Agricultural Project Planning in Tanzania

A handbook on cycles and sequences, participation, identification, planning and design, economic and financial analysis, and environmental assessment of agricultural projects.

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Development and Project Planning Centre

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INTRODUCTION

BACKGROUND

This handbook is the second in a series of three jointly prepared by the Institute of Development Management (IDM), Mzumbe, Tanzania and the Development and Project Planning Centre (DPPC), University of Bradford, United Kingdom. The first, prepared in 1995, was on the design and preparation of Industrial Projects. The third handbook is concerned with Project Management and Implementation. These handbooks were all prepared under assistance provided by the United Kingdom Department for International Development through a collaborative project between IDM and DPPC.

This handbook focuses on Agricultural Project Planning with special reference to Tanzania. Agriculture plays an important role in the development of many countries especially in Tanzania where it accounts for about half of the Gross Domestic Product (GDP). It also provides employment to about 90% of the rural population. Agriculture accounts for over 70% of the country's exports earnings. The plight of most the rural population has basically not improved; land productivity is declining; population is increasing. There is considerable experience that the massive injection of foreign funds into this sector has not achieved the desired results, a point highlighted in a recent study by the World Bank. One of the major weaknesses identified has been poor project design. The traditional project cycle used in the past was founded on the premise that the planners and technicians knew the needs of the people. This top down approach did not sustain the projects, or their expected benefits.

The fundamental question still remains: what are the most appropriate project designs to make agricultural projects achieve their objectives and be more sustainable? In addition, are traditional textbooks adequately catering for the different needs of the individual farmer in developing countries? These and related questions are very crucial, especially now when resources must be allocated according to market forces. The main objective of this Handbook is to address this issue, and to assist in increasing the national capacity of Tanzania to design better agricultural programmes and projects.

Experience has shown that while the government is responsible for policy formulation and a conducive environment for agricultural development, ultimately success will depend upon the efforts of the many individual farmers in the country. There are about three million smallholder farmers in the country with less than one hectare of land. Meaningful development is about assisting these farmers. Ideally this should be accompanied by strengthening the capacity and capability of Tanzania to formulate projects that are worth financing and implementing, and increasing the participation of farmers in these decisions. Good agricultural project planning is one of the necessary ingredients in this process. Knowledge of project design is also a requirement by many financiers in appraising loan applications. As credit is an important part for any agricultural expansion, sound knowledge of writing and presenting project proposals for funding is an important consideration for loan application. The long term objective of this Handbook is to enable small farm households, and those supporting them, to acquire these skills.

While one of the long term objectives of this handbook is to help empower the majority of the farmers and to develop sustainable development, one immediate objective is to build up capacities of the students undertaking agriculture, agricultural economics and related subjects. It is hoped that these students would form the nucleus of a group to facilitate intervention and change. The other intended users are extension and agricultural officers, agricultural economists and others involved in agricultural projects in both government and non-government sectors. The handbook intends to help provide a framework for communication among these various actors. It is hoped that the inclusion of local examples and exercise will make the Handbook more relevant and stimulating.

HOW TO USE THE HANDBOOK

Trainer

This handbook is quite flexible and the trainer is not bound to follow each chapter sequentially. The trainer may use his or her own discretion as to the most suitable way for his particular audience. The Handbook provides key concepts and words to help the trainer see the most important issues covered in each chapter. The trainer is expected to use training aids such overheads, flip charts. The trainer is expected to review the previous chapters to show linkages with the current one. The individual chapters are intended to be integrated to make the Handbook more meaningful. The summary at the end of each chapter is primarily aimed to show this link. The trainer is highly encouraged to revisit them before introducing any new chapter. At the end of some chapters exercises have been included which the trainer may use, or adapt, with students to test their understanding of some basic concepts and skills. This handbook is primarily designed to develop skills and therefore the role of learning by doing is highly encouraged.

At the end the handbook has a list of references and further selected bibliography of reading is given. Trainers are encouraged to try to obtain some of these key references or books for their libraries.

Student

While the handbook is primarily intended to be used as part of a course, it can also be used for private and independent study. But ideally the student is expected to read the chapter before the beginning of each class. This helps the student participate actively. The student is expected to do all the exercises at the end of the chapter to consolidate his/her skills.

CHAPTER SUMMARIES

Summaries for the individual chapters and appendices are given as an overall guide as to the content and scope of the handbook.

Chapter 2: Agricultural development in Tanzania

This chapter reviews agricultural development in Tanzania and the challenges facing the sector today. This includes a review of past agricultural policies and the effects of economic changes in Tanzania on agriculture. One of the main features of Tanzania economic development has been the central importance of the agricultural sector over the whole period of 1960s-2001. This structure has essentially remained unchanged since independence in 1961. About 90% of the population live in rural areas and depend upon agriculture for their livelihoods. This dependence is reflected in the country's economy where agriculture is responsible for 90% of employment, over 60% of GDP, and 70% of export earnings. For the foreseeable future the agricultural sector will continue to have a major role in the economy. High and sustainable agricultural growth will therefore be crucial for food security and to maintain the livelihood of the majority of the people of Tanzania.

It is within this overall social, political and bio-physical environment that agricultural planing of whatever nature must take place, and importantly take account of. If not then the chance of successful projects, plans and programmes in the agricultural sector is poor.

Chapter 3: Agricultural projects

This handbook is concerned with the planning of agricultural projects. It is therefore important to have a clear understanding about what is meant by an agricultural project, and the differences between this and a programme for agricultural development. This chapter explores a definition of an agricultural project, the different types of agricultural project, the scale of projects and the level at which they operate. Later chapters discuss in more detail how new projects are identified, designed and analysed.

Chapter 4: Participation in project planning

A key element in agricultural development and planning is now seen to be the active participation by farmers and their communities in this process. This chapter looks at the reasons for this, how to achieve participation, its institutional implications, and how these relate to agricultural project planning. In subsequent chapters it is explained how participatory methods can be incorporated into the various stages of the project cycle.

Chapter 5: Project cyclem

This chapter introduces some of the concepts generally used in project planning and in particular the project cycle. In the 1970's the World Bank developed a cycle which is now known as the traditional or Baum cycle. This cycle followed a linear progression from project identification to implementation through design and appraisal stages. This cycle was largely universally adopted in the 1970's and early 1980's for agricultural and rural development projects.

Following the development of new ideas and the experience of less than universal success with this cycle, a new approach has been developed. This emphasises the participation of all stakeholders in the process, particularly beneficiaries, and that the cycle is circular and not linear with feedback between the different stages of the cycle, i.e. the cycle is seen as a process rather than a blueprint - the approach of the traditional cycle. This new cycle is frequently called the process approach, and is leading to the increased participation by farmers and other stakeholders in project planning and management.

Chapter 6: Project identification

Project identification is the first of the stages in the project development. The initial conceptualisation of a project may be made in rather general terms and the idea will be progressively developed as the planning process takes place. Alternative versions of the same project may be conceived, and it is likely that most project ideas are abandoned at a very early stage. Ideas for projects can come from a range of different sources and institutions. Ideas may come from within the Ministry of Agriculture (MOA), from individuals working at the district or national levels. Other ideas may originate from local communities themselves, while others may be suggested by donor and international agencies.

With limited resources only a small portion of these ideas are likely to lead to the implementation of a project. Mechanisms are needed to identify different project ideas, and to put these into priorities for development and eventual implementation by government, NGOs and local communities.

Chapter 7: Project design and analysis

This chapter begins with a general introduction to the design of projects, and then explains in more detail the range of tools available for project design and analysis. In this Project Analysis, which can be used as

the overall term covering the process of appraisal, is also used to cover particular elements of a project, such as logical framework analysis, social and gender analysis, stakeholder analysis, and participatory approaches to analysis. Project Design is used in this chapter to cover the tasks of preparing and formulating project plans prior to any formal appraisal.

Chapter 8: Economic and financial assessment

Viability for a project refers to the assessment of whether the project has the capacity to meet the defined objectives, and in addition to generate significant financial and economic gains to the stakeholders and to the economy in general. Financial and economic viability are not the overriding criteria for approval of all projects. There may be projects which appear to have very high potential for economic gain but which are very risky in terms of the technical, social and institutional factors; or have negative impacts on the environment. There may be other projects where social and environmental factors are very strong but all the economic gains cannot practically be estimated or valued.

This chapter discusses the economic and financial assessment and viability of projects, while chapter 9 focuses on the environmental assessment of projects. Issues of social and institutional viability of projects are also dealt with under sections in chapter 7 on project design and analysis.

Chapter 9: Environmental assessment

Many, if not all, agricultural projects have significant impacts on the environment. These can be both positive and negative. For example, in a soil conservation project one of the major objectives is often the protection of the environment as well as other economic and social objectives. The positive environmental effects need to be enhanced and the negative effects mitigated against. To achieve this projects should be subject to an environmental assessment. This should be undertaken at the same time as the analysis of its financial and economic viability. Today, the financial, economic and environmental viability of projects is now a prerequisite of most funding agencies and governments. This chapter reviews the environmental assessment of projects, and an overview of how to value the costs and benefits of environmental impacts.

Chapter 10: Project planning for small farms

This chapter considers the project planning for agricultural projects which focus on the development of small farms and farming enterprises. As discussed in chapter 2, agriculture is the main stay of the Tanzania economy and the source of livelihood for the majority of the people. Successful agricultural expansion and increased (sustainable) production from agriculture can increase food security and cash income for farmers, and help alleviate poverty in the country.

This chapter discusses farm models and budgets which can be used in the development of successful small farm projects. Increased and sustainable farm production requires a range of physical inputs, finance, technical knowledge, markets and transport. Small farmers cannot provide all these things for themselves. Successful small farm development thus calls for the adequate integration and participation of farmers and with each other and help of government, non-government and private agencies. It does not depend solely on the farmers resources, motivation, and abilities, but involves the provision and development of off-farm agencies in a participatory approach to development.

Chapter 11: Monitoring and evaluation

While monitoring and evaluation are more strictly management functions, which occur during project implementation, it is important that these aspects are considered and included in the design and preparation of projects covered by this handbook. Monitoring and Evaluation are quite different functions but are brought together by their use of similar data and information. Both are concerned with the collection, processing and analysis of data for measures of performance.

However, project monitoring is essentially a management function undertaken by those implementing a project - this may involve beneficiaries where projects have been developed along participatory lines. Additional monitoring may be carried out by project sponsors. Evaluation is essentially an external function carried out by the project's sponsors. This chapter explores the functions of monitoring and evaluation, data and information requirements and the management systems required for an effective monitoring and evaluation.

Chapter 12: Feasibility and appraisal studies

The preceding chapters have presented in depth the background to agricultural project planning, the identification of projects, their design, and the economic, financial and environmental appraisal of projects. This chapter discusses the format of project reports, and briefly reviews the process through which projects are assessed (appraised) before they receive approval for implementation. This appraisal may be undertaken by a government agency, or an overseas funding agency such as the World Bank, a bilateral agency like DFID, or an international non-government organisation. Increasingly assessments and appraisals are undertaken in-country by national agencies and consultants, in part to strengthen the national capacity and capability in this area. In Tanzania, GTZ supported this through assistance to the Tanzania Association of Consultants (TACO) during late 1990s.

Appendices I to IV: References; Abbreviations, Glossary; and, Index

A list of references used in the handbook is given as appendix I. This includes references for further reading on project planning and design. A list of abbreviations is given in appendix II, a glossary of terms in appendix III, and appendix IV contains an index of the handbook.

2. AGRICULTURAL DEVELOPMENT IN TANZANIA

Keywords and concepts:

Agriculture and the macro-economy; Agricultural policies and strategies; Institutions and roles; Natural resources and land use; Farming systems; Agricultural potential; Agriculture and the environment; Agricultural services; Sustainability of agricultural development.

INTRODUCTION

One of the main features of Tanzania economic development has been the central importance of the agricultural sector over the whole period of 1960s-2000s. Though it is now over forty years since Tanzania attained its independence in 1961, its economic structure has basically not changed. About 90% of the population live in rural areas and depend upon agriculture for their livelihoods. This dependence is reflected in the country's economy where today agriculture is responsible for 90% of employment, over 60% of GDP, and 70% of export earnings. For the foreseeable future the agricultural sector will continue to have a major role in the economy. High and sustainable agricultural growth will therefore be crucial for food security and to maintain the livelihood of the majority of the people of Tanzania, and as a foundation for the economic development of the country as a whole. In 2000 after the country's election, the government split the Ministry of Agriculture and Livestock, by removing livestock that was combined with Ministry of Water. The Ministry of Agriculture now comprises of arable agriculture and food security to emphasize the role of food security.

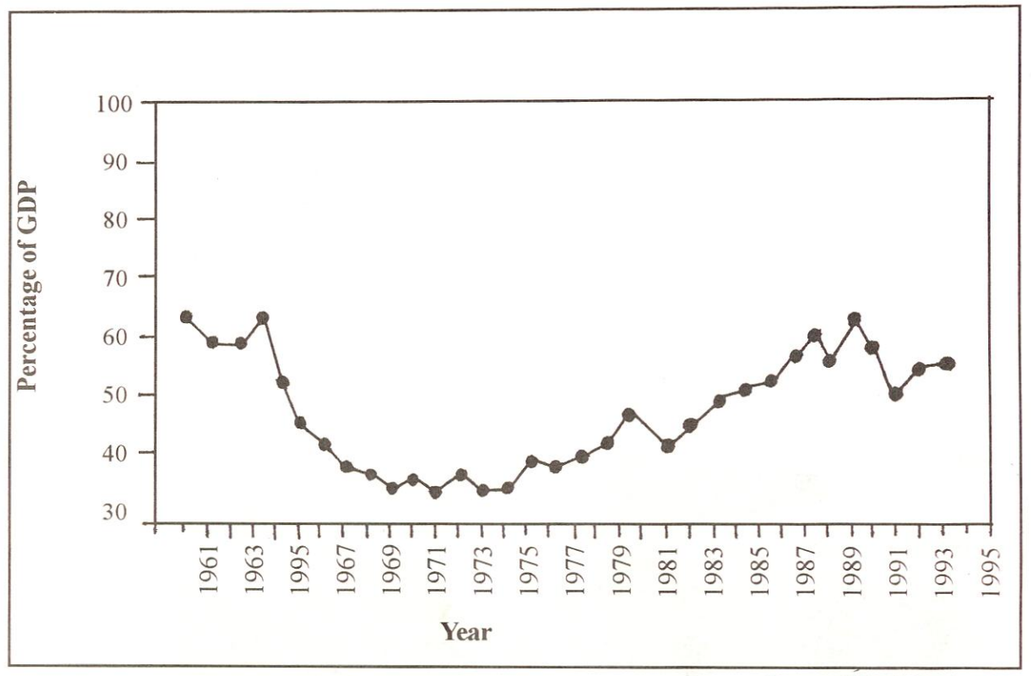
This chapter reviews the background of agricultural development and the natural resource base it depends upon. It is within this overall social, political and bio-physical environment that agricultural planning, of whatever nature, must take place and take into account. If not then the chance of successful agricultural projects and programmes will be limited.

AGRICULTURE AND THE MACRO-ECONOMY

Share of Gross Domestic Product

The importance of agriculture in Tanzania is shown in the agricultural share of the Gross Domestic Product (GDP). In 1960, agriculture accounted for over 75% of the country's GDP. At the same time it also accounted for 90% of the total employment and 75% of the total foreign exchange earnings. During 1960-1970s, total agricultural output in the national economy declined from 60% to about 40%, Figure 2.1. The reasons for this decline are highlighted in Box 2.1.

Figure 2.1 Agricultural percentage of Gross Domestic Product 1960 to 1993



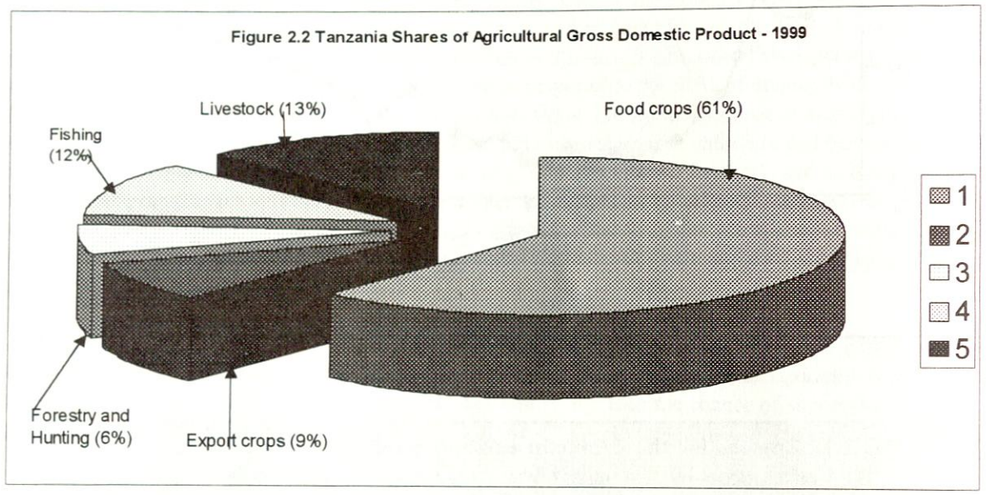
Source: World Bank, 1994

Box 2.1 Reasons for the decline in agricultural growth1960 to 1970's

- Shift of resources by government from the agricultural sector to the manufacturing and service sectors.
- Government instituted a programme of collectivisation and villagisation of agriculture which separated farmers from their perennial crops and known lands, this was accompanied by uncertainty related to relocation and security of land tenure.
- Government interventions resulted in the distortion of markets. The state established and owned marketing institutions e.g. crop boards. State sponsored co-operatives and parastatals were formed to replace liberal markets. These institutions operated in bureaucratic ways and were often miss-managed and inefficient. These institutions paid farmers administrative prices and were rigid and slow to respond to economic stimuli.
- Government dissolved the rural co-operative system in 1970's setting back the provision of credit and services to farmers.
- Adverse global economic conditions exacerbated hardships through low commodity prices for Tanzania's traditional export crops.
- Incentives for agriculture were low. Generally official producer prices were low and fixed at the same level for several years, despite increasing input prices.

In 1990s, after the implementation of economic reforms (structural adjustment the decline in agriculture has been reversed. In recent years the sector has again accounted for over 60% of GDPas shown in Figure 2.1. Similarly, agriculture accounts for 85% of total employment and generates over 60% of the total foreign exchange earnings. This is in sharp contrast to the 39 to 40% agricultural share in GDP achieved in the early 1970s. Agricultural food crop production accounted for about 55% of GDP, livestock for 30%, traditional exports (coffee, cotton, tobacco, tea, cashew nuts) accounts for 8 per cent, fishing and hunting account for 6% while forestry's share is about 1% (Figure 2.2). In 1995/96 agriculture also accounted for 58% by value of exports, an increase from 46% in 1989/91. These export statistics are shown in Figure 2.3.

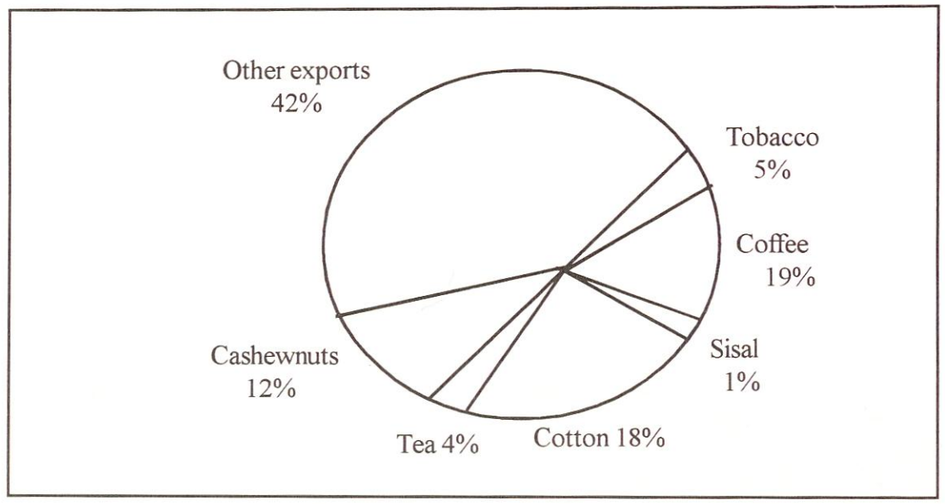
Figure 2.2 Shares of Agricultural Gross Domestic Product (GDP), 1989 - 1991



Source: World Bank, 1994

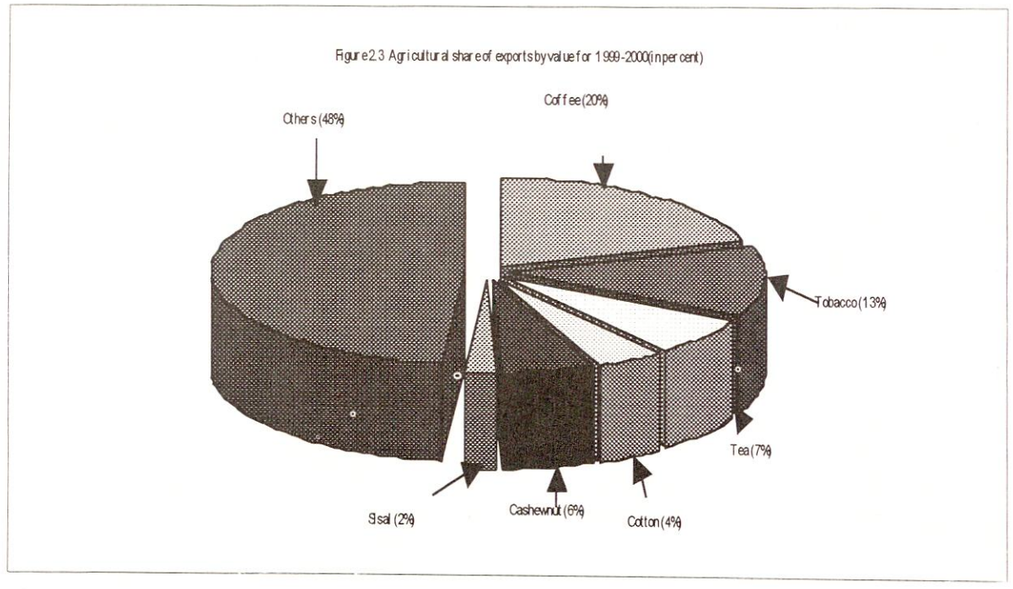
Figure 2.3 Agricultural share of exports by value

(i) For 1989/91



Source: World Bank, 1994

(ii) For 1995/96



Source: Bank of Tanzania, 1996

Economic reform and structural adjustment

As highlighted in Box 2.1, many of the problems which agricultural development faced in the 60's and 70's were a reflection of the macro-economy and policies of the time. The first attempt to tackle some of these problems was through the National Economic Survival Programme (1979-1981). Between 1982 to 1984 a move towards a more market-based economy began through a structural adjustment programme which included a major devaluation, and the recognition of the role the private sector could and should play in the economy. This was followed by the Economic Recovery Programme which was launched in 1986. Supported by bilateral and multi-lateral donors and agencies this programme included a number of major economic reforms or adjustments to the national economy (Box 2.2). Structural adjustment or economic reform were common terms used to describe this process.

Box 2.2 Economic Recovery Programme reforms 1986

- Adjustment of exchange rate and devaluation of Tanzanian shilling.
- Establishment of a open licensing facility for the allocation of foreign exchange
- Raising of interest rates by state banks to give positive rates in real terms
- Removal of price controls on 400 consumer goods
- Increase in producer prices for export crops in real terms
- Liberalisation of the food market
- Establishment of targets for fiscal deficits and monetary expansion.

Source: World Bank, 1994

The process of reform was continued under the Economic and Social Action Programme - ESAP (Box 2.3) which saw increased liberalisation of markets and privatisation of state assets and parastatals. Accompanying these national macro-economic reforms a parallel reform programme was undertaken for the agricultural sector with a new agricultural policy in 1983. The effects of these reforms on agricultural markets, production and farmers are discussed in this chapter.

Box 2.3 Focus of the Economic and Social Action Programme

- Reform of trade policy and reduction of import tariffs.
- Improvements in management of state enterprises.
- Commencement of restructuring and privatisation of state enterprises and parastatals.
- Restructuring of the state bank system and co-operatives.
- Measures to increase the provision of social services.
- Rehabilitation and expansion of transport links (road and rail).
- Measures to improve the efficiency of public utilities.

Source: World Bank, 1994

Agriculture and other sectors

Agricultural sector is a complex and intertwined industry. It provides raw materials and food to non-agricultural sectors. It also provides business to service sectors such as transport, trade and financial sectors. These sectors depend to a great deal on the volume, and value of agricultural production. They also add value to agricultural products, and this added value accounts for about 5%. While these activities increase the value of agricultural products, agro-based industries they also provide a market for agricultural production, and supply inputs to the agricultural sector. Industries such as textiles, shoe factories and cigarette, coffee processing are closely linked to the agricultural sector. Any meaningful industrial growth, must first begin with increased productivity in the agricultural sector to be able to release resources for the non-agricultural sector.

Agriculture provides foreign exchange required by the non-agricultural sector to import essential capital goods and intermediate inputs for domestic manufacturing sector. It also provides foreign exchange for imported consumer goods. It is only when industries and service sectors are growing at a faster rate that the share of agriculture output in the GDP will decline. What is important is to pursue a policy that is growth oriented for all sectors. Well designed agricultural policies and strategies are crucial because of the key role of the agricultural sector in economic recovery, and as a path for sustainable growth.

Current macro-economic status

The major macro economic factors that effect agricultural sector include - inflation, interest rates, institutional reforms. A brief view of these variables is given to allow the reader an understanding of the implications they have on the sector.

Inflation

One of the critical factors affecting agriculture is stability of general prices. In 1995 .....inflaction rate was 26% thus giving Tanzania the dubious privilage as one of the leading countries in dolbe digit inflation reate in the world. this has been largely caused by government budget deficits to finance its operations - including remove of subsidy of those parastatals with persistent financial problems largely heped to reduce inflation to its current level of five parent privatization of most productive sectors. Government initiatives to increase revenue collection by streamlining the Ministry of Finance including creation of Tanzania Revenue Authority in 1995, have started to show positive results. During the first quarter of 1996, the revenue collection surpassed the planned target. Strict accountability by ministries to match approved expenditure by Parliament, should instil greater financial discipline. Continued strigent monetary policies during 1996/2001 reduced the inflation from its previous high rate of 26% to 11.2 in December, 1998; 7% (1999); 5.5 (2000) and 5.4 (January, 2001). Liquidation of parastatals and privatisation should also help create internal equilibrium in the public expenditure. These measures and creation of a central independent, the Bank of Tanzania, in 1996.

Interest Rates

High inflation rate results in high nominal interest rates. During 1995, the nominal rate of interest was 40%. Efforts to reduce inflation through the reduction of government budget should also see a reduction in interest rates. Real rates of interest for the agricultural sector have recovered from the negative figure of 20% in 1984, to over 15% in recent years. Following the economic reforms these interest rates are based on a market system. The previous system required commercial banks to set their 12 month deposit interest rate above the inflation rate, or maintain a positive real interest rates. This restriction has now

been lifted and commercial banks are now free to set their own rates. The short term lending rate was 37.3% (1996) and the average interest rates on medium and long term lending increased from 33% to 38.8 between June 1994 and June 1995 respectively. Interest rates on housing mortgages have increased from 31% to 33% between 1994 and 1995 respectively.

However, due to decreasing inflation during 1995- 2001 interest on savings and time deposits fell from (15-27%) in 1995 to 5.5 - 11% in 2000. But the lending rate by the commercial banks staggered. It fell from 40% in 1995 to about 20-22% during 2000. This large difference between the savings/deposits and the lending rate continue to make borrowing to the agricultural sector very expensive because of the high risks.

Discount rate

During 1994/95, the Central bank used the discount rate as an instrument of monetary policy to bring down excessive borrowing from the government and the other financial institutions. The discount rate was varied more often than at any previous period. During 1994, it was changed ten times compared to the period 1966-1993 when it was changed only four times. The frequent changes were made to make it reflect the interest rate prevailing on the Treasury Bill market. This made the discount rate high during the year 1994/95. The average discount rate was 45.6%. Following felling inflation rate the discount rate continued to be policy. The discount was changed 10 times in 1997, 12 times in 1998 and 9 times in 1999 and 10 times in 2000. In 1996 it ranged between 14.9 to 40.8 while in 1997 it ranged between 20.1 - 20.6% and 20 - 20.50% respectively.

Minimum Reserve Requirement

In another effort to curb price rise, the determination of minimum reserve requirements which was previously based on domestic currency deposits was changed to include foreign currency deposits, and vault cash. The Minimum Reserve Requirement was raised from 12% to 18% during 1994 and 1995 respectively.

In 1996 it was charged to 12%. During the peiod 1997 - 2000 it stood at an average of 10%.

Exchange Rate

Given the high share of agricultural GDP which is exported (Figure 2.3), exchange rate play an important part in determining the export potential. Since 1992, the official rate of exchange and the market rate (bureau du change) have been equalised. The exchange rate since 1993-96 has fluctuated between Tsh 550 to 580 to one US dollar. Between 1997 and 1998 the exchange rate ranged between TShs. 600 and 750 per US dollar. During the period 1999 and 2000 the exchnge rate stabilized at TShs 800 to USD. This was because of favourable inflow of foreign funds from exports or donors and private investors especially in tourism and mining. This short term inflows did not hold the currency very long. In early 2001, the dollar appreciated to TShs. 880 in January and 890 in May, 2001.The importance of market exchange rate to farmers is the incentive it provides when exporting their products. This increases farm gate prices (in domestic currency) they receive.

Commodity prices

Tanzania operates within the global economic system and about 8% of the agricultural GDP is exported. There are seven major export crops: coffee, cotton, cashews, tobacco, cocoa, pyrethrum, and sisal.

Tanzania is not a major producer of any of these crops traded on the world market. It can not set commodity prices since these are determined by market forces of demand and supply. Thus Tanzania is price taker. Between 1975 and 1990 both prices and export volume of most of these crops have declined. Asian and Latin American producers have taken a substantial market share compounding the problems of African producers. This has partly been as productivity in these countries has been higher. However, African countries such as Tanzania have some advantages such as lower unit costs and the availability of fertileland for increased production.

In recent, years productivity in Tanzania has started to increase - a result of economic liberalisation and currency devaluation - and the country has started to become more competitive in its traditional agricultural markets. However, even with improved productivity world commodity prices have continued to fluctuate. For example, coffee and cotton, the most important export crops, experienced a price fall in 1993. This resulted in lower production levels in 1993 and 1994. Since 1994-95 coffee and cotton prices have increased substantially and production has increased. For instance, coffee output increased by 12.4% from 48,500 to 54,500 tons in 1993/94 and 1994/95 respectively - partly due to an increase in coffee prices from US $ 2.05 to US $ 3.90 per kg. The favourable weather also attributed to the increase of output. Similarly, tea production increased by 10.7% (22,360 to 24,800 tons) during 1993/94 and 1994/95 respectively. This was a consequence of increased world prices from US $ 1.55 to US$ 1.80 from 1992/93 and 1993/94 respectively. During the period 1996 and 2000 Coffee prices ranged from USD 3.8 (1997)and 1.2 (2000). Coffee export volume also declined from 61.7 tons to 39 (1999) and increased to 54. tons in 2000. Similarly Cotton export volume declined from 82 (1996) to 26.3 (1999) and slightly recovered to 36 tons in 2000.

Unfortunately, medium and long term prospects are for continuing fluctuations and low prices for primary export crops. Thus the prospect of increasing income from increasing prices for its traditional exports is small. However, Tanzania has a good potential to increase its traditional exports as Tanzania's share in the world market is very small (except in the case of sisal). Higher production and exports from Tanzania would not affect world market prices, as the volume from Tanzania will be negligible - this assumes that increased productivity is achieved in the country. In summary, Tanzania has the potential to produce most of its traditional exports at low cost. Its comparative advantages could also be an opportunity for expanding production without sacrificing quality and standards of its production.

