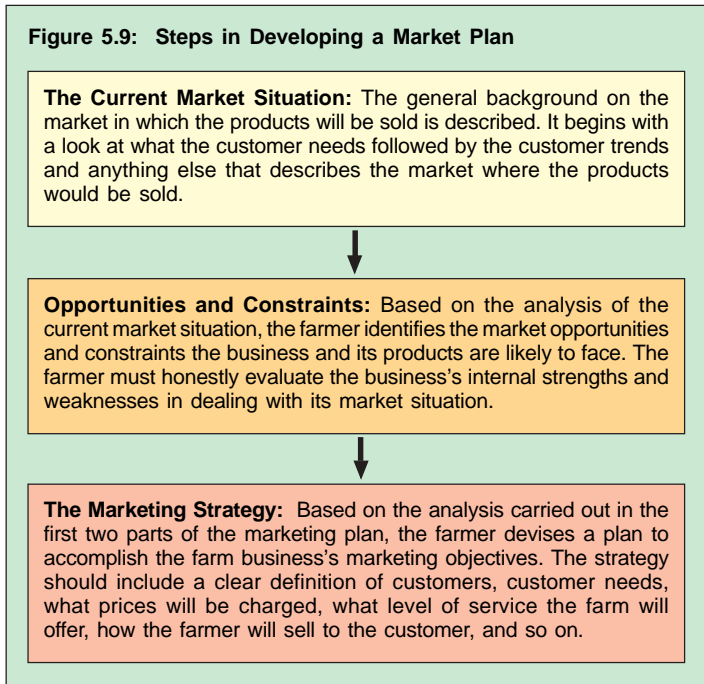
Gathering and analysing information will help to determine if the plan takes into account potential competitors and what adjustments can be made to improve the overall competitiveness of the produce produced by the small farmer.

The first step in developing a marketing plan is to write a clear and concise statement of what the farmer wants to do. This should say what specific customers the farmer is focusing on. The next step is to establish the business' objectives, which indicates how the business is going to accomplish its purpose. Objectives are what separate the business from all of its competitors.

A good marketing plan begins with a good knowledge of the products to be produced and the potential customers. Knowing who buys and why, is the first step in understanding how best to market. A marketing plan should cover the topics indicated in Figure 5.9.

An important step in developing a marketing plan is to undertake a constraints and opportunity analysis. With the help of the facilitator, the farmer can do this exercise to quickly understand whether an idea to produce a new product for the market is worth following up. Understanding what the problem is allows the farmer to find solutions. Knowing what the opportunities are allows a farmer to take action to prosper in a market and make profitable sales.

Table 5.4 indicates a useful way a farmer can structure their thinking when undertaking a constraints and opportunity analysis exercise. A constraints exercise—and usually an opportunity analysis—should always be undertaken when preparing a marketing plan. The best solutions to marketing problems are normally relatively simple and usually do not need major changes in production methods or adoption of new technologies. Complex plans are much more likely to fail.



5.7.2 Advantages of a Marketing Plan

Developing a marketing plan helps a farming family plan how they will get and keep customers. This is an important aspect of marketing because ultimately customers are the means by which the farmer will generate the income needed for daily operations, to repay debts and to return a profit.

The marketing plan is essential to any successful business. Marketing provides the farmer with accurate information that, if it is acted on, can increase monetary income. In other words, a good marketing plan will help boost sales and increase profit margins. The farming family must be able

Table 5.4: Analysis of Marketing Constraints and Opportunities ^a	
Constraints	Opportunities
<i>Problems:</i>	<i>Advantages:</i>
No local market	Capable of early crop production
Poor transport services	
<i>Solutions:</i>	<i>Actions:</i>
Organise local farmers' market	Encourage growing early crops and develop production techniques for earlier crops
Encourage buyers with own transport	
<p>a. For small farmers moving tentatively into the marketing process, identifying the constraints and finding solutions to them is likely to be the major preoccupation. However, as they move towards being commercial farmers, looking for opportunities and exploiting them are likely to become progressively more important, as they potentially offer greater rewards.</p>	

to convince customers that they are offering the best product at the best possible price. If the farming family cannot convince potential customers of this, they will be wasting time and money. This is where the marketing plan comes into play, and this is why it is so important.

There are a number of advantages to having a marketing plan. The plan:

- identifies what the customer wants;
- lets the farmer know how much produce they can sell;
- helps the farmer plan production to have enough to sell;
- indicates to the farmer what to do to make enough money to repay debts and to make a profit;
- identifies competitors and tells the farmer what they are good at in comparison to other farmers;
- identifies new products to produce;
- identifies new and/or potential customers;
- identifies weaknesses in the farmer's management skills;
- identifies weaknesses in the overall business plan.

One possible disadvantage of the market plan is that it could create unrealistic financial projections if information obtained is interpreted incorrectly.

5.7.3 Concluding Comment

To be in the position to carry out market research and to prepare a sound marketing plan, the facilitator and the farming family need to have an understanding of the most important marketing concepts. But is it realistic for a small farming family, the major focus of this manual, to have a written marketing plan? Probably not. Certainly, large commercialised farmers whose farm operation has truly become a business can benefit from having a marketing plan. And even small farming families can benefit from going through the thought process of developing a basic market plan. This can be done in consultation with a facilitator. It is vitally important when planning to produce for the market to have some idea about when, how and where to market the product before the production process is started. Leaving such marketing decisions until the product has been produced will usually have disastrous consequences (in other words, resulting in the farmer losing money).

5.8 CONCLUDING COMMENT ON THIS MODULE

Small farmers, as the name implies, do not rely a great deal on the marketplace for purchasing inputs or disposing of products. However, as they become more commercialised in their farming and move towards treating farming as a business rather than a "way of life", the marketing component will become more important, therefore making the link between production and marketing more important. Because small farmers have not been fully exposed to the commercial world, they may lack knowledge and skills in dealing with the marketing component. It is probably fair to say that many are likely to be naive about how to engage in the marketing activity. For this reason many small farming families could be (and unfortunately are *likely* to be) exploited by unscrupulous individuals who service the marketing system. Facilitators can help educate farmers about how to operate in the marketplace and also help farmers develop strategies that can ultimately improve their power and influence in the marketing process and marketplace.

6. PRODUCTION MARKETING LINKAGE

This chapter discusses strategies that farmers can use to try and ensure that they are treated equitably in the market place and that maximum benefits are achieved from linking farm production to the marketing system. Three specific strategies, all of which feature a vital role for facilitators, are described:

- farmer groups (Section 6.1);
- contract farming (Section 6.2);
- accessing grants and loans (Section 6.3).

The primary emphasis is on farmer groups, which have the greatest potential to empower farmers since collective influence is likely to be much greater than that of a single individual.

6.1 FARMER GROUPS

Farmer groups were mentioned earlier in the manual (see Sub-Section 3.6.1) as a valuable means for facilitators to increase their multiplier impact. In that context, farmer groups are likely to be informal in nature (see Sub-Section 3.6.1.1). However, in terms of production marketing linkages, they are likely to be more formal in nature since their role is primarily economic; the obligations of the members are greater and the economic success of the group is determined by everyone pulling their weight.

The following topics are covered:

- when farmer groups are useful (Sub-Section 6.1.1);
- what farmer groups can do (Sub-Section 6.1.2);
- characteristics of successful groups (Sub-Section 6.1.3);
- requirements for successful group economic activity (Sub-Section 6.1.4);
- assessing a group's self-reliance (Sub-Section 6.1.5);
- farmer groups in the Pacific (Sub-Section 6.1.6).



Picture 13: Farmer group harvesting egg plants near Goroka, Eastern Highland Province, Papua New Guinea

6.1.1 When Farmer Groups Are Useful

There are many advantages to farmer groups, and they are desirable in many cases (see Sub-Section 3.6.1.2). Of course, they are not attractive to everyone. To participate in a group with an economic objective, an individual must see more benefits (in relation to costs) than staying outside the group and acting independently.

For this reason, farmer groups are most suited to the more disadvantaged small farmers in rural areas who are most likely to benefit from the activities of the group. The groups also have the potential to improve participants' feeling of well-being, such as through improving community relationships, reducing their levels of risk, and improving their standard of living.

Farmers with more income are less likely to consider joining a farmer group beneficial. Their relatively wealthy situation means that their access to income-earning opportunities and services is likely to be better than is that of more disadvantaged people.

Finally, there is the question of gender. In many countries in the world, and the Pacific is no exception, women tend to be more willing to work together than men. For this reason, women's work groups are commonly found, whereas men's groups—if they exist—tend to have a social function rather than an economic role. Working in groups is probably more acceptable and attractive to women in part because of their relative disadvantages. In addition, women generally tend to be more social and cooperative in nature (and therefore more comfortable with being part of a team effort toward a shared goal) while men are often oriented toward individual achievement and independent work.

Therefore although there are many reasons for farmer groups to be encouraged, level of welfare and perhaps gender may limit participation and possibly the success of a group (see Sub-Section 6.1.6 for more).

6.1.2 What Farmer Groups Can Do

Farmer groups serve two important functions for disadvantaged people:

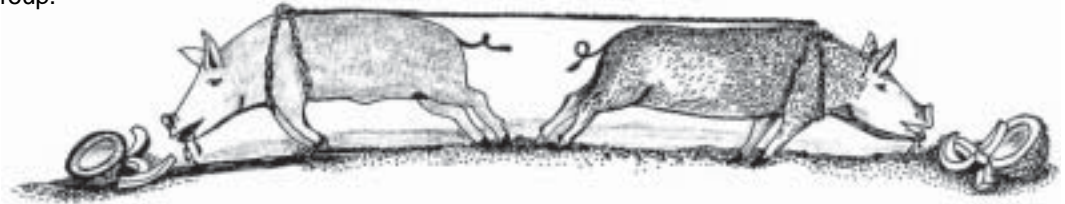
- **cultural or community security:** People who associate with each other in groups often help each other in difficult times. Thus groups that do not always have an explicit economic role still can provide welfare or economic benefits. This kind of support is common in the Pacific (such as with religious groups, community groups, women's groups) and contributes positively to the Pacific Way of Life.
- **economic:** The economic benefits of farmer groups is the main reason they are included in this manual. This function can be shown in one or more of the following two types of activities:
 - *marketing related activities:* This involves members reducing their costs by taking advantage of what economists call **cost discounts**. For example, the group could:
 - ★ reduce costs of production by collectively purchasing inputs in bulk and therefore obtaining a price discount;
 - ★ increase their incomes through collectively marketing a large quantity of product so the marketing cost per unit is reduced (for example, as vanilla farmers in Tonga do);
 - *income-earning activities:* This involves group members collectively participating in or contributing to a joint income-earning activity. It may involve purchasing an expensive piece of equipment, such as a grinding machine for value-adding processing of product produced individually on members' farms. Another example would be building a chicken shed in order to produce eggs.