Effects of market liberalisation

On cereals

One of the major problems of regulated or monopolised agricultural product market was lack of incentives. Prices were set low and administered by a centralised marketing system. This was further compounded by an over valued exchange rate and controlled domestic product prices. In both nominal, and real terms, the producer prices were artificially kept low. This reduced real agricultural incomes. The effects of monopoly marketing channels such as co-operatives, frustrated farmers. Farmers were often not paid on time especially as many co-operatives incurred substantial losses. Co-operatives were "rescued" by the government. These inefficiencies and wastes by the monopoly marketing institutions were perhaps one of the major contributing factors to the poor food crop performance of the late 1970s and the early 1980s. These were among the principal reasons for the need for the implementation of economic reform.

After the adjustment policies were put into place during the mid 1980s, a key was the liberalisation of agricultural markets. Cereal trade and prices were liberalised in 1989 and today the trade is now almost completely in the hands of the private traders. The National Milling Corporation - previously the sole end

cereal distributor - is currently under receivership; the Co-operative Unions - previously the major buyers from farmers - are no longer dominant buyers. The role of government in cereal trading is now in terms of food security. In 1991 the government established a Strategic Grain Reserve (SGR) which keeps stock of cereals for regions which face food deficits. The stock also serves to regulate the cereal market from excess market supply as SGR purchases this excess and releases it when the market supplies are being depleted. However, this has not worked as well as may have been expected. Following the late rains in 1996/97 and drought, a food shortage has arisen and to date the SGR has been insufficient to adequately maintain food supplies across the country.

On coffee

One of the effects of liberalised product market has been to increase competition. By allowing free entry to buyers it has provided a competitive environment. Coffee is generally produced by smallholders (95% of the total production). Two types of coffee are grown in Tanzania - Arabica and Robusta - in three main zones: North (Kilimanjaro and Arusha), South (Southern Highlands including Ruvuma) while robusta is mainly grown in Lake region (Kagera). Coffee marketing was liberalised in 1993/94. A multi channel marketing system started in 1994/95 when private buyers permitted to compete with the co-operatives. The role of the Coffee Board was reduced to regulation, management of the coffee auctions, and the promotion of production and marketing. During 1994/95 season, a total of 73 buyers entered the coffee market of which 56 (77%) were private traders, Table 2.1. During this period 43,081 tonnes of coffee were purchased, of this private traders accounted for 14,004 tonnes (33%).

Table 2.1 Numbers of coffee traders 1993 to 1995

Year	Co-operatives	Private Traders	Coffee Board	% Private Traders
1993/94	12	-	-	
1994/95	15	56	2	77

Source: URT, 1996.

Producer prices form an important part of any commodity marketing and the profitability of a farm enterprise will depend partly on the prices the farmer receives. The effects of the arrival of competition in 1994/95 are shown in the average annual prices offered by private and co-operatives, Table 2.2.

Table 2.2Average coffee prices for 1994/95 paid by private traders and co-operatives (Tsh/kg).

Buyer	Mild Arabica		Hard Robusta
	Noth Region	Southern Highlands	Lake Region
Pivate buyers	1050	725	497
Cooperative (only first payment)	775	592	450

Source:URT, 1996

The prices paid by the private traders were higher than those given by the co-operatives, though thelater does pay a second payment. One of the complaints by farmers in the past, has been delay in payments from co-operatives who bought their crop on credit with an initial payment followed by a second up to 18 months later after crop had been sold overseas. Farmers with low incomes place a very high discount rate on the future consumption especially as the real value of the amount received twelve months from now, may not be same as that received at present. The private traders work in a market where this time preference of money is understood - especially in times of high inflation.

Boxes 2.4 and 2.5 give further case studies on the effects on the tea and dairy industries of economic reforms.

Box 2.4 Case study of tea industry

One of typical characteristics of agricultural development is its scale of operations. Some of the crops need to be grown on a minimum scale for them to be economically undertaken. The long-term nature of the crops like tea are examples of the agricultural crops that require estate approach to their expansion. Major reasons include cost of establishing them. The specialised techniques of cultivation such as pruning, plucking, and the need for processing within a short time after plucking, appears to favour vertically integrated plantation production. The greatest documented yields per hectare on most tea plantations in the tea producing countries have been on estate sizes ranging from 200 ha to 600 ha.

One of the major estate projects initiated during the late 1970's was Mlangali tea estate in Njombe district, Iringa region. Its size is 200 ha and it is located in Ukalawa division 40km from Lupembe tea processing factory. The Mlangali tea estate was established by the Tanzania Tea Authority (TTA) and its yield at maturity was expected to be 4000 kg per hectare. The Mlangali estate was also partly established to use the excess capacity of the Lupembe tea factory. However, like other state run projects, the Mlangali estate experienced economic and operational problems. In addition, by 1990 it was evident that smallholder expansion had outstripped that which was envisaged by TTA at the beginning of 1977 and the Lupembe tea factory capacity was inadequate and the envisaged yield for Mlangali could not therefore be processed. By late 1980's when all Mlangali tea had reached maturity, TTA had planned to build a new factory at Ukalawa. This was overtaken by other events and the privatisation programmes that started in 1992 by establishing Presidential Parastatal Sector Reform Commission (PSRC).

In 1997 a bill was passed by the Tanzania Parliament to privatise tea industry. Two organisational structures established are the Tanzania Tea Board responsible for ensuring quality, licensing and regulatory issues. The second institutional change is creation of a Small holder Tea Agency responsible for assisting the former TTA factories operate as independent commercial enterprises. The agency is also responsible in assisting smallholder farmers acquire shares in the former TTA factories.

Box 2.5 Case study of the Dairy Farming Company (DAFCO)

A long standing national objective has been to improve the nutritional status of majority of population, especially children, who have been affected by malnutrition. One of the main problem areas is the coastal belt areas stretching from Tanga in the north to Mtwara and Lindi in the south.

Substantial investments were made by the government in the 1970's and this included the establishment of the Dairy Farming company (DAFCO). The project established farms in Dar-es-Salaam, Ngerengere and Kibaha. The main output was fresh pasteurised milk for residents in Dar-es-Salaam and the neighbouring metropolitan areas like Morogoro. The project was financed by the government of Tanzania with financial assistance from the USAID.

DAFCO was capital intensive, with modern equipment and specialised buildings. It also required constant supply of feed etc. After running for a few initial years, the project experienced operational problems including lack of apparent commitment from the government. Political interference and lack of coordination were other problems, as was the shortage of foreign exchange to buy spare parts was also another important factor that affected its performance.

In early part of 1990's the company was liquidated as part of the overall on going reform to privatise the economy. The original project was clearly not sustainable and the control and top down role of the government contributed to its lack of success.

On rural economy and farmers

It is estimated that there are about 3.4 million smallholder farmers in Tanzania. They cultivate 91% of the 3.4 million cultivated hectares. Small farmers also account for about 75% of the total area under perennial crops. The programme of structural adjustment has had major economic and social impacts on small holder farmers. Some of these effects have been beneficial - increase in crop prices and liberal markets - while others have initially been adverse - removal of subsidies on agricultural inputs and reduction in spending on social benefits (e.g. education and health). Box 2.6 illustrates some of the impacts of economic reforms on small holder tea farmers in Lupembe. Overall the effects have been mixed. Increased prices for tea had increased incomes, but increased prices for basic consumption and services has meant an increase in expenditure. It also appears that the farmers are still to see the full benefits of reforms.

Box 2.6 Impact of reforms on smallholder tea and maize farmers in Lupembe

Lupembe is an area of some 4000 small holder tea farmers and the scheme was established in the early 1960's. Individual farm sizes are under 0.4 hectare with a tea factory processing serving Lupembe and other areas. In 1993 the major impacts of the economic reforms on smallholder tea and maize farmers were:

Tea

- Tea prices (farm gate) had increased since structural adjustment but 72% of farmers were still dissatisfied with prices and considered them too low - reflected in the drop in the share of the export sales price from 78% in 1986 to 26% in 1990, this has now recovered to 60%. But it would appear that the liberalisation of the market and benefits of devaluation have not been fully enjoyed by farmers.
- 95% of farmers stated that their incomes from tea had increased since 1991.
- No expansion in tea had occurred as the limiting factor remained the capacity of the tea processing factory, it had been expected that reform would have led to investment in the tea factory, this has yet to occur and is limiting the possible benefits of increased production and prices farmers might have expected.
- Fertiliser prices have increased since reform and this has led to a drop in their use, fertilisers were still procured by government and deliveries were late, there appeared to have been no appreciable entry of the private sector into this market so far in the area.

Food (maize)

- Prices and markets for maize have increased since the reforms, and farmers had increased the area under maize by about 20% since 1986.
- 93% of farmers attributed the increase to the privatisation of markets that give better access and prices.
- High prices for maize has led farmers to reduce their food stocks with risks of lack of food before the next harvest.
- Food consumption, while increasing in value, appeared overall to have been reduced in quantity since the reforms, though these affects were ambiguous.

Education and health

- Fees for schools had increased since the reforms and nearly all farm households attributed this to the reforms.
- There has been an increase in absenteeism, primarily from the lack of funds for school fees.
- There has been a reduction in people visiting government health centres and an increase in those visiting private centres (missions) - reasons for this were lack of drugs and medical attention at government centres (partly as a result of less resources).
- The implication of increased private visits (79% in two years) is that households are now spending more income on medical expenses.

(Source: Nagu, 1993)

POLICIES AND STRATEGIES

One of the critical factors in agricultural development under whatever economic system is its policy or sectoral strategy. All sectors compete for the limited resources at the disposal of the society, the criteria by which resources are allocated in the public sector depends on weight given to that sector. National and agricultural policy is therefore an important instrument in providing overall direction and weight to the sector. Between independence and 1983 Tanzania had no explicit agricultural policy. Development of agricultural policy was largely on ad hoc with policy statements such as "Siasa ni Kilimo" (Politics is Agriculture) in 1972 which was never followed by a blue-print. Similar policy statements were made during the acute famine of 1974-75. For example, "Kilimo Cha Kufa na Kupona (Agriculture for Survival) and "Kilimo Cha Umwaligliaji" (Irrigation Agriculture) which were really only political pronouncements addressing the immediate problems.

It was not until 1983 when the first full agricultural policy document was produced. Its major objectives are given in Box 2.7 under which two sectoral policies were produced for agriculture and livestock. These objectives were accompanied by the means (strategies) to achieve them as shown in Box 2.7. This policy was partially implemented but was overtaken by major economic adjustment policies of mid 1980s: liberalisation of trade, devaluations, withdrawal of government from direct productive activities.

Box 2.7 1983 Agricultural Policy

Overall objectives/goals:

- To increase food production for both domestic consumption and export
- To increase quantity and quality of traditional exports
- To create new institutions for procurement and distribution of farm inputs
- To rehabilitate small and large irrigation schemes for the benefit of smallholders
- To reduce "post harvest losses"
- To strengthen Ministry of Agriculture and offer guidance in agricultural production and monitor progress of agricultural parastatals.

Strategies:

- To increase yield and area under crop production and livestock
- To reorganise agricultural extension and strengthen its capacity at all levels
- To strengthen marketing system by improving efficiency through appropriate investment packages in marketing facilities
- To increase producer prices through appropriate exchange rate mechanism
- To relate producer prices to inflation through indexation
- To increase agricultural infrastructure support (credit, transport, research etc.)
- To increase agricultural investment in agro-industry through joint venture, private individual or organisation.

(Source: URT, 1982)

In light of these economic reforms it was necessary to review agricultural policy and a new policy was produced in 1996 whose major objectives (goals) included food security, foreign exchange, etc. (see Box 2.8). Again these objectives were accompanied by a set of strategies. These included, in particular, provision for an enabling environment to allow private agencies, NGOs and quasi government to operate efficiently.

Box 2.8 1996 Agricultural Policy

Overall objectives/goals:

- To assure food security for the nation by maintaining annual crop and livestock growth rates of 4% and 5% respectively.
- To improve standards of living in the rural areas through increased incomes from agricultural activities
- To increase foreign exchange earnings
- To produce and supply raw materials for non-agricultural sectors
- To develop and introduce new technologies for improved productivity
- To promote integrated and sustainable use and management of natural resources such as water, land, soil and environment
- To develop human resource within the sector in order to increase labour productivity and to improve ability, awareness and morale
- To provide support services to the agricultural sector which cannot be provided efficiently by the private sector
- To promote specifically the access to, and awareness the needs of women for, land, credit, education and information

Strategies:

- To increase investment in agricultural research, extension and training monitoring and evaluation of agricultural development and identification of new opportunities
- To increase investment in data collection and dissemination of market information for both private and public decisions
- To facilitate infrastructural support (transport and storage) to agricultural sector
- To regulate quality, hygiene and sanitary standards
- To increase resources to control vermin, epidemic pests and diseases
- To provide adequate legal and regulating frameworks
- To increase resources for natural resource management
- To promote institutional structures in the agricultural sector taxes and subsidies

(Source: URT, 1996)

INSTITUTIONS AND ROLES

The role of the public sector in economic production and commodity exchange has declined since 1986 as a result of the move towards private and market system following the launching of economic reform and structural adjustment in the late eighties. This section looks at the changing roles of the major formal institutions involved in agricultural development in Tanzania. Institutions in this sense are usually formal organisations - see the section on institutional analysis in chapter 7 for a description on the different types of institutions.

Ministry of Agriculture and Co-operatives

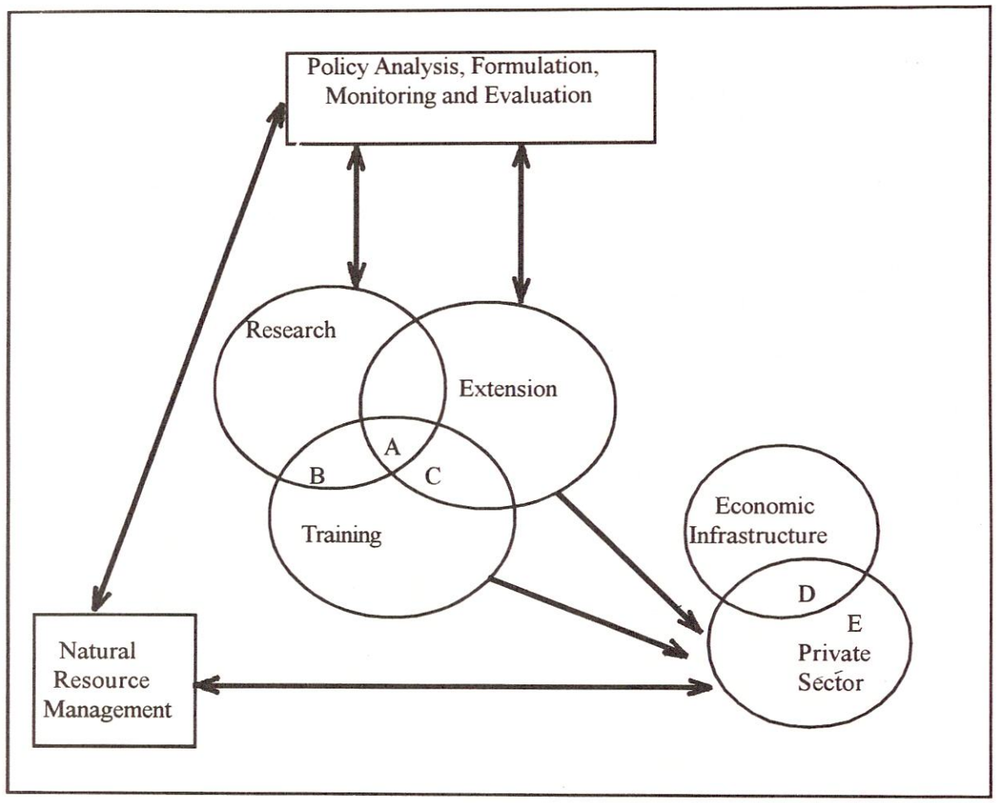
The new economic environment has had major changes on the roles of the Ministry of Agriculture and Co-operatives (MOA). A fundamental change is that MOA will no longer play a direct role in agricultural production, but instead will be responsible to provide the environment to allow others (farmers, NGOs and commercial sector) to produce and market agricultural products.

In this role the MOA now provide goods and services that cannot effectively be provided by the private sector. These goods are generally called "public goods". These include: extension, research, and education (training). Other goods include action directed to the management of renewable natural resources (forestry, environment, fisheries, etc.). These include the important functions of policy formulation, monitoring and evaluation to ensure that society's resources are used in the manner the society wants (Figure 2.4). While government will continue to undertake production of most of social goods and other public goods it will also have to play a regulating role for activities of the private sector: licensing; quality control of products and agricultural inputs; dissemination of market information; and, build institutional capacity to implement policy and facilitate activities of private sector.

Research, extension and farmers

A problem in the past for agricultural interventions and projects has been the lack of effective linkages within MOA between extension, research and training, and outside to farmers. The new agricultural policy attempts to overcome this weakness by integrating these components under one directorate - Directorate of Research, Training and Extension Services. Area A (Figure 2.4) represents where extension, research and training are maximised in terms of dissemination of information to the private sector. Areas B and C are where two components complement (research and training or extension and training) each other at the same time. Recognition of these inter-relationships in the utilisation of resources is a crucial factor to reduce resource wastes. For example, the benefits of economic infrastructure are realised by the private farmers in area D. This overlap is crucial if private rural access roads ar be built to allow farmers access to markets so that they can increase their agricultural productivity. This inter-relationship calls for co-ordination within the sector and across other sectors. Lack of attention to these issues in the past has been partly responsible for a great degree of the poverty in remote regions such as Kigoma, Mara, Lindi, and Mtwara.

Figure 2.4 Core functions of Ministry of Agriculture and Co-operatives



Focus of intervention

The new nature of economic relationships between the private and the public sectors, as reflected in Figure 2.4, means changes in the nature of government intervention. Intervention will be in those areas where private sector is not motivated to provide goods and service (public goods). One of these areas will be small holder farmers. Their role in the development of Tanzania's economy and an increase in their income are crucial both for the overall economy and for poverty alleviation. A key issue here in the context of market orientated reforms is accessibility of these resource-poor farmers to appropriate technologies, credit and other inputs necessary for them to increase or maintain their production.

Even though government resources are limited and are likely to remain so in the immediate and medium terms, government provision of "public goods is critical in the process of agricultural improvement. The most crucial government intervention is to focus research, and extension towards resource poor farmers. This is a necessary condition if the government's commitment to reduce poverty among the majority of farm households is to be met. The government has already made substantial capital investment in the provision of "public goods. This needs to be effective and strengthened. This will involve, inter alia, farmer participation in research design, technical dialogue between research and extension personnel.

Project Preparation and Monitoring Bureau (PPMB)

The Project Preparation and Monitoring Bureau (PPMB) is the main section of the Ministry of Agriculture XE "Ministry of Agriculture and Co-operatives" § (MOA) which has the responsibility for project planning and development. PPMB is under the division of Planning and Marketing which is primarily concerned with the formulation of sectoral policies and implementation strategies (Figure 2.5). The PPMB comprises of three units: the Project Preparation Unit: the Project Monitoring Unit; and, the Budget and Finance Unit The functions of these units are given in Box 2.9. New posts of Regional Agricultural Economists have recently been created and it is expected that these officers will play a key role in developing and monitoring projects in their respective regions. The draft terms of reference for these posts is given in Box 2.10.

Box 2.9 Functions of the Project Preparation and Monitoring Bureau

Project Preparation Unit:

- Preparation of project identification reports.
- Preparation of appraisal reports on planned and existing projects.
- Preparation of TOR for individuals and agencies undertaking project identification and/or appraisal reports.
- Preparation of comments and recommendations on project reports;
- Maintenance of an information system on: the status of existing projects and project proposals; costs, prices and cost composition of inputs and outputs; and, technical parameters for project design and appraisal.
- Liaison and co-operation with visiting missions on initial phases of the project cycle.
- Assistance to parastatals in establishing project preparation teams and in training the staff of such teams.

Project Monitoring Unit:

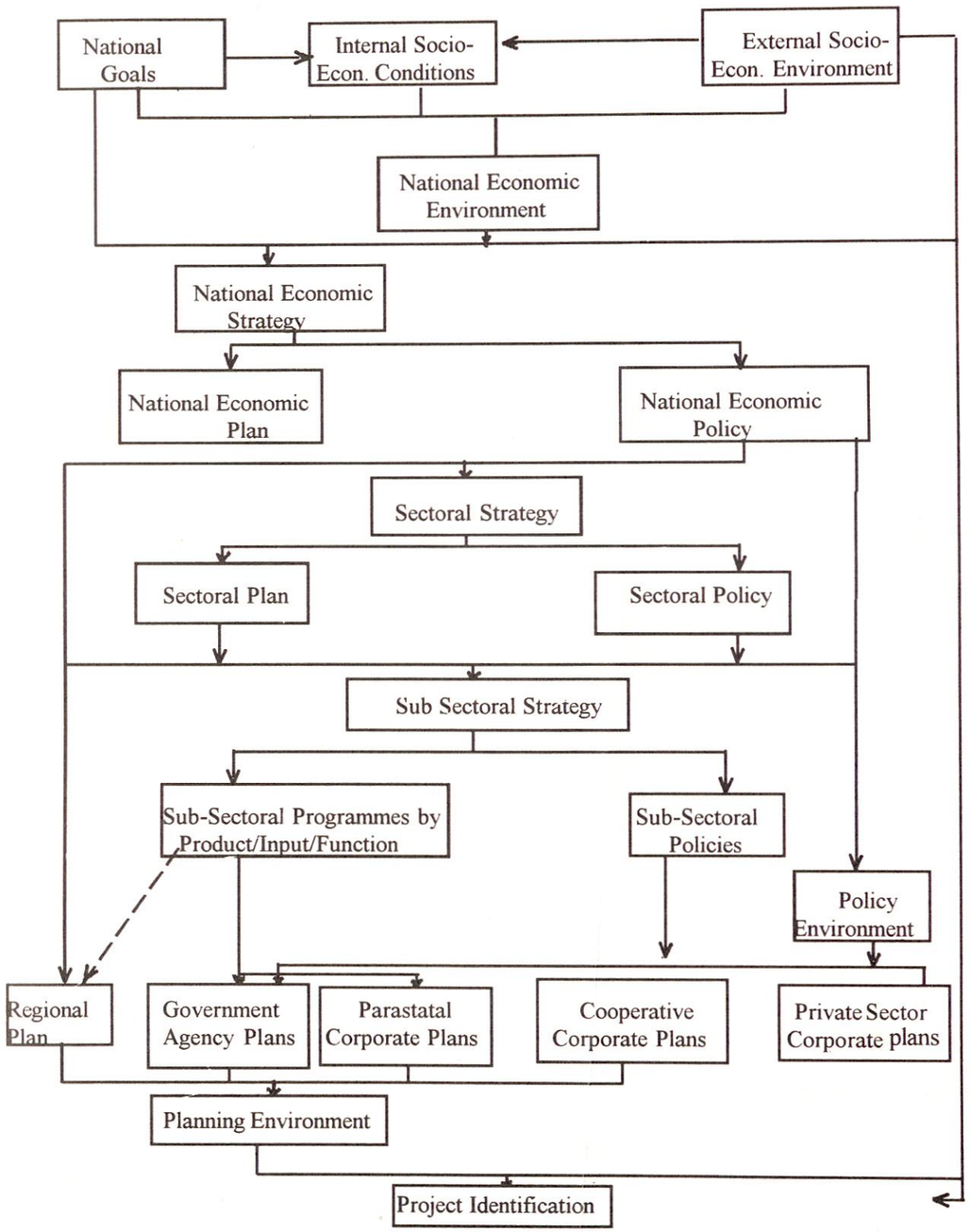
- Assist the Sectoral Planning Section in the preparation of MOA's Annual Development Programme and Budget.
- Establish and maintain a system for collecting key data for project monitoring.
- The evaluation of major development projects.
- Liaise and co-operate with visiting, missions in supervision, monitoring and evaluation of development projects.

Budget and Finance Unit:

- Provision of advice and assistance to parastatals in project implementation including financial analysis and accounting matters (it is currently involved in parastatal restructuring and privatisation).

(Source: Hall, 1995)

Figure 2.5 Planning and policy environment for agricultural projects in Tanzania



(Source: Guidelines for the preparation of project planning reports: PPMB and MOA)

Box 2.10 Provisional duties for Regional Agricultural Economists

- Represent the Commissioner of Planning and Marketing Division and be answerable to RALDO (Regional Agricultural and Livestock Development Officer).
- Advise RALDO on all matters pertaining to planning and policy.
- Co-ordinate agricultural data collection and information dissemination.
- Monitor and evaluate development projects and programmes.
- Support visiting missions related to planning, policy and marketing in agriculture.
- Co-ordinate planning activities at the grassroots level and assist farmers and pastoralists with project matters.
- Co-ordinate regional inputs to the formulation of new development policies.
- Monitor and evaluate food security activities and early warning signals at the regional level.
- Participate in regional planning activities.
- Monitor the agricultural inputs situation in terms of requirements, distribution and prices.

(Source: Hall, 1995)

Other government agencies

Agriculture, as the main driving force of the economy in Tanzania, is linked to many sectors of government and the economy in Tanzania. The polices and plans of nearly all the major sectoral and central government agencies will affect agricultural development. Principal among these agencies are the Ministry of Finance the Planning Commission, and the Bank of Tanzania. In addition, other Ministries or Departments will also be concerned with agricultural development. These would include Forestry, Environment and Wildlife. Another crucial area for agricultural development is access to markets and regions, therefore the development and maintenance of the country's infrastructure (roads, rail links, etc.) will play a key role in the successful development of the sector and the country's economy.

Private and commercial

The private and commercial agricultural sector is now expected to play an increasing role in agricultural development in Tanzania. Economic reforms have liberalised the market to allow small and large traders to operate, parastatals are to be restructured and privatised and inward investment in agricultural enterprises is now encouraged. This all heralds a much larger role for the private sector in agriculture both for smallholder farmers and commercial plantation development. The involvement of the private sector in agricultural projects will also increase.

Non-governmental organisations

The needs and concerns of the poor farmers are many and varied and governments cannot address them all at the same time. Increasingly Non-governmental organisations (NGOs) are becoming a common feature in both the developed and developing countries, including Tanzania. NGOs often work closely with the local communities where they have played a significant role in identifying poor communities needs, potential beneficiaries from interventions, and the implementation of projects at the grassroot level.

NGOs can also provide effective emergency relief services. However, NGOs have generally not been (explicitly or implicitly) recognised in the conventional project approach. This is now changing, the potential and actual roles NGOs play or can play are summarised in Box 2.11.

To strengthen capacity of the local community organisations to influence policy and systems is also a critical factor as the market can no longer provide assistance (except charity) to the resource poor farmers. NGOs can play a role in this by:

- Working in partnership with national institutions.
- Lobbying with donors to target resources to the poor.
- Negotiating with the government on behalf of local communities and the poor.
- Understanding external environment to increase their bargaining power.
- Making external linkages and alliances.

Box 2.11 Potential and actual roles of NGOs

- Strengthening local organisations of resource poor communities to increase their capacity to sustain the benefits induced by interventions. The NGO thesis is that resource poor communities have internal and external weaknesses (Carroll, 1992). These weaknesses include - capacity for planning and goal setting, resource mobilisation, resource management, information and data management and dealing with external stress.
- Establishing grassroots organisations to mobilise resources and strengthen sustainability of development projects. These organisations may include agricultural producer associations rural agricultural credit schemes, water users associations, soil and range conservation groups, pastoralist associations "grassroot/community organisations: forestry associations etc.
- Provide assistance to grassroots organisations as these are strategic resources and source of capital accumulation (Cernea, 1987)
- Strengthening grassroots organisations is also crucial to mobilise local participation. Participation outside local organisational structures has been ineffective to sustain projects.

NATURAL RESOURCES AND LAND USE

Sustainability of agricultural development

Agriculture is above all dependent upon the natural resource base of the country that is the biological and physical environment: particularly the soils, physiography and climate. This is the base on which human management and husbandry must work to produce agricultural products. Failure to manage this environment properly can in the long term result in land degradation and eventually the loss of land for agriculture. The long term sustainable use of land has to be addressed by agricultural policy if its overall objectives are to be met. This will require a knowledge of the country's resource base and a systematic analysis of the agro-economic profile data as a basis for agricultural development. This type of national analysis increases the ability to effectively focus appropriate extension and research strategies to homogeneous ecological zones. Agri-ecological analysis also provides the basic data necessary for the design of agricultural

development strategies for different areas, and for agricultural project planning. Data on availability of potential agricultural land provides basis for agricultural land use planning. In summary the long term sustainability of agricultural development in Tanzania will be under threat unless the countryÆs land and water resources are sensibly managed by all land users.

Agro-ecological zones

Agro-ecological zones (AEZ) are areas which have similar climates, soils and topography. Several different classifications have been undertaken, Table 2.3 represents the findings of a study by the Land Resources Development Centre (1987). AEZs are differentiated by climate, soils and physiography/topography - conditions all determining the land's agricultural potential. These demarcations provide useful basis for determining production, and for analysing the potential for different crop and livestock farming systems in Tanzania. Seven major agro-ecological zones have been identified and the areas these cover, by physiographic, regions are given in Table 2.4.

Table 2.3 Agro-ecological zones of Tanzania

Zone	*Sub-zone and area*	*Soil topography*	*Altitude (masl)*	*Rainfall (type & mm/yr.)*	*Growing Season*
I.cost	North: Tanga (except Lushoto Coast and Dar es Salaam (except Lushoto Coast and Dar es Salaam	Infertile sands on gently rolling uplands Alluvial soil in Rufiji <300 uplands Alluvial soils in Rufiji	<300	bimodal,750-1200	Oct-Dec & March -June
	South: Eastern Lindi and Mtwara (except Makonde Plateau)	Sand and infertile soils Fertile clays on uplands and river flood plains	<300	Unmodal, 800-1200mm	Dec - April
II. Arid lands	North Serengeti, Ngorongoro Parks, Part of Masailand	Volcanic ash and sediments. Soil variable in texture and very susceptible to water erosion	1300 - 1800mm	Unmodal, unreliable, 500 - 600mm	March - May
	Masai Steppe Tarangine Park Mkomazi Reserve, Pangani and Eastern Dodoma	Rolling plains of Reddish sandy clays of low fertility. Susceptible to water erosion. Pangani River flood plain w/saline, alkaline soil.	500-1500mm	Unmodal and unrealible; 500-800mm	March - May
III. Semi-arid lands	Central Dodoma, Singida, N.Iringa, Some of Arusha Shinyanga	Undulating plains, w/rocky hills and low scraps. Well drained soil w/low fertility Alluvialhardplan and saline soils in Eastern Rift Valley and Lake Eyasi. Black cracking soil in Shinyanga	1000-1500mm	Unimodal and unreable 500-800mm	Dec- March
	South-eastern: Morogoro (except Kilombero & Wami Basins and Uluguru Mts). Also Lindi and SW Mtwara	Southe-eastern: Flat, or undulating plains w/rocky hills. Moderately fertile loams and clays in South (Morogoro), infertile sands in centre.	200-600mm	Unimodal: 600-800mm Unimodal: 600-800mm	Dec - March

IV Plateau	Western: Tabora, Rukwa (North and Center), Mbeya (North), Kigoma, part of Mara	Wide sandy plains and Rifty Valley scarps. Flooded swamps of Malagalasi and Ugalla rivers have clay soil with high fertility.	800-1500mm	Unmodal, 800-1000mm	Nov - april
	Southern:Ruvuma, and Southern Morogoro	Upland plains w/rock hills. clay soil of low to moderate fertility in South, infertilie sand in North.	800-1500mm	Unimodal, very reliable, 900-1300mm	Nov Appr
V. Southern: and Western High-lands	Southern: A broad ridge from N. Morogoro to N. Lake Nyasa, covering part of Iringa Mbeya	Undullating plains to dissected hills and mountains, Moderately fertile clay soils, with volvanic soils in Mbeya.	1200-1500mm	Unimodal, reliable, local rain shadows, 800-1400mm	Dec - April
	South-westerb: Ufipa plateau in Sumbawanga Western: Along the shore of L. Tanganyika Kigoma and Kagera	Undulating plateau, above Rift Valley(s). Sandy soils of water fertility.	1400-2300	Unmodal, reliable, 800 - 1000mm	Nov- April
		North-Southridges separated by swampy valleys. Loams and clay soil of low fertility in hills, with alluvium and ponded clays in valley	1000-1800mm	Bimodal, 1000-2000mm	Oct-Dec & Feb -May
VI Northern high-lands	Northern: foot of Mt. Kilimanjaro and Mt. Meru, Eastern Rift to L. Eyasi	Volcanic uplands. Volcanic soils from lava and ash. Deep fertile loan and clays. Soils in dry areas prone to water erosion	1000-2500mm	Bimodal, varies widely: 1000-2000mm	Nov-Jan & March
	Granitic Mts: Uluguru Mts in Morogoro, Pare Mts. in Kilimanjaro, and Usambara Mts. in Tanga Tarime Highlands in Mara	Granitic Mts.: Steep mountain side to highland plateau. Soil are deep, friable and moderately fertile on upper slopes shallow and stony on steep slopes.	1000-2000mm	Bimodal and very reliable 1000-2000mm	Oct-dec & March -June
VII Alluvial plains	Kilombero (Morogoro)	Central clay plain, with alluvial fans East and West		Unimodal, very 900-1300mm	Nov-April
	R-Rufiji (Coast)	Wide mangrove swamp delta. Alluvial soils, sandy upstream, loamy downstream in floodplain		Unmodal, often inadequate 800-1200mm	Dec-April
	U-Usangu (Mbeya)	Seasonally flooded clay soils in North, alluvial fansin South		Unmodal, 500-800mm	Dec -March
	W-wami (Morogoro)	Moderately alkaline black soil in East, and alluvil fans with well drained black loam in West.		Unmodal, 600-1800mm	Dec-March

Source:World Bank, 1994

Agricultural Potential

The potential of the different AEZs for arable agriculture is given in Table 2.5. Apart from soil the overriding influence on agriculture potential is the climate, in particular rainfall pattens and amounts especially as the area under irrigation at present is not very significant. Tanzania covers a total area of about

944,800 km^2 Mainland Tanzania accounts for 942,800 km^2 (99.7%), while Zanzibar and Pemba account for the rest 2000 km^2 (0.3%). Of the total area covered by mainland Tanzania 881,300km^2 (93.5%) is the land while the remaining 61,600 km^2 is under inland lakes

Table 2.4 Physiographic regions of Tanzania

Location	*Description*	*Agro-ecological Zone*	*Area (million hectares)*
Coastal Zone	Low altitude plains (below 750m) on marine secondary and tertiary sediments	I	6
Eastern Plateaux and Mountain Blockson	Medium altitude plains (150-1,300mm) Precambrian metamorphic rocks	II & III	21.1
Southern Highlands	High altitude plateaux (1,500-2,000 m) on volcanic and Precambrian metamorphic rock.	V	6.7
Northern Rift and Volcanic Highlands	Medium altitude plains (1,000-2,300m) with volcanic and rift landforms	VI	5.8
Central Plateaux	Medium altitude plains (1,000-1,300m), on granite	IV	32.7
Rukwa-Rusha Rift	Medium altitude rift depression (800-1,200m) with lake sediment	VII	3.5
Inland Sediments	Medium altitude plain (750-1,000m) on Karoo sediments	VII	6.7
Ufipa Plateau	High altitude (1,500-2,200m) on metamorphic, sedimentary and granitic rock	V	1.8
Western Highlands	Medium to high altitude plain (1,200-1,999m) on volcanic or sedimentary rock	V	4.3

Source: World Bank, 1994

Table 2.5 Agricultural arable potential of agro-ecological zones(AEZ)

AEZ	*Arable agricultural potential*
I	Moderately suitable for arable cropping, more suitable for drought resistant crops such as cassava, sorghum and sisal.
II	Marginally suitable for arable crops, best for grazing.
III	Moderately suitable for arable cropping, more suitable for drought resistant crops such as cassava, sorghum and sisal.
IV	Highly suitable for arable cropping with good soils, and reliable and plentiful rainfall.
V	Highly suitable for arable cropping with good soils, and reliable and plentiful rainfall.
VI	Highly suitable for arable cropping with good soils, and reliable and plentiful rainfall.
VII	Highly suitable for arable agriculture with potential for large-scale mechanised agriculture.

Using the extent of the agro-ecological zones and their potential it has been assessed (World Bank, 1994) that between 13 to 16 million hectares were highly suitable for cereal (rice and maize) production. This includes an area of 3 to 4 million hectare within National Parks and Reserves suitable for cereal production, but excludes other areas which may be suitable for drought resistant crops such as sorghum. Existing land use for cereals (see following section) is around 3 million hectares. Thus from these tentative findings there is potential to increase the hectarage under cereal production using the existing technology. There will be constraints to any expansion (e.g. economic infrastructure - transport, storage, etc.), it also ignores other types of land use (grazing by pastoralists) and other socio-economic factors (e.g. land tenure). It may seem reasonable from this to conclude that there is enough land for the next 20 years at the current annual population growth rate of 2.8%. However, as discussed later this is not without major impacts of the environment which will have to be addressed by the development of better land husbandry so that sustainable land management can be realised.

Farming systems

The most important part of any agricultural system is the farmer and the way he or she manages his or her land. Before attempting improvements or changes to agricultural systems it should be a prerequisite that project planners should understand the farming systems of an area. Although this will require detailed knowledge of a project, the farming systems of Tanzania can be grouped into six main types based on the cultivation system and agro-ecological similarities, more detailed classification would be based on socio-economic and management characteristics. The six categories, described in detail in Table 2.6, are:

- coffee-banana systems

- maize and legume systems
- pastoral and agro-pastoral systems
- sorghum, millet, livestock (cotton and rice) systems
- wetland paddy and sugarcane systems
- cassava, cashewnut and coconut systems

Table 2.6 Farming systems of Tanzania

System	*Description*	*Farming*		*Share*
		Pop.	*H'old*	*(%)*
Coffee-banana	Production in this system is based on perennials. Coffee and bananas are often intercropped. Tea is grown in appropriate areas. Cereals and pulses are intercropped outside the perennials. Land is scarce under this system. There is little fallowing, and fertility is maintained with much from crop residue and manure from dairy cattle. Rainfall is high, and high-value vegetables and other crops are grown where markets are available. The system is found in the densely populated highland areas in Arusha, Kilimanjaro, Tanga, Mbeya, Ruvuma and Kagera (Zones V and VI).	3.2	584	16.6
Maize and legume	Maize and legumes, sometimes intercropped, are the common denominator of this farming system which also includes coffee, tobacco and pyrethrum as cash crops, and cassava as an additional food. Maize is grown as a cash crop and for subsistence. Most of the maize marketed crop in the country is produced under this system. Fertiliser is used in some areas, but draught power use and mechanisation are limited. Normally land is not scarce under this system, and fallowing and shifting cultivation are practised. The system is found in zones with medium to good agricultural potential, and predominates m the Western Plateaux (Zone IV) and the South-western Highlands (Zone V).	6.8	1258	35.7

Source: World Bank, 1994

* *Note: Pop - population - in millions; H'old - households in thousands*

Table 2.6 Farming systems of Tanzania (continued)

System	*Description*	*Farming*		**Share*
		Pop.	*H'old*	*(%)*
pastoral and agro-pastoral	Pastoralists graze herds of cattle, sheep and goats, travelling to take advantage of fodder and water as available. Animals and milk products are sold/traded to purchase cereals Food crops: cereals" and other foods. The agro-pastoral system is a modification of this approach in regions where rainfall and soils permit limited (and highly risky) cropping. Livestock herds are the familys main commercial activity, with incomes (and diet) enhanced by the cultivation of sorghums and millets. The mixed system has advantages for animal production as well. The clearance of bush reduces the incidence of tsetse fly (and trypanosomiasis) which improves animal health, longevity and procreativity. Crop residues from cultivated areas improve animal nutrition. However, the cultivation of marginal soils can exacerbate wind and water erosion. Fallow periods have to be very long to restore productivity. The unreliability of rainfall makes the use of fertiliser and other inputs unattractive. The deterioration of conditions for agricultural production causes migration into new, under-utilised areas of higher potential. Pastoralism is prevalent in the arid and semi-arid regions in central Tanzania (Zones 11 and 111).	2.1	374	10.6
sorghum millet and livestock (cotton and rice	Under this system cropping is the farmers' main economic activity. Conditions for crop production are marginally better than those under the agro-pastoralist system, and the need for migration and shifting cultivation is less. Land is not scarce, and fallowing is practised. While food production is still based on the drought resistant cereals (sorghum and mallet), farmers also produce cotton, oilseed and rice for the market. Livestock are important for meat and milk production, and as a source of draught power for cultivation and transport. Draught power is used for bunding (for rice, in the valley bottoms), and ridging. Animal manure helps to maintain soil fertility. This system is prevalent in the Shinyanga and Mwanza regions north of the Plateaux and Northern Highlands (Zones IV and V).	2.6	476	13.6

Table 2.6 Farming system of Tanzania (continued)

System	Description	Farming		Share (%)
		Pob	H'old	
wetland paddy and sugarcane	The system is based on the use of permanent water sources to cultivate rice and sometimes sugarcane in river valleys and alluvial plains. Smallholder technology is simple, and furrow irrigation is the predominant technique. The potential for increasing yields through intensification is great. However, additional investment in water management infrastructure and grain milling capacity will be needed to make expansion attractive to smallholders. Large scale operations, public and private, are also using irrigation to produce sugarcane and rice in these regions. The system is found in the alluvial river valleys in Zone VII.	0.5	88	2.5
cassava, cashewnut and coconut	The key subsistence crop in this system is cassava, grown in regions where maize is too risky. Conditions are also suitable for cashew and coconut cultivation, the traditional cash crops. Land is not scarce, and fallowing and shifting cultivation are practised, within limits imposed by continuous access to the cashew and coconut stands. Intensification is limited by climate and access to markets. Low prices for cashews and coconuts have caused smallholders to diversify into sesame and groundnuts. Where irrigation and markets are available, vegetables are also grown. Cashew nut production has been revitalised because of improved access to export markets and the availability of treatment for the powdery mildew disease. The system prevails in the Coast region, Eastern Lindi and Mtwara (Zone 1).	4.0	740	21.0

Source: World Bank. 1994

* Note: Pop - population - in millions; H'old - households in thousands

Land Tenure

The present land tenure situation in Tanzania reflects a mixture of customary tenure, western type tenure inherited from the colonial period, and legislation enacted at the time of villagisation in 1974, following from the Arusha declaration in 1967. However, the majority of land is communally owned and administered within the village and clan. Government control exercised through the villagisation programme had by the early nineties reverted back to local institutions. Thus the majority of Tanzania's smallholder farmers hold their land under customary tenure or deemed right of occupancy subject to continuous use, and approval by village or communal authority. Areas cultivated by smallholder farmers are typically under two hectares.

There have been recent proposals to begin titling of land as it is believed by some that this will provide security of tenure. This has been debated and the present situation in Tanzania is in a state of change: villagisation having been reversed, land held under customary tenure, demarcation of village boundaries and proposals for land titling. A Presidential Commission on Land Tenure completed its report in 1993. Following this a review on land tenure policy was completed in 1995. The main objective of the policy review was to make land tenure more responsive to the needs of both the present and the future generation. The major recommendations of the policy review were:

- The overall power of owning the land will continue to be vested in the country through the President
- There will be no freehold as before independence, but land will be subject to leases ranging from 33 to 99 years.
- Land under the ownership of households cannot be disposed of by any one person without the consent of the family i.e. the husband and spouse.
- Husband or wife can own land other than that under ownership of the family.
- All land to be demarcated and surveyed to provide how land is available for various uses
- Land will not be leased to foreigners except those investing in the country where this is in partnership with local investors.
- Villages will continue to lease land and they will be allowed to lease these to individual citizen.
- No foreigner will be allowed to lease village land.

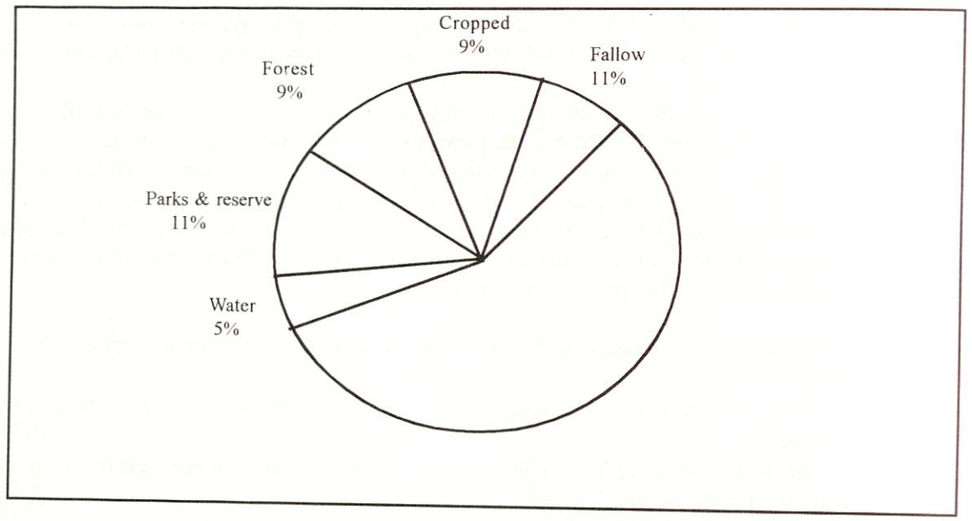
A new act on land policy and tenure was enacted by the Parliament in April 1997. However, this act the proposed bill has raised a great controversy among various groups such as the Tanzania Women Legal Association, Tanzania Women Media Group and the Ministry of Community Development. The source of this controversy is that these groups do not think that the new act caters for the needs of the women especially where women account for over 80% of the family food production in Tanzania. The law owned by family cannot be used as a collateral to obtain credit from the commercial banks.

Land use

The current land use of Tanzania is depicted in Figure 2.6. The major land use in the country, by area, is grazing (59.4 million hectares), the next largest land use is the area set aside for parks, and game and forest reserves (3.8, 7.5 and 9.4 million hectares respectively) - this is the largest portion (20%) of any Sub-Saharan country devoted to reserves. Of the remainder 9.1 million hectares are used for arable production of which 3.4 million hectares was actually cropped, the rest being left to fallow, grazed or for perennial crops (coffee, tea, etc.). The balance of the surface area was under inland lakes. The use of land for arable agriculture has been on the increase, today it is estimated that 5.1 million hectares is actually planted annually. The actual utilisation of land varies from region to region, in some there is still a

large amount of unused or under utilised land (Morogoro, Lindi, Ruvuma, Iringa, Mbeya, Tabora, Rukwa, Kigoma and Mwanza), while others have very little or no under utilised land (Dodoma, Kilimanjaro, Dar es Salaam and Singida - all high potential zones). This clearly indicates the need for different agricultural development strategies for different parts of the country, and for different types of project interventions.

Figure 2.6 Land use in mainland Tanzania in 1988/89



Source: World Bank, 1994

Cereals are the major food crops in Tanzania. About 58% of the total 3.4 ha cultivated, is put under cereals. The major cereals include maize, sorghum/millet rice, wheat. Maize is the major staple crop; Of the total hectarage devoted to cereals, 58% is planted with maize. The share of the other cereals were as follows: sorghum 22%, millet 7%, rice 11% and wheat 2%.

AGRICULTURE AND THE ENVIRONMENT

Agricultural land use has major impacts on the biophysical environment. Some of these can be beneficial but others can be harmful where the land use is inappropriate or poorly managed. Chapter 9 on environmental assessment explores in detail these impacts while this section highlights some of the major issues facing Tanzania at the present time and which should be addressed in agricultural project planing. In fact some projects may have the specific objective of tackling some of these issues.

Soil erosion and soil fertility

One of the most significant environmental impacts in Tanzania is the problem of soil erosion. Soil erosion is a naturally occurring process but under the impact of agriculture this can be accelerated leading to high rates of erosion. This has occurred where fallow periods have been shortened and land used more intensely, from over grazing, or where more marginal (steeper slopes, semi-arid climates) areas of land have been cleared for arable agriculture. Soil erosion will lead to loss of valuable top soil and loss of fertility which can mean lower crop yields. Other effects are increased surface runoff of water, siltation of rivers and reservoirs/lakes, loss in water quality, increase in flooding - these are termed off-site or down stream

effects. Soil erosion can be reduced or prevented by the use of better cultivation techniques and land husbandry (mulching, minimum tillage, agroforestry etc.), or the development of more appropriate land use to the existing environmental conditions.

Soil fertility can decline for other reasons. The continuous cropping of land will remove soil nutrients and, unless these are replaced, crop yields will decline. In parts of the country fallow periods are shortening, allowing less time for some fertility to be built up in the soil. Thus the soil is effectively being mined of nutrients, in the long term this is not sustainable and will result in unproductive land which will be abandoned. Better land husbandry (crop rotations, mulching, organic matter management) can combat losses in fertility. However, if fertility is to be maintained in areas of high land use intensity, fertilisers - organic or inorganic - will eventually be required. Farmers perceptions on the problems of soil erosion and fertility show that they are well aware of the problem, Table 2.7 summarises their views. They see the major reason for fertility decline as shortening fallows, with soil erosion as a contributing factor.

Table 2.7 Farmers views on soil erosion and fertility decline over the last ten years

Farmers views on soil fertility						
System	*Zone*	*Decline a lot*	*Decline a little*	*Same*	*Better*	*Don't know*
Cashew/Cassava	S. Coast	47%	39%	10%	3%	1%
Maize,coffee, cattle	S. Highlands	32%	54%	4%	8%	2%
Tobacco, rice, maize	W. Plateau	33%	48%	12%	3%	3%
Cotton, rice	Central Semi-Arid	11%	39%	31%	8%	11%
Agro-pastoralist	Agro-pastoralist,semi-arid	19%	19%	43%	20%	1%
Coffee, banana, dairy	N. Highlands	21%	34%	27%	17%	1%
Farmers views on reason for decline in soild fertility						
System	*Zone*	*Lack of fallow*	*Soil erosion*	*Over-grazing*	*other*	*Don't*
Cashew/Cassava	S. Coast	70%		1%	7%	22%
Maize, coffee, cattle	S. Highlands	83%	12%	1%	1%	3%
Tobacco, rice,maize	W. Plateau	86%	3%	3%	5%	3%
Cotton, rice	Central Semi-Arid	75%	6%	5%	4%	10%
Agro-pastoralist	Agro-pastoralist, semi-arid	55%	11%	10%	13%	11%
Coffee, banana,dairy	N. Highlands	79%	8%	2%	7%	4%

Source: ADIS in World Bank 1994)

Deforestation and encroachment

Earlier the major types of land use were discussed. Around 20% of the country's land is used for National Parks, Game and Forest Reserves. These contain areas which are suitable for both arable agriculture and livestock. Encroachment by farmers for both agricultural and other types of use (collection of fuelwood, building poles or timber) is a major problem in some areas. Particularly where pressure on

existing land is high and all suitable land is used for agriculture. These issues are being addressed by the government through the better management of these parks and reserves, the creation of buffer zones around them, and to provide increased benefits from parks to local communities (see economic evaluation section in chapter 9). Efforts are also being made to control the exploitation of the forests for timber production.

Water

Water shortages are a common feature of many areas of Tanzania. Agricultural activities are dependent upon water, most of the agricultural systems are rainfed but the potential development for irrigation agriculture is large. It is estimated that 900,000 hectares are potentially suitable for irrigation, compared to an existing area of 25,000 for major schemes and 150,000 hectares for informal small holder schemes (World Bank, 1994). Any major development of irrigated agriculture would thus have a major impact on water availability in the country. Water could be drawn from surface sources or ground water. These sources may not be sufficient if all other uses for water are to be met. The issue of water will therefore need to be carefully addressed and assessed in the development of any major agricultural projects.

AGRICULTURAL SERVICES

Research

Agricultural research is key to the development of improved systems and technologies for smallholder and large farmers alike. In the last ten years agricultural research has faced considerable problems of lack of funding and fragmentation of efforts and lack of interaction with the extension system. This is now being addressed by a major project to support and develop the research system in Tanzania. A review of this project in 1993 recommended the following strategy for the system (World Bank, 1994):

- priorities for research (see Box 2.12).
- guidelines for better financial management
- rationalisation of the research network
- rehabilitation of infrastructure
- new organisational structure
- human resource development and better terms of service.

Box 2.12 Research Priorities

- Cash crop research - coffees, cotton, rice and tea
- Root crops and tubers, legumes, vegetables, and cereals - maize - country's main food crops.
- Crops for agro-industries - sugar, cashew, sisal etc. - with private sector finance.
- Livestock research to focus on ruminant meat and milk production.
- Special programmes in soil conservation and agroforestry, and farming systems unit.

Extension

This is one of the key functions of MOA. There are about 7,500 staff in MOA of which about 80% are involved with extension. Extension was first a centralised function of MOA, but then this was regionalised in 1972 only to be centralised again in 1983. The extension service has similarly suffered from low morale and limited resources and funding for the last ten years. These problems have been addressed through the National Agriculture and Livestock Extension Rehabilitation Project, and the capacity of the service has improved. However, problems still exist, among which are:

- poor linkages between research and extension
- lack of women in higher levels of extension service
- lack of management supervision
- poor linkages between general and specialised extension staff
- lack of resources and funding

MOA and the Project are continuing to address these areas.

Agricultural inputs

Seeds

Prior to economic reform most of the seed supply in Tanzania was centrally imported and distributed by Crop Boards, Co-operative Unions and some parastatal organisations such as Tanzania Seed Company (TANSEED). Since reform, a few private traders have entered the market, e.g. Cargill is now providing quality seed. Farmers are increasing their use of seed from the private sector, even though it is more expensive as they view the quality as high. In the 1994/95 season Cargill sold 140,000 tons - 58% of the total market, the remainder was provided by TANSEED. In view of the relative easy entry of Cargill into the market and the present scarcity of certified seeds (only about 3% of demand is currently met), there is a potential for new entrants into the market.

Fertiliser

Before the liberalisation of fertiliser trade in 1990 the Tanzania Fertiliser Company (TFC) was the sole importer of fertiliser. In 1991, 146,000 tons of various kinds of fertiliser were used. In 1989/90, 68% of the total fertiliser imported were used in the Southern Regions (Mbeya, Iringa, Ruvuma and Rukwa) mainly for tobacco and maize. Fertiliser was distributed by co-operative unions and the crop boards. It was also supplied on credit and deducted from the price paid to the farmer's crop after the sale of the crop.

After the liberalisation of fertiliser trade, several private traders entered the market. In 1992 the Tanzania Farmers Association (TFA) and one private trader imported fertiliser (20,000 tons and 45,000 respectively). Total supply by TFC, TFA and the other private trader were 166,999 tons but only 112,202 tons was sold. By 1993/94 nine institutions and traders were involved and they imported a total of 235,273 tons of which only 95,000 tons was sold. This suggests overstocking of fertiliser, and low demand after the subsidies were gradually removed. In 1995 one bag of 50 kg was Tsh 15,000 compared to the price in 1993 of Tsh 4500. Data from the Agriculture Sample Survey of Tanzania has shown a drop in agrochemical use by farmers. Figures for the last census were: 14% farmers used chemical fertilisers, 24% used farm manure, 27% used improved seeds, and 12% used insecticides and/or herbicides.

The problems surrounding the use of fertilisers (and other agrochemicals) can thus be summarised as:

- prices are too high for many farmers to afford after removal of subsidies
- private traders have not entered this market because of its low profitability untimely distribution of inputs
- farmers have less access to credit for farm inputs.
- poor infrastructure to supply inputs to rural areas.

Farm cultivation and mechanisation

It is estimated that about 70% of Tanzania's arable lands are cultivated by hand using the hoe as the major tool to till the land. While 20% of the land is cultivated by oxen and 10% is cultivated by tractor. Most of ox ploughing is concentrated in the Southern Highlands, Mwanza and Shinyanga regions. Nearly over one million oxen, 250,000 donkeys and 300,000 ploughs are used for animal traction. The percentage switching to ox-plough is gradually increasing - it doubled from 4% in 1970 to 8% in 1995. Tractor cultivation is concentrated in the Northern Regions - Arusha and Kilimanjaro.

The increasing use of ox-plough is a positive factor in increasing agricultural productivity. Its relative simplicity and low price make it is affordable to medium size farmers (less than 10 ha). Oxen can also be hired by smaller farmers who cannot afford to maintain their own. This is cheaper than hiring a tractor. In villages in Hanang district (Arusha Region), the hire price for an ox-plough per ha was Tanzania Shilling 3000-4000 compared to an average of 10,000-12,000 for hiring a tractor. Tractor owners are also reluctant to plough a small area. All the farm machinery is now privately traded.

Rural finance and credit

An important factor in increasing agricultural productivity is availability of finance and credit to purchase inputs such as seeds, fertilisers, and farm equipment. Before the economic reforms the major sources of farm credit were the state owned commercial banks - National Bank of Commerce (NBC) and Co-operative and Rural Development Bank (CRDB). These banks lent to the Co-operative Unions and Crop Boards to purchase seasonal inputs such as fertiliser and buy crops from the farmers. Problems arose when overhead costs of the Co-operative Unions and Crop Boards increased. Failure to purchase crops was compounded by poor management and sometimes embezzlement of finances. Subsidies became a heavy burden to the government and farmers lost trust in these institutions, and difficulties in obtaining working capital increased.

In 1991 the government decided to allow new financial and quasi-financial institutions as part of its liberalisation programme. Public banks were to be re-structured, see example in Box 2.13. The Co-operative Act was amended to make co-operatives more voluntary and important that they had to be viable. Commercial banks were to operate on a purely commercial basis. This has meant that the majority of small farmers - 90% of the total farming population - were largely excluded from access to credit from commercial banks as they do not have the collateral these banks demand.

Box 2.13 Re-structuring of public banks: Case of the National Bank of Commerce

In July 1997, the National Bank of Commerce (NBC) was broken into three separate banks. These are a trading bank, regional bank and micro-finance. The purpose of this is to make the new banks more responsive to the diverse needs of farmers and non farming groups. However in 1999 only two banks were maintened- microfinance and NBC. On 24th July, 1999, the government of Tanzania signed a Management Contract with Development Alternatives Inc. (DAI) under which DAI would provide management services to NMB

Up to 2000 NBC was under pressure and financial stress. Most of the Bank's short and long term loans have been classified as "non-performing" assets. By April 1997, the Bank's outstanding loans stood at Tsh 120 billion. Only 35 billion of these have been paid, and there is little evidence that the remaining loans will be repaid. It is therefore expected that the public sector will have to absorb a large portion of this debt. To do otherwise would risk and loss of public confidence in the banking system

At the end of 1999, NBC was privitized in which Amalgated Banks of South Africa (ABSA) acquired 75% of the total shares. The NBC (1997) was changed to NBC only

Thus a major constraint to agricultural development is the lack of an appropriate institutional set-up to supply credit to the poor smallholders farmers. The Tanzanian small farmer does not have land as collateral. The land title is not owned by an individual farmer but by the village. Farmers do not have good credit histories and individual farmers are unknown to the financial institutions. Farmers do not usually have equity capital to match the loan equity. In short, the small farmer (owning less than 1ha land) does not meet the conditions for credit i.e. the three Cs (capital, credit worthiness and collateral).

The 1991 Co-operative Act and the 1991 Financial Act provided for the formation of Co-operative Banks to address this constraint. These banks are designed to be close to the farmer. Operational costs would be lower than those by the commercial banks. These could lend to the small farmers at a small interest rate (10%). Setting up of regional Co-operative Banks is one of the strategies used by Tanzania. An example is the Kilimanjaro Cooperative Bank (KCB). It is an experiment in the rural finance. It is regional in character and has a local membership, see Box 2.14.

Box 2.14 Kilimanjaro Co-operative Bank

Kilimanjaro Co-operatives (KCB) started operations in August 1996. Its members are mostly from Savings and Credit Co-operative Societies (SACCO) and Primary Co-op Societies.

In April, 1996, it had a share capital of Tsh 350 million. The minimum capital share for licensing a bank is Tsh 100 million. An expatriate General Manager was employed to start the bank. He is a consultant from RABO Bank of Netherlands. RABO is one of the largest banks in the world and operates on the same principles of Co-operatives.

The KCB will provide loans to Savings and Credit Co-operatives Societies, and Primary Societies. These institutions are responsible for loan recovery. The individual farmer does not have direct access to the bank to obtain the loan. The bank deals with his societies.

The Bank has employed fresh graduates from local institutions, to help build new attitudes in the new working environment. The Bank provide on job training for good accounting records and management of banks assets.

Total number of farmers (mainly coffee growers) in the region is about 65,000. There are 50 co-operative societies in Moshi rural district and 14 Co-operative Societies in Mwanga District. This makes a total of 64 Co-operative Societies. 33% of total co-operatives are agricultural societies.

The bank strategy is to mobilise individuals to bank with KCB. There is also CRDB next door. This makes competition very stiff. Sustainability of KCB will depend on aggressive marketing. Competition also comes from the recently formed Mwanga Co-operative Bank that was established in September, 2000 Kagera region has also emulated the KCB by May, 2001 itwas in its final stage to be established as Kagera Farmers Co-operative Bank (KFCB) with a paid capital of Tshs. 229.5 million moe than the minimum of TShs. 100 million required to operate as a bank.

SUMMARY

The chapter has highlighted the key issues facing the agricultural sector. Agricultural sector accounts for over half of GDP; it accounts for 90% of employment and 75% of export earnings. The sector is dominated by smallholders who account for over 90% of total food production. Most of these farmers are poor and family survival is accorded high priority in the allocation of family resources. Effects of structural adjustment on the agricultural sector have had mixed outcomes. On the one hand, market liberalisation has had positive outcomes in the sense of increasing farmer incentives resulting from competitive cereal buyers. Similar cases are also seen in coffee marketing where a number of private traders are increasing and paying the farmer immediately on delivery of the crop. On the other hand, though the distribution of inputs such as fertiliser and seeds has improved with entry of private distributors, the removal of subsidies has increased prices. The smallholder farmers now find it difficult to purchase adequate fertiliser inputs because of lack of credit facilities.

The role of government is now reduced to the traditional functions of providing "public goods" to make the environment conducive to private initiative. Even then, about 90% of the farmers will continue to be poverty stricken. Agricultural intervention must focus on these poor farmers. Government policies and strategies have accorded food self sufficiency a top priority. The issue is now what kind of intervention and strategies that are likely to alleviate rural poverty, and which will be in harmony with the environment? This calls for examination of past experiences, the shortcoming of traditional project concept and actions necessary for improvements to overcome some of the past shortcomings.

EXERCISES AND QUESTIONS

Agricultural policy

One of the key factors in agricultural development is the direction to which agriculture should move. This is determined by government policy, answer the following questions:

- Compare and contrast the Tanzania policy initiatives of 1983 and those of 1996.
- Give at least six positive and four negative aspects that you have learned from Tanzania's agricultural development.
- What do you think contributed to the positive and negative factors?
- How could you improve on the negative aspects? Give at least four ways.