Many group-related activities in the Pacific have an economic aspect. Often they are organised by women's groups, such as:

- fairs and markets for special occasions (for example, Women's Week);
- fundraising for the community;
- accessing loans for handicraft-making and vegetable gardening.

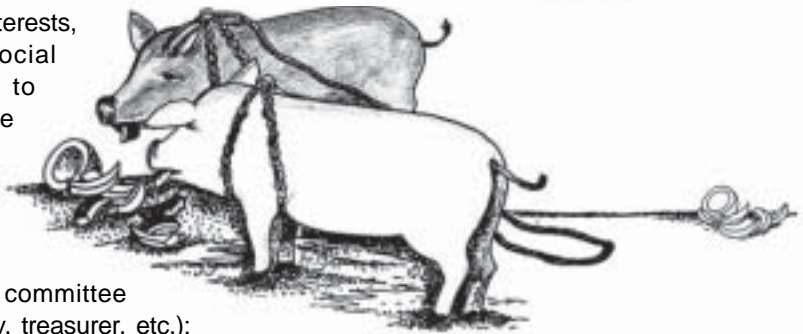
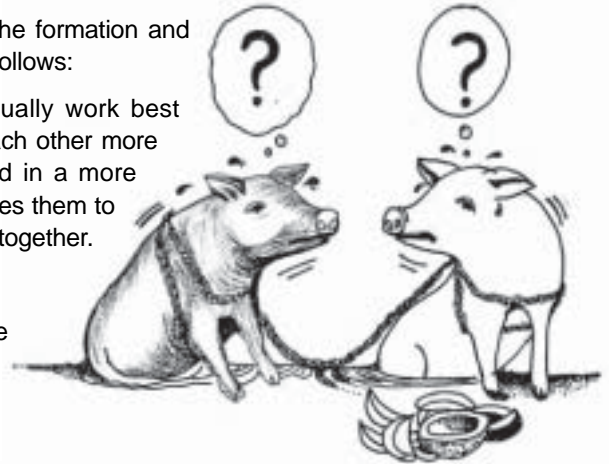
6.1.3 Characteristics of Successful Groups

Successful formal groups tend to have some characteristics in common. Looking at these can give some indication as to what points need to be considered when setting up a formal farmer group.



Some of the characteristics that contribute to the formation and successful sustaining of farmer groups are as follows:

- Small groups of less than 20 persons usually work best because members get to know and trust each other more quickly and tend to work more closely and in a more informal manner. This, as a result, encourages them to analyse problems together and also to plan together.
- The group should have:
 - clear objectives, and plans to achieve these objectives;
 - a written constitution that members agree to obey;
 - members with common interests, close economic and social affinity, and a desire to participate actively in all the group's activities (this is sometimes referred to as the "sharing and caring bonding element");
 - a democratically-elected committee (i.e., chairperson, secretary, treasurer, etc.);
 - leadership that is committed, honest, transparent and accountable, and encourages active participation on the part of all its members;
 - simple record-keeping of finances, attendance, minutes of meetings, etc.;
 - a set of rules in place, as well as a willingness to enforce punishments (fines, suspension, expulsion, etc.) for deviant behaviour (such as lack of attendance at meetings, not completing responsibilities associated with activities of the group, etc.).
 - a savings system so that membership dues, funds resulting from fines, and a small proportion of funds from income-earning functions can be ploughed back into future activities, etc.
- The group should have regular structured meetings:
 - with a previously prepared agenda that includes dealing with unfinished issues arising out of earlier meetings, but also has the flexibility to have new topics added;
 - at which attendance of all members is expected;
 - at which active participation of members is encouraged and expected;
 - at which decision-making is transparent and democratic;
 - that are recorded in writing (and a copy should be kept in an accessible location).



Facilitators guiding the formation of a formal group should strongly encourage the group to adopt these characteristics. Without them, the group is unlikely to be viable and sustainable.

6.1.4 Requirements for Successful Group Economic Activity

A successful economic activity does not occur in a haphazard manner. Rather there is a definite sequence of steps that should be followed in order for a group to develop a successful economic activity³³. Briefly these are as follows:

- **feasibility:** The group must be able to market something that people want to buy. A feasibility study will help determine:
 - whether there is a market for the product;
 - what resources are needed;
 - the necessary start-up and operating costs and where to get them from;
 - what the risks are likely to be (both those originating within the group and outside of it) and whether it is worthwhile to take them;
 - potential profitability.
- **profitability:** The activity must generate more money than is spent. In trying to assess profitability it is important to take into account risks (such as changes in prices or the possibility of a drought). There are a number of steps in a profitability study. These are as follows:
 - *estimate sales price:*
 - ★ total cost = sum of the number of items used X cost per unit of each item
 - ★ sale price per unit = cost per unit + some profit per unit (except for items with an established market, in which case the sale price may be fixed by tradition or other market forces)
 - *estimate annual income from sales:*
 - ★ sales income per period (week, month, production cycle, year) = sales price per item X number of items sold per period
 - ★ annual income = sales income per period X number of periods in the year (This formula assumes that the sales income per period does not vary, or that if the price and level of production do vary, they offset each other; if this is not the case, then the variation should be taken into account.)
 - *prepare a cash flow chart:* This involves setting up a chart to estimate the cash coming in and going out per period (usually per month) for a complete year. If more cash is going out than coming in during certain periods, it may be possible to use cash savings from a previous period, or, as a last resort, borrow money to cover the shortfall (see Sub-Section 4.7.2).
 - *calculate the profit of the activity:*
 - ★ cost of sales = start-up expenses + operating expenses - repayment of loan principal (if there is one) and other fixed costs
 - ★ profit (or loss) = income from sales - cost of sales
- **planning:** The group must decide in advance the goal, tasks and resources for the activity. This involves making a tentative timetable indicating decisions on:
 - what to do;
 - how to do it;
 - where to do it (if there is a possibility of more than one location);
 - who will do it.
- **marketing:** The group must aim to satisfy its customers so that it can market enough at a specific price to make a profit. The six P's discussed in Sub-Section 5.1.3 are relevant when thinking and planning a marketing campaign.

³³ More detail can be found by looking Cook and Thomas [1994] and Bonitatibus and Cook [1995].

- savings: Savings are required to provide the resources needed to start or expand the group activity. Although saving involves sacrifice, it is an important discipline that all groups engaging in an economic activity should learn. Group savings have a number of useful functions such as:
 - paying for day-to-day expenses such as paper, transportation, etc.;
 - investment capital for starting or expanding an enterprise;
 - serving as an insurance fund that can be used in an emergency or to guard against risk, or other contingency;
 - possibly being lent to members or non-members;
 - showing members' financial commitment to their group enterprise;
 - promoting members' financial discipline, increasing group cohesion, and building group financial self-reliance (in other words, financial independence from outsiders);
 - reducing bank costs (one account is cheaper than many individual accounts).

Methods of group savings can vary, but the best way is for all members to save the same amount each time they meet, and to fine those who do not do so, thus keeping out those who do not pull their weight. However, special and transparent rules are required to ensure accountability. Group rules should state:

- the purpose of the savings;
 - the amount to be contributed and the dates of payment;
 - how the treasurer will keep records (they must be precise) and where the money will be kept;
 - how defaulting members would be disciplined.
- loans: Loans for a group activity should only be sought after the group has demonstrated its ability to save regularly. The group must recognize that a loan is not a gift and has to be repaid, usually together with interest and possibly some service charges. Group lending by banks is often preferable to individual loans because banks:
 - prefer to give larger loans because paperwork and administrative charges are lower than for a lot of small loans;
 - can insist on group responsibility or liability for paying back the loan—a good idea when borrowers have little personal collateral (such as equipment or title to land) for loans.

Experience has shown:

- A loan should not be more than three times the amount the group has saved.
- Loans should be obtained for productive purposes, not consumption purposes. A proper business plan should be developed before applying for a loan to verify that the income generated from the loan will enable it to be repaid.
- Every effort should be made to repay loans on time so that repeat loans can be obtained from the same source.
- Certain governments and development entities only provide financial and technical assistance to formally chartered groups.

Once again facilitators guiding the formation of a formal group should strongly encourage the group to adopt these approaches. Without them, the group is unlikely to be viable and sustainable.

6.1.5 Assessing a Group's Self-Reliance

After guiding the formation of sustainable and economically viable farmer groups, facilitators eventually need to withdraw their hands-on involvement. This means that the groups need to be self-reliant. There are a number of indicators to measure a group's progress in becoming sustainable and self-reliant, such as:

- A highly motivated group has regular group meetings and high participation of members at those meetings.

- There is evidence of shared leadership and obvious member participation in group decision-making.
- There is continuous growth in group savings.
- There are high rates of loan repayment when loans are obtained.
- There is evidence of group problem-solving, which indicates the group is becoming empowered in taking initiatives for its own self-development.
- There is evidence of having established effective links with development services both in the public and private sector (for example, NGOs).

Participatory monitoring and evaluation (PMOE) tools are particularly useful in checking and assessing progress:

- Monitoring involves keeping regular records of group decisions, actions and finances, and checking that actions are taken according to plan.
- Evaluation involves analysing the group's records to assess whether the group and its enterprise are achieving objectives and to identify possible improvements if the group lags behind.

If done in a participatory manner (one that involves members in the planning and implementation of activities as much as possible), such activities can:

- help assess whether what the group is doing is on the right track;
- if necessary, can help suggest ways of adjusting or changing plans to improve performance.

As a result of PMOE, groups can learn from past mistakes and thus increase their own self-reliance and strength.

6.1.6 Farmer Groups in the Pacific

Although generalisations are dangerous, when considering the role farmer groups play in the Pacific, the following conclusions appear to be reasonable:

- The groups that exist tend to be of the formal type and sometimes are registered with government institutions.
- Women's clubs or groups are very common. Mixed groups with both women and men are sometimes found. Men's groups, particularly economic (rather than just social) ones, are not commonly found.
- Groups that engage in economic activities rarely pursue joint production activities. Marketing activities, particularly product marketing, are more common.
- Product marketing oriented groups are especially attractive to farmers who are far away from the main market outlets. In addition, they appeal to farmers who market their surplus product but are not heavily commercialised. Highly commercialised farmers are more likely to have developed their own marketing channels and outlets.

In theory, farmer groups in the Pacific have tremendous potential to strengthen production to marketing linkages and facilitators should be vigorous in encouraging their formation, particularly as a means to help empower small farmers in the marketplace. However, in practice, there appears to be better potential success with women's groups than men's groups. The challenge in some Pacific countries will undoubtedly be to find ways that men can cooperate in groups, particularly with value-added and marketing related activities. There are individuals who are trained to be group promoters. The skills of such people, who often are found associated with NGOs, need to be tapped in order to address this challenge.