Effects of economic reforms

Trade and price liberalisation strategies were adopted by Tanzania since 1984 to promote agricultural and non agricultural sectors. Describe the effects of such reforms on agriculture by copying and completing the table given below:

Effects of trade liberalisation

Trade liberalisation measure	Groups positively affected	Group negatively affected	How affected (Indicators)
1.			
2.			
3.			
4			
5.			

Effects of price liberalisation

Price liberalisation measure	Groups positively affected	Groups negatively affected	How affected (Indicators)
1.			
2.			
3.			
4.			
5.			

Monetary instruments

Several different monetary instruments have been used by the Bank of Tanzania as part of structural adjustment measures. Copy and use the table below to show how they theoretically affect agricultural sector.

Effects of monetary instruments

Instrument	*Affected group*	*How*	*Remarks*
Discount Rate			
Interest Rate			
Open Market Operations			
Minimum Reserve Ratio			

AGRICULTURAL PROJECTS

Keywords and concepts:

What is a project; Basis of projects; Types and scale of projects; Projects in Tanzania; Sources of funding; Information for projects.

INTRODUCTION

This handbook is concerned with the planning of agricultural projects It is therefore important to have a clear understanding about what is meant by an agricultural project, and the differences between this and a programme for agricultural development. This chapter explores the definition of an agricultural project, different types of agricultural project, the scale of projects and the level at which they operate. Later chapters discuss in more detail how new projects are identified, designed and analysed.

WHAT IS A PROJECT?

Projects come in many forms, shapes and sizes. A common feature of all types of projects is that they have an objective, or objectives, which is to be achieved over a set period of time. This may be an individual objective. We all have personal projects, for instance to pass a diploma or to purchase a car. Households or villages may have projects: for instance, a household may have decided to plant a new crop or expand the area of an existing one; or a village may have decided to improve their water supply by constructing a new hand pump. Formal agencies and institutions will develop projects to help achieve their goals, for example the MOA may develop a training project to increase the capacity of its staff to undertake research and extension; or to develop a new irrigation scheme. These projects may be part or component of an overall programme - a series of projects and activities - to achieve a wider sectoral goal such as increased food production and poverty alleviation. In describing a project there are four basic features to consider:

- Goal and objectives
- Time
- Scale
- Type

By considering these features (summarised in Box 3.1) it is possible to have a clear understanding of what a project is, and is not.

Box 3.1 Features of projects

- *Objectives (goal, purpose and outputs)*

  A project has a number of objectives (purpose and outputs) which are to be achieved during its implementation, by achieving these a project will contribute to achieving an overall higher objective - the project goal.

- *Time*

  A project will have a finite length during which it should achieve its objectives, the benefits of which should last and be sustained after completion of the project.

- *Scale*

  Projects operate at different scales or levels, ranging from the very local - a farm and village - to the regional and national level.

- *Type*

Projects can be characterised by what they are expected to produce, or what focus the project has:

- infrastructure and capital development
- poverty alleviation
- training
- capacity building and institutional strengthening
- increasing agricultural production
- conservation and environmental protection.

Goal and objectives

A project usually has a number of outputs which it wants to achieve by its implementation and through which it will achieve its purpose. By reaching these it will help make progress towards achieving some overall goal or aim. For instance, if I have a personal project of buying a new truck (the project purpose), my expected project outputs may be twofold: to compare a range of different models based on price and performance; and to obtain the money to buy the vehicle. The overall personal goal of this project may be to establish a marketing business of horticultural crops. To achieve this goal I would need to have a number of other projects. Similarly the government may have a policy and overall goal on poverty alleviation to achieve this it has developed a plan or programme to expand agricultural production and markets. To achieve this it will have developed a programme with a series of projects with a focus on: rural credit and banking reform; training and capacity building of MOA research and extension staff; soil conservation and land husbandry; rural road and improved transport links; reform of land tenure etc. All of these would

have specific outputs which the project should achieve, and by their achievement these would make progress to achieving the project purpose, and contributing to the overall project goal.

Time

Every project will have a finite period of time, with a beginning and an end, during which they should achieve their objectives. While projects have a certain time period the effects and results of a project can last longer and in most cases this is expected as a result of a project i.e. the projects results (or benefits) are sustained after the project is over. Returning to our example after I have purchased my new truck, I would hope that this would keep running for several years under an operational phase or project, before I developed a new personal project to replace it and buy a new one. Similarly, projects undertaken by MOA are expected to produce benefits after they end which can last and be sustained. One of the main reasons for this handbook is to aid in the design of projects which achieve their objectives and produce sustainable benefits.

Projects undertaken by government and donor assistance will frequently have a length of three to five years, they may also have two or more phases. Once one period is finished and depending upon its outcome a second phase may be undertaken. Occasionally some projects may have no fixed period - particularly with personal projects - it may take me some time to raise the money for my new truck and therefore I may not have been able to set a specific time for my project though I would want to compete it sooner rather than later.

Scale

Projects can operate, or be implemented, at a range of scales. This may be very local, for instance the household may want to increase their planting of maize will be implementing their project on their own farm, this may affect others in the village or local town who provide extra labour or agricultural inputs. Other projects could operate across the whole village or community, e.g. provision of a new water pump, or the adoption of soil conservation measures on all the village lands and farms. Government or private sector projects can again operate at different scales or levels. Projects from MOA can be focused on particular regions or districts, or at the national level. Projects may also operate at a range of scales, for instance a project may aim to develop small irrigation schemes in the country - this would operate both at the national level and also at the local level with villages and communities where schemes are actually developed. As well as difference in geographic scale, projects may also differ in their sectoral focus. Some projects may operate across different sectors e.g. agriculture, forestry, wildlife, finance, and transport. Others are solely focused on one sector.

Type

Projects can be characterised by what output they are expected to give rise to, or what focus the project has. This will be related to the scale of the project and the kind of enterprise the project is tackling. Some projects will focus on infrastructure and capital development, others on training, capacity building and institutional strengthening, and others on increasing agricultural production through improved technologies or better marketing. Common types of agricultural project are listed below:

- estate and commercial projects
- agri-business and agri-processing
- livestock

- irrigation
- research
- extension
- conservation and land husbandry
- rural credit and finance
- marketing
- small farm development
- smallholder crop production

Some agricultural projects will focus solely on one of these, while others may include components which relate to more than one of these types.

BASIS OF PROJECTS

A distinction can be made between demand, need and resource based projects. The characteristics of these different types of projects are discussed in the following sections.

Demand based projects

A demand based project is one which satisfies a particular demand for an agricultural project. In the agricultural sector demand for the product is usually reflected in terms of:

- Consumer demand for agricultural products.
- Export opportunities
- Demand for agricultural inputs into agro-industries
- Subsistence consumption
- Resource based projects

Resource based identification is important in the agricultural sector. Many agricultural projects are identified because of the availability resources and land that is suitable for production of particular crop. Surveys of land capability or suitability may lead to the identification of potential new areas of economic activity.

Agro-industrial projects involve the matching of raw material production with processing capacity and so they may involve more than one project or a project having two or more components. Definition of demand based or resource based identification can sometimes be confusing in this context because the agricultural component may be "demand based" (industrial demand for raw materials), while the industrial component may be "resource based" (the existence of local production or suitable land). A common situation is one where there is a surplus of raw material currently available but where this is not sufficient for the minimum scale of processing plant. The initial surplus leads to resource based identification of the processing project which then may lead to potential demand based identification of the need for further raw material production to ensure full capacity operation of the processing facility.

Need based projects

Need based projects are an important element in the agricultural sector, particularly in relation to better conservation practices and improvement in the production of subsistence crops and/or drought resistant crops. Sometimes agricultural development may be promoted in relatively poor areas as a means of increasing income earning opportunities and poverty alleviation. Promotion of projects oriented towards particular

target groups (e.g. women or under-privileged ethnic minorities) can also be need based, although such projects are usually expected to be self sustaining.

AGRICULTURAL PROJECTS IN TANZANIA

Since 1970s, the Tanzanian approach to agricultural development was generally supply led. It was influenced by the global development paradigm. Growth with equity was the globally accepted development philosophy. This was due to the failure of the "trickle down effect" of the market driven economic growth of the 1960s. The focus was on poverty in the rural areas, the provision of needs and reduction of regional disparities. This approach focused on rural development and generally targeted small farmers. Various crop development programmes were undertaken. The most notable successful projects were small-holder tea development. Currently, about half of the total area under tea is under small-farmer holdings. The following sections look at the scale and type of projects undertaken in Tanzania.

Scale

Local/community projects

These are projects which originate from the community organisations or communities themselves. These may include Savings and Credit Co-operatives (SACCO). They are managed by the members themselves and are registered under the Co-op Society's Act. These may cater across the local community, e.g. Village, Ward or Division. They may be assisted by voluntary agencies like the Churches, local or foreign NGOs. Examples include the Kilimanjaro Savings and Credit Co-operative Societies. Some key issues and design features of community based projects are given in Box 3.2.

District level projects

These are usually small and restricted to the district level. The key leader of agricultural projects is usually the District Agricultural and Livestock Development Officer (DALDO). Most district projects tend to be focused on poverty alleviation and targeted to the most vulnerable groups. The DALDO's key role is to co-ordinate and to provide technical expertise to the project farmers. Donor support, if any, is usually limited to a single donor or international NGO. Farmers participate in project identification and the planner's role is to facilitate the process. Usually the project is simple in design, enjoys a reasonable degree of autonomy from central government, though it is usually built into the existing political and administrative framework for convenience of monitoring and evaluation purposes. Community development officers are key animators to mobilise resources and community participation.

Box 3.2 Design features of community based projects

- Is it simple?
- Is it small?
- Does it increase local employment, income to women and rural poor?
- Is it labour intensive?
- Is human labour available locally?
- Does the project entail recurrent financing after the project life?
- How does the project plan to finance recurrent expenditure after the project life?
- Do the project activities, output respond to the priority of local problems?
- Does the project originate from the community?
- Is the project in line with national/sectoral development objectives?
- Does the proposed project budget exceed the programme funding? If so, how are the additional funds being financed?
- Does the project avoid administrative complexities?
- What is appropriate organisational set up?
- Is organisational structure strong?

Regional projects

These projects cover more than one district. They may be large and may also be inter-district in scope. The Regional Agricultural and Livestock Development Officer (RALDO) is the key leader/facilitator of agricultural projects. At the regional level there tends to be only a limited role for local project beneficiaries. A typical example of a regional project is the recent Mara Development Project. This project was a farmer initiative project supported by International Fund for Agricultural Development (IFAD). The region comprised three agro-ecological zones - Lakeshore, Midlands and Tarime highlands. Major problems were identified by farmers - food security, credit, drought, low crop yields and animal diseases - which the project is addressing (see Box 4.3).

The objective of regional projects is to set in motion the development process so that the target groups (most disadvantaged) in the regions are reached. Development projects may be multi-sectoral projects (agriculture, agroforestry, appropriate technology and skills training). There may be many implementing agencies. For example, in the Mara Development project, NGOs provided support for agriculture and rural development included the Catholic Diocese of Musoma, Kilimo Sasakawa Global 2000, Tarime Rural Development Trust Fund (TARDTF), Austrian NGO (Support agroforestry), the Anglican Mogabiri Extension Centre (agronomy) and the district local governments.

National/sectoral projects

While regional and district projects are restricted to the specific administrative and/or geographic regions, there are national projects which may cut across one or more geographical regions. These are usually large in size and may be complex in design. These projects are usually under the MOA. An example is the National Agricultural and Livestock Extension Rehabilitation Programme (NARLEP). These programmes cover many regions and their administration is usually undertaken at the sectoral ministry. There often tends to be little or no community participation in both identification and implementation design. There may be one major donor or multilateral donor support.

PROJECT FUNDING

The implementation of a project will almost always require some additional finance to purchase inputs and services. This will be in addition to other human and institutional resources the project needs, although the expansion of these under a project will frequently require additional funding. For agricultural projects in Tanzania there are five main sources of finance for projects, these are:

- Government recurrent national budget
- Multi-lateral and bilateral donor grants
- Multi-lateral and bilateral loans
- Beneficiary contributions
- Cost recovery and charges

Some projects will be reliant upon only one of these sources but many projects will rely on several of these for project finance. Brief summaries of these different sources are given below.

National budget

The principal source of funding for many agricultural projects - especially for those of a "public goods nature" - will be from government revenue. While this will fund he every day recurrent activities of government agencies, it can also be used to fund specific projects. The recent, and present, state of the Tanzanian Government finances has reduced the amount of money available for agricultural projects resulting in greater reliance on grants and loans from donors and multi-lateral organisations.

Grants

As part of many developed countries' aid programmes, grants are given to developing countries such as Tanzania for the specific implementation of a project. Indeed this handbook is the result of grant aid from the UK DFID to support a collaborative capacity building project between DPPC and IDM. Grants are usually made to supplement national funds and will often only be provided for a two to three year period and to fund additional project costs and not normal or recurrent expenditure. Sizes of grants vary considerably and some can be quite large, up to several million US dollars. Generally grants for small projects are not often a feature of donor grants, except where this is an actual project to set up a facility to make small grants to NGOs, community groups or villages for development projects. Grants may also be made by international NGOs, foundations and churches for project activities, and these are often targeted to Tanzanian NGOs and community groups.

A common feature of donor grants is that the recipient will have to follow a procedure of the donor to develop and submit a proposal and the project will have to fall within the criteria that the donor has established on their own, or in consultation with the Government of Tanzania. Thus there will be some degree of conditionality on the granting of funds for a project, and certain donors will only fund certain types of project. A number of the processes, e.g. log frames, required by donors are covered in subsequent parts of this handbook.

Loans

Projects can be funded under loans. These can be of several types: straightforward commercial bank loans or credit facilities to a small farm for a project on his or her farm to develop a crop; loans to a commercial

organisation to develop a plantation development; or, to the government of Tanzania by a development or commercial bank. Loans to the government by development banks are perhaps the most common for support of agricultural projects. These would include loans from the World Bank or the African Development Bank. Often these loans are given on favourable terms to less developed countries like Tanzania. These terms include reduced interest rates and long terms to repay the loan, and are often called soft loans as opposed to hard loans from commercial banks which are at international market interest rates. Projects funded under loans from the development banks tend to be large - up to tens of millions of dollars - and will fund major projects such as the National Agricultural and Livestock Extension Rehabilitation Programme.

Beneficiary contributions

An important element of project funding is from the project beneficiaries, this may vary from a small proportion of the cost of a project to a substantial portion. These contributions can be in actual cash or in kind support - labour, land, etc. Beneficiaries contributions are likely to be most significant and beneficial where they have participated in the preparation and design of projects. If farmers have helped identify a problem and solutions to it through a project intervention, they will have a commitment to achieving the objectives of the project and may be more willing to make contributions to project activities to achieve these. However, other projects in the past have tended to assume in kind contributions from project beneficiaries - where they haven't participated in the project. These have not been forthcoming, or at worst only from forceful persuasion. The participation of beneficiaries in projects is discussed in greater detail in later chapters, particularly 4 and 7.

Cost recovery

Projects may also attempt to obtain funding from the recovery of costs incurred by the project or by charging for services provided by the project. An example would be charging for water on an irrigation project, or for the use of tractors for cultivation. Cost recovery will depend upon the ability and willingness of users to pay. If the users are resource poor farmers this can be problematic, particularly if the services provided are not what the farmer wants!

INFORMATION

Project requirements

As will be seen in more detail throughout this handbook information and data will be needed at various stages in the planning of an agricultural project. It will be needed in particular during the following stages:

- Identification (Chapter 6)
- Design (Chapter 7)
- Assessment and appraisal (Chapters 8, 9 and 12)
- Monitoring (Chapter 11)
- Evaluation (Chapter 11)

This will be true for whatever approach to project planning is followed. In most of the rural areas of Tanzania information and data is limited, not available or inaccessible. Information and data at national level is often aggregated so it does not show critical aspects needed at the project level. For example this makes the task of forecasting output and prices a difficult one. Where administered prices were used (past government prices), it was easier to predict prices as these were set and were fixed over several years.

Under market system, prices fluctuate and it is not very easy to predict future prices. However, information and data is still required for good project planning and the next section looks at possible sources of data in Tanzania.

Sources

The first task at the early stage of project preparation in planning is to gather information about the project area and about the farmers in the target groups. Once the project has been identified, much of the information will have already been available, at least on a visual impression if not recorded. Some information might have already been recorded, other information can be obtained from secondary sources: government reports; resource surveys; old project documentation; consultant reports etc. Locating this information can be a problem as it may be scattered across different offices, various libraries, donors, or overseas. Recently an information resource centre, the Tanzania Resource Information Centre (TRIC) has been opened at the University of Dar es Salaam which should prove a useful source of information on the natural resources of the country.

If no or little information is available it may mean information must be sought from the area. In most cases a number of approaches to collecting information that can be used include: Participatory Rural Appraisal (PRA), Rapid Rural Appraisal (RRA) and surveys. PRA and RRA are usually the quicker ways of getting information - formal survey results may take up to nine months and by the time the results are received, they may not be relevant for decision making.

A cautionary note should be added on the use of PRA. The term participatory in PRA implies the active participation of farmers and/or communities in the identification, design and implementation of a project. If this is not the case then an RRA, using some of the participatory methods, may be the best terminology to use. However, as discussed in chapters 4 and 7 the active participation of farmers in projects is seen to be desirable to address real problems and to make the benefits of project interventions sustainable.

Information which is useful for project planning purposes, and which can be obtained from both secondary and primary sources includes:

- Land area according to classification of qualities;
- Labour force by family and other non family;
- Land use pattern and enterprises in each area;
- Input-output relations of the enterprises grown;
- Sales of enterprises and farm income levels in the target group;
- Finance sources - family and credit;
- Water availability if irrigation used;
- Physical conditions including climatic conditions - amount of rainfall, reliability, seasonality.

In undertaking data collection, the need for relevance, timeliness, accuracy, reliability, and least cost must be taken into account.

SUMMARY

This chapter has looked at what is meant by the term project and the range of different types of agricultural projects, the funding sources for these and the information that projects require. It is important to note that projects can vary immensely in size, scope and scale. Some projects may be limited to the efforts of one or

two farmers, or a project may attempt to benefit the whole of agricultural development in Tanzania. Projects may be supported solely by the project beneficiary or may be the subject of a multi million dollar loan from international financial institutions like the World Bank.

However, whatever the size of a project they all have in common the key characteristics of having an objective or objectives which the project will attempt to achieve over a finite period of time. To make any decision information must be an integral part of project identification, design , appraisal and implementation. The focus of most agricultural interventions in Tanzania at the present time are likely to be on poverty alleviation and rural development. Participation of project beneficiaries will be a critical factor in project development. The question is how to achieve such participation in a diverse and complex social and economic set-up which is Tanzania today. This subject is discussed in the next chapter.

4. PARTICIPATION AND PROJECTS

Keywords and concepts:

Why is participation necessary? What is participation? Participation vs consultation; How to achieve participation?

INTRODUCTION

It is implicit from the previous chapters that the ultimate aim of most agricultural interventions and projects in Tanzania should be to improve the quality of life of rural communities and farmers. Yet, the end beneficiaries or users, have rarely features in traditional process in planning and developing projects. A key element in agricultural development and planning is now seen to be the active participation by farmers and their communities in this process. This chapter looks at the reasons for this, how to achieve participation, its institutional implications, and how these relate to agricultural project planning. In subsequent chapters it is explained how participatory methods can be incorporated into the project cycle (chapter 5).

PARTICIPATION

Why is participation necessary?

In recent years, there have been an increasing number of comparative studies of development projects that show participation is one of the critical components of success. It has been associated with increased mobilisation of stakeholder ownership of policies and projects; greater efficiency, understanding and social cohesion; more cost-effective services; greater transparency and accountability; increased empowering of the poor and disadvantaged; and strengthened capacity of people to learn and act.

Until very recently, the traditional project cycle focused on technical and physical, financial and economic analysis. It is now generally being admitted that one of the contributing factors to poor project performance in the past has been the lack of participation of the beneficiaries. The typical project cycle comprising of identification, preparation, appraisal, implementation and evaluation was in the past largely led by economists with some assistance and input from engineers, scientists and agronomists. Objectives were generally perceptions of the appraisers. Very often objectives were ill defined and were stated vaguely like "increased food production". The objective was not seen as an end to enable the poor control more of what they want, but rather by what technicians perceived they wanted and needed. Plans were formulated to implement projects and were carried out in a way professionals thought about the rural people. Such programmes were designed as "spread and take up", but rarely did benefits spread to the rural population.

This has resulted in an increasing consensus at both national and donor levels that involvement of the beneficiaries in the project design is of crucial importance for sustainability of projects. Putting People First (Cernea, 1985) and Putting The Last First (Chambers, 1992) are examples of this current thinking and recognition of community participation. This had also been reflected in the development of agricultural research towards a farming systems and farmer participatory research approach - see Farmer Participatory Research (Farrington and Martin, 1988), Farming Systems Research (Collinson, 1987) and On Farm Client Oriented Research (OFCOR) (Merril-Sands, 1986). These all reflect a shift from the traditional blue print approach (see chapter 5) to a dialogue between the beneficiaries and the donors or government. A summary of some of the potential benefits from increased participation are given in Box 4.1.

Box 4.1 Summary of potential benefits from increased participation for projects

- Improves dialogue between researchers/planners/communities and increases knowledge about needs and problems of the local communities.
- Increases farmer participation in decision making rather than being passive or consulted. Farmer becomes a subject and not an object in projects. Helps the planners, researchers etc. to recognise creative potential of the farmers and turning them into subject of development rather than turning them into objects of development - the traditional view.
- Develops new procedures for identifying priority needs and optimal investments at the community level.
- Instigates dialogue to resolve conflicts by turning some of them into strengths.
- Identifying local organisations to support the project.
- Provides a greater respect for socio-cultural values which reflect a deep and rooted respect for the values and creativity of others.
- Participatory approach provides an opportunity to discuss various group interests and arrive at a consensus on project ideas and design. Participation does not mean that all ideas from different and diverse groups will be accepted.
- Participation helps people sharing common problems (water, poverty) to voice their demands and to work together towards solutions.
- Understanding of ecological, social, political, cultural and economic differences helps to design projects targeted to meet these differences remembering that there is no such thing as universally "correct" development model especially in the agricultural sector.

What is participation

Today, the terms 'people's participation' and 'popular participation' are part of the normal language of many development agencies. It is such a fashion that almost everyone says that participation is part of their work. The term participatory rural appraisal (PRA) sometimes seems an obligatory term for inclusion in project proposals. This has created many paradoxes and discrepancies. The term 'participation' has been used in some countries to justify the extension of control of the state as well as to build local capacity and self-reliance; it has been used to justify external decisions as well as to devolve power and decision-making away from external agencies; it has been used for data collection as well as for interactive analysis. In conventional rural development, participation has commonly centred on encouraging local people to sell their labour in return for food, cash or materials. Yet these material incentives distort perceptions, create dependencies, and give the misleading impression that local people are supporting external initiatives. But rarely do these supportive acts continue once a project ends. It is perhaps in this context that the various uses of the term participation need to be analysed. Pretty (1995) and others have identified seven possible uses of the term participation, and these are summarised in Table 4.1.

The ways that development agencies (donors, governments and NGOs interpret and use the term participation ranges from manipulative and passive participation, where people are told what is to happen and what to

do, to self-mobilisation, where people take initiatives largely independent of external agencies. This suggests that the term "participation" should not be accepted without appropriate clarification.

The problem with participation as used in types one to four in Table 4.1 is that any project achievements are unlikely to have any positive and sustainable effect on people's lives. Participation is interactive and self mobilisation in analysis stage and implementation, gives better changes of project sustainability. The type six and seven highlights the main characteristics required for sustainability- here the people have actively participated in the development of a project to help ensure it really meets their needs and objectives. If the project has achieved these then its results can be expected to be maintained and be sustainable. Great care must, therefore, be taken over both using and interpreting the term participation. It should always be qualified by reference to the type of participation. What will be important for sustainability of development and projects is for agencies and individuals to define better ways of shifting from the more common passive, consultative and incentive-driven participation towards the interactive end of the spectrum.

This has been one of the greatest deficiencies in the conventional project cycle where there has been little, or total absence of, involvement and participation of the intended beneficiaries or losers in the project. The conventional design and operational procedures have been rigid and standardised. The result of such practices is that the project was seen as an external intervention with disappointing results and project benefits that were not sustained. For those with local participation, the project was sustained. An example in Tanzania was smallholder tea development Box 4.2.

Table 4.1 Types of participation in development programmes and projects

Type	*Characteristics*
1.Manipulative participation	Participation is simply a pretence, with people's representatives on official board but who are unelected and have no power.
2. Passive participation	People participate by being told what has been decided, or has already happened. It involves unilateral decisions by project management without any listening to people's responses. Shared information belongs to professionals.
3. Participation by consultation	People participate by being consulted or answering questions. External agents define problems and gather information, and control analysis. This process does not concede any share in decision-making, and professionals are under no obligation to take on board people's views.
4.Participation for material incentives	People participate by contributing resources, e.g. labour in return for food, cash or other material incentives. Farmers may provide the field and labour, but are not involved in experimentation or the process of learning. This process is often called participation, yet people have no stake in prolonging technologies or practices when the incentive end.
5. Functional participation	Participation is seen by external agencies as a means to achieve project goals. People may participate by forming groups to meet predetermined objectives related to the project. Such involvement may be interactive and involve shared decision making, but tends to arise only after major decisions have already been made by external agents.
6. Interactive participation	People participate in joint analysis, development of plans, and formation or strengthening of local institutions. Participation is a right, not just the means to achieve project goals. The process involves interdisciplinary methods that seek multiple perspective and use structured learning processes. As group take control over local decision and determine use of available resources they have a stake and ownership in maintaining practices, or project outcomes.
7. Self-mobilisation	People participate by taking initiatives independently of external institutions to change systems. They develop contacts and projects with external institutions for resource and technical advice they need, but retain control over how resource are used.

Adapted from: Pretty 1995, Satterthwaite et al (1995); Adnan et al (1992), Hart (1992

Box 4.2 Smallholder tea development in Lupembe, Iringa

One of the successes of smallholder tea programmes was at Lupembe in the Southern Highlands of Tanzania through the active involvement of the farmers themselves. After the failure of Coffee plants in 1960s - due to disease - the farmers in Lupembe had no source of cash income. Some of the farmers started growing tea on the outskirts of private farms but there was shortage of seedlings. Farmers desire for cash and knowledge of tea planting were instrumental in the success of the tea scheme of 1972-77. The scheme was financed through IDA credit. Lupembe has now become the second largest smallholder tea growing area in Tanzania after Mbeya. Tea is processed at Lupembe Tea factory. The factory was purchased by Tanzanian Tea Authority (TTA) from a former owner. At the present, negotiations to sell are underway between TTA and private bidders, including the Commonwealth Development Corporation (CDC) which owns Wattle Co. in Njombe.

Similarly success has been achieved by the Mara Region Agricultural project where farmers played a leading role in problems, their causes and possible solutions (Box 4.3). A research project undertaken by Sokoine University of Agriculture has also shown the benefits of involving farmers (Box 4.4).

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Box 4.3 Problem analysis by farmers in the Mara region

Perceived Problem	Cause of Problem	Farmers' Solution
Food shortage, frequent famines	Drought, diminishing farm size, soil exhaustion, cassava disease, striga	Solve cassava disease problem + restore soil fertility + water harvesting for rice
Unrealibility of rains, drought	Man-made changes in environment	Moisture retention: farmer-to-farmer visits to villages where tie-ridging, deep basins and sweet-potato cover crops have been developed by farmers.
Soil exhaustion(Sandysoils)	Absence of rotation, non-restitution of orgnic matter, soil mining	Demonstrate use of farm yard manure
Cassava production low due to diseases (mosaid virus, mealy bug, etc.	Pest attacks exacerbated by soil exhaustion, poor cultural practices	Multipliction/distribution of disease-free, resistant planting material + IPM(wasps) + cultural practices
Cassava/sweet potato mono-cropping	Absence of alternative crops that will be grown on exhausted soil; striga	Introduce rotations with beans, leglumes, simsim, sunflower
Striga in sorghum, milletand maize	Aggravated by absence of rotation and soil exhausted	Test, demostrate striga control techniques developed by IITA; restore soil fertility, rotate with legumes.
Population pressure, diminishing farm size, disappearance of grazing	High birth rate, polygamy	Family planning, spontaneous out-migration (farmers do no want forced resettlement as in past).
50% decline in livestok numbers in past 10 years	Disappearance of grazing, theft of animals	Maximise use of existing feed resources: demostrate crop residue feeding; promote alternative means of keeping savings.
Collapse of input supply and market system for main cash crop (cotton)	Dismantling of cotton parastatal	Encourage private stockists and ginneries to provide input to farmers on credit.
Declining income from fishing	Over fishing, Government ban on fishing in some areas, ban on illegal gear, water hyacinth infestation of lakeshore	Create fishermen's associations to self-regulate fishing effort
Schistosomiasis	Snail vectors on lakeshore; women forced to wade in lake to fetch drinking water	Install hand pumps near lake (cf. HESAWA and Austrian NGO VODP project experience)
Deaths from AIDS	HIV associated with high mobility fishermen	Link with ongoing projects: awareness campain, etc.

Source: Tanzania: Mara Region Agricultural project 1995.

Box 4.4 Research and extension: an example of the farmer orientation approach

In 1984 Sokoine University of Agriculture (SUA) identified that low protein intake among many families in Tanzania was a major problem and to reduce this they proposed to introduce dairy goats in the highlands of Mgeta. Mgeta is a hilly area where the main crop is maize grown on soils of low fertility subject to erosion. Little or no soil conservation is practised and maize yields are low at about 400 kilograms per hectare - about half the national average. Generally the people of the area are poor and goat production for milk was seen as an opportunity to increase the farmer's income. Milk output from local breeds was low but could be increased through crossbreeding. This idea was discussed with local people by the SUA researchers. The idea was accepted by some farmers in some of the villages who decided to take part in the project. Upgrading of the local breed was through the introduction of imported Norwegian goat kids to be crossed with local breeds. The crossbreed was to be called Tan-Nor cross bred.

Three villages were initially involved: Tchenzema, Mwakalazi, and Nyandira. The approach used was partially participatory, and farmers were involved at the implementation stage. Farmers were trained at SUA on animal husbandry where the approach placed emphasis on farm client orientation. After three years, the original farmer groups started training other farmers. And after ten years most of the extension services have now been transferred to the farmers from SUA, and a total of 150 farmers have joined the scheme.

Interviews carried at the beginning of 1997 indicate that the scheme has been a success, and is an example of successful collaboration between a research unit and the beneficiaries.

ACHIEVEMENT OF PARTICIPATION

Key elements

If participation is desirable or essential aspect of the successful formulation, implementation and sustainability of agricultural development projects, the next question to ask is how to achieve effective participation. This will involve four key elements:

- *Institutional change* - Formal institutions at all levels may have to change to accommodate the move to increased participation by project beneficiaries. This will include policy and organisational changes.

- *Professional/personal change* - Achieving participation also calls for a change in attitudes of professionals. In the past there has been an assumption that those in authority or of a technical background could provide the answers to the problems of development. The participation of local people and communities will require this to change if their views and knowledge are to be acknowledged and they themselves empowered to take part in the development process. The role of the professional is now to act as a facilitator, and stakeholder, in the process of change.

- *Community acceptance* - Communities also have to accept a change to a participatory process. In the past they may have been used to a top down approach from government. Initially there may be suspicion from local communities on the offer to participate in the development of projects. The process will have to be transparent and trust may have to be built up between all the different stakeholders.

- *Mechanisms and methods* - A simple decision to move towards greater participation in itself will not be enough. Participation of different stakeholders will require appropriate mechanisms and methods to help achieve this. A range of participatory methods have now been developed (see chapter 7), and these will need to be accompanied by mechanisms which actually allow stakeholders to participate in the development and implementation of new projects.

Institutions and NGOs

Most of the projects that are demand oriented depend on the capacity of the beneficiaries to conceive and sustain the projects. Most of the targeted beneficiaries are resource poor farmers. They lack technical and managerial expertise. These two constraints are likely to reduce the ability of the local communities to absorb the resources. In order to design an effective intervention, it is essential to understand the nature of the problem and know more about the poor. Understanding institutional strengths and gaps is a critical factor in designing projects for poor farmers (World Bank, 1992).

The participatory approach in projects targeted to resource poor farming communities is now generally acknowledged in Africa and other regions as an important factor in achieving sustainable development. However, institutional weaknesses and strategies to overcome them have not been addressed adequately in both the process and conventional project cycle. NGOs can and should play a reinforcing interaction among the institutions that promote change especially at the local levels. Local institutions may be too weak to effectively participate in the project planning process. These institutions need capacity building. This section dwells on the reasons behind strengthening local institutions, participation and why organisations are necessary.

One of the critical issues that has not received attention in project planning is the local institutional capacity building role in the process of project planning and implementation. The issue of institutional capacity building is fundamental to all project phases and eventual sustainability. There is an emerging general consensus among development professionals and major donors that interventions outside the context of local organisations has not been very successful. But these institutions, though important, have not been effective in negotiating with government and other institutions because their internal organisational structures are weak. Rectifying the internal institutional constraints and integrating them into the project cycle had not received attention until the 1980s.

Carroll (1992) points out two dimensions of group capacity, concerning internal and external aspects. The internal dimension centres on learning how local communities can manage their resources i.e. planning and goal setting, resource mobilisation, resource management, conflict resolution etc. The second dimension relates to learning how these groups can negotiate with government and the private sector. In both of these dimensions the central focus is always capacity to effectively work as a group, foster democratic process in development efforts through consensus, conflict management and networking. The critical question is which institutional structure can play a role in initiating the local "empowerment"? The market is not the right institution for resource poor farmers. Government is too far away from the base, has little resource and it is apparently rigid and bureaucratic. Government can continue playing the role of providing public

goods. However, the government resources are also limited. The complementary institution that has proved effective in some countries are the non-governmental organisations (NGOs). The potential roles of NGOs were given in Box 2.11.

SUMMARY

If projects are to adequately address the problems of local people and communities then their active participation in the development and implementation of projects will be essential. Past experience has shown that projects are more likely to fail or lack sustainability where the participation of stakeholders has not happened. Simple consultative mechanisms are unlikely to achieve this and real participation is needed, where stakeholders, including project beneficiaries, are true partners in the development of the project. Achieving this will not necessarily be easy, it presents a range of institutional and policy challenges. These challenges are explored in the following chapters in the identification and design of projects.

5. PROJECT CYCLE

Keywords and concepts:

Traditional project cycle; Baum cycle; MacArthur's cycle; Advantages and disadvantages of traditional cycle; Why a new cycle; New project cycles; Participatory and process approaches; Comparison of approaches.

INTRODUCTION

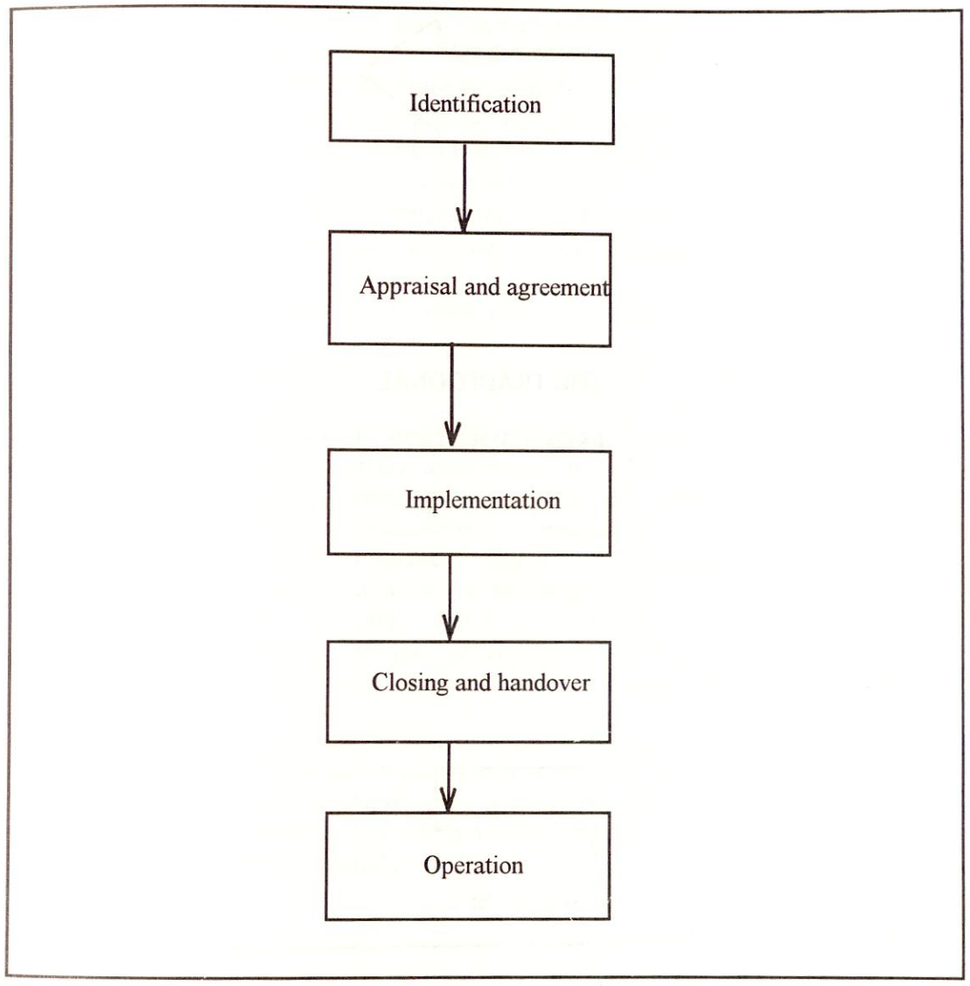
This chapter introduces some of the concepts generally used in project planning and in particular the project cycle. In the 1970's the World Bank developed an approach to project planning which is now known as the traditional or Baum cycle. This process followed a linear progression from project identification to implementation through design and appraisal stages. Although termed a project cycle, it is not in its strictest sense a cyclic process. This cycle was largely adopted in the 1970's and early 1980's for agricultural and rural development projects. Following the development of new ideas and the experience of less than universal success with this cycle a new approach has been developed. This emphasises the participation of all stakeholders in the process, particularly project beneficiaries, and that the cycle is now truly circular and not linear with feedback between the different stages of the cycle, i.e. the cycle is seen as a process rather than a blueprint - the approach of the traditional cycle. This new cycle is frequently called the process approach, and is leading to the increased participation by farmers and other stakeholders in agricultural project planning and management.

TRADITIONAL APPROACHES

Baum cycle

The starting point is that projects have a "life" with a programmed beginning and end, usually because the funding of the project is for a limited period. This was seen as a linear and top-down process, and is shown in Figure 5.1. With many development projects, a single project may end but others may then follow. Either the project itself is extended, or it is replicated in a similar form in another area, or a revised form is developed using lessons learned from the first. Hence the idea of a "cycle" developed - with experience from current projects' evaluations being passed on to the next generation of projects. The World Bank is a major lender for development and under its Articles of Agreement its lending policies are required to be project oriented. In the 1970's the Bank evolved a form of project planning which has become known as the "traditional" cycle since it was used by many development agencies for many years. It is also known as the "Baum Cycle" after the author of early articles on the cycle. This "cycle" or sequence is represented in Figure 5.2.

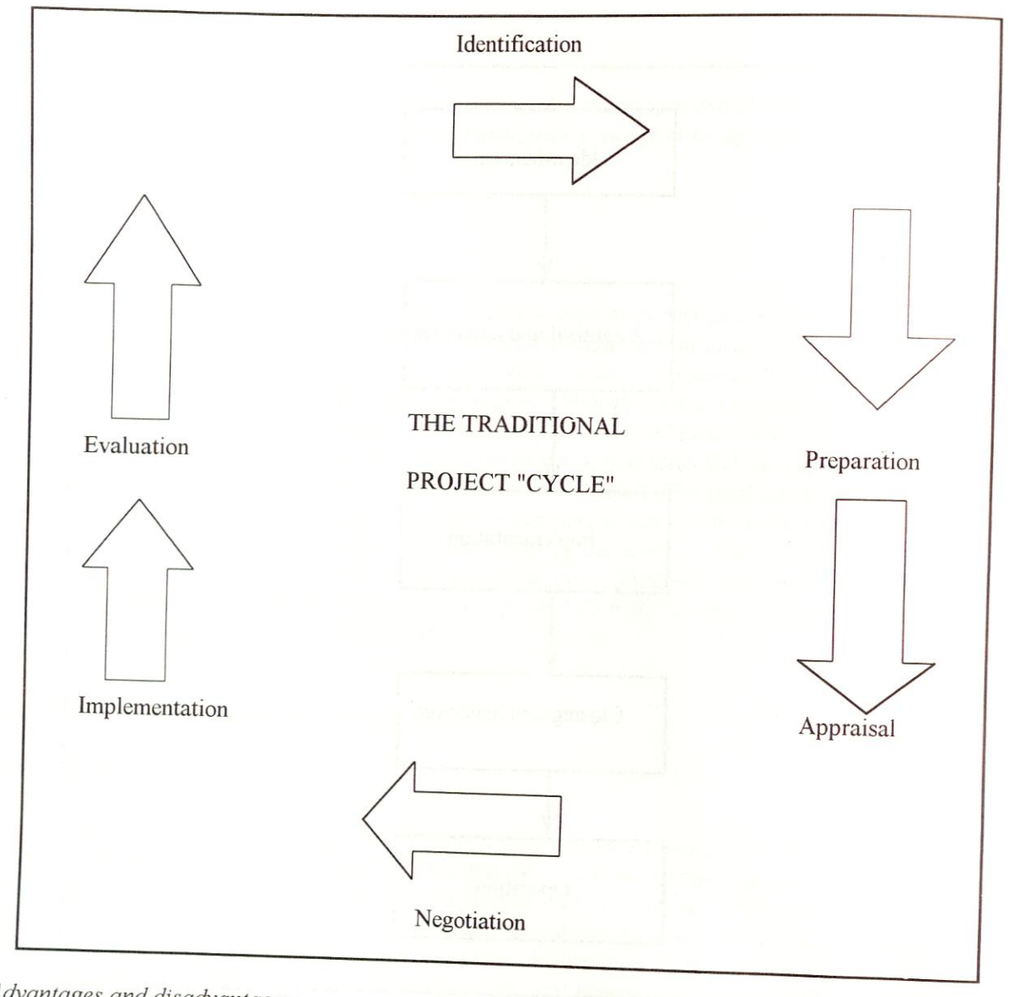
Figure 5.1 **The traditional linear and top-down approach to project planning**



Under the traditional project cycle the following actions were undertaken:

- *Identification* - selection of projects which are acceptable for financing..
- *Preparation* - collection of information and preparation of a feasibility report on the proposed project, showing technical and economic viability of the project according to criteria largely set by the financier(s).
- *Appraisal* - review of the project by staff of the financier(s)
- *Negotiation* - of an agreement between borrower and financier (s), with various terms and conditions.
- *Implementation* - of the project by the borrower, with monitoring and supervision by the financier(s)
- *Evaluation* - on completion of the project, by the financiers(s). Lessons learned are used in subsequent projects of the financiers(s).

Figure 5.2 The Baum project cycle



Advantages and disadvantages

The major advantages of the traditional cycle were:

- It provided uniform format for project preparation in a logical framework and sequence within which data collection, compilation, analysis and investment priorities were established
- It provided the basis for common communication between the borrower and the Bank
- It was objective oriented. Performance was based on achievement and emphasis was on planning a whole project or blueprint by technical personnel before approval

The major disadvantages and criticisms of the traditional cycle summarised by Picciotto and Weaving (1994), are:

- Participation of beneficiaries and other stakeholders was minimal. It was concerned with preparation and implementation. This reduced government commitment and chances of sustainability of projects beyond the project life.
- Knowledge of physical and socio-economic environment was often inadequate. This subjected projects to great risks and human error in forecasting and estimates.
- Projects were generally too rigid to respond to new economic and social-cultural environment except for those assumed in the original blueprints.
- Capacity building, though a critical factor to many projects, was not integrated into the project design. It was often assumed that this would be carried out by a different project. This resulted in heavy reliance on external technical support.
- Institutional environment and strengthening was often understated or neglected.
- External expertise and assistance had little or no knowledge of local environment under which the project operated.
- Too long a time elapsed before a project received approved for implementation.

MacArthur's project sequence

Though the traditional Bank's project concept did not incorporate continuous in built mechanism, it was accepted by many professional economists, as a reference point. However, one of the criticisms regarding rigidity could be overcome by a systematic information feedback system throughout the project cycle. One of the variants of the modified project cycle concept was development by John MacArthur of the Development and Project Planning Centre (DPPC). Figure 5.3 has an in built mechanism to provide information. Its twenty three possible stages show that a decision to change project design, postpone or abandon is not necessarily taken at the end of the project life. It can be taken at every stage from identification to implementation. This is possible when there is an in built mechanism to provide continuous flow of information that is crucial to the management as well as the policy makers or other interested groups.

Despite the central role of a constant feedback at each stage, there is no explicit dialogue between the borrower, beneficiaries and the donor. While the approach is inherently "neutral" and is neither truly top down or bottom up, experience has shown that agricultural projects planned and undertaken in this way, have not been completely successful. Lack of commitment from policy makers and beneficiaries appear to be the main cause for lack of sustainability.

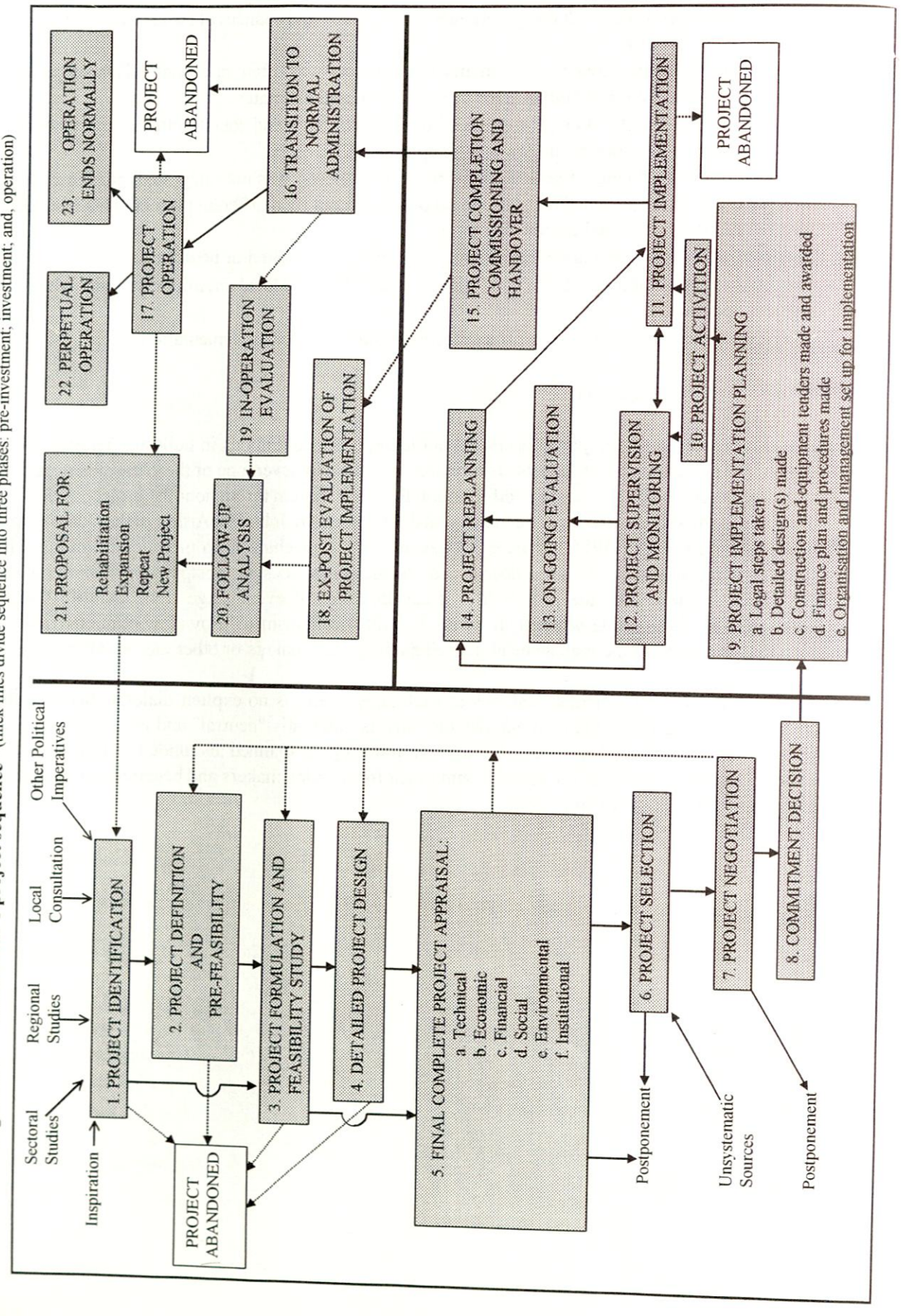


Figure 5.3 MacArthur's project sequence - (thick lines divide sequence into three phases: pre-investment; investment; and, operation)

NEW PROJECT CYCLES

Why a new cycle?

Projects are generally interventions to rectify a persistent social, economic or biophysical problem, or sometimes to exploit a new opportunity for social and economic development. However, agricultural project interventions following a traditional non-participative approach appear to have a higher risk of failure. Increasingly, empirical evidence seems to show that project failures have been on the rise. Towards the end of 1990s, about one third of projects funded by the World Bank did not achieve their relevant goals. This figure is higher than that of 1970s when it was only fifteen percent. In Tanzania only 10 out of 27 agricultural projects supported by the World Bank were rated as satisfactory (World Bank, 1994). Other lending agencies and international donors had similar experiences. The risks have therefore also increased both on the lender or donor agency and on the recipient. Evidence also suggests that the lack of participation by beneficiaries or by those affected negatively, appear to have important role in project success. This was covered in more detail in chapter 4 on participation.

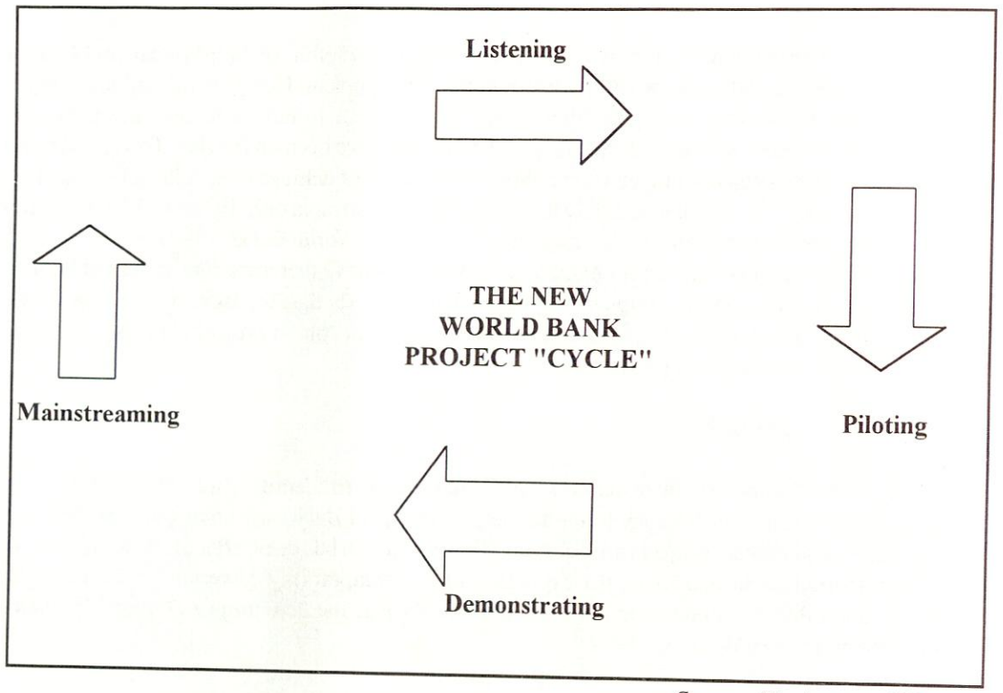
The World Bank's new approach

Identifying the needs and potentials of resource poor farmers helps to identify ways of transferring or acquiring improved agricultural technology to the farmers. The World Bank now holds the view that new approaches to process development projects are essential. This conviction has come after the past experiences of projects poor performance in delivering the expected output. Adaptability, government commitment, capacity building, and effective monitoring are critical elements that the new project concept. Its major features include (Picciotto and Weaving, 1994):

- Focus on the borrower and the beneficiary, not on the requirements of the donor;
- Incorporates participation and capacity of development institution;
- Provides for explicit, practical ways to manage risks;
- Reduces elapsed time and resources spent before initiating a project.

The new approach is a learning "cycle". It encourages early collaboration and resulting consensus, commitment to the goals agreed on. Its explicit focus on experimentation, institutional learning and risk assessment provides more pragmatic approach to development process. It recognises development as a complex process whose effect cannot be predicted with certainty. The four stages of the "New Cycle" (Figure 5.4) clearly illustrate the role of learning: Listening, Piloting, Demonstration and Mainstreaming. The major features of each stage are given in Box 5.1. while this approach is not followed by all Bank projects, it is increasingly being adopted for agricultural and smallholder projects.

Figure 5.4 The World Bank's new approach



Source: Picciotto and Weaving, 1994

Participatory and process approaches

Other institutions and agencies have moved to adopt more participatory approaches to project planning, and to develop what is now becoming known as the process approach. This approach starts from the idea that local people should be more actively involved in projects. This begins with the analysis of the problem, establishing objectives, designing interventions and ends with implementation, monitoring and evaluation. The assumption embodied in the process planning is that the affected people know their needs, but what they lack is technical knowledge, institutions, skills or resources to achieve their objectives.

Agricultural development is a complex activity. It is subject to physical and socio-economic/cultural factors. It is operating in a diverse environment comprising of farming systems and people. A process, participatory and market approaches to project planning is increasingly being adopted as a complement to traditional project cycle to overcome some of the shortcomings "traditional projects".

Box 5.1 Main features of World Bank's and new approach to the project cycle

1. Listening:	• participation of borrower and beneficiaries in project identification. • lender is the listener, while borrower and beneficiaries are active players. • demand led-reflecting what really are the beneficiaries problems priorities. • different project alternatives and options analysed.
2. Piloting:	• small trials of identified strategies. • can be funded without being subjected to stringent internal procedures. • small scale projects with trials of different management styles • training of leaders. • design of participatory techniques in a holistic manner to incorporate social, physical, cultural, ecological and institutional actors.
3. Demonstration:	• trials on representative scale e.g. village. • management information system established. • cost sharing/recovery mechanism established through joint participation. • skills developed in larger scale.
4. Mainstreaming:	• once results of demonstration show that constraints have been removed, risk managed, consensus of ownership prevails, the project can be extended to larger scale e.g. District, Region, etc.

The participatory approach to project planning aims to make the project concept originate from local communities, and other project beneficiaries and stakeholders. This is important in enhancing local community commitment for sustainability after the donors leave - this logic extends to sustainability of projects which intervene at district, regional or national levels. Learning about and understanding the needs and potentials of resource poor farmers helps to develop dialogue between the change agents (planners, extension, researchers) and the farmers. It increases willingness of stake holders to work together. It builds up a two way knowledge sharing. The planners, researchers etc. learn and understand the local conditions. This helps the planners adjust their initial perceptions of the local situation to what is actually in the field. Project design may have to be modified or even abandoned if the initial assumptions are not likely to happen. The traditional project can be adjusted to incorporate participatory project planning. A large number of aid agencies and donor governments have adopted participatory project planning. These include GTZ, DFID, NORAD and CIDA all of which have adopted a logical framework that incorporates some aspects of process and participatory planning. Box 5.2 illustrates the five stages used by GTZ. For more detailed discussion of this type of approach see Chapter 7.

One aspect of process planning is its flexibility and the participative features. This is important because it creates mutual respect between the farm population and those carrying out the planning process. As this is cemented, a feeling of "ownership" is developed among those affected. This sense of ownership will also extend to others involved in the development of the project - government officers, private sector and NGOs. This increases commitment in decision making and eventual sustainability of the project.

Box 5.2 Five stages of the GTZ participatory approach to project planning

- Participatory analysis - identify beneficiaries, their status and resources, and identify other stakeholders.
- Problem analysis - problem tree in which the core problem is identified by the participants.
- Objective analysis - in which the problem tree is turned into an objective tree to identify the central objective.
- Discussion of alternatives both in technical, environment, social (e.g. gender) and physical terms are discussed, leading to agreement on the most appropriate alternative (cost effectiveness and technical considerations).
- Project planning matrix (logical framework).

COMPARISON OF APPROACHES

Table 5.1 shows the comparison between the "Blueprint" (Traditional) and "Process" (Participatory) approaches to project interventions. The process approach is more flexible, participatory than the traditional blue print cycle. However, both use similar tools of appraisal e.g. financial, economic, environmental criteria for project viability.

Table 5.1 **Comparison of blueprint and process approaches for rural development**

Stage	*Blueprint approach*	*Process approach*
Identification	Centralised (Capital/ sectoral/regional)	Decentralised village, district, regional
Concept drawn by	Technical experts	Team work and diologue between experts and beneficiaries
Primary funding	Central	Local, community and their assets (land, labour), and central
Design	Static and by technical experts	Collaborative and involvement of all stakeholders.
Growth	Rapid growth and, target oriented	Flexible, gradual and incremental
Supporting institutions	Central government	Local communities and district institutions.
Administration	Top down and directive	Bottom up and participatory.
Project duration	Fixed and finite	Flexible indefinite
Capacity building	Formal intemittent	Continuous and action oriented
Beging with	Plan	Action
Technology	Advanced scientific and usually imported	Indigenous and scientific, and appropriate
Evaluation	External and intermittent	Self evaluation and continuous
Leadership	Limited and 'erratic'	Strong and continuous

THE NEW PROJECT CYCLE IN TANZANIA

In the last ten years, Tanzania like some other developing countries has been undergoing significant economic reforms whose long term objective is to bring about structural equilibrium and a higher sustainable economic growth rate. These reforms have significantly reduced the role of the government. Reforms are market oriented rather than supply managed. If markets are to be the major allocative mechanism for all traded goods, then the scope of any government intervention must be justified in those cases where market system does not provide an efficient allocation mechanism. There are about 3.4 million small farmers who "own" about 90% of the total land area under cultivation. They are involved in production of market and subsistence goods. These farmers are readily responsive to economic stimuli and survival. The key question is what

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form and kind of public intervention would be needed to assist these farmers improve their productivity and incomes?

This question is relevant and important in the sense that the government resources are scarce. This situation will not improve in the medium term. New kinds of collaboration with the private sector small farmer must be established. This calls for the adoption of the process or participatory approach. This will involve new partnerships and mechanisms. The characteristics of this approach will need to reflect the features of the Tanzanian environment given in Box 5.3. Under this new approach the major functions of the government are likely to be those identified and discussed in chapter 2, and summarised below:

- The co-ordination of agencies within and outside the sector.
- The provision of information on markets.
- The provision of extension and research.
- The provision of economic infrastructures such as rural roads.
- The regulation of quality and standards of agricultural outputs.

Box 5.3 Features to consider in a new project cycle for Tanzania

- Project planning must be done in consultation with and active participation of those affected i.e. grassroots approach
- Projects should facilitate local development rather than become a dominant player i.e. the ultimate objective is to build local institutional capacity
- By enhancing local institutional capacity (knowledge, skills, attitude and structure), to make local communities play an active role in decisions i.e. ("Empowerment")
- Local action which reduce existing cultural constraints (e.g. gender gap), and target specific social groups
- Government to facilitate and promote local community based organisations and provide conducive environment to Non Governmental Organisations (NGOs).
- Projects must be streamlined to address sectoral goals and clearly show verifiable indicators of local and sectoral achievements.
- Government to facilitate creation of enabling environment for these economic agents and institutions to efficiently work.

In summary, the new project planning process for the agricultural sector would be based upon process project oriented planning. The process is congruent with the current market driven system. The project concept must always be related to the macro level goals by addressing the extent to which the project contributes to the development goal. In the long run, it must contribute towards the achievement of the sectoral goal. In the past, this linkage has not been regarded as an important objective from the management point of view.

Unlike the conventional project cycle, the new cycle must focus on incremental improvement rather than rapid changes from adopting a transformation approach (chapter 10). This is important in the case of dissemination of agricultural technologies and expectation of scientists undertaking agricultural researches. Research outputs must be based on the local conditions. Local knowledge is incorporated into the scientific knowledge to get an appropriate agricultural technology.

As this approach is gradual, both researchers and extension people must be patient. The role of the project must be to help farmers adopt the new ways of production and to find ways of reducing risks such as dissemination of information.

SUMMARY

In conclusion, the new learning process project approach does not replace the traditional cycle comprising identification, preparation, appraisal, implementation and post evaluation. Projects will still be evaluated on technical, financial, economic and other criteria. What process project approach does is to adapt the traditional cycle to socio-cultural and economic environment in which the role of dialogue between the donor and the beneficiary is emphasised. This dialogue and participation, starts early in the planning process in problem.*

6. PROJECT IDENTIFICATION

Keywords and concepts:

Phases of project identification; Who identifies projects; Sources of Project Ideas; Project concepts and profiles; Ranking and prioritisation; Roles of governmental Non-government organisations and farmers.

INTRODUCTION

Project identification is the first and, perhaps, the most crucial stage of both the traditional or new project cycles. It is from this idea that the project will be based, and a poor idea or lack of ideas is likely to lead to poor or no projects. The initial project idea may be made in rather general or sketchy terms, and different versions of the same project may be conceived. It is at this stage that an initial screening of project ideas will take place, with some project ideas being abandoned as impractical or of a low priority. Ideas for projects can come from a range of different sources and organisations including: the Ministry of Agriculture (MOA); individuals; local communities; non-governmental organisations; and, donor and international agencies.

There will usually be more project ideas - and wishes - than resources to implement them, and therefore only a small portion of these are ever likely to lead to the full implementation of an actual project. Mechanisms are therefore needed not only to identify different project ideas, but also to put these into priorities for development and eventual implementation. This chapter discusses these issues: who identifies project ideas, how to prioritise projects; and, the different roles of government, parastatals, private sector, NGOs and local communities in this process.

ELEMENTS

Phases of project identification

There are four key phases of project identification. These are:

- *Actual project identification* - the generation of project ideas by formal and informal institutions and individuals.
- *Description of project idea* - an actual written description of the project idea or concept, summarising the main elements of the proposed project to use in the screening, ranking and prioritisation of project ideas.
- *Screening* - an initial review of project ideas and concepts to see if they should be advanced or abandoned at an early stage.
- *Prioritisation* - the ranking and selection of projects against a set of criteria to identify the "best" projects to move actively into the design stage and development.

These phases are discussed in more detail in the rest of this chapter.

Who identifies projects?