Picture 14: Farmer group harvesting carrots, Papua New Guinea

6.2 CONTRACT FARMING ³⁴

The practice of contract farming is becoming increasingly common in some Pacific island countries. The process involves buyers (sometimes exporters) entering into an agreement with farmers to buy a certain quantity of a product at a specific price. Such arrangements, for example, exist for bananas in Samoa, squash in Tonga, and root crops in Vanuatu. Such an arrangement can have some or all of the following advantages for the producer:

- provision of inputs by the potential buyer;
- extension advice on the part of the potential buyer to try and ensure a good quality product;
- a certain market for the product produced at a previously agreed price;
- in some cases, a way of providing a product for a distant market (in other words, export).

Contract farming relieves the producer of a great deal of uncertainty with respect to the marketing component, on both the input and output side. However, possible disadvantages for the producer are:

- some loss of control of what they can do on their farm;
- sometimes, some uncertainty about selling the product, if the quality does not satisfy the standards of the buyer;
- the possibility that the product price earlier agreed to by the producer ends up being lower than the market price when the crop is harvested.

On balance, however, contract farming is likely to be quite appealing for small farmers. It is also a way to reduce marketing risk (see **forward contracting** in Sub-Section 7.3.3). Individual small farmers may find it difficult to enter into contract farming agreements because buyers are more likely set up contracts with larger farmers in order to reduce overhead expenses. However, a group of small farmers might be attractive to buyers, and facilitators can potentially play a significant role in brokering such access and agreements.

Box 6.1: Contract Farming

In 2001, a contract farming operation began in Papua New Guinea's Minj-South Wahgi district where Gambolo Investment Ltd regularly bought fresh produce at the farm level for onward supply to mining companies working in the area. The farmers were notified of the prices and demand for each kind of produce in advance. Village extension workers facilitated the whole process, including establishing contact between the buyer and farmers, creating price display boards at the farmers' training centre at Minj-South Wahgi, distributing the order among farmers and arranging supplies accordingly, and advising farmers on how to improve the quality of their produce. On Mondays, farmers brought their produce to the farmers' training centre and the buyer came to collect the produce. This guaranteed a market for the farmers as well regular supplies for the buyer. The farmers have reported that over the last two years this contract relationship has led to significant improvement in produce quality, an increase in production levels and above all an increase in farm incomes.

*M. Iqbal, FAO Consultant,
Papua New Guinea.*

Box 6.2: Contract Farming — Squash Example from Tonga

The squash industry in Tonga is into its seventeenth year in 2003 and is now a mature industry. Funding for farmers to buy production inputs is provided by the Tonga Development Bank and other commercial banks. However, more common is that exporters provide inputs to and later market the produce for the farmers on a contract-farming basis. Exporters and farm-supply shops import and sell seeds, fertilisers, chemicals and other supplies needed by farmers to grow squash. Farmers use their own equipment or hire farming-services contractors to carry out soil preparation, planting, fertilising, weeding, spraying and harvesting work. Exporters have packing and processing sheds with all the equipment needed to process squash for export.

The farmer only finds the price for the crop when the squash is landed in Japan. It depends on the supply coming at the time the Tonga shipment enters the market. This creates uncertainty and risk. 2003 was not a good year for Tongan squash farmers. The 25 seniti (USD\$0.12) or 36 seniti (USD\$0.17) per kg of squash paid by Japanese exporters was enough only to pay for the freight. Growers received low prices because the Japanese squash market was flooded after good harvests from Russia, China and Japanese domestic growers. Tonga also exported about 6,000 tons more than its targeted allocation of 15,000 tons. The Tongan Squash Exporters' Council is now seeking a TOP6 million (USD\$2.593m) loan for the purpose of compensating squash growers who were hurt by low returns from their sale of squash to Japan this year. The idea is to give the growers some money to meet their debts.

³⁴ More detail can be found in FAO [2001], Cook and Thomas [1994] and Bonitatibus and Cook [1995].

6.3 ACCESSING GRANTS AND LOANS

The major aim of loans from development banks and grants from development agencies is to further economic development, especially to generate additional revenue, create employment, and generate income for the local government in the form of taxable income. The major aim of loans from private banks is to increase the profit of the bank. Loans and grants are not handouts. Loans and grants are accompanied by stipulated responsibilities and obligations.

6.3.1 Loans and Grants to Group Activities

If a group wants to access external funds (loans or grants), they usually need to develop a detailed and well thought-out business plan. It is also highly desirable for the group to demonstrate their commitment and fiscal responsibility so that an agency will consider them worthy of support. In addition to a good track record, a group should ideally show that it is using its own internal financial resources (savings from earlier income-generating activities and member contributions) to good effect. Once these financing sources have been fully utilised, then external funding sources can be sought.

For success to be achieved in attracting external funds, the group's business plan needs to demonstrate that the proposed economic activity is potentially profitable. Obviously, the first choice would be to obtain a grant, since there are no repayment implications. If the business plan demonstrates the potential for making a profit, taking into account repayment implications, and grants are not available, then a loan may be considered. Before applying for the loan, the group must decide issues including:

- what collateral will be put up;
- how the loan will be repaid;
- who will follow up on the loan application;
- who will make and track repayment;
- who will monitor the loan sponsored activity.

Bear in mind that most grants and loans to farmer-associated groups in the Pacific are for product value-adding activities (see Section 5.5), and marketing related activities (such as the purchase of a transport vehicle, for example a pick-up or boat).

6.3.2 Business Plan and Loan Packaging Services

As indicated in Sub-Section 6.3.1, loan and grant applications usually require some kind of business plan indicating how the money will be used and the revenue flow expected over time. Like whole farm planning and developing marketing plans (see Sections 4.8.2 and 5.7), these take some skill and expertise to develop. Although facilitators sometimes have the necessary expertise, there are also often experts in NGOs and in the granting and lending agencies themselves that can help in putting the necessary documentation together, usually free of charge. It is critically important that the business plan is developed carefully and realistically. A good and reasonable business plan will receive much more sympathetic treatment than one which is sloppy and unrealistic.

6.3.3 Loan and Grant Sources

It is not possible to indicate in this manual the potential sources of grants and loans in the different Pacific countries. There are many. Small development grants are often available from development agencies, embassies and NGOs, and occasionally from domestic sources. Loans tend to more likely be available from national and regional development-related institutions including NGOs, and sometimes from commercial lending institutions. Each grant giving and lending institution tends to have its own priorities and conditions for giving and distributing funds. Therefore, it is important for groups to learn about these before investing much time in preparing grant or loan applications. Information about such sources, priorities and conditions should be sought by facilitators who are better connected with the outside world and can therefore be a conduit for such information.

6.4 CONCLUDING COMMENT ON THIS MODULE

It is critically important for small farming families to be nurtured and supported as they become increasingly exposed to the formal markets outside their villages. This chapter has outlined three strategies that facilitators can utilise to help empower these families as they move into this complex external environment.



Picture 15: Honiara Central Market, Solomon Islands

7. RISK AND UNCERTAINTY

Farming families, no matter where they are on the subsistence to commercial agricultural production spectrum, are concerned about risk and uncertainty. People working in agriculture are especially exposed to these because they can be adversely affected by changes in both socioeconomic conditions (for example, if inputs are not available for purchase when they are required, market prices drop badly, etc.) and biophysical conditions (such as droughts, cyclones, devastating disease and pest problems, etc.). Farming is a risky business but farming families who have very low levels of income and little in the way of cash and food reserves are particularly vulnerable. Larger, more commercial oriented farmers also worry a great deal about risk and uncertainty but they usually have some reserves (such as bank savings) to enable them to survive during bad periods as long as they are not too long. However, as farmers move along the subsistence to commercial end of the agricultural production spectrum they are exposing themselves to greater risk because the adoption of improved technologies often involves purchasing inputs and certainly involves risk relating to marketing production produced on the farm. Thus exposure to economic risk, in this case marketing risk, increases. Poor small farming families are likely to go to great lengths to minimise risk; for these people increasing exposure to market forces is likely to be a major concern. Until now we have not talked much about risk and uncertainty in the manual but that does not mean we do not think that it is important. It is in fact a very important concern for all types of farmers whether or not they are highly commercialised.

Picture 16:
Taro leaf
blight, an
unexpected
risk for farming
activities in
Samoa



After a brief introduction to the topic of risk and uncertainty, this chapter will address:

- the importance of, and sources of, information that can be useful in managing risk and uncertainty (Section 7.1);
- the approach to designing farming strategies to reduce risk and uncertainty (Section 7.2);
- some specific methods of reducing risk and uncertainty (Section 7.3).

7.1 MANAGING RISK AND UNCERTAINTY

Risk means what could go wrong, while **uncertainty** means what may go wrong but is not certain to occur. Therefore in terms of risk we can put a probability on the event occurring (e.g., there is a 15% chance that a cyclone will hit Vanuatu in any one year) but no such probability can be assigned to uncertainty (e.g., a terrorist attack). Therefore insurance companies will often be

willing to offer policies that insure against risk but are not so keen on insuring against uncertainty. As far as the following discussion is concerned we will not differentiate too much between risk and uncertainty. Both are bad as far as farmers are concerned.

Risk management involves attempting to prevent an undesirable event from occurring or attempting to make its negative effects as small as possible. In the case of farmers, they have to take risks to grow a crop but cannot be sure about the weather, the price they may get for the product if they choose to market, what people may want to buy, etc. There are two ways the farmer can try and deal with risk. These are:

- attempt to guess what may happen and try to avoid it;
- do things in advance that will make the impact of the problem, if it occurs, as small as possible.

For example, if a field is likely to get very wet, then planting all the crops on a ridge to keep the leaves dry and drain water away from the roots is a sensible strategy. An even more sensible strategy would be to plant a crop that thrives on very wet conditions (such as taro or kangkong).

In order to minimize risk, farmers need to make choices. To do this effectively they need to know both technical (soil conditions, weather patterns, knowledge on how to implement specific enterprises, etc.) and socioeconomic (information on input and selling prices, yields, markets, etc.) information. However, often farmers find that the decisions they have made turn out not to be the best, because:

- conditions have changed from the time the decision was made and the crop or animal was finally harvested or sold;
- there are many factors or influences in agriculture over which farmers have no control.

For example, crop farmers must make some major decisions (such as what crops to plant and what seeding rates, fertiliser levels, etc., to use) early in the cropping season. The final yield and prices will not be known for several months, or even several years, in the case of tree crops. In addition, risks in farming activities can come from unexpected places such as drought, disease, low market prices, imports, etc.).

7.2 INFORMATION AND DECISION-MAKING

What farmers think they will get in the future for their crop is important in the decisions they make. What happened in the past is important to the farmer and helps them decide what they think will happen in the future. Farmers tend to remember the bad things and not the good things. If the tractor recently broke down, they tend to think it is bound to happen again, soon. However, if something has not happened before, like a severe drought or hurricane, the farmer may not be prepared to consider such an event ever happening.