The identification stage requires a careful analysis of a broad spectrum of project ideas. The question then is where do these ideas come from. Ideas for projects can come from a range of different sources and organisations. Ideas can come from within the Ministry of Agriculture (MOA), or from individuals working at the district, regional or national levels. Other ideas can come from local communities themselves, from non-government organisations, while others my be suggested by donor and international agencies. Those most likely to be involved are given in Box 6.1. The same project idea may be identified separately by different agencies and at different times. In addition, projects may be identified through the political process, or simply through bright ideas occurring to people with sufficient influence or financial resources to put them forward

Box 6.1 Institutions involved in identifying project ideas

- Farmers' organisations and community groups
- Large scale farmers
- Crop marketing organisations
- Private sector enterprises
- Parastatal enterprises
- Government ministries
- Development banks
- Donor agencies (local and international)
- Local politicians and pressure groups
- Non-Governmental Organisations (local and international)
- International research agencies (e.g. International Institute for Tropical Agriculture - IITA)

Projects will be identified by institutions on the information they hold and receive. This information can be formal from surveys and reviews, or it can be informal, e.g. local peoples' views and opinions. The main formal information sources of project ideas for the agricultural sector in Tanzania are likely to be:

- Policy reviews and development plans made by central government ministries.
- Sectoral surveys by technical ministries, e.g. the sectoral review by URT and the World Bank published in 1994.
- Surveys conducted by local government (district and regional) and other regional organisations.
- Formal problem diagnosis and analysis exercises.
- Environmental and natural resource surveys.
- Reviews and evaluations of past projects.
- Community meetings and public gatherings
- Participatory rural appraisal and participatory development programmes.
- Private sector, co-operative and parastatal corporate plans.
- Investment identification missions by development banks (e.g. African Development Bank) and other aid donors.

Informal sources of information can also be a rich source for project ideas. These may have been collected by the use of participatory approaches such as participatory rural appraisal (see chapter 7). In the past this source for project ideas has often been neglected. As discussed in chapters 4 and 5 the lack of participation by local communities as project beneficiaries and implementors has been in part the reason for the failure of some projects. By involving local communities at the first stage of developing a project the chance of success can be greatly increased.

It is important to have an effective mechanism for channelling project ideas, this may be through the government system or outside of it. In Tanzania the role of government and NGOs are discussed in later sections, and their importance in ensuring that good ideas are "picked up" and developed.

Project concepts and profiles

Once a project idea has been c onceived, the next stage is to describe the idea so that it can be prioritised and move on to the next stage in the process. This may involve the preparation of a project identification report or project concept or profile. It might be part of a more general sectoral or regional planning exercise or the result of a participatory approach at the village level by a district officer. Wherever, or how, it is developed it is essential to have a clear idea of what the proposed project is supposed to be and what it hopes to achieve. A project concept or profile should be short and can sometimes be only a couple of pages. It should include answers to the questions given in Box 6.2. An example of a simple format for a concept note is given in Box 6.3

The conceptualisation stage of the project can be very important. It is at this early stage when alternative strategies can be examined most easily. As project preparation proceeds it becomes more and more difficult to alter the fundamental project design. It is also important that the initial identification of project concepts gives consideration to all possible options. Careful work at this stage can help not just in ensuring that good project proposals work, but also in rescuing or amending proposals that might otherwise have been disasters. The questions outlined above are addressed in detail in following chapters on project design and assessment. As will be seen later these require time and resources to undertake. Therefore by starting to address these issues at the time of project identification can save time at later stages of the project cycle.

Box 6.2 Questions to be addressed in a project profile or concept note

Justification and purpose

- What goal is the project contributing to?
- What is the purpose of the project, what does it intend to achieve?
- What problem is the project addressing?
- What is the justification of the project?
- What demands, needs or opportunities is the project addressing?
- What are the main alternative ways for meeting the project's objectives?
- What existing information sources were, or can be used, in identifying and developing the project?

- *Beneficiaries and stakeholders*
- Who will benefit from the project?
- Who identified the project?
- Who has a share or stake in the project?
- Who will be positively, and negatively, affected by the project? How have project beneficiaries and other stakeholders participated in the identification of the project?
- Which institutions are the targets of the project?

Resources and institutions

- What potential resources may be available for implementing the project?
- Which organisations are to be involved in project planning and implementation?

Policies and plans

- How does the project proposal fit into any sectoral or regional plans?
- Does the project fit into current policies?

Impacts

- What are likely the major positive and negative social impacts of the project?
- What are likely the major positive and negative environmental impacts of the project?

Support

- What is the level of political and administrative support for the project?
- Does the project have the support of beneficiaries and/or local communities?

Risks

- What are the chances of the project achieving its objectives
- What are the main risks associated with the project
- What assumptions have been made, e.g. what support is needed from others?

Box 6.3 Format for a project concept note

1. Summary information:
- Project title
- Project goal and purpose
- Project proposer - name and contact details
- Estimated project cost
- Duration of project
- Location of project

2. Background
- Description of the problem the project is addressing
- General background information
- Justification for project
- Support for project

3. Project Purpose

4. Project outputs

5. Project beneficiaries
- Primary
- Secondary

6. Project target institutions
- Formal
- Informal

7. Project activities

8. Inputs - summary of inputs and resources the project will require

9. Risks and assumptions

10. Financial summary

Prioritisation and ranking

The limited resources available in Tanzania for agricultural development mean that effective project identification and selection at various levels will be essential. There will be more ideas for potential projects than resources available. This will occur at all levels from community based projects to national based projects. Even individual farmers will have to allocate resources between 'personal' projects on their own farms, even when there is no outside intervention and support. At the national level different agencies and divisions within Ministries will have their own project ideas and will have to compete for support and resources. To decide which projects to support it will be necessary to set priorities. This calls for the ranking of projects. But how are projects ranked, and who is to do this? A set of criteria against which

projects can be ranked needs to be established, these criteria will vary depending upon the level of a project. The criteria of a village in selecting projects will be different from that of the Ministry of Agriculture. Criteria include social, economic, financial and environmental factors. Potential criteria for ranking projects are given in Box 6.4.

Box 6.4 Example of criteria for ranking projects

Extent:
- Number of people affected by project
- Geographic area affected by project

Economic and financial:
- Potential economic benefits to the country or region
- Potential financial benefits to farmers and local communities

Environmental:
Conservation of natural resources and more sustainable land use
Protection of natural resources (e.g. forests)

Social:
- Poverty alleviation
- Assistance to disadvantaged groups

Policy:
- Is the project in line with national policies?

Resources:
- Availability of human resources to implement project
- Likely availability of funding from government, NGOs and/or donors

Success or failure:
- What are the chances of the project successfully meeting its objectives?
- What degrees of the risks are associated with the project that may affect its implementation?

Support:
- Political support for project
- Community support and demand for project

During selection process, each project can be assessed against each of the criteria to give a rating. At this stage of the project cycle this is more likely to be qualitative than quantitative. Certain criteria can be given greater weighting to reflect the importance of the criteria in determining the overall rank the project. This initial ranking or prioritisation of projects is similar to the tool of multi-criteria analysis presented in chapter 12. However, an early ranking of projects before the detailed design of projects can save time and resources by concentrating efforts on the priority projects.

ROLE OF GOVERNMENT

Overview

The Ministry of Agriculture(MOA) is still the main player in the realisation of the overall sectoral development objectives in Tanzania. It is responsible to facilitate an environment where both small farmers and the private sector can achieve their goals. This core function is done through a hierarchical system. Any agricultural intervention passes through various stages. The scope and type of projects are largely determined by needs and demands at various institutional levels. Project design during the identification stage is an attempt to respond to these demands or needs. This includes setting in motion the process where the relevant institutions at regional, districts, and local levels identify problems and opportunities, and develop project profiles or concepts to meet these.

From the MOA's view one of the fundamental factors (criteria) in project planning is the requirement that a project profile be in line with policies on poverty alleviation and other related development priorities. There are three main levels through which identification process is undertaken:

- *At the Macro level* - Planning Commission, Ministry of Agriculture and Co-operatives (MOA), and other central government agencies and Ministries.
- *At the Meso level* - Regional and districts play an advisory role in policy formulation while they are important in the implementation of the programmes. District and regional levels form the necessary linkage between the farmer and local organisations with macro level institutions.
- *At the Micro level* - Farmer and farmer organisations, village committees who link with the Districts to the meso level.

The role of the government at these different levels is explored in more detail in the following sections.

District Level

At the district level the key leader is the District Agricultural and Livestock Development Officer (DALDO). Most of the district projects are focused on poverty alleviation. DALDO's key role is to co-ordinate and to provide technical expertise to farmers. Donor involvement is usually limited to a single donor, or NGO. Participation in project identification is undertaken by the farmers and the planners' role is to facilitate this process.

Project proposals developed within the district are submitted to the District Development Committee for consideration. This Committee comprises of local councillors from the wards and constituency Members of Parliament. The Committee develops district priorities according to the guidelines received from the sectoral ministry - MOA - and the Planning Commission. This results in district (project) profiles which are sent to the region for further refinement, prioritisation and possible amalgamation by the Regional Development Committee (Members of Parliament in the constituency, chairmen of district councils and a few representative councillors).

Regional level

Projects at this level cover more than one district. They may be large, and may also be inter-district in scope. The Regional Agricultural and Livestock Development Officer (RALDO) is the key leader and helps provide the necessary technical expertise. Recently a new post of Regional Agricultural Economists has been created. Part of the duties of these officers will be to assist the RALDO in project identification

and development. While RALDO is the key leader for the co-ordination of agricultural projects, the overall responsibility for project management, including resolution of policy issues, rests with the Regional Administrative Secretary (RAS) - the highest-ranking civil servant in the administration under the Regional Commissioner. Once the regional priorities have been established, these are sent to the relevant ministries for further prioritisation and possible integration into the government's Rolling Plan and Forward Budgeting (RPFB) - a short term indicative development forecast.

National level

While regional and district projects are restricted to the specific geographic regions, there are national projects which may cut across one or more geographical regions, or are owned by MOA as a national organisation. These are usually large in size and may be complex in design. These projects are usually under the MOA. An example is the National Agricultural and Livestock Extension Rehabilitation Programme (NARLEP). These projects may cover several regions and their administration is usually undertaken at the sectoral ministry.

Project Preparation and Monitoring Bureau (PPMB)

The Project Preparation and Monitoring Bureau (PPMB) is the main section of the Ministry of Agriculture (MOA) which has the responsibility for project planning and for assisting in the identification of project ideas. When regional project profiles are received the PPMB appraises and prioritises projects before they are sent to the National Planning Commission for further screening. Once the projects have been approved they are included in the RPFB. One of the obvious features of this approach to project planning is that it is top down. The planner is the key person in the process from the district level to the sectoral level, and thus the old system allowed only a minimum of participatory planning in the process. It is therefore that this led to:

- Rigidity.
- Lack of commitment from project beneficiaries.
- Did not allow for risk management.
- Did not give adequate attention to sustainability issues.
- Did not give attention to social cultural differences.

The development of a new and more participatory approach to planning as already discussed in previous chapters is likely to avoid some of these problems (see chapters 4, 5 and 7).

ROLE OF NON-GOVERNMENTAL ORGANISATIONS

Most of the projects that are demand oriented (see chapter 3 for explanation) depend on the capacity of the beneficiaries to sustain the projects. Most of the targeted beneficiaries are resource-poor farmers, their absorptive capacity of large investments is low. In order to design an effective intervention, it is essential to understand the nature of the problem and know more about the poor. Needs and concerns of the poor farmers are enormous and governments cannot address them all at the same time. Non-governmental organisations (NGOs) are increasingly becoming a common feature in both the developed as well as in developing countries. NGOs are often close to local communities, and this helps NGOs in identifying poor communities needs and developing projects which can meet these needs and/or demands. NGOs therefore can play a significant role in identifying project ideas themselves, or in facilitating local communities to identify ideas themselves. These ideas can then either be developed into projects by the NGO with their own financial resources or put to government agencies to secure government of donor support.

ROLE OF COMMUNITIES AND FARMERS

The importance of involving local communities and farmers in projects has been emphasised in previous chapters. This has been repeated in this chapter, but it is still important to recognise the formal and informal roles local institutions and individuals can play in project identification. It is these organisations with which government and NGO agencies will often work. Farmers have first hand experience of the problems they are facing and for which they want solutions. These may or may not be the same as problems perceived by others and outsiders. Therefore it is essential in the initial identification of project ideas that their views are understood and they actively participate in the development of projects which are to be implemented at the grassroots level.
Where projects have a larger or national focus it will be impractical to have all affected farmers participating in the process. However, it will still be important to have mechanisms in place to link the bottom with the top to feed in farmers' and local communities' needs and demands to allow appropriate national level projects to be identified. The ways and means to achieve this are discussed in chapter 7.

ROLE OF PRIVATE AND COMMERCIAL ORGANISATIONS

Following the economic reforms and liberalisation the private and commercial agricultural sector can be expected to play an increasing role in agricultural development in Tanzania. These organisations will also be involved in the development of projects and the identification of new ones. Small and large traders are now operating in the country. Parastatals are being restructured and privatised, inward investment in agricultural enterprises is now encouraged. This all heralds a much larger role for the private sector in agriculture both for smallholder farmers and commercial plantation development, and this will flow onto project identification and planning.

SUMMARY

Identification is a complex and interactive process. Project ideas can come from many different institutions and sources. It involves local communities, the various levels of government administrative structures, and NGOs. In the past the role of participation by the community in project identification has been under-emphasised. This is now changing with the recognition that by involving beneficiaries at an early stage the chances of successful project interventions are increased. Project ideas need to be screened and priorities given to different ideas, limited resources mean that only a few ideas can be supported. These need to be the best, and have the greatest chances of success.

In Tanzania the District and Regional Agricultural and Livestock Development Officer play a key role in providing technical inputs as will the new Regional Agricultural Economists. The Ministry of Agriculture is responsible for giving guidelines to the regions and districts on how the project profiles should be submitted to the MOA. The primary role of the MOA is formulation of sectoral policies and implementation and monitoring of such policies. Under this the MOA has a technical section - the Project Preparation and Monitoring Bureau (PPMB) - responsible for project planning and monitoring. The next critical stage is how beneficiaries and stakeholders are involved in the design of project interventions. The next chapter discusses in detail a range of approaches and tools to achieve this.

EXERCISES

Sources of project ideas

What are the main sources of project ideas? Give at least three reasons why you think the traditional approach to project identification has been less successful in identifying successful projects?

A tomato project

Mr. Omari wants to grow tomatoes. His argument is that he wants to be employed during the dry season. Tomatoes are grown on the wet valleys. Describe how Mr Omari's idea for a tomato project may be developed, and suggest details about the project. Include in your description his goal, objectives, and impacts of his proposed project.

A village project

The village committee had a meeting with planning officer. They identified five major problems villagers are facing. These were:

- Shortage of clean water.
- High rate of water borne diseases.
- The village does not have primary school.
- Millet and sorghum are their staples, and occasionally have a surplus but lack storage facilities and market.
- They have no transport and poor access to rural roads.

Suggest possible agricultural project ideas that can help solve some of these problems. Describe how the village committee and planning officer could develop these ideas to secure support for a project, when resources are only adequate for one project.

Ranking of projects

As the new Regional Agricultural Economist in your region, the RALDO has asked you to prioritise three ideas for different projects. At present resources are limited and it is likely only one of these project ideas will be able to be supported for further development. The RALDO has only given you the following brief descriptions of the project ideas:

- *Project A* - The farming lands of a number of villages in one district are being degraded by soil erosion. This is resulting in reduced yields for food and cash crops. Following a series of meetings with the village committees the DALDO has suggested that a project should be implemented to work with farmers to develop and implement conservation farming practices. This idea has been well received by the farmers and villagers who see soil erosion as a major problem. It is expected that this project will help halt soil erosion and maintain soil fertility and help sustain crop yields. It is hoped that this will lead to greater food security for the villages and enable them to produce a surplus for sale at the local market.

- *Project B* - A local politician has suggested that an irrigation scheme should be developed in their district for the production of horticultural crops for sale in Dar es Salaam. The proposal is for an intensive system, and for local business people to be assisted in the marketing of the produce. This is expected to be a profitable operation with good financial and economic returns. The politician has also suggested that this should be the first of many similar projects throughout the region which could have a significant positive impact on the region's economy. There have however been some concerns raised about a lack of available surface water for the project which may affect water users downstream of the proposed project.

- *Project C* - A major international donor agency has informed the RALDO that they would like to support a project to assist women's groups in the region to develop home gardens. The object of this is to help women to provide more food to their families and to sell a surplus on local markets. To date there has been little consultation with women's groups in the region and other interested parties about this proposed project. However, the project is in keeping with the government's policies on poverty alleviation and if implemented may have a major positive social and health impacts.

Develop a set of criteria in order to rank these projects, and use these to identify which project should be given a high priority. Write a short memo addressed to the RALDO justifying the priorities you give to the projects, and which you recommend for further development.

7. PROJECT DESIGN AND ANALYSIS

Keywords and concepts:

Project Cycle Management; Project Environment; Tools for Project Analysis; Logical Framework Analysis; Objective Orientated Intervention Planning; Social Analysis; Stakeholder analysis; Gender Analysis; Institutional Analysis; Rapid Rural Appraisal; Participatory Rural Appraisal; Participatory Learning and Action.

INTRODUCTION

In the previous chapter the role of various organisations and groups in project identification was discussed. The challenge is how these different groups are involved in the design of projects. This chapter begins with a general introduction to the design of projects, and then explains in more detail the range of methods and tools available for project design and analysis. Project Analysis, which can be used as the overall term covering the process of appraisal, is also used to cover particular elements of a project, such as logical framework analysis, social and gender analysis, stakeholder analysis, and participatory approaches to analysis. Project Design is used in this chapter to cover the tasks of preparing and formulating project plans prior to any formal appraisal.

DESIGN

Project cycle management

Following the identification of a project, it then moves into the next stage of the project cycle. Whether for projects following either the traditional or new process cycles there is a need for some form of management of the passage of the project through the various stages or processes of the cycle. That is, some agency or organisation has responsibility to oversee the progress of the project right through to completion and evaluation. This could be a specific "Project Director" in the Ministry of Agriculture, a "Steering Committee" composed of various stakeholders and beneficiaries, this may include donor representatives, or at a local level the District Development Committee and community representatives or similar institutions.

A particular task of the Project Cycle Management is to make sure that project design and project management are complimentary. In the appraisal stage, it must be confirmed that the activities and objectives are "manageable". In the implementation stage, management should follow project design. This sounds obvious but when projects do not succeed much of the criticism divides between managers blaming poor design and designers blaming poor management.

The design stage will be followed by an appraisal stage so project designers must always try to design the project to meet the various appraisal requirements - be these formal or informal. That is, designers are also appraising the project as they design it, in anticipation of the judgements which will come later. Hence project design and project analysis are essentially inter-linked.

Stages and circles of design

In project planning, design is a complex process undertaken in a diverse social, economic and biophysical environment. It is not an easy task. Designing a project is a circular iterative process rather than a purely step by step process. A project contains various elements - multiple objectives, various components, choices

of technology, involvement of various people and institutions, the resources and finance available. In particular there are the requirements of stakeholders, beneficiaries and sponsors to consider. Thus a first attempt at design may be found to be appropriate for some elements but not for others.

To reach an acceptable design will require a circular process of participation and consultation with stakeholders, further analysis and redesign. Thus a series of various alternative designs will often be proposed and rejected until a final design is produced which meets most or all of the various requirements of the different groups, or stakeholders, associated with the project.

Within this circular process there are seven key tasks, Box 7.1. This process involves, for all these tasks, a continuous process of participation and information gathering with the various interested parties. In addition, whether a project has been identified at the local level, regional level or national level there must usually be a circular process of referring designs up to higher levels for approval and down to lower levels for reference to local knowledge and for the active participation of project beneficiaries. This may happen a number of times, to ensure that preliminary designs, revised designs and final drafts are acceptable in terms of national and policy objectives, regional and district authorities, and local circumstances. Understanding the external environment is therefore of crucial importance.

Box 7.1 Key tasks of project design

- *Diagnosis* of the development situation through analysis of problems, opportunities and constraints, leading to development of broad project objectives (goal, purpose and outputs results) and proposed activities.
- *Review* of the background of issues at the national, regional and local levels in relation to other development objectives and activities which have a bearing on the proposed project.
- *Identification* of the characteristics of the socio-economic and biophysical environment of the project: the intended beneficiaries, the key institutions and other potential stakeholders, and the nature of markets, policies and other environmental elements.
- *Development* of a strategy for achieving the project objectives as the basis for identifying the various components and activities needed to address those objectives; including the appropriate technological and institutional approaches for the project.
- *Identifying* the resources and inputs required for project activities and the estimation of their cost.
- *Predicting* the potential benefits of the project, as a basis, where appropriate, for cost-benefit analysis.
- *Funding* sources available for the project, identification of possible and appropriate sources of funds, which may be a mixture of different types of funding, with amounts required and their time scales.

Project environment

Environment here refers not only to the physical environment, but more importantly to include the social, economic and institutional environment of the project (Box 7.2). The project environment may also be called all the external conditions that affect a project and over which it has little or no control. In project design it is usually necessary to make assumptions about these external conditions, and for the project to have some flexibility in adapting to changes in the environment. This is crucial since the project is only a subset of the economy and is not insulated from other external interactions which are not under the control or influence of the project (Box 7.2).

Box 7.2 Major elements of the project environment

- Government policies, which may change during the life of the project.
- Macro-economic factors such as interest rates and inflation.
- Markets both local and international, and prevailing prices in those markets.
- The actions of public and private institutions, such as banks and marketers.
- The biophysical environment, soils, ecology, and particularly climate and rainfall.
- The social and political environment of institutions such as community organisations, local councils and traditional institutions/structures.

When projects are implemented, they will usually have core management or co-ordination provided by a "Project Manager" or "Project Co-ordinator". Where there are different project components these may be implemented by different institutions, over which Managers or Co-ordinators have varying degrees of control. Many of the prices for farm inputs and outputs will be beyond the control of the project, but may be critical to the project's success. Again agricultural policy may change during the project over which the project has little or no influence.

Where projects are aimed at benefiting small farmers, project managers can influence what farmers may do, but cannot control how they use technology, how much and what they plant or do not plant. It will usually be necessary to make some assumptions about how farmers may behave, such as at what rate they may adopt new technologies. Part of these problems can be avoided if farmers have actively participated in the original design of the project and subsequently in its implementation - the participatory or process approach.

An important development in Tanzania in recent years has been the decline of public sector and co-operative involvement in marketing, input supply and credit, and the entry of many small private traders into the business of buying crops and selling inputs (see chapter 2). In the past, there was more certainty about crop marketing and input supply. Project designers could know that the parastatals and co-operatives would buy all of farmers crops at predictable prices. Farm inputs were also predictable in terms of supply and price, but not usually the case with efficiency in delivery (time).

Projects must now be designed to allow for uncertainty in crop marketing and supply of inputs, or to attempt to reduce these uncertainties by promoting relations between farmers and traders and other institutions. This could take the form of a project assisting both farmers and traders in an area so as to promote the complementary activities of production and marketing.

In summary, design must consider what elements are controllable and which are not; the more which are not the more uncertain will be the project's viability. In terms of farmer behaviour, over-ambitious assumptions about how farmers will respond to the project can be avoided by having real dialogue and participation with the farmers during the design stage (chapter 4). Similarly, uncertainties about markets may be reduced by including the traders within the projects activities as beneficiaries and/or stakeholders.

Analysis and appraisal tools

As stated in the previous section project analysis is an ongoing process during design, whereas in appraisal it is a specific final analysis of the whole project after the project design has been completed. In practice the terms analysis and appraisal are often interchanged and used for any form of project assessment. The main elements of projects for analysis and final appraisal are:

- *Technical* - the choice of farm technology, also technical designs for construction of infrastructures.
- *Social* - how the project relates to social and institutional structures.
- *Environmental* - the impacts of the project on the social and biophysical environment, significance of these both positive and negative, and economic valuation of these costs and benefits.
- *Organisational* - how the project will be managed, and what relations it may have with associated institutions.
- *Financial* - whether the project is financially viable in terms of meeting the needs of the various stakeholders.
- *Economic* - whether the project provides real economic benefits to the country

This chapter reviews the approaches and methods available to undertake the analysis and design of projects. These methods and tools are summarised in Box 7.3. This list excludes other environmental, financial and economic analysis methods which are covered in detail in Chapters 8 and 9.

Box 7.3 Methods for the design and analysis of projects

- Logical Framework Analysis - a technique of project planning which tries to ensure that designs are logical and consistent in terms of achieving a hierarchy of measurable objectives.
- Social analysis- rural households operate in the context of a larger socio-economic system; this is a technique to gain a better understanding of the interaction between the farm and this wider system.
- Stakeholder analysis - stakeholders are defined as all the people and institutions who have an interest in a project, this technique helps identify these groups and their interests in a project.
- Gender - gender refers to the different roles men and women play in the development process, this technique helps identify these roles and how a project will affect these different groups.
- Institutional analysis - techniques to assess the status of current and proposed institutions, and their future sustainability.
- Participatory methods - a series of approaches which emphasise participative and cumulative learning by all the participants, with an acceptance of multiple perspectives which through group learning leads to sustained action where experts are facilitators and people play a leading role in any project.

LOGICAL FRAMEWORK ANALYSIS

The logical framework analysis (LFA) for project planning was first developed in the 1970's by USAID. The terms "logical framework", "project framework", "project matrix", "ZOPP" and "logframe" may also be used to describe this method. LFA is perhaps most of all a powerful planning and management tool. It aims to link in a logical way the objectives of a project, project activities, assumptions about the project environment, to the results of the project. It also aims to link the objectives of the project to a sectoral goal and final developmental goals - many different projects may contribute to the same goal. LFA is now being used by many organisations, including donor agencies such as USAID, EU, and DFID.

LFA can be used in the preparation of the project, and then applied in management of the project, in monitoring and evaluation, in any re-examination and revision of the project. One of the key presentational features of the logical framework is that an overview of the objectives, the means of achieving these, and the main assumptions behind a project, can all be presented on a one page statement - a very effective project summary.

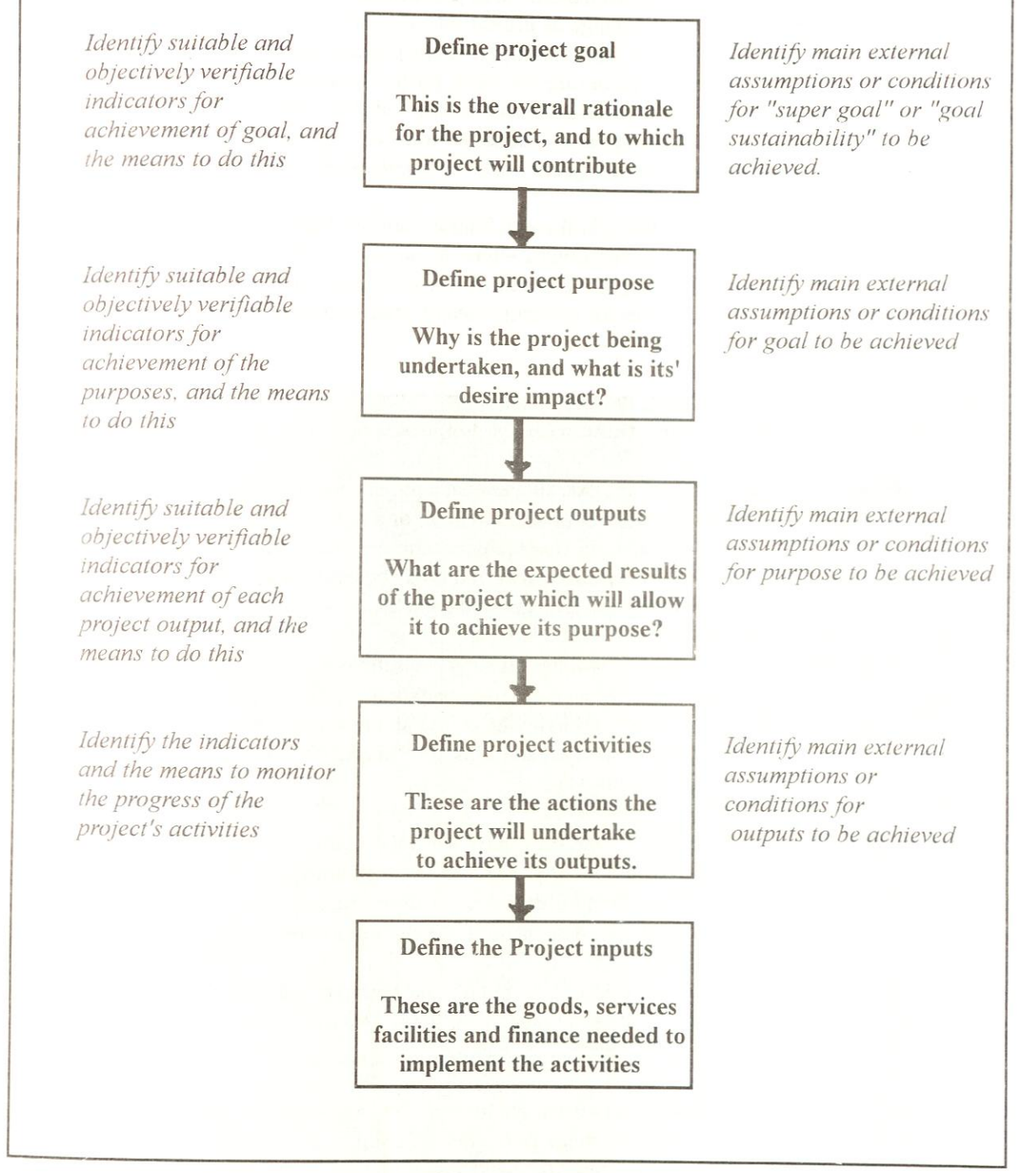
LFA is essentially a process of developing, in a logical and consistent way, a project that: can achieve realistic objectives within its economic, social and biophysical environment. The process should be based on a team, or participatory approach, where all the main beneficiaries and stakeholders contribute to developing a project framework which represents a consensus view on realistic objectives, viable activities and the realities of external conditions. Figure 7.1 shows overall structure of the full logical framework and introduces the vocabulary used. While the terms used vary between organisations, the basic four-by-

four matrix is a common pattern. The logical framework in Figure 7.1 is based on that used by DFID. A flow chart showing the main steps in developing a logical framework is given in Figure 7.2.

Figure 7.1 Structure for a logical framework matrix

Narrative summary	*Verifiable indicators*	*Means of verification*	*Important assumptions*
Goal Description of the higher-level objective to which the project will contribute	Qualitative and/or quantitative measures or parameters used to show the extent to which the goal is met or fulfilled.	Sources of information and methods, the means for verifying (Checking) indicators -used to establish what has been achieved	*Goal sustainability* Main external conditions/events necessary to sustain the objectives in the long term -"the super goal"
Purpose Description of the impact or effect the project is expected to achieve as a result of its outputs.	Qualitative and/or quantitative measures or parameters used to show the extent to which the goal is met or fulfilled.	Sources of information and methods, the means for verifying (Checking) indicators -used to establish what has been achieved	*Purpose to goal* Main external conditions/events over which the project has no control but which must prevail if goal is to be achieved.
Outputs Description of the results the projects should achieve during its lifetime	Qualitative and/or quantitative measures or parameters used to show the extent to which the outputs are produced.	Sources of information and methods, the means for verifying (Checking) indicators -used to establish what has been achieved	*Output to purpose* Main external conditions/events over which the project has no control but which must prevail if purpose is to be achieved.
Activities Description of the activities that the project will undertake during its lifetime	*Inputs* Qualitative and/or services needed to carry out the stated activities.	*Monitoring* Means to be used check (monitor) progress of the project's activities	*Activity to output* Main external conditions/events over which the project which must prevail if purpose is to be achieved.

Figure 7.2 The main steps in the preparation of a project logical framework



Objectives: goal, purpose and outputs

There will usually be an overall aim or goal under which the project has been developed. For example a national goal of the government may be "To increase food production for domestic consumption and food security". To achieve this overall goal a range of project interventions may be necessary, each of these projects will have a purpose - the expected overall impact of the project. To achieve its purpose a project will be expected to achieve specific results or outputs. Goal, purpose and outputs are all objectives of the project, but at different levels. The goal can be considered as the higher level objective at which the project aims, the outputs (or project results) are the more immediate or lower level objectives of the project, while the project purpose is an intermediate level objective and the impact of the project.

It is important to understand the difference in these definitions and the hierarchy it implies. It is easy to confuse things by misusing terms, e.g. switching outputs to objectives. While different approaches to logical frameworks may use terms in slightly different ways, it is essential to be consistent with which terms in the approach you use. Definitions for the terms used by approach used by many organisations are given in Box 7.4.

Box 7.4 Goal, purpose, outputs, activities and inputs: a hierarchy of definitions

OBJECTIVES

- *Goal* — This is the overall goal that a project operates under. This may be a national or sectoral goal, or a goal of a particular organisation. Under a particular goal there can be a range of different programmes and projects, which together, are all working towards achieving this goal.
- *Purpose* — A project will have a single specific purpose which it aims to achieve through its implementation. This is the expected impact of the project as a whole. The attainment of this purpose will work towards achieving the project goal (the long term or higher level objective).
- *Outputs* — A project will often have several outputs or expected results. Through *(results)* their achievement during the lifetime of the project the project purpose will be attained. Outputs can be considered to be the project's immediate objectives.
- *Activities* — To achieve each output it is necessary to implement a number of activities. Through their implementation the project outputs are expected to be achieved.
- *Inputs* — Resources are needed to implement a project's activities. These resources range from goods, facilities, labour and services, and are termed (project) inputs.

In describing a project's objectives it is important to avoid general or imprecise statements but to be specific and precise. Good objectives should avoid ambiguous or "fuzzy" statements which are capable of misinterpretation, and seek to specify targets which are clear and are capable of being measured. Table 7.1 gives some good and bad examples of project objectives (goal, purpose and outputs). Try to avoid using

the terms improve, promote, upgrade and develop in writing objectives. These are difficult to define and also include some non-quantitative components which are more difficult to measure. Standard of living and farming practice are also non-specific terms which may be interpreted in different ways. A basic problem with these examples is how to measure their actual achievement.

Table 7.1 **Examples of good and bad objectives**

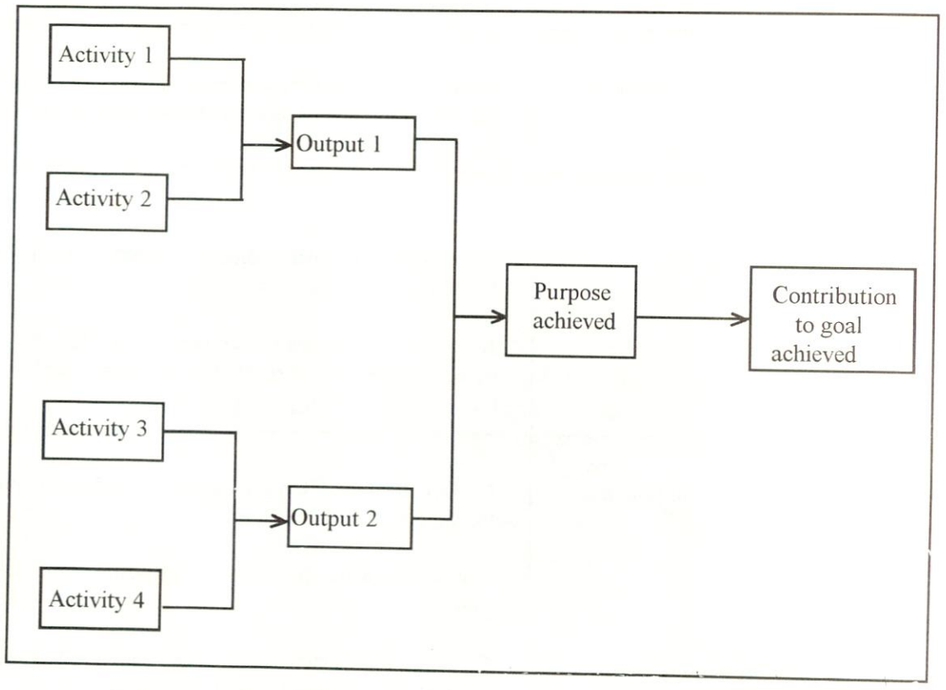
Bad examples	*Good examples*
Goal: Increase income from agriculture	To increase food and cash crop production for domestic consumption, poverty alleviation and increase in household incomes.
Purpose:	
Increase coffee growing.	Raise household cash income from coffee smallholder farmers.
Better farming	Adoption of improved farming technology for rice cultivation (improved seeds, fertility management, cropping and labour practices etc.)
Outputs:	
Promote better farming practices.	On-farm testing of new and improved land management technologies.
	Testing of new rice varieties through on-farm and station trials.
Upgrade extension services.	Training of extension staff in new extension techniques and farming systems research and extension.
	Increase in extension resources (staff, transport, funds).
Develop storage facilities.	Research into new and improved post harvest storage technologies for use in villages.
	Construct and operate village storage sheds

Activities: the means to the ends

To achieve the expected outputs of a project, will require the implementation of different activities or actions by the project. These are the means to achieve the project's objectives, its "ends". The immediate results of project activities should be the achievement of the its expected outputs or results. By achieving these it leads to the achievement of the project purpose, and through this to contribute to achieving the project goal. For example, a project activity of on-farm research or farmer training has an effect on the

objective of raising farm productivity on an irrigation scheme; but the project itself does not directly produce, but provides the means (on-farm research/training) to achieve the ends (productivity). The cause and effect relationships between project activities and objectives is the upwards vertical logic of the logical framework. Vertical logic works both ways, so the downwards logic is that project objectives (ends) require project activities (means), so in the example the objective of productivity may require a specific activity - on-farm research or farmer training. This logic is illustrated in Figure 7.3.

Figure 7.3 The means to the ends: from activities to project objectives



Assumptions and external conditions

As discussed earlier in this chapter projects operate in a wider social, economic, political and biophysical environment. A project usually has little influence over this wider and environment and will be affected by changes to this environment. These may have negative or positive impacts on the project, and effect whether the project is able to meet its stated objectives (goal, purpose and outputs). In developing the project it is necessary to make assumptions on the project environment, and the major conditions or factors necessary for its successful implementation. It is important to make assumptions at different levels: goal, purpose, outputs and activities. The inclusion of the major assumptions on external conditions and factors upon which the project is dependent for its success in the logical framework, allow some assessment of the "risk" of the project in not meetings its objectives. These assumptions on external conditions are given a separate column in the logical framework matrix.

Indicators and verification

Once the objectives of a project have been established, how is the achievement of these different objectives to be assessed and monitored? To do this it is useful to establish indicators which can be measured to determine whether the project is meeting its objectives. Different indicators can be identified for the different levels of objectives: goal, purpose and outputs.

Indicators should ideally specify quality, quantity and time. They should be given for each level of objective (goal, purpose and output) and activity, and in effect are the target we set to indicate that the objective has been achieved or the activity successfully completed. Table 7.2 gives some examples of indicators for rural projects.

To be useable indicators need to be both easily measurable and reliable. They must, in other words, be objectively verifiable and each must have a means of verification or measurement. This is important as they will be used as part of monitoring and evaluation system of the project. "Objectively Verifiable" means that two observers of the indicator should both independently reach the same result. This means that objectives have been clearly defined in measurable terms and that the indicator does not involve subjective judgements. A "means of verification" must be able to be specified for each indicator. The means may be existing secondary data (such as trade statistics), primary data collected specifically for the project (such as farm surveys) or information usually available in institutions (such as loans issued, or project budget reports).

Qualities looked for in means of verification are that the means are capable of providing reliable data while being time-effective and cost-effective. This is explained further in the chapter on Monitoring and Evaluation. For ongoing monitoring the project management will need relatively quick and low cost information on the indicators of achievement. Evaluation can include more expensive and time consuming measures such as long term surveys.

Farm incomes are a particularly difficult indicator to measure in a reliable way since farmers are understandably reluctant to give true values of their income to strangers or government officials. Hence it is more effective to seek "indicators" of changes in incomes from other sources, such as crop and livestock sales to traders or markets, and to use "proxy" indicators such as observable house construction or sales of durable goods in farming areas. While these proxies do not fully "measure" the achievement of objectives they give general indications and may be suitable for monitoring in a cost- and time-effective way. Later, in-depth evaluations may use complex survey methods to attempt to measure income effects and impacts more comprehensively.

Table 7.2 Examples of performance indicators for sustainable rural projects

Characteristic of objectives (purpose, outputs, and activities)	*Indicator*
Self-Reliance and Sustainability (Staff and Funds)	Ratio of expatriates/senior local staff Transfer of responsibilities (to local staff) Transfer of responsibilities (maintenance) Volume of external financial assistance Percentage of foreign exchange used Sources of recurrent costs Recurrent cost recoveries - fees and charges Beneficiary contributions to capital costs Sources of recurrent costs Recurrent cost recoveries - fees and charges Beneficiary contributions to capital costs
Self-Reliance and Sustainability (Institutional)	Management and Leadership Training Monitor Community General Meetings Monitor Community Executive Meetings Monitor Organisation Income + Expenditure
Labour Inputs	Community Labour Records Percentage of male/female employment Turn-out rates by villages and individuals
Resource Inputs	Contributions of material by community Monitor use of scarce resources (e.g. fuelwood)
Environment	Monitor Positive and Negative Effects Monitor Control and Conservation Activities Monitor any Winners and Losers effects (Compensation mechanisms)
Benefits	Usage and Adoption Rates Compare with/without project (if possible) Levels of income (or proxy indicators) Health and Nutrition Improvements Levels of Beneficiary Investments e.g. on farm

Steps in the preparation of a logical framework

The main steps to the preparation of a logical framework for a project were shown in Figure 7.2. A practical approach to these steps is described in the following sections using an example of hypothetical agricultural project. The process of using logical frameworks in project design is discussed further under objective orientated planning.

Define the project goal

The first step is to define the overall goal under which the project will operate. This will often be a stated national or sectoral goal of the Ministry. An example could be "to increase food production for domestic consumption and food security in Tanzania". This goal would then be inserted into the top left corner of the logical framework matrix as shown in Figure 7.4.

Figure 7.4 Logical framework - goal added

Narrative summary	*Verifiable indicators*	*Means verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.			*Goal Sustainability*
Purpose			*Purpose to goal*
Outputs			*Output to purpose*
Activities	*Inputs*	*Monitoring*	*Activity to output*

Define the project purpose

The next step is to determine or define why the project is being undertaken. What is the project expected to achieve? What is the overall impact of the project,? This should contribute to achieving the project goal. A project should only have one purpose, and it should not be the same as one of the project outputs, or the overall goal. In our example the purpose of a project contributing to the overall goal could be "the rehabilitation of irrigation schemes in the Mbeya region". This narrative would then be inserted in the purpose box in the logical framework, Figure 7.5.

Figure 7.5 Logical framework - purpose added

Narrative summary	*Verifiable indicators*	*Means of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.			*Goal sustainability*
Purpose The rehabilitation of irrigation schemes in the Mbeya region.			Purpose to goal
Outputs			Output to purpose
Activities	Inputs	Monitoring	Activity to output

Define the project outputs (results)

Now determine what the project is expected to actually accomplish. What are the outputs or results of the project going to be? There will normally be several outputs from one project which all contribute to the project purpose. These should be produced by the project during its lifetime. In our example possible outputs could be: on-farm research with farmers to develop new or improved technologies for irrigated rice; training of farmers in the use of new technologies and irrigation practices; renovation and renewal of existing infrastructure on existing schemes; and, formation of water uses groups for the management and maintenance of irrigation infrastructure.

These are then inserted in the outputs box in the logical framework, Figure 7.6.

Figure 7.6 Logical framework - outputs added

Narrative summary	*Verifiable indicators*	*Means of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.			*Goal sustainability*
Purpose The rehabilitation of irrigation schemes in the Mbeya region.			*Purpose to goal*
Outputs 1. On-farm research with farmers to develop new or improved technologies for irrigated rice. 2. Training of farmers in the use of new technologies and irrigation practices. 3. Renovation and renewal of existing infrastructure on existing schemes. 4. Formation of water uses groups for the management and maintenance of irrigation infrastructure.			*Output to purpose*
Activities	*Inputs*	*Monitoring*	*Activity to output*

Define the project's activities

To achieve each output requires the implementation of a number of activities. These should be identified and defined for each of the project's stated outputs. In our example the activities for the first output could be: training workshops in on-farm and participatory research for research and extension staff; researcher managed on-farm trials for new rice varieties; and, farmer managed on-farm trials of new or improved irrigation management practices. The activities for all the outputs are then inserted into the logical framework. In our example only the activities of the first output are shown, Figure 7.7.

Figure 7.7 Logical framework - activities for first output added

Narrative summary	*Verifiable indicators*	*Means of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.			*Goal sustainability*
Purpose The rehabilitation of irrigation schemes in the Mbeya region.			*Purpose to goal*
Outputs 1. On-farm research with farmers to develop new or improved technologies for irrigated rice. 2. Training of farmers in the use of new technologies and irrigation practices. 3. Renovation and renewal of existing infrastructure on existing schemes. 4. Formation of water uses groups for the management and maintenance of irrigation infrastructure			*Output to purpose*

Activities	Inputs	Monitoring	Activity to output
1.1 Training workshops in on-farm and participatory research for research and extension staff. 1.2 Researcher managed on-farm trials for new rice varieties. 1.3 Farmer managed on-farm trials of new or improved irrigation management practices.			

Identify important assumptions

The next step is to identify and describe the important assumptions made about the external environment and conditions which are outside of the control of the project, but on which it depends. These assumptions should be made for the four different levels: goal, purpose, outputs and activities.

The assumptions at the goal level should be those which produce the necessary conditions for achieving this goal, the sustainability of the goal - assumptions for achieving the "super goal". The assumptions at the purpose level should be those for achieving the goal; assumptions at the outputs level should be those for achieving the purpose; and assumptions at the activity level should be those for achieving the outputs. Assumptions about achieving activities should be placed underneath the activity level assumptions. In our example possible assumptions at the different levels could be:

goal sustainability:
1. Successful implementation of economic reforms and stable economy.
2. Good governance and political stability.

purpose to goal:
1. Sectoral support to irrigation remains a priority.
2. Economic conditions favour irrigated production.

outputs to purpose:
1. Target institutions invest and adopt new research and extension approaches.
2. Appropriate designs available for renewal of irrigation structures.
3. Appropriate irrigation technologies identified and adapted from research.

activities to outputs:
1. Active participation by researchers and extension agents at workshops.
2. Researchers and extension agents adopt new approaches.
3. Farmers willing to be involved and to manage trials.

These assumptions are inserted into the logical framework, Figure 7.8.

Figure 7.8 Logical framework - assumptions added

Narrative summary	*Verifiable indicators*	*Means of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.			*Goal sustainability* 1. Successful Implementation of economic reforms and stable economy 2. Good governance and political stability.
Purpose The rehabilitation of irrigation schemes in the Mbeya region.			*Purpose to goal* 1. Sectoral support remains a priority. 2. Economic conditions favour irrigated production.
Outputs 1. On-farm research with farmers to develop new or improved technologies for irrigated rice. 2. Training of farmers in the use of new technologies and irrigation practices. 3. Renovation and renewal of existing infrastructure on existing schemes. 4. Formation of water uses groups for the management and maintenance of irrigation infrastructure.			*Output to purpose* 1. Target institutions invest and adopt new research and extension approaches. available for renewal of irrigation structures. 3. Appropriate irrigation technologies identified and adapted from research
Activities 1.1 Training workshops in on-farm and participatory research for research and extension staff. 1.2 Researcher managed on-farm trials for new rice varieties. 1.3 Farmer managed on-farm trials of new or improved irrigation management practices.	*Inputs*	*Monitoring*	*Activity to output* 1.1 Active participation by researchers and extension agents at workshops. 1.2. Researchers and extension agents adopt new approaches. 1.3. Farmers willing to be involved and to manage trials.

Define indicators in terms of quality, quantity and time

The next step is to define indicators at each of the four levels which will be used to monitor and assess the performance of the project in meeting these. Indicators should specify quantity, quality and time taken to achieve them. At the activity level indicators will be the inputs needed to undertake this activity, and should include a budget or financial summary. Examples for our example could be:

goal: By 2010 food production should have increased by 10%, and national food reserves should contain 6 months supply.

purpose: Rice production on irrigated schemes should have increased by 20% by 2005.

outputs:
1. 20 on-farm research and farmer managed trials implemented to test at least 5 new technologies per annum.
2. 100 farmers per annum receive training in new technologies.
3. Renovation of irrigated schemes - 100 hectares per annum.
4. Water users groups meeting bimonthly and managing schemes.

activities: Finance, materials, staff, labour, training costs, vehicles, and facilities. (These are the project inputs)

These indicators are now inserted into the logical framework. Figure 7.9.

Determine the means of verification of indicators

The next to last step in developing the logical framework is to identify the means to verify the indicators for each level. This should include sources of information which would contain this data, and sometimes the methods to measure these indicators. The means of verification in our example could include:

goal: Official government statistics and reports.

purpose: Farm and market surveys, and project annual reports.

outputs:
1. Project reports, and scientific papers, farmers meetings, workshop reports.
2. Workshop reports, water user meetings feedback and reports.
3. Project annual report and monitoring visits.
4. Minutes of water user meetings, and project reports.

activities: Monitoring through project monthly and annual reports.

These means to verify the indicators are now also inserted into the logical framework which is now complete as shown in Figure 7.10. (NB We have only shown the activities for the first output.)

Figure 7.9 Logical framework - indicators added

Narrative summary	*Verifiable indicators*	*Means of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.	By 2010 food production should have increased by 10%, and national food reserves should contain 6 months supply.		*Goal sustainability* 1. Successful Implementation of economic reforms and stable economy 2. Good governance and political stability
Purpose The rehabilitation of irrigation schemes in the Mbeya region.	Rice production on irrigated schemes should have increased by 20% by 2005.		*Purpose to goal* 1. Sectoral support to irrigation remains a priority. 2. Economic conditions favour irrigated production.
Outputs 1. On-farm research with farmers to develop new or improved technologies for irrigated rice. 2. Training of farmers in the use of new technologies and irrigation practices. 3. Renovation and renewal of existing infrastructure on existing schemes. 4. Formation of water uses groups for the management and maintenance of irrigation infrastructure	1. On-farm research and farmer managed trial trials implemented to test at least 5 new technologies per annum. 2. 100 farmers per annum receive training in new technologies. 3. Renovation of irrigated schemes - 100 hectares per annum. 4. Water users groups meeting bimonthly and managing schemes		*Output to purpose* 1. Target institutions invest and adopt new research and extension approaches. 2. Appropriate designs irrigation structures. 3. Appropriate irrigation technologies identified and adapted from research.
Activities 1.1 Training workshops in on-farm and participatory research for research and extension 1.2 Researcher managed on-farm trials for new rice varieties. 1.3 Farmer managed on-farm trials of new or improved irrigation management practices	*Inputs* Finance/budget Materials Staff Labour Training costs Vehicles Facilities.	*Monitoring*	*Activity to output* 1.1 Active participation by researchers and extension agents at workshops. 1.2. Researchers and extension agents adopt new approaches. 1.3. Farmers willing to be involved to manage trials.

Figure 7.10 Final logical framework - means of verification added (NB only activities for one output included)

Narrative summary	*Verifiable indicators*	*Mean of verification*	*Assumptions*
Goal To increase food production for domestic consumption and food security in Tanzania.	By 2010 food production should have increased by 10%, and national food reserves should contain 6 months supply.	Official government statistics and reports	*Goal sustainability* 1. Successful Implementation of economic reforms and stable economy 2. Good governance and political stability
Purpose The rehabilitation of irrigation schemes in the Mbeya region.	Rice production on irrigated schemes should have increased by 20% by 2005.	Farm and market surveys, and project annual reports.	*Purpose to goal* 1. Sectoral support to irrigation remains a priority. 2. Economic conditions favour irrigated production.
Outputs 1. On-farm research with farmers to develop new or improved technologies for irrigated rice. 2. Training of farmers in the use of new technologies and irrigation practices. 3. Renovation and renewal of existing infrastructure on existing schemes. 4. Formation of water uses groups for the management and maintenance of irrigation infrastructure.	1. On-farm research and farmer managed trials implemented to test at least 5 new technologies per annum. 2. 100 farmers per annum receive training in new technologies. 3. Renovation of irrigated schemes - 100 hectares per annum. 4. Water users groups meeting bimonthly and managing schemes.	1. Project reports, and scientific papers, farmers meetings, workshop reports. 2. Workshop reports, water user meetings feedback and reports. 3.Project annual report and monitoring visits. 4. Minutes of water user meetings, and project reports.	*Output to purpose* 1.Target institutions invest and adopt new research and extension approaches. 2. Appropriate designs available for renewal of irrigation structures. 3. Appropriate irrigation technologies identified and adaptedfrom research.
Activities 1.1 Training workshops in on-farm and participatory research for research and extension staff. 1.2 Researcher managed on-farm trials for new rice varieties. 1.3 Farmer managed on-farm trials of new or improved irrigation management practices.	*Inputs* Finance/budget Materials Staff Labour Training costs Vehicles Facilities	*Monitoring* Monitoring through project monthly and annual reports	*Activity to output* 1.1 Active participation by researchers and extension agents at workshops. 1.2.Researchers and extension agents adopt new approaches. 1.3. Farmers willing to be involved and to manage trials.

Review of logical framework

The final stage in the preparation of the logical framework is to review it, to check its logic and that the indicators identified are easily measured and reliable. A recent publication from DFID (1997) suggests that in reviewing a logical framework you should check to see if it answers the questions given in Box 7.5.

Box 7.5 Questions to answer when reviewing a logical framework

Goal:

- What is the overall problem the project is trying to solve?
- How will the project contribute to its solution?
- How will the contribution be measured?
- What other key conditions need to be met, and what are the risks and assumptions?

Purpose:

- What will be the project's direct effects and impacts?
- How will these help solve the problem?
- How will the impacts be measured?
- What other key conditions need to be met if the project is to contribute to the goal, and what are the risks and assumptions?
- How will the impacts and benefits of the project be sustained?

Outputs:

- What will the project deliver, or what are its expected results?
- How will the project generate its impacts?
- How will the outputs be measured?
- What other key conditions need to be met if the outputs are to contribute to the project purpose, and what are the risks and assumptions?

Activities:

- What is going to be done?
- What skills, goods, equipment, facilities, and services are required to do this?
- What finance is required?
- What other key conditions need to be met if the activities are to produce the project's outputs, and what are the risks and assumptions?

Adapted from DFID, 1997

Participatory development and logical frameworks

There is now considerable experience of the use of LFA to increase the participation of stakeholders in the design and preparation of projects. The combination of LFA and participatory development methods has the rather long title objective orientated intervention planning (OOIP) or objective orientated planning, it is also known as ZOPP - the German acronym. An outline of this method for project planning is given in the following section. Several guideline have also been prepared, including one by NORAD (1996) which is recommended to the reader.

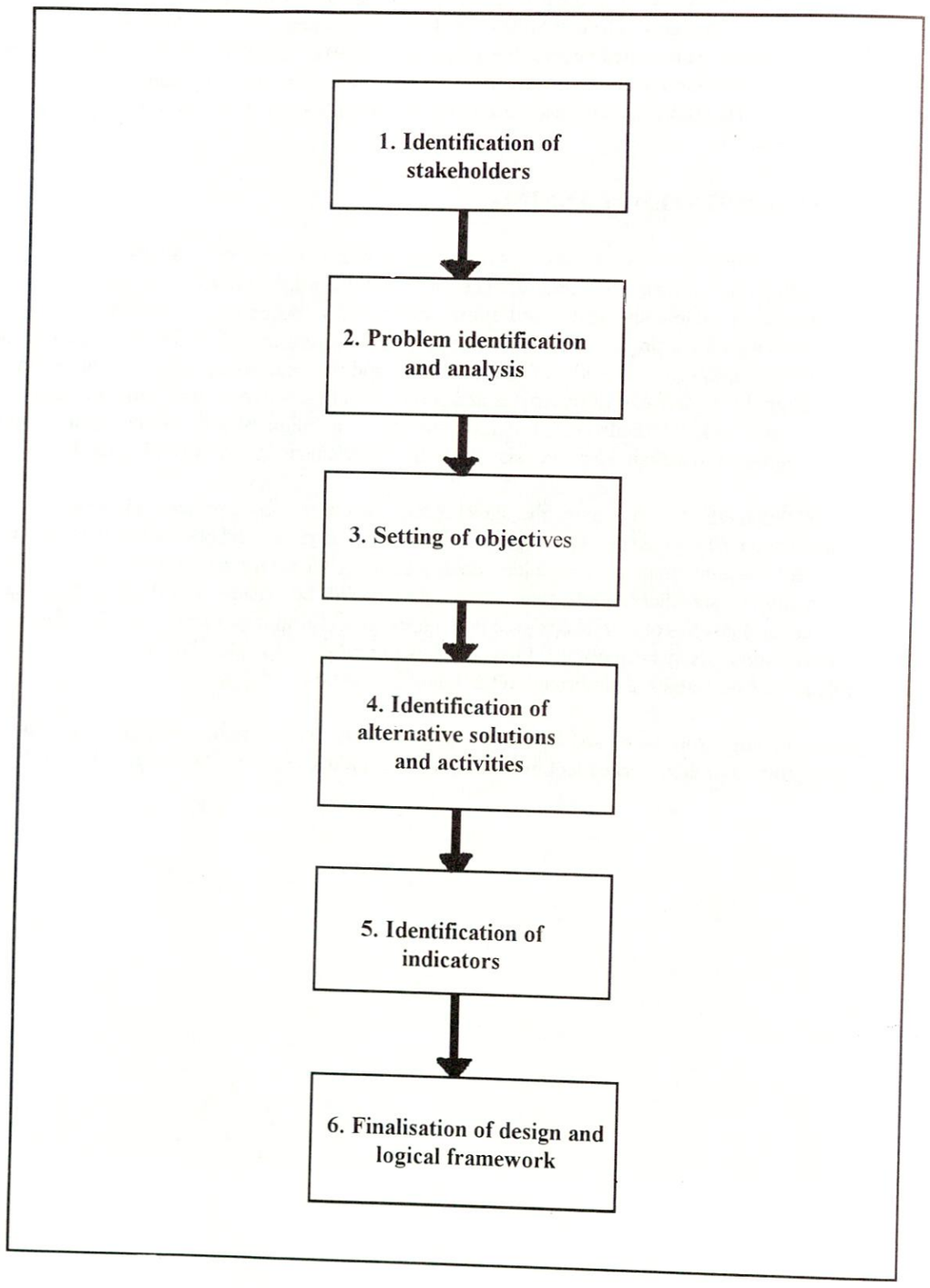
OBJECTIVE ORIENTATED PLANNING

The OOIP approach to project planning combines the use of LFA in a process which attempts to ensure the participation of project stakeholders (especially beneficiaries) in the process. OOIP uses a group, or team, approach to obtain all available knowledge and information for a proposed project, and based on this a consensus on best design for a project. To achieve this, OOIP uses a range of participatory approaches (see PRA/PLA) and team exercises to identify the problems and their causes the project is proposing to address, and through this to arrive at its objectives and activities. These are then used in the preparation of a project logical framework. OOIP also uses the results of other type of analysis described in this chapter including social, gender and stakeholder analysis. OOIP has six elements as shown in Figure 7.11.

The first part of this method is to identify the stakeholders for the proposed project. Thus the project's proponents must have first decided the type of project they want to support, and often the geographic area. This process is described in chapter 6 on Project Identification. After identification of the stakeholders a meeting or workshop of stakeholders and their representatives will be organised to develop the project. Prior to the workshop (or series of workshops - see Box 7.6 for the GTZ approach) all available information on the project area should have been obtained where this is practically possible. This workshop is used to identify problems and objectives as described in the following sections.

A participatory planning approach used by DFID includes visits, observation, focus group etc. It uses various participatory approaches to collect information. Its main features are illustrated in Box 7.7.

Figure 7.11 **The six steps in objective orientated planning**



Box 7.6 GTZ approach for OOIP

GTZ commonly allow for five ZOPP workshops during the life of a project. Typically these are used:

- In preparation to decide whether a full project appraisal is required.
- As preparation for the project appraisal
- With the project partners in-country, i.e. before detailed planning of inputs and services.
- In preparation of the plan of operations.
- During re-planning (possibly more than once).

Box 7.7 The DFID Participatory Planning Approach: The Kribhco Project

1) Cluster/village selection (project team) and visits (community organisers)
2) Village entry and rapport building. Discuss development issues with villagers
3) Participatory Rural Appraisal (PRA) including village maps, natural resource maps, information relevant to farming (weather, soils, plants, stock) farming calendar, household data, village kinship diagram, village history, land and stock ownership
4) Community problem analysis
5) Identification of development problems
6) Prioritisation of development problems
7) Negotiation of village workplan.

Problem analysis

It is important to recognise that different stakeholders will have different ideas and perspectives about the problems that a project should address. Governments and donors may have little appreciation of the problems that local people consider important. Problem analysis attempts to identify the range of problems which are faced and to determine the root or focal problem which a project should address. The method used to do this is the problem tree. The first step is to agree on this focal or core problem, if this is not possible then it should become clear in an analysis of all the problems presented by assessing the causes of these problems.

There is often an hierarchy of problems - one problem may be the cause of another. For example, soil erosion could be the focal problem but this could cause a range of other problems: decline in crop yields; food insecurity; sedimentation of rivers and reservoirs; etc. The format of a problem tree is given in Figure 7.12. In this the (focal or core) problem is placed in the centre below which are listed the causes of the problem and above it are the effects of the problem (these will often be other problems identified by the group). The effects develop into the branches of the tree, while the causes develop into the roots of the tree.