What happened last month is considered more important than what happened last year. When things change, like the start of an El Niño, the amount of rain last year will not tell the farmer what to expect now. Basing what will happen tomorrow on what happened yesterday is based on the belief that what happened yesterday will continue to happen. It is not a good idea for a farmer to base a decision that will impact over many years on what happened yesterday.

Therefore the most useful tool a farmer can have to help in the management of risk is good information. There are several sources of information available to the farmer:

- Farm records: The best source of historical production and marketing information are—or should be—the farm records. Crop yield, livestock production, and cost information generated by farm records tell the farmer what can be achieved. Production records should give the farming family some idea how successful they were at managing risk in the past. These should also give some hints to the farming family as to what they should do in the future to be successful.
- Information from elsewhere: This includes information from the Agricultural Statistics Service, National Extension Service, and other government agencies. In addition consulting advisory services, newsletters, magazines, agricultural suppliers, and neighbours can all prove to be valuable sources of information for farming families.

- **Production and market information:** Historical yield and price information may be available from the National Statistics Services in some of the Pacific. This information can prove useful when compared to the data generated by farm records. It is important to remember that national data is an average of many farms and may not tell the farmers exactly what they might get. Comparing historical farm yield data to that of similar farms in the same area should provide additional information on how the farmers can improve their performance.

What the market is doing will not tell the farmer about the risk, it will just give a trend that the farmer must decide whether it is good or bad news. Understanding the importance of these issues and good information about them could help the farmer avoid bad decisions in both the short and long run.

7.3 FARMING STRATEGIES TO REDUCE RISK

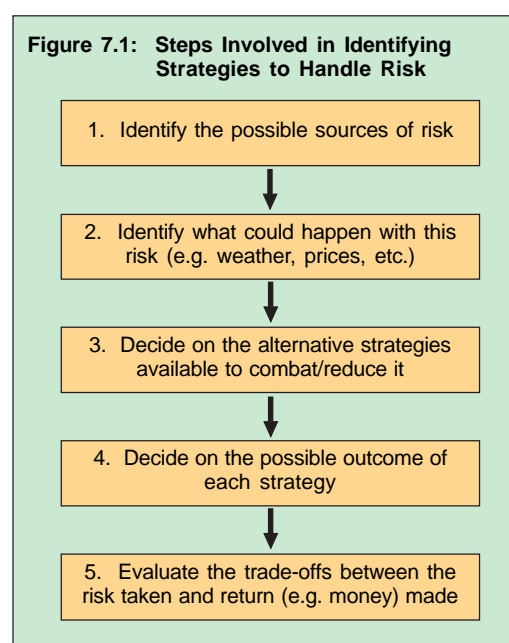
7.3.1 The Approach

Farmers are well advised to make plans to cope with risk so that they can get some protection against the decisions they make today, not knowing what may happen tomorrow. Risk management strategies have many responses, which may reduce the chance of a bad event occurring and/or reduce the effect of the bad event, if it occurs.

Farmers can make taking risky decisions easier by thinking about different strategies and guessing the possible outcome of each. The process can be broken down into several steps as indicated in Figure 7.1.

Risk responses are commonly grouped into three groups:

- production (Sub-Section 7.3.2);
- marketing (Sub-Section 7.3.3);
- financial (Sub-Section 7.3.4).



As shown in Table 7.1, most farmers use a combination of these risk responses in designing and implementing their risk management strategy.

Table 7.1: Risk Management Strategies According to Farm Operation Area		
Area of the Farm Business	Strategies for Reducing Chances of Occurrence	Provide Protection Against Adverse Consequences
Production:	Choosing low-risk production activities	Diversification of production practices
	Diversifying enterprises	Maintaining flexibility
	Geographical dispersion of production	
Marketing:	Obtaining market information	Forward contracting
	Spreading sales over time	Minimum price contracts
Financial:	Off-farm activities	Insurance against losses
	Maintaining liquidity reserves	
	Spacing investments	
	Acquiring assets	
	Obtaining limited amounts of credit	

7.3.2 Production Responses

Production responses have traditionally been very important in risk management. There are a number of production responses to the risks farmers face. Five specific strategies used to deal with production risk are the following:

- Choosing low risk production activities: Farmers can manage their risk through the crop or livestock enterprises they choose to implement. Farmers are likely to be aware of how specific crop yields are related to soils, management, and other factors on their own farm. For this reason, a crop enterprise may be considered high-risk by one farmer and low risk by another farmer. Some farmers may also undertake only part of a production activity as a means of reducing risk. For example, a farmer may breed pigs but may not fatten them.
- Diversification of enterprises: Implementing many enterprises (growing many crops, often in mixtures) is a risk management technique traditionally used by farmers. If one crop does not do well, another crop may do better, because different crops have different production cycles, different rooting habits, different demands on soil nutrients, etc. The money the farmer may make may not be as high as if they had specialised in growing just one crop, but the annual variation in income levels will likely be reduced. For most farmers, combining crops (crop mixtures, crop rotation and diversification) is not only a risk management strategy but also good management: Farmers rotate crops to protect their soils and stop disease building up, a strategy which can reduce costs and potentially increase yield.
- Growing crops in more than one farm location: This production strategy may not always be suitable for small farmers. Growing crops in different places reduces the impact of localised weather, soil and pest and disease conditions. Availability of land for rent or purchase potentially has some impact on this. Farmers, in order to increase the size of their crop production, must farm over a wider area. This requires more money in the form of operating costs. However, spreading out production is one way of reducing risk as well as possibly increasing efficiency of machinery and labour use.
- Diversifying production practices for the same enterprise: Farmers often choose different ways of doing things as a way of spreading risk. They may plant several varieties of a single crop or have more than one species of livestock; they may implement a plant protection programme to prevent pests (for example, bagging fruits). The additional cost of these approaches has to be compared against the potential losses that might occur without them.
- Maintaining flexibility: Farmers commonly try to maintain flexibility in their operations as a production response to risk. Increasing specialisation of livestock facilities and equipment limits flexibility. However, farmers are more likely to maintain flexibility in their marketing and financial decisions than in the type and size of production activities. Often the costs associated with flexibility in production are higher than most farmers are willing to risk.



7.3.3 Marketing Responses

Fluctuation of product prices in the market place has increased farmers' awareness of price risks and highlighted the importance of good marketing skills. Farmers have increasingly attempted to improve their marketing knowledge and to develop new marketing skills, and new marketing responses to risk are emerging. Four strategies to combat marketing risk are the following:

- **Obtaining market information:** Very often farmers do not know the national price for a product. Obtaining market information from friends, relatives and the radio is not difficult, but obtaining reliable information is. Getting market information is a starting place; the information must be combined with other actions before there is an effect on price and income variability.
- **Spreading sales:** The technique of spreading sales (that is, selling a particular product several times during a year) is commonly used by farmers. Dairy and other livestock producers are forced to spread the sales over the entire year because of the nature of their production. With frequent sales throughout the year, the average price received by a producer is nearly equal to the season or annual average price. Producers with marketing flexibility can also spread cash sales and obtain a price similar to the seasonal average price. This method of selling enables a farmer to avoid selling all of the production at the lowest price during the year. The more seasonal agriculture is (for example, rain-fed agriculture in drier areas) the higher the price variation is likely to be.
- **Forward contracting:** The practice of forward contracting, when available, can be used for both inputs and outputs. Some farmer contracts indicate quantities of inputs at specified prices to avoid the risk of price increases and unavailability of inputs. Similarly, some producers contract the price of some of their production. Forward contracting may result in the farmer getting a lower price than they would have if they had sold "on the day". However, the ability to guarantee the price the farmer receives allows them to plan ahead. If the farmer is happy with the gross margin made and feel they can safely supply the quantities contracted, then forward contracting is a good risk-avoidance mechanism.
- **Minimum price contracts:** A marketing response that has recently become available with respect to some agricultural commodities is minimum price contracting associated with government programmes. This type of contract provides farmers with the opportunity to secure price insurance. However, this contract will not always be able to guarantee a profit. This marketing technique provides producers with greater flexibility and more risk management alternatives.

Box 7.1: Vanilla Price Drives Buyers Crazy

For the last ten years, there seems to be a lot happening in the lucrative vanilla industry in Vanuatu. Recently, the price has risen surprisingly high (ranging from Vatu 9,000 to 12,000 per kg cured at farm gate). Because of the rise in price, a lot of middlemen are jumping into the spice industry and fighting amongst themselves over the supply. This has caused numerous disturbances in Vanuatu's fledgling spice industry. These include:

- Farmers have split up in common groups.
- Farmers are harvesting immature beans.
- Some middlemen are offering prices higher than the world market price.
- Beans are often stolen in the night.

Sadly, the increase in price of vanilla should be a sign of progress; instead it has negatively affected Vanuatu's superior spice industry.

7.3.4 Financial Responses

Farmers can adopt a number of strategies to cushion themselves against financial risk. One is a very traditional approach while the others become increasingly important as farmers become more monetised in their approach to living and more exposed to the world outside their communities. Six possible strategies are as follows:

- **Activities off-farm:** Off-farm work for some family members has been, in most traditional societies throughout the world including the Pacific, a means for farmers and their families to cushion themselves against risk from implementing agriculturally related activities (see Figure 3.1 and Section 3.1). Often, in rain-fed agriculture, which is frequently seasonal in nature, such activities are concentrated in periods during the year when agriculturally-related activities are less demanding.

- **Maintaining liquidity reserves:** In case of emergencies, it is beneficial for farming families to set aside money for bad times.³⁵
- **Spacing investments:** Another obvious strategy is to avoid too many investments that must be financed through loans or that are very risky at any one point in time.
- **Acquiring assets:** Accumulating assets that can be sold in times of trouble is another way of responding to financial risk.
- **Obtain limited amounts of credit:** Not acquiring too much credit at any one point in time that would result in a burdensome repayment schedule is also a risk-averse measure making bad times less traumatic.
- **Insurance against losses:** Crop or livestock insurance schemes can cushion farmers against losses if for some reason the crop fails or livestock die. However, unlike in the high-income countries, this is not yet a general possibility in the Pacific.

Box 7.2: Market Requirements

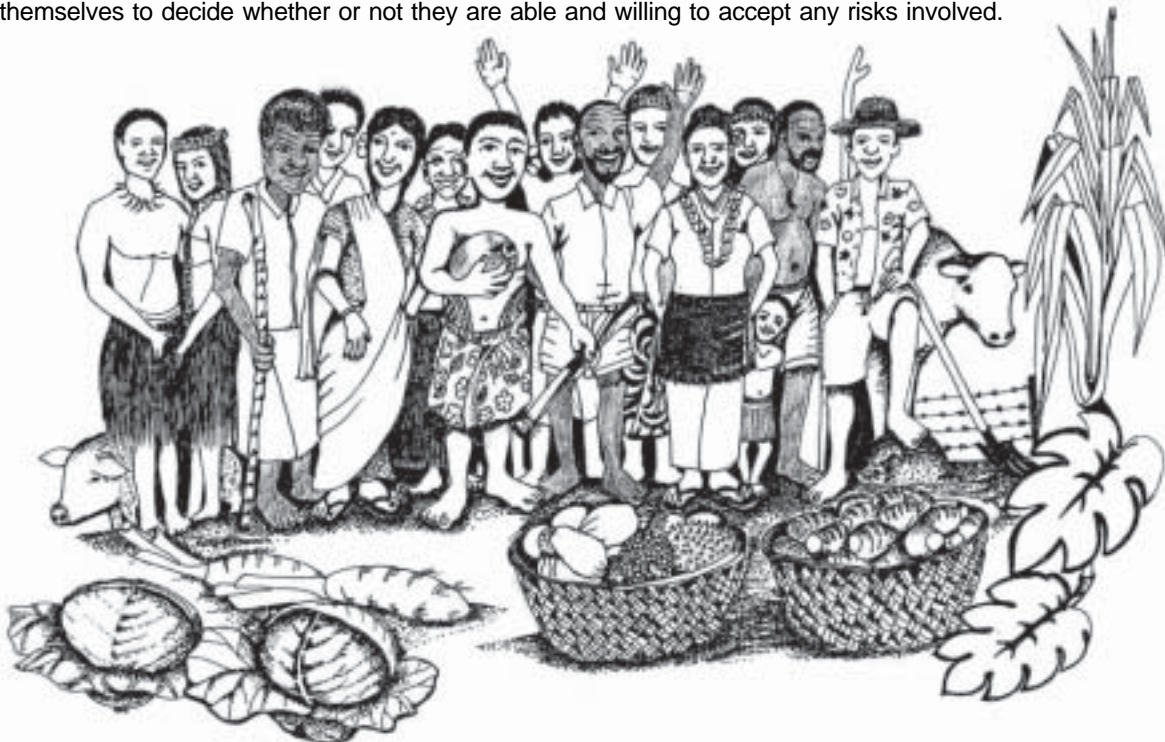
Returning from an overseas tour, one of Vanuatu's government ministers advised farmers to plant ginger for export. Unfortunately, this was done without having done accurate market research. Farmers went ahead and started planting ginger because the market price sounded very promising. At harvest time, everyone was looking forward to selling their ginger and getting paid. But the farmers found out that there was no market. Of course, they were upset and angry. Farmers were found loading their sacks of ginger onto 4-wheel drive trucks and pouring the contents out along the roads as they drove. Most likely, this situation could have been avoided if the market requirements had been studied and government experts been consulted.

7.4 CONCLUDING COMMENT ON THIS MODULE

Risk is a fact of life and cannot be ignored. People working in agriculture are particularly vulnerable because what happens in their business is very much determined by the biophysical environment. Entering the marketplace for purchasing inputs and marketing products provides another major dimension to risk and uncertainty. For small farming families, risk is a particularly important problem because of:

- close linkages between farms and families;
- low levels of incomes and savings.

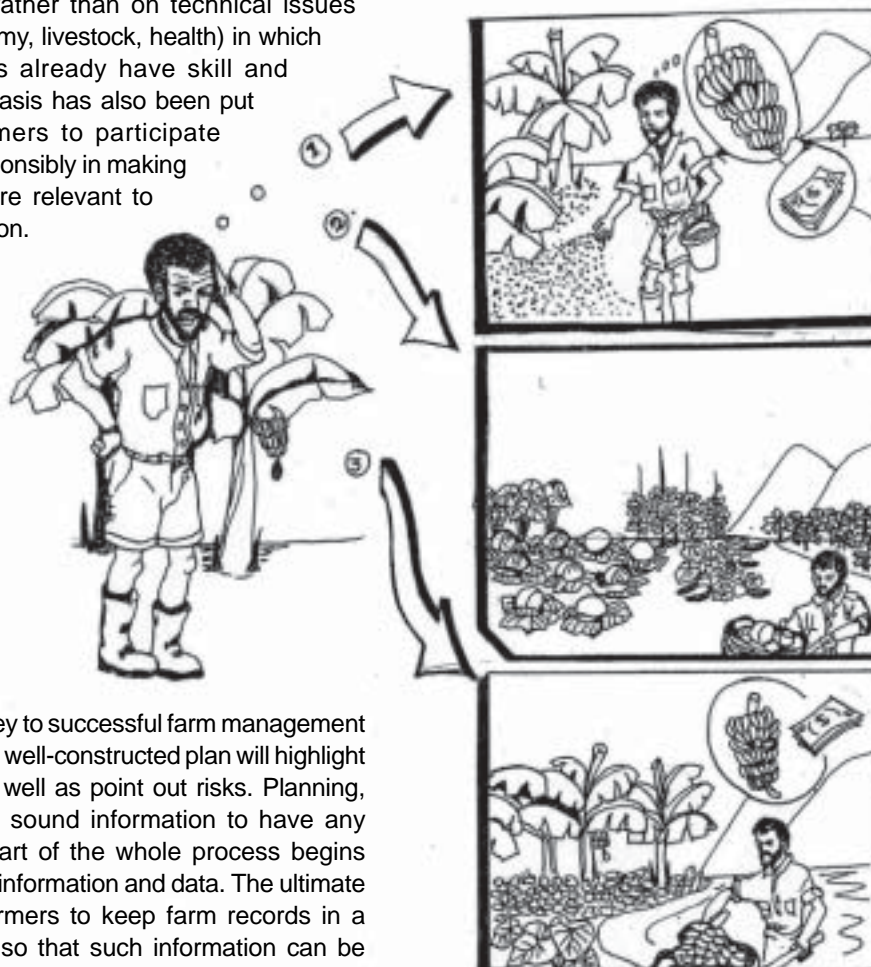
Therefore when working with such farmers it is very important for facilitators to be aware of this and not give advice that would cause the farming family to unknowingly expose themselves to greater risk. If facilitators believe that farmers may be vulnerable then it is important for the farmers to understand that before they make any changes. It is the responsibility of the farmers themselves to decide whether or not they are able and willing to accept any risks involved.



³⁵ One way to set up a liquidity reserve is to designate one crop (e.g., giant taro) as a security crop. The profit for this crop can be set aside for use when needed.

8. OVERALL CLOSING COMMENT

The aim of this manual has been to bring to the attention of facilitators the importance of farm management and marketing in helping small (i.e., semi-commercial) farmers in the Pacific plan and implement their farm activities. Facilitators have a critically important role in guiding such farmers in a way that will help them to continue entering, and benefiting from, the inevitable commercialisation of agriculture in the Pacific. Emphasis in this manual has been on the analytical tools and techniques required for helping farmers in this transition, rather than on technical issues (such as agronomy, livestock, health) in which most facilitators already have skill and expertise. Emphasis has also been put on helping farmers to participate actively and responsibly in making decisions that are relevant to their own situation.



Planning is the key to successful farm management and marketing. A well-constructed plan will highlight opportunities as well as point out risks. Planning, however, needs sound information to have any value, so the start of the whole process begins with assembling information and data. The ultimate aim is to get farmers to keep farm records in a systematic way so that such information can be used in future planning exercises.

Choices should be made on the basis of sound information and a good analysis. Gross margin analysis has been introduced in this manual as the tool most suitable for helping small farming families, together with facilitators, assess the “profitability” of any proposed enterprise. Gross margin analysis is also the means by which competing enterprises can be ranked. At first, the calculations involved may seem daunting, but the principles behind them are simple and it is only through applying the method of analysis in real farming situations that facilitators and farmers will fully grasp the value of such a management tool. It can be used not only in assessing financial performance but in planning and evaluating small changes (with the help of partial budget analysis). An important component of both assessment and planning stressed in the manual is the need to look at the flow of certain resources, namely labour and cash, during the production cycle of enterprises.

As commercialisation of agriculture proceeds, marketing becomes critically important in determining the success of an enterprise and hence farming. Therefore, like farm management, marketing starts with the construction of a plan. This not only highlights the strategy the farming family should use in terms of what to produce but also with respect to decisions on how the product should be marketed, together with an estimate of the potential costs involved in marketing. An understanding of the costs involved in the marketing process can be the difference between making a profit or loss from selling farm produce.

In the past, success for the small farming family was usually gauged by how much they produced for their families and the in-kind contributions they made to their social groups (religious, community and extended families). Once farmers fully enter the commercial environment, success will be evaluated in terms of how much money is made from farming without destroying the production base for the future (in other words, based on sustainable farming techniques). This is a transition many farmers now wish to make as they seek new opportunities that only money will allow them to access. Facilitators will increasingly need to consider this criterion in evaluating their success in helping farmers.

In the final analysis, the measure of a facilitator's competence is not how much they know about farm management and marketing. Instead, the indicator of their success will be how effectively they can transmit these ideas to farmers in the Pacific.



Picture 17: A happy farmer group in Salili village, Vanuatu

APPENDICES

APPENDIX A: ROLE AND TECHNIQUES OF FACILITATORS

A1 Role of Extension

This manual has repeatedly stated that facilitators play a critically important role in helping small farmers and their families to become more market oriented in their farming activities. Facilitators are educators. As educators most information is well researched and sound. Many farming families know the messages or have learned the lessons but are not applying them. Facilitators are puzzled as to why. Perhaps:

- They are viewing themselves as separate from those they are seeking to help.
- They are stumbling into the many pitfalls on the path to effective extension.
- Their research into contrary and other conflicting messages is inadequate.
- They are not learning nor are their organisations.

Let us look at each of these in a little more detail. But before doing we wish to make one small but important point. Extension should begin with the people they want to help. They need to be provided with the type of information and skills, etc., that will make such help possible. Hopefully this manual has provided some information and skills that can help facilitators guide farmers in how to benefit from the rapid changes coming about because of economic liberalisation and globalisation. Extension is however more than transferring knowledge and skills. Extension needs to nurture or generate interest, commitment and motivation, which are the keys, or important ingredients for success.

Now let us look at each of the above issues in a little more detail:

- Extension as “we” rather than “us” and “them: It has become increasingly apparent that adoption does not automatically follow from the provision of extension, increasing awareness, and from generating interest. Commitment, motivation to action and support services are required. Facilitators and farmers should operate as an interactive team.
- Pitfalls of extension: There are many pitfalls on the path to effective extension, which need to be avoided. Briefly, some are:
 - *Favouritism and sexism:* People who are physically, intellectually, etc., attractive, receive better service than others. Awkward, slow, abrupt and otherwise disadvantaged people receive the least services. People with the “right” family, clan, neighbourhood, political, etc., ties, receive better service than others.
 - *Credibility:* Trust and confidence are earned. It is important to admit to mistakes or lack of knowledge about specific topics. Try and rectify such mistakes and deficiencies in knowledge as quickly as possible.
 - *Inflexibility:* It is important to be as flexible as possible and not to make promises on things that are not feasible or possible.
 - *Privileged knowledge:* Some people believe knowledge loses value as the number of people who know about it increases. Some also believe if one gives someone knowledge or skill, the receiver has a debt that needs to be repaid. Both are fallacies. Knowledge and skills not used are soon lost. A good way to retain knowledge and skills is by giving it away. It will become ingrained in one’s memory and will be returned many times over.
- Learning from the competition and others: It is important to know who else is influencing the farmers (e.g., commercial businesses). Some of their messages may be incompatible with ones given by facilitators. Try and resolve such inconsistencies if they occur and where possible learn from what they are presenting and how they are presenting it.
- Continuous learning: Effective extension is dependent on the continuous learning of farmers, extension agents and their organisations. Learning is a central and crucial activity of facilitators

and time should be set aside to make this possible. This is important given the many tasks that facilitators are expected to do and the rapid changes taking place in the Pacific as they embrace free trade and they accept the reality of globalisation.

A2 Extension Techniques

Facilitators have many methods or techniques for helping, guiding and instructing farmers which vary greatly in terms of interaction, level of involvement of the facilitators and degree of initiative required on the part of farmers themselves. Therefore no method or technique is necessarily always superior to another. All methods have value in specific circumstances and the facilitator should consider using all of them. Some of the more important techniques are as follows:

- Farmers teaching farmers: For example a successful farmer can explain to a group of farmers his or her production and marketing practices. The meeting is usually most effective on the farmer's own farm.
- Demonstrations: Practical demonstrations of production and marketing techniques such as harvesting, cleaning, grading and packing can highlight to farmers what can be achieved. These should preferably take place on a farm. Prepared samples, which demonstrate the differences over time of varying handling practices, can be effective, as are samples of competing produce and photographs.
- Talks and seminars: Possible topics include: market-oriented production techniques, marketing possibilities, successful case studies, post-harvest techniques, etc. Producers, buyers and middlemen, if relevant, can be involved in such presentations. The facilitator could actively seek their involvement.
- Problem-solving techniques: Farmer groups are encouraged to identify their own major problems. The problem solving exercise can be tackled systematically, by calling in specialists to advise the groups or by forming panels to answer farmers' questions. Alternatively, the groups might be encouraged to decide their own solutions, which they then implement themselves, individually or collectively.
- Asset building and opportunity building techniques: Farmer groups are encouraged to identify their assets and use them in exploiting opportunities. The first part of this exercise can be done with the help of facilitators using PLA techniques. The facilitators also can provide a supporting role in subsequent activities of the farmer groups in exploiting the identified opportunities.
- Study tours: Farmers are taken on a study tour to make their own contacts and to see production, marketing and processing systems. Farmers visiting farmers in another area provides an opportunity to exchange experiences and be exposed to new techniques. This first hand exposure can often transform farmers' views on production and marketing.
- Written information: Fact sheets are prepared and distributed. These can provide technical information on production, post-harvest, and marketing and financial techniques and analysis. They can also help identify potential marketing channels, trading partners, etc. Information should be presented in as simple form as possible and use figures and graphs, wherever possible. Sometimes there may be merit publishing them in the local language.
- Market news services: The establishment of a market news service, which provides regular, reliable, relevant and timely information, can be helpful to both farmers and facilitators. This may involve including such information in a news sheet, a radio bulletin and/or radio play.

APPENDIX B: EXAMPLES OF FARM RECORD FORMS

B1 Introduction

In the manual we have emphasized the importance of farm records for the collection of data that can help in evaluating and planning production and marketing activities. In this appendix we give one example of a farm record format put together for Palauan farmers in 2002. Obviously adjustments will be needed in such forms in order to accommodate the different production and marketing conditions in other countries. However, the forms described in the following sections could perhaps be a useful starting point for setting up similar types of forms for other countries. We therefore reproduce below the farm record forms designed for Palau in their entirety. Note that these are for a crop enterprise. A set of forms would be needed for each plot with an enterprise. Livestock record forms could also be created although we don't include an example here.

The types of data required and the reasons for collecting farm records in a systematic fashion are given in the main body of the manual (see Sub-Section 4.1.3).

B2 Data Collection Forms

As indicated earlier, the objective in designing the forms is to design them in a way that makes data recording as simple and easy as possible. Input related information will be collected on four types of forms all of which, apart from the first rather general form, refer to inputs on the enterprise which is being analysed.

The forms to be used are the following:

- Background and farm information form (Table B2.1). This is information that needs to be collected only once per production cycle of the enterprise.
- Labour activity data form (Table B2.2), which indicates by date and the enterprise, the operations undertaken and the amount, type and cost of labour hired. Obviously this needs to be completed every time an activity is carried out on the enterprise.
- Non-labour inputs form (Table B2.3), which indicates the inputs other than labour applied to the enterprise. This form needs to be completed every time an input other than just labour is applied to the enterprise.
- Price information (Table B2.4), which gives information on prices of products and inputs for which no information appears on in the other forms. This needs to be completed at the end of the production cycle for the enterprise.

In addition there is another form for collecting data on production called Number of Units of Crops Harvested and Sold (Table B2.5). If farmers don't have information on weight harvested or numbers of units harvested (i.e., that can be weighed) then estimating production is a complicated process. One approach that is possible but somewhat time consuming is given in Sub-Sections 4.2.1.2 and 4.2.1.3.

B2.1 Background and Farm Information Form (Table B2.1)

For Table B2.1 on farm background information, the form is fairly self-explanatory and is filled in at the beginning of the enterprise. The only points that need some clarification are:

- Relative size of farm: The objective is to indicate the total size of the farm (i.e., all the gardens including those that are fallowed) that the household has in relation to farms of other households in the village. That is, is it larger, the same, or smaller than the average?
- Number of hired farm-hands: These are the permanent hired labourers who work on the farm.
- Soil quality: Here is written an assessment of the soil quality by looking at it with the farmer and indicating whether it is good, average or bad, making a wet ball for assessing texture, plasticity, etc.
- Drainage: Here indicate whether it is good, average or poor.
- Erosion: Here indicate whether it is little, average or much.
- Tenure: Here indicate whether the land on which the enterprise is being implemented is family owned, clan owned, leased, squatted, etc.

B2.2 Labour Activity Data Form (Table B2.2)

Important points always to remember are:

- This form needs to be completed every time some work is done on the plot.
- It is best if possible to record the labour activity as soon as possible after it has been done because it is the type of information that can easily be forgotten. It would therefore be best if someone in the household keeps the records. Labour is often a limiting factor and it is often underreported or underestimated.

Details on completing the table are as follows:

- Fill out details about the location and the enterprise in the first two lines of the table. Since more than one page is likely to be completed, number the pages.
- Column (1). Record the day work was done on the plot.
- Column (2). Record the date work was done on the plot.
- Column (3). Record the activity done on that plot on that day (e.g., land preparation, mulching, planting, weeding, pruning, pest control, disease control, fertiliser application, harvesting, etc.). If activities are done at the same time (e.g., weeding and harvesting), include them both on the same line.
- Column (4). If while working on the plot, inputs are added, then these should be recorded (e.g., seed, cuttings, pruned materials, mulch, compost, chicken manure, fertiliser, herbicide, etc.). *Then Table B2.3 must be completed as well— this provides details on the inputs used.*
- Column (5). *This refers only to family labour — is unpaid labour.* There are three sub-columns as follows:
 - (5)(a). Record the number of family members who worked on that enterprise and that operation that day.
 - (5)(b). Record the type of units you are measuring the time in (i.e., preferably hours, if not half-days).
 - (5)(c). Record the total number of units all the family members worked on that enterprise and that operation that day. At the end of the crop cycle these figures can be added up to give the total family labour expended on the enterprise plot.
- Column (6). *This refers only to hired labour — is paid labour.* There are five sub-columns as follows:
 - (6)(a). Record the number of hired labourers who worked on that enterprise and that operation that day.
 - (6)(b). Record the type of units you are measuring the time in (i.e., preferably hours, if not half-days).
 - (6)(c). Record the total number of units all the hired labourers worked on that enterprise and that operation that day. At the end of the crop cycle these figures can be added up to give the total non-family (i.e., hired) labour used on the enterprise plot.
 - (6)(d). Record the cost per unit of labour (i.e., per unit of labour of what has been entered in Column (6)(b)). If the worker is paid by the month it will be necessary to work out what is equivalent in terms of the unit in Column (6)(b).
 - (6)(e). Record the total cost of the hired labour for that operation on that day - this can be found by multiplying the entry in Column (6)(c) by the entry in Column (6)(d). At the end of the crop cycle these figures can be added up to give the total cost of hired labour expended on the enterprise plot.

B2.3 Non-Labour Inputs Form (Table B2.3)

This form needs to be completed every time an entry appears in Column (4) of the *Labour Activity Form* (Table B2.2), which is every time an input (i.e., non-labour) is applied to the enterprise.

Details on completing the table are as follows:

- Fill out details about the location and demonstration in the first two lines of the table. Since more one page might be completed for the enterprise, number the pages.
- Column (1). Record the day non-labour inputs were added on the enterprise.
- Column (2). Record the date non-labour inputs were added on the enterprise.
- Column (3). Record the input that was applied (e.g., seed, cuttings, pruned materials, mulch, compost, chicken manure, fertiliser, herbicide, etc.). This should be same as that entered in the input column (i.e., Column (4) of the *Labour Activity Form* (Table B2.2)).
- Column (4). Describe the input in a little more detail (e.g., type of seed, cutting, etc.).
- Column (5). Indicate the units the inputs are measured in (e.g., pounds, basket, bundle). Note that for some pruned materials it will not be possible to enter anything in this column or in the next one. In that case just leave the columns blank. This might also apply to other inputs (e.g., other types of mulch).
- Column (6). Try and indicate, if possible, the number of units (i.e., those in Column (5)) applied to the plot.
- Column (7). If the input was paid for enter Y in this column. If the input was free (i.e., no cost) then enter N in this column.
- Column (8). If no (N) is entered in Column (7) then indicate where it came from as follows:
 - From the farmer's farm (F).
 - From another farm (A).
 - From BoA (B).
 - From the Chinese Agricultural Mission (C).
 - From PCC-CRE (D).
 - From somewhere else (E) — indicate from where, if possible.
- Column (9): If yes (Y) appears in Column (7), indicate the cost per unit of the units indicated in Column (5).
- Column (10): If yes (Y) appears in Column (7), indicate, if possible, the total cost of that input applied to that enterprise by multiplying the number of units (i.e., those in Column (6)) by the cost/unit (i.e., those in Column (9)).

B2.4 Price Information (Table B2.4)

This form helps in providing information on the inputs used and the products produced for which no information appears on the other forms. This type of information is required to do the financial analysis. This form can be completed at the time of harvesting the main crop in the enterprise.

Details on completing this form are as follows:

- Fill out details about the location and the enterprise in the first two lines of the table.
- Column (1): In the 'Class of Variable' column (i.e., Column (1)) are listed the products and inputs for which price or cost information is required. Details are as follows:
 - Below the 'Products Produced' row in Column (1) should be listed the crops that were produced in the enterprise.
 - In terms of below the 'Inputs' row:
 - Some value needs to be placed on family labour. What we usually do is to use what they could earn working as hired labour.
 - Other inputs - the ones that have N in Column (7) in the *Non-Labour Input Form* (Table B2.3) should be entered in Column (1).

Column (2): Indicate the units that price or cost per unit are to be expressed in terms of in Columns (3), (4) and (5) (e.g., bag, pound, hour).

Column (3): Indicate what the usual price is, on average, or cost per unit of the different products and inputs at the farm (i.e., farmgate price) for each of the products and inputs listed in Column (2).

Columns (4) and (5): Indicate, if possible, during the last year, what was the highest (i.e., Column (5)) and the lowest price or cost per unit of the different products and inputs at the farm (i.e., farm gate price) for each of the products and inputs listed in Column (1).

B2.5 Estimating Production (Table B2.5)

Farmers often harvest in standard-sized baskets and generally know the weight per basket. They are also likely to know the number of baskets harvested in the last week. Therefore by far the best approach to estimating production, if the farmer uses a standard sized basket, and knows the weight of the contents, would be for the farmer to keep records of the number of units he or she harvests from the enterprise. If one knows the total number baskets harvested and the weight per basket it is then possible to get an estimate of total production. A simple form for recording such information is given in Table B2.5.

Details for completing this table are as follows:

- Fill out details about the location, farm and enterprise in the first two lines of the table. Since more one page might be completed for the enterprise, number the pages.
- Column (1). Record the day in which harvesting of and sales from, the enterprise took place.
- Column (2). Record the date in which harvesting of and sales from, the enterprise took place.
- Column (3). Record the name of the crop being harvested or sold - this is needed because the enterprise may consist of more than one crop from that enterprise.
- Column (4). *In this column are given details about the harvesting only.* There are four sub-columns referring to harvesting. These are as follows:
 - (4)(a). Record the unit of harvest (e.g., basket).
 - (4)(b). Record the number of units harvested.
 - (4)(c). Record the average weight per unit in lbs (e.g., of the basket).
 - (4)(d). Estimate the total weight harvested in lbs by multiplying the entry in Column (4)(b) by the entry in Column (4)(c).
- Column (5). *In this column are given details about sales only.* There are six sub-columns referring to selling. These are as follows:
 - (5)(a). Record the unit of sales (e.g., basket).
 - (5)(b). Record the number of units sold.
 - (5)(c). Record the average weight per unit sold in lbs (e.g., basket).
 - (5)(d). Estimate the total weight sold in lbs by multiplying the entry in Column (5)(b) by the entry in Column (5)(c).
 - (5)(e). Record the amount of dollars received per unit (e.g., basket).
 - (5)(f). Record the total amount of dollars received for selling all the units entered in Column (5)(b).

Note that not all the production need necessarily be sold — therefore entries in Columns (4)(d) and (5)(d) may not be the same.

The amount not sold can therefore be found by subtracting the total in Column 5(d) from the total in Column 4(d).

Table B 2.1: Background and Farm Information Form

Date _____
Enterprise:
Name of enterprise _____
Location of enterprise _____
Year _____
Name of extension worker _____
Farm/farmer information
Name of farmer _____
Age of farmer _____
Sex of farmer _____
Size of household _____
Nos. of land parcels household has _____
Relative size of farm _____
Number:
Family members who assist in farming _____
Hired farm hands _____
Field/plot information:
Soil quality _____
Drainage _____
Erosion _____
Is the enterprise on sloping land? _____
If yes, where on the slope is the enterprise _____
Indication of disease and/or insect problems by crop: _____

History of plot where enterprise is:
When was it last fallowed (year) _____
How long was it fallowed (years) _____
What have been the 'main' crops:
Last one harvested _____
Previous one _____
One before that _____
Area of enterprise (acres) _____
Tenure of land where the enterprise is: _____

APPENDIX C: LIST OF REFERENCES

C1 Introduction

Not all of the references listed below are cited in the text. A few additional ones are included because they include material relating the topics covered in the reference manual. Also some information was obtained from FAO publications which was reproduced in the text but not cited at that point (see explanation in Chapter 1).

In the following list of references we have separated out those that were produced by FAO and those that were produced outside FAO.

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APPENDIX D: DEFINITIONS OF ACRONYMS

AGSF	Agricultural Management, Marketing and Finance Service, FAO, Rome, Italy
AGSM	Agricultural Marketing and Rural Finance Service, FAO, Rome, Italy
AGSP	Farm Management and Production Economics Service, FAO, Rome, Italy
BOA	Bureau of Agriculture, Republic of Palau
CGIAR	Consultative Group of International Agricultural Research
CNRD	Continuous Non-Registered Data
DARD	Division of Agricultural and Rural Development, Vanuatu
FAO	Food and Agricultural Organisation, Rome, Italy
FFS	Farmer Field School
FSD	Farming Systems Approach to Development
FTP	Forest, Trees and People Network, FAO, Rome, Italy
Ha	Hectare
HIC	High Income Country
ICLARM	International Centre for Aquatic Resource Management, Philippines
ICRAF	International Centre for Research in Agroforestry, Kenya
IDRC	International Development Research Centre, Canada
IDS	Institute of Development Studies, University of Sussex, UK
IIED	International Institute for Environment and Development, London, UK
ILEIA	Information Centre for Low External Input Agriculture, Netherlands
Kg	Kilogramme or Kilo
Lb	Pound
MOAF	Ministry of Agriculture and Forestry, Kingdom of Tonga
MAQFF	Ministry of Agriculture, Quarantine, Forestry and Fisheries, Vanuatu
MIS	Management Information System
NGO	Non Government Organisation
Pacific	Pacific Island Country
PMOE	Participatory Monitoring and Evaluation
PMV	Private Motor Vehicle
PNG	Papua New Guinea
PLA	Participatory learning and Action
PRA	Participatory Rural Appraisal
RELO	Research Extension Liaison Officer
SAPA	FAO Sub-Regional Office for the South Pacific, Apia, Samoa
SPRD	Single Point Registered Data
SSI	Semi-Structured Interviewing
TCP	Technical Cooperation Project, FAO
USA	United States of America
VCR	Value Cost Ratio

APPENDIX E: DEFINITIONS OF TECHNICAL TERMS

Other terms, that are less technical in nature and have specific connotations for all the papers in this series (i.e., *The FAO Pacific Farm Management and Marketing Series*), are given at the beginning of this manual.

Adding Value In the context of this manual, when farmers do something to the products they produce which raises their value before they are marketed. Two obvious ways are by careful harvesting and post-harvest handling and/or processing.

Background and Farm Information Necessary information used to assess the history and current status of the plot on which financial analysis is being undertaken.

Biophysical (Technical) Environment or Element The part of the production environment that determines what potentially can be grown. It consists of technical components such as weather, soil conditions, topography, pests and diseases, etc.

Breakeven Budget A budget drawn up to estimate the value of the selected variable (e.g., price per unit of the product or input, number of units of output or input) at which the gains and losses are equal (i.e., the net change equals zero). The value that is determined in this way is the **breakeven value**.

Cardinal Data Actual value data (i.e., 1, 2, 3, etc.). Such data is important for financial analysis purposes but usually is more expensive to collect than **ordinal data**. Actual numeric data is known as **quantitative** data.

Commercial Farmers Farmers that market virtually all their farm production and buy many of their inputs in the marketplace. With these farmers, farming is treated more like a business and the primary aim is making a profit. The link between the farm and family or household is weak.

Consumption Unit In this manual, this is the family and household members. In small farming, the consumption and farm production linkage is very close and as a result the activities of the **production unit** are very much influenced by the priorities and characteristics of the consumption unit. As agriculture becomes more commercialised that linkage becomes weaker.

Continuous Non-Registered Data (CNRD) Events that occur frequently and whose specific details are usually forgotten (e.g., harvesting a little cassava when the family wants to consume it, exact times spent weeding a field).

Cost Discounts In the context of this manual means: being able to reduce costs of production by purchasing inputs in bulk thereby obtaining a price discount; or marketing a large quantity of product so the marketing cost per unit is reduced. This can be done by farmer groups.

Demand How much consumers are prepared to buy at the market price

Empowerment When disadvantaged people are given the opportunity to be self-reliant and to control their own destinies.

Endogenous (Internal) Factors The farming family has a certain quantity and quality of three types of inputs (i.e., land, labour and capital) under their control. In traditional settings the **production unit** (i.e., the farm) and the **consumption unit** (i.e., consisting of the family or household members) are very closely linked because decisions on what to do on the farm are determined to a great extent by family priorities (i.e., goals), needs, capacity and ability (i.e., management). The use of the inputs referred to above are influenced by these priorities, needs and skills (i.e., internal or endogenous factors) and by the **exogenous or external factors**.

Enterprise An individual crop or animal production function within a farming system. In terms of crops as far as this manual is concerned the enterprise is defined in terms of the major crop if there is a mixture (e.g., taro-based enterprise).

Exogenous (External) Factors Factors outside farmers' control that influence what they can and/or cannot do. In this manual, these factors are aggregated into three basic groups: community structures norms and beliefs; external institutions (e.g., credit, extension, and distribution and marketing systems for inputs and outputs), and other influences (e.g., population density, nearness to an urban area, etc.).

Farm Activity A specified method of implementing a particular farm enterprise. However, to make things simpler, in this manual different farm activities with respect to a particular enterprise are referred to as different **technologies**.

Farm Gate Price The price farmers would expect to receive for their product if they sold it at their house rather than the market. Therefore it is the price they would receive in the market minus the transportation and associated costs relating to marketing (e.g., rent of market stall).

Farming System Consists of all the elements of a farm which interact as a system, including people, crops, livestock, other vegetation, wildlife, the environment, and the social, economic and ecological interactions between them.

Feasibility Study Determining whether it is potentially possible (technically and financially) to produce and market something that people want to buy.

Farm Management Using, managing and allocating resources to fulfil some objective (e.g., maximise profits). In this manual, this term is used in two ways. "**Traditional**" farm management involves using farm resources (both technical and economic) wisely; this approach is more analogous to FSD. "**Modern**" farm management has become more constrained and now has primarily an economic meaning (i.e., usually thought of in terms of maximising profit). In this manual, the term farm management reflects "modern" farm management.

Farming Systems Development (FSD) Approach An approach that involves farmers and their families in identifying and prioritising problems and opportunities; evaluating and ranking practical solutions to those problems and opportunities; and, if necessary helping to create conditions that enable the preferred solutions and opportunities to be implemented. Implementation of the approach involves four steps or stages: description/diagnosis, design, testing/evaluation and dissemination/implementation.

Fixed Inputs or Costs Inputs or costs that have to be paid whether or not production takes place and cannot easily be allocated directly to any particular enterprise. Also, inputs that last for more than one production cycle (for example, a piece of equipment). Fixed costs tend to be minimal for small farmers but become progressively more important as agriculture becomes more commercialised as a result of purchasing equipment, means of farm power and erection of farm buildings.

Formal Farmer Group Usually formed as a result of an external stimulus for the purpose of collectively accessing some external service. Membership tends to be fixed or closed, and some form of collective action often occurs. Formal leadership is common, and sometimes even a constitution is drawn up.

Formal or Structured Survey One person is usually interviewed at a time. Alternatively for more commercialised farmers, a special type of structured survey would be the farm records they keep. A structured approach is usually necessary in collecting data for financial analysis purposes.

Forward Contracting A risk-avoidance mechanism in which a farmer enters into an agreement with a potential buyer at the beginning of the production cycle for the resulting product to be bought at a specified price and sometimes for the necessary inputs and extension advice to be provided. Forward contracting may result in the farmer getting a lower price than they would have if they had sold it on the open market.

Gross Income or Value of Production Production expressed in monetary terms (e.g., dollars).

Gross Margin The **gross income** (i.e., **value of production**) minus **variable costs**, expressed in terms of an input (i.e., usually per unit area) for a specific **enterprise**.

Imputed Cost An estimated cost for an item available for "free" on the farm, based on what would have cost had it been purchased. See also **opportunity cost**.

Imputed Gross Margin In this manual, the **gross margin** with a value placed on the family labour devoted to the **enterprise**.

Informal Farmer Groups Groups which are often formed spontaneously and usually have some common interest or purpose; members often act individually. Membership is often fluid, although it tends to become more fixed the longer the group is in existence. Leadership is not always very well defined, although over time it usually becomes more visible (e.g., emergence of a spokesperson). Sometimes these groups later become more formal in character.

Informal Surveys Semi-structured or unstructured surveys used to interview individuals or groups. Informal survey methods are now most popular and important in FSD activities, particularly in dealing with non-economic issues.

Intercropping Consists of growing two or more crops in a mixture on a plot at the same time. The term is used interchangeably with the term crop mixture.

Labour Profile A table or graph which shows the seasonal labour requirements of one or all enterprises on the farm in each month of the year.

Main (Major) Crop In this manual, the main crop in the mixture (as defined by the farmers). In the Pacific context it is usually a root crop (i.e., taro, sweet potatoes or cassava). **Enterprises** are defined in this manual by the main crop. Therefore, for example, gross margins are likely to be estimated on a main crop basis (e.g., taro-based enterprise).

Marketing The process by which the space between the producer and the consumer is bridged, involving transportation and sometimes storage combined with techniques for minimising product losses and maintaining the quality of produce. Sometimes the marketing process also involves adding value through grading, packaging and/or processing the product.

Marketing Channel or **Chain** The sequence of stages involved in transferring produce from the farm to the consumer.

Marketing Margin The percentage share of the final retail price that is taken up by the marketing function.

Measurement Error Mistakes in the collection and analysis of data. The type of data being collected influences the likelihood of measurement errors. Measurement errors are more likely to arise with respect to **continuous non-registered types of data (CNRD)**.

“Modern” Farm Management Has primarily an economic meaning (i.e., usually thought of in terms of maximising profit). In this manual, the term farm management reflects “modern” farm management.

Monthly Labour Flow The process of obtaining estimates of family labour commitments for different periods of the year to determine whether sufficient family labour is available in specific months. If labour demands at any one period are greater than the available family labour then labour has to be hired or the farming system adjusted in some way.

Multiplier Impact The objective of trying to maximise the influence of the efforts of someone. In the context of this manual it refers to the issue of maximising the influence of the limited numbers of facilitators in addressing the needs of as many small farmers as possible.

Net Cash Flow The difference between the flow of money into a farm (from sales and/or income earned from them) and the flow of money out of the farm (in the form of purchases), usually on a monthly basis for a period of one year. Sometimes the term **cash flow** is used to mean the same as net cash flow.

Net Farm Income or **Farm Profit** In this manual, the sum of the **gross margins** of all the enterprises minus the fixed costs.

Opportunity Cost The cost of any choice (for example, of using some resource in a particular activity), determined by the value of the best alternative use forgone. For example, the opportunity cost of family labour on the farm is what those workers could have earned in off-farm activities (e.g., as hired labour).

Ordinal Data Ranking types of data or information (i.e., 1st, 2nd, 3rd, etc.). Ordinal data is much cheaper and easier to collect than **cardinal data**. Usually ordinal data is sufficient for FSD activities (particularly with respect to those that are not economic). In addition, small farmers have an easier time thinking in terms of ranking. Ranking also provides method of expressing attitudinal (i.e., **qualitative**) data.

Partial Budget Analysis Evaluation of the consequences—expressed in terms of “profit”—of changes in technologies or enterprises that affect only part of the farm. It is sometimes called **partial profit budget analysis**.

Participatory Learning and Action A set of techniques using visualisation and diagrammatic methods to encourage participation, develop rapport and improve the accuracy of the findings. These techniques are particularly useful for getting information from people who have had little in the way of formal education.

Person-Days or **Person-Hours** The time worked by people expressed in days or hours without distinguishing individuals by gender or age.

Price Taker Sellers whose situations in the marketplace mean that they have no control or influence on the market price. Small farmers are usually price takers.

Production Cycle The period of time from the time a crop is planted to when it is harvested.

Production Environment The environment in which farmers implement their enterprises. Two components make up the production environment: the **biophysical (technical)** and the **socioeconomic (human)** components.

Production Unit In this manual, this means the farm itself. In semi-subsistence agriculture (i.e., termed small farmers in these training materials) the consumption and farm production linkage is very close and as a result the activities of the production unit are very much influenced by the priorities and characteristics of the **consumption unit**. As agriculture becomes more commercialised that linkage becomes weaker and the production unit or farm becomes treated more as a business with the objective of making a profit.

Profit Gross income minus variable and fixed costs. In this manual extensive use is made of **gross margin** analysis in which fixed costs are not taken into account. Therefore the gross margin is not a true measure of profit — hence the use of the expression “profit”. Similarly the gross margin could be negative indicating a loss, which would be even higher if fixed costs were taken into account.

Qualitative Data Data that is usually attitudinal or involves ranking (i.e., is not numerical).

Quantitative Data Data involving actual specific numbers.

Risk What could go wrong. A probability can be assigned to the event occurring, such as a 15% chance that a cyclone will hit Vanuatu in any one year. In this manual risk is used interchangeably with **uncertainty**.

Sampling Error The result when surveyed farmers do not perfectly represent other farmers. This can be a problem in many FSD activities when dealing with small numbers of farmers and there are many different types of farmers. What this means is that conclusions arising and recommendations from working with specific farmers may not be valid for other farmers. Unfortunately, in FSD activities, reducing sampling error through larger samples increases the possibility of larger **measurement errors**.

Semi-Structured Interviewing A type of guided interviewing in which only the topics are predetermined and new questions and insights arise as a result of the interactive discussions and visual types of analyses using **participatory learning and action** techniques.

Sensitivity Analysis Modifying the values of specific variables that were involved in calculating a **gross margin** (e.g., yields, price of the output, and/or costs of inputs) to see how sensitive the gross margin is to such changes. Sensitivity analysis can thus be used as a simple measure of **risk**. It is also applied in **partial budget analysis**, where it involves changing the value of one or more of the variables and determining how sensitive the results are to such changes.

Single Point Registered Data (SPRD) An event that occurs once or very few times and is usually remembered (e.g., putting fertiliser on a specific crop).

Small Farmers In the context of this manual, farmers who market only part of the production they produce on the farm. The link between the farm (the **production unit**) and the family or household (the **consumption unit**) is very close. Small farmers are essentially semi-commercial farmers.

Social Capital The ties and relationships that sustain a community.

Socioeconomic (Human) Environment or **Element** Components of the production environment that determine what will be grown, which is a subset of that defined by the **biophysical environment**. Examples of such components are the objectives of the farming household, the resources they have at their disposal (i.e., land, labour and capital), their management ability, location of the farm in relation to a market, etc.

Specific Enterprise Information Information necessary for calculating the cost of production, **value of production** and **gross margin** of the **enterprise**.

Supply What producers are willing and able to market at a certain price.

Sustainable Livelihood A way of making a satisfactory level of living in the same way indefinitely into the future.

Technology A specified method of implementing a particular farm enterprise. For example, on one cassava plot, fertiliser and an improved variety may be used while another cassava plot has no fertiliser added and an indigenous variety is used. These constitute different technologies (also referred to as **farm activities**).

Total Revenue The number of units sold multiplied by the price per unit sold.

“Traditional” Farm Management Involves using farm resources (both technical and economic) wisely; this approach is more analogous to FSD.

Triangulation Cross-checking the answers or responses to a particular question or issue by asking the question in more than one way.

Uncertainty What may go wrong but is not certain to occur. No probability can be assigned to uncertainty. As far as this manual is concerned, **risk** and uncertainty are used interchangeably. Both are bad as far as farmers are concerned.

Value Cost Ratio (VCR) Used in **partial budget analysis**; obtained by dividing the total anticipated gains from making the change by the total anticipated losses.

Value of Production Is the sum of **total revenue** (reflecting what was sold) and an estimate of the value of production of what eaten by the family, given away and still in store.

Variable Inputs or Costs Inputs and costs that vary according to the level of production (i.e., increase as production increases and decrease as production decreases), and can be easily associated with a particular enterprise. The services variable inputs provide usually only last for one production cycle.

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This publication is part of a series of papers in the FAO Pacific Farm Management and Marketing Series designed to help improve the incomes of small farmers in the Pacific Island Countries (PICs). Globalisation of the world economy and the breaking down of trade barriers mean that farmers in the PICs, if they are to sustain and improve their levels of livelihood, will have to address these new realities. This will involve the need to view farming more as a business rather than simply a way of life. Sustainable agricultural techniques will need to be combined with good farm management involving sound planning and marketing decisions. The techniques presented in this manual provide the basis for making these planning and marketing decisions. Although the ultimate target group for these techniques are the farmers themselves, it is anticipated that this manual will be most useful for those who are helping and advising farmers (e.g., extension and development officers in the public and private sectors).