A problem tree will go through a number of iterations (reversions) before an amended version is agreed. To reach a consensus may be time consuming and requires the gradual build up of knowledge and skill of the participants. An example of a problem tree where the main problem is increased soil erosion is given in Figure 7.13

Figure 7.12 Format of a problem tree

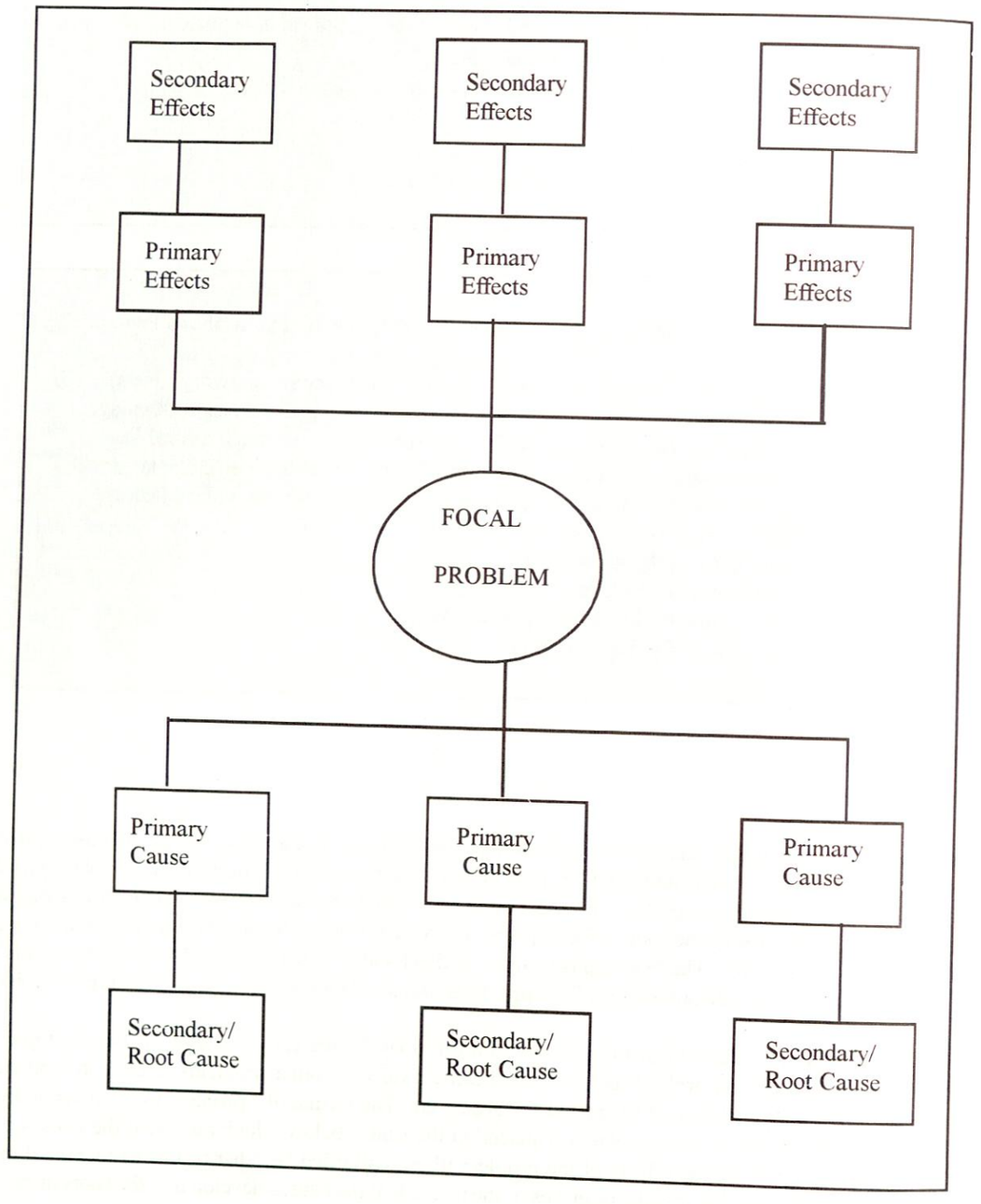
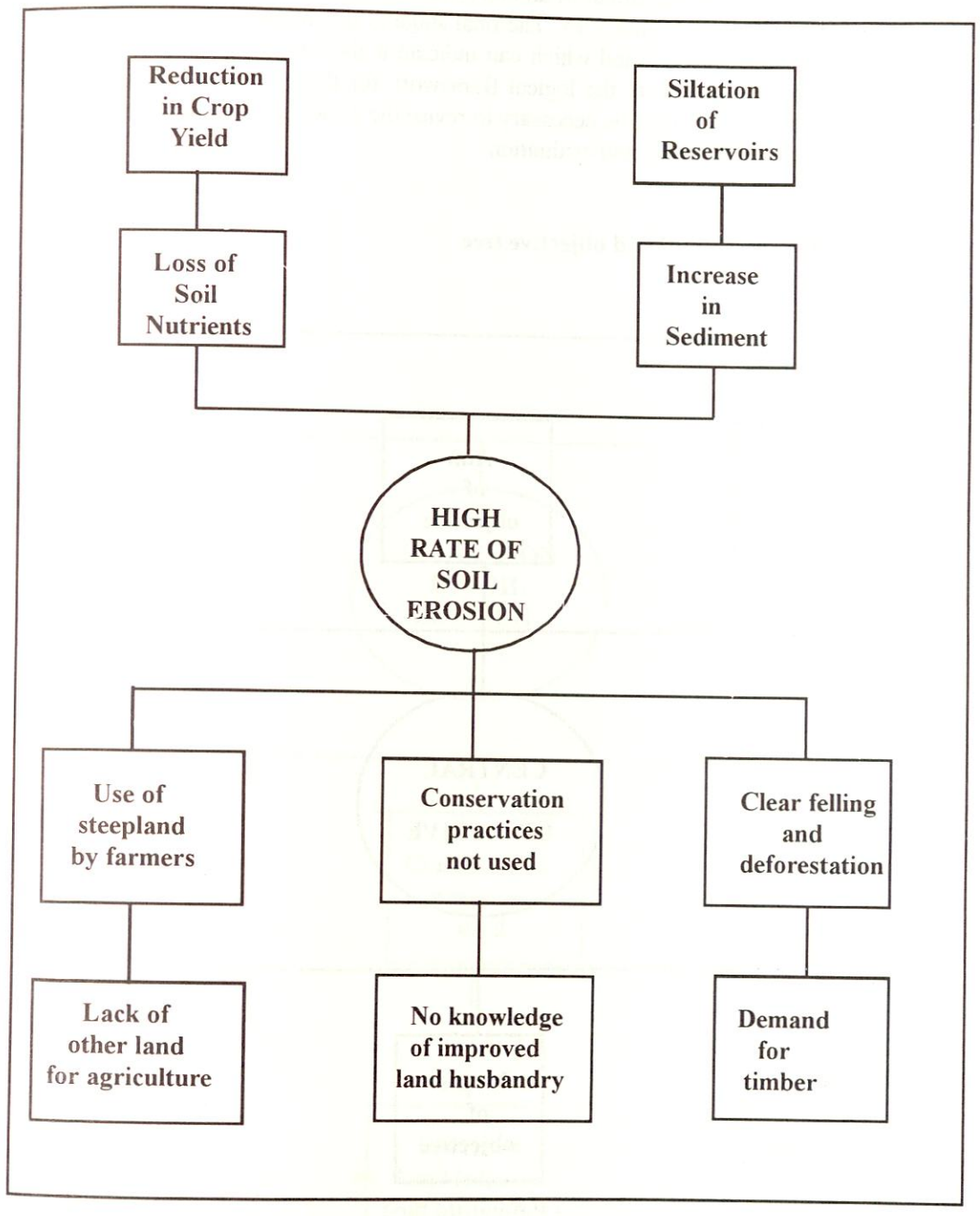


Figure 7.13 Example of a problem tree - Soil erosion is the focal problem



Objective analysis and activities

In objective analysis the problem tree is turned into an objective tree, by looking for solutions to this problem. The focal problem becomes the central objective or purpose; solutions to the causes become the means to achieve our objectives; while the removal of the effects are turned into the aims or ends of the project. In our example the root problem is serious soil erosion (leading to land degradation) could become

the objective to prevent soil erosion and reduce land degradation. Above the objectives are the aims (or purpose of the objective), and below it are the means of achieving the objective - these then become the project activities. An example of the format of an objective tree is given in Figure 7.14, and the example for the problem of soil erosion in Figure 7.15. The final stage of the method is to develop indicators by which the activities can be measured and which can indicate if they are successful. The results of the workshop can now be used to prepare the logical framework for the project. As project development continues meetings, or workshops may be necessary to revise the project and its logical framework. This would also be part of any monitoring and evaluation.

Figure 7.14 Format of a simplified objective tree

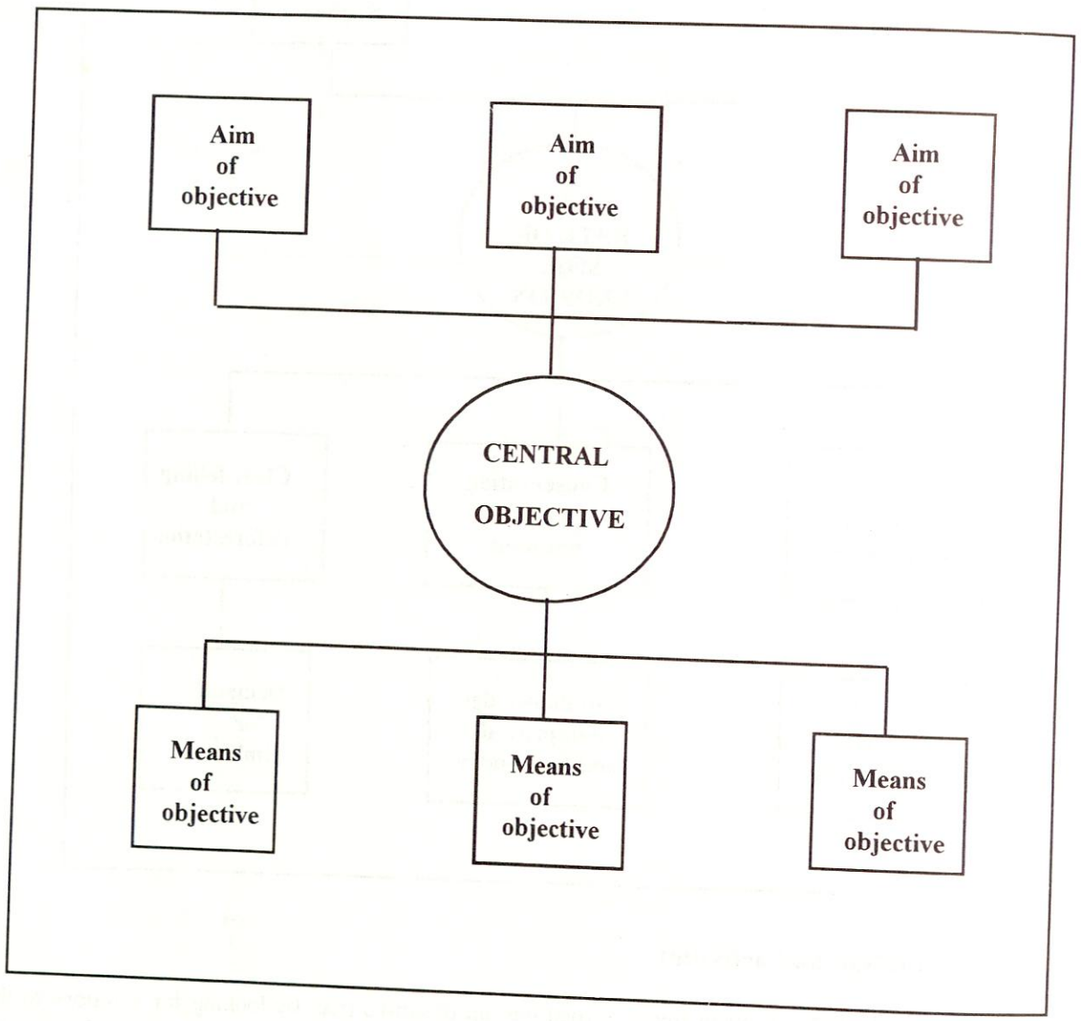
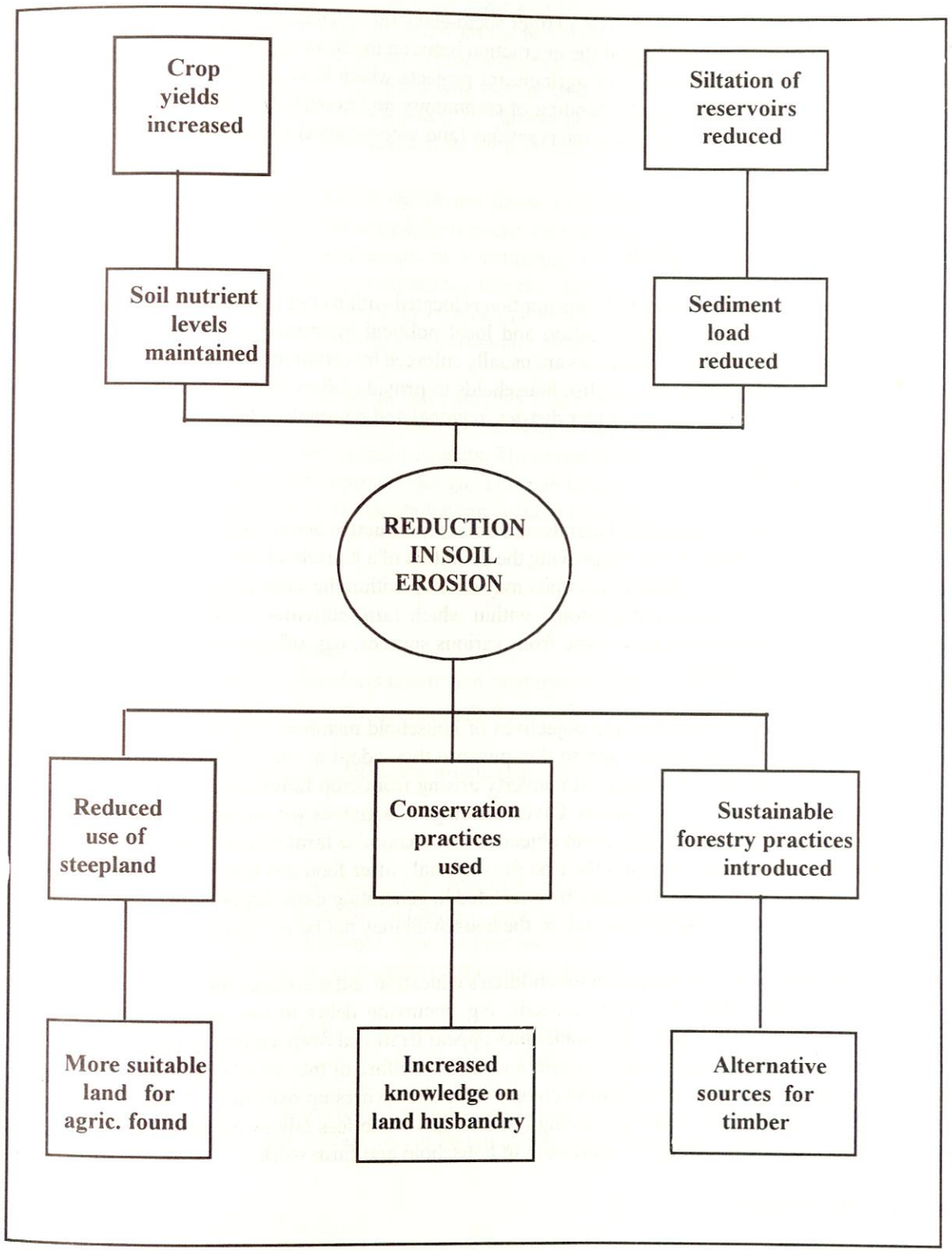


Figure 7.15 Example of an objective tree - soil erosion was the focal problem



SOCIAL ANALYSIS

Rural households operate in the context of a larger socio-economic system, one of the keys to sustainable development is a better understanding of the interaction between the farm and this wider system. This has significant implications for the design of agricultural projects which have often been neglected in more conventional project design. The understanding of community and household dynamics, and institutions and how these affect agricultural project interventions (and vice-a-versa) is essential. Some of the basic concepts are now considered.

Household and community systems

The household system of production and consumption is located within community level systems including land tenure, social organisation, stratification and local political institutions, e.g. the rules and rights governing use of common property resources are usually enforced by community social control; community leaders may also have the power to mobilise households to provide labour for community purposes. The community, in turn, interacts with the wider district, regional and national system.

The household economy

This includes the productive, household maintenance and reproductive activities of the family or group of people who "eat from a common pot". Improving the definition of a household can be difficult, e.g. in West Africa several productive and consumption units may overlap within the same compound. In this way, the farm is one aspect of the household economy within which farm activities interact with off-farm and domestic activities. Farm income may come from various sources, e.g. off-farm employment, non-farm production, small scale trading.

Farmers' behaviour is conditioned by the objectives of household members. The first objective of many small farm households' is to survive and to this purpose they adopt a range of survival strategies, i.e. measures to minimise the risk of sinking into poverty arising from crop failure or external events, by e.g. inter-cropping, diversifying income sources. Given the range of activities within the household economy, it cannot be assumed that the household's main objective is to maximise farm output or profits from the sale of farm products. Food security is often the first priority; only after food and household requirements for the year have been secured will the farmers be interested in generating cash. Equally, if it is easier to earn cash from off-farm sources to meet basic needs, the household may not be interested in selling food crops.

Other household objectives, e.g. provision for children's education and marriage, enter into farm decisions. Fulfilment of the households reproductive needs, e.g. incurring debts to pay for a son's wedding or accumulating cattle for bride wealth, may sometimes appear irrational from a purely economic perspective but are perfectly rational in terms of the current and future welfare of the household. Farmers' objectives are also influenced by changes in household composition and ownership over time, sometimes called the Domestic Cycle, e.g. a family with very young children has much less labour capacity than it will have when these children are old enough to contribute to household and farm work.

Intra-household dynamics

Models used in investment project analysis sometimes assume the family farm is a unified production and consumption unit which pools labour and earnings. However, in actuality, each enterprise may be considered separately and cash transactions occur within the household, e.g. between spouses. Farm land may be

divided between, e.g. subsistence production for the whole household and land allocated the wife or to individuals for own account activities, produce may also be stored separately. In this case, the head of household only controls income and produce from the household fields; crops and income from personal plots are not pooled but retained by the family member concerned. Individuals may be involved in several overlapping production units. For example a wife may be obliged to contribute labour for the family plot but not for her husband's personal fields unless he compensates her for the work. Work requirements on household fields may also leave insufficient time for personal plots since these are competing activities.

Gender roles and relations are also a significant factor in intra-household dynamics; socially defined division of labour often produces separate labour peaks for men and for women. It cannot be assumed that labour bottlenecks can be overcomed simply by substituting one for the other, although this is sometimes taken to be the case in household micro-economic theories. In practice, rigidity of gender roles and hence labour division can prevent the household responding to market signals when, for instance, women's reproductive roles constrain their capacity to participate in farm production.

Many agricultural projects are deliberate interventions that aim to change and improve socio-economic systems which may have evolved over centuries. Although they are intended to have a positive effect overall, there are likely to be some negative aspects. These can be mitigated if the present situation is well understood and taken account of in project design. This can be achieved through sensitive design, and the use of other analysis methods such as stakeholder and gender analysis and participatory methods of project preparation.

Organisation of Production

The key issues to be considered are:

- How will the project affect land tenure and land use rights?
- How will the project affect the access of different groups in the community to other factors of production?
- What changes can be expected in the production system?

Land Tenure and land use rights

Even if land redistribution is not an explicit objective of the project, access to land is always a very sensitive issue. If land gains value through direct improvement, e.g. irrigation or by adoption of more productive cultivation techniques, competition for land increases. Even in small irrigation schemes, land designed for small farmers may be appropriated by more powerful people.

There often exist a range of rights to use land for different purposes by different groups within local communities. These may include grazing rights, or the right to collect fuelwood from a local forest. The development of agricultural land may mean individuals or groups lose these rights when the land is acquired and converted for permanent cultivation. This issue needs to be carefully considered and if rights are to be lost, communities have to agree to this and to be compensated for this loss (see Kilombero Project case study in chapter 9).

Access to other factors of production

The target group may be unable to purchase the package of inputs/equipment, nor be able to take choice in order to benefit from the project. It is necessary to assess whether farmers will be able or willing to use inputs as recommended (or may be used for other crops or sold).

Changes in the Production System

Changes in the organisation of production may alter the relationship between farmers in terms of hiring of equipment or labour. The need for draught power may cause farmers to take up animal breeding where it might previously have been the preserve of herders.

There is also the question of how increased labour requirements will be met within the family labour unit. It may precipitate a change in the gender division of labour which might also affect the traditional division of income, e.g. if a project encourages the sale of animals (controlled by men) there may be a conflict because milk production (controlled by women) is affected. Some projects have accelerated the process whereby traditional extended families breakdown into nuclear families, e.g. by allocation of production factors to all men. Some projects have failed to recognise that a particular crop was a women's activity and directed inputs and training towards men.

Projects often assume all labour to be equal and only value it in terms of hours or days worked. Certain types of labour tasks are much easier or harder. For instance, weeding under tree shade in an agroforestry systems is much easier than weeding in the sun. Most of us prefer to work in the shade.

Settlement patterns

Changes in settlement patterns may be an indirect consequence of an agricultural project, e.g. restrictions on movement of pastoralists. Spatial population redistribution can occur if a project creates a zone with high potential, e.g. irrigation schemes, or cattle projects which create watering points. Labour shortages and changing wage patterns, arising from cropping changes, may cause temporary migration. Land settlement schemes have sometimes been overwhelmed by unexpected inflows of people, and the effect of a project on "non-target" groups must be anticipated.

Health and nutrition effects

The project may have indirect effects on nutrition, e.g. where meal preparation is affected by women's greater involvement in production activities or where milk production-consumption decreases through sale of animals or changes in transhumance patterns. Many projects have a health component, e.g. inoculations, health centres etc. but indirect effects may arise from, e.g. changes in nutrition with new cropping patterns, dams and irrigation water bringing parasites, pollution from agro-industrial plants (see chapter 9).

STAKEHOLDER ANALYSIS

The concept

The ideas of participation developed in chapters 4 and 5 usually refer to the active inclusion of beneficiaries in project identification, design and implementation. The concept of stakeholding includes such participation but goes further in bringing in not just beneficiaries but a wider group of stakeholders.
Stakeholders may be defined as all those people and institutions who have an interest in the successful design, implementation and sustainability of the project. This includes those positively and negatively affected by the project. Stakeholder participation involves processes whereby all those with a stake in the outcome of a project actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project and hence ultimately their own interests.

The concept of stakeholding originated in large industrial companies concerned to involve as many people as possible in making the company successful. These included not only employees at all levels but suppliers, customers and financiers. The operational processes for stakeholding were teamwork, profit sharing, works councils, quality and value circles, and general sharing of ideas and information on how to improve products, services and earnings. The basic feature of stakeholding is that it aims to be "inclusive" and not exclusive. That is, it recognises that close co-operation between all interested parties yields better results than planning and management that is distant, exclusive, bureaucratic or based on power relations.

Stakeholders can be classified into different types based on their functions and degree of involvement in the project. These types are given in Table 7.3. An example of the possible classification of stakeholders in a large agricultural project is shown in Table 7.4. This example gives thirteen different stakeholders ranging from direct beneficiaries to off-farm groups.

Table 7.3 Classification of stakeholders

1. According to function:	
Category	***Description***
Contributors:	Funding and sponsoring organisations. Principally donors and various departments of government supplying funds and staffing for the project.
Implementers:	The people or organisations employed or assigned to implement and manage the project, including associated institutions.
Beneficiaries	The people or organisations who benefit from, or use, the goods and services provided by the project.
2. According to degree and type of stake:	
Category	***Description***
Primary	Those who gain material benefits from the project, or who make direct contributions of resources or services to the project.
Secondary	Intermediaries in the implementation process of delivering the project benefits and who may make some gains (or losses) from their involvement.
Key	Those who have significant power or influence to determine the direction and outcomes of the project.
Negative	Those who may suffer material losses or loss of influence.

Stages of stakeholder analysis

There are five main stages in a stakeholder analysis, these are:

Identifying and listing all potential stakeholders.
Identifying their interests in relation to project objectives and activities
Assessing the likely impact of the project on each of those interests
Assessing the relative importance of each stakeholder to the success of the project
Drawing up a "Participation Matrix"

The outcome of stages 1 to 4 is a stakeholder table which lists all the main stakeholders, their interest in the project, the potential impact of the project on them, and the relative importance of their involvement in the project. An example of a stakeholder table is given in Table 7.5.

Table 7.4 Example of different stakeholders in an agricultural project

Stakeholder	*Description*	*Category*
Donor	One or more funding agencies providing financial support.	Primary, Key, Contributor
Treasury	Ministry of Finance as manager of aid funds and as contributor of recurrent costs for project	Primary, Key, Contributor
Ministry of Agriculture	At national, regional and district level. Involvement may be divided between a) policy and administration and b) services such as extension and research	Primary, Key, Contributor, Implementers Beneficiary
National Planning Commission	Agency responsible for national planning and development activities.	Primary, Contributor
Divisions of Wildlife or Environment	Concerned with the impacts on wildlife -environment from conversion of land to agriculture.	Secondary/negative
Project team	The project management team may include international consultants, contracted local staff, seconded government staff.	Primary/secondary, Key, Implementers
Farmers	Small farmers who benefit from project activities but who may be required to make small but significant contributions.	Primary, Key, Beneficiaries, Contributors
Households	Households who benefit from project activities but who may be required to make significant contributions	Primary/secondary, Key, Beneficiaries, Contributors

Communities	Communities living in the project areas who are likely to benefit directly or indirectly from the project	Primary/secondary, Key, Beneficiaries, Contributors
Downstream communities	Communities living away from the project who may be adversely affected by project e.g. loss of surface water from irrigation project	Negative
Pastoralists	Pastoral communities displaced from project area, or denied access to traditional grazing lands.	Negative
Contractors	Private enterprises as contractors and suppliers to the project	Secondary, Implementers
Traders	Private enterprises involved in trading of crops and farm inputs,	Secondary, Key Implementers
Farmer organisations	Associations or co-operatives involved in marketing, credit, supply of farm inputs and services. Community organisations for managing irrigation schemes associated water and health components, soil erosion activities.	Secondary, Key, Implementers
Commercial	Larger private or public commercial organisations such as banks, fertiliser and seed companies.	Secondary, Key, Implementer

Table 7.5 Examples of a stakeholder table for an agricultural project

Stakeholders	*Interests*	*Project impact expected*	*Importance to project*
Donor Agencies	1. Targets achieved within life of project	Enhancement of agency position	High
Ministry of Agriculture	1. Contribution to sector performance 2. Upgrade research and extension 3. Staff development	Increase in output Extra resources Positive	High
Division of Forestry	1. Protection of evergreen forest. 2. Alternative development option for plantation forestry lost	Negative if deforestation Negative	Medium

Individual Farmers	1. Raise incomes 2. Reduce risks 3. Access to credit	Positive Positive Positive	High
Pastoralists	1. Rights to dry season grazing	Negative	High
Farmer organisations	1. Access to funds and resources 2. Business and staff development	Positive	Medium
Private traders	1. Increase turnover	Positive or Negative	Medium
Commercial	1. Sale of agricultural inputs. 2. Increase in loan activity (bank)	Positive Positive	Medium
Local Government	1 Infrastructure 2. Expansion of economic base 3. Political influence	Positive Positive Positive or negative	Medium

A stakeholder table can be used as the basis for planning a participatory approach and will be essential for planning a process project. The information from the table can be used in developing the logical framework for the project, since it identifies the people and institutions who will be involved or affected by the project's proposed objectives and activities, and be part of the assumptions made on the external conditions affecting the project. The involvement, or participation, of a project's stakeholders for different stages of the project cycle can be plotted in a participation matrix, Table 7.6. This example is a 5 x 5 matrix. The rows represent different project stages while the columns show the degrees of participation by the different groups of stakeholders. This matrix can then be used to classify the degree of active involvement/participation in the project using information from the stakeholder table. A classification is commonly used:

Partner	Active participation in the task
Consultee	Contributes information and opinion
Informee	Is given information only
Delegate	Subsidiary role may be delegated with limited consultation
Controlee	Non-participant in planning but party in implementation

Table 7.6 Outline of a participation matrix

Participant: / Stages:	*Partner*	*Consultee*	*Informee*	*Delegate*	*Controlee*
Identification	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
Design	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
Appraisal	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
Implementation	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
Monitoring & Evaluation	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.

In a participation matrix the name of each stakeholder is entered into the appropriate box for stage of the cycle according to their involvement. Clearly the more stakeholders who are in the left hand area of the table equates with a project planning process which is more inclusive and participatory. If the entries into the table is biased to the right hand side then the project planning process is more exclusive and a rethink of the planning process should be made to increase stakeholder participation.

It should be recognised that stakeholders have varying degrees of power and access to information. Small farmers in particular may not consider themselves as active stakeholders until steps are taken to involve them through consultation leading to partnership and active participation. There may be hostility from public sector staff and co-operative staff to the inclusion of private traders as stakeholders: obtaining information from traders may be difficult unless they are treated as active participants and potential beneficiaries.

Stakeholder analysis is a process which allows planners to widen the involvement of people and institutions in project planning. The participation matrix assists the project planners to draw up an agenda for inclusion of the various stakeholders in the planning process. The effect of this should be better designed projects which meet the needs of the various stakeholders and beneficiaries, partly through an increased feeling of ownership.

GENDER ANALYSIS

Gender issues

It is often wrongly assumed that gender analysis refers only to the role of women in development. However, it actually refers to the different roles men and women play in the development process. To date much of this has focused on the issues concerned with women as they have often been excluded from the development and project process, and their role in development and agriculture ignored or neglected. The focus on gender has therefore largely looked at the role of women, and at ways of redressing past biases through project and other interventions. This is not to exclude the role of men and there is a small but growing literature concerning men's` gender needs.

Gender analysis is a systematic way of looking at the differential impacts of development upon men and women. Age and class/social group are also important determinants of access to productive resources. It is important to work within existing social contexts, fuller understanding of a local community may be obtained from existing data or may entail collating information, e.g. through surveys or (preferably) the use of RR or PRA methods which involve the local community themselves. One aspect of this data collection is to understand the different gender roles and responsibilities of men and women in agriculture and hence to avoid development interventions which are likely to be detrimental to some members of the community.

Gender roles

Before analysing gender it is useful to understand the different gender roles conferred upon men and women. Gender roles can be grouped under four headings: reproductive role; productive role; community management; and, decision-making. These are discussed below. Women, especially in low income groups, will be involved in the first three roles, whereas men generally fulfil productive and community decision-making roles.

Reproductive role

Reproduction in this context refers to maintenance of the household. It includes the tasks associated with childbearing and rearing but also recurring domestic tasks. These roles are nearly always undertaken by women and are characterised by being unpaid and low status.

Productive role

Productive work can be work done for cash or for use, e.g. production on the household farm for home consumption. In a rural household productive roles include:

- Work on the household farm.
- Direct household production for consumption, e.g. food processing, pottery, husking of grain, making clothes, construction of buildings, etc.
- Non-farm income generation, e.g. the making and sale of handicrafts.
- Off-farm paid work (agricultural or non-agricultural).

Both men and women are involved in these roles. Generally men are involved in paid work or production for sale i.e. cash crops, whereas a feature of women's productive work is that it is usually unpaid because it is mostly production for use rather than sale.

Community management

This is an extension of the household reproductive role at the community level usually, but not exclusively, undertaken by women. Roles include the provision and maintenance of scare resources for the community such as water and healthcare. This work is usually voluntary and unpaid e.g. participatory development projects often assume that women will provide the necessary labour.

Community Decision-making

Men usually play the key roles in decision making on the use of the communities resources. However, women often have access to or use rights for certain resources (water, fuelwood etc.) and may be involved in the management of these resources. It is important to differentiate between access (e.g. being able to farm someone else's land) and control (owning land and being able to decide how that land is used). Women often have use rights to resources but as they lack control they often have little say in decisions regarding resource use. Also of significance for agricultural projects is that men and women are usually responsible for different types of crops and e.g. promotion of cash crops (usually controlled by men) may affect women's` access to land for e.g. vegetables for home consumption.

The Gender Analysis Matrix

The gender analysis matrix (GAM) is a tool for gender analysis of development interventions which is used to assess the likely differential effects of development projects upon men and women. It is used at the planning and design stage to determine whether the potential gender effects of the project are desirable and consistent with project goals. Table 7.7 shows the format of a GAM matrix, and Table 7.8 is an example of a completed GAM.

Table 7.7 **Format of a gender analysis matrix**

Project impact:				
	Labour	***Time***	***Resources***	***Social/Culture***
Women				
Men				
Household				
Community				

Table 7.8 Example of a completed gender analysis matrix

Project Objective	Increase women's income by supporting existing productive activity with training to use new technology to do embroidery faster. Provide credit to women to purchase technology.			
	Labour	Time	Resources	Culture
Women	+New skill acquired	+Less time to produce more output	+Producing much more -No visible increase in income for family	-Greater confidence because of new skill
Men	-Transportation of more goods difficult	-Takes more time to sell and more to purchase more inputs	+ More income generated	-Uneasy about women acquiring new skills
Household	+Women work more easily -Men work more	+Men at home less + Women have more time	-Disagreement on changes in household income	Women's status changing -Family instability
Community	+More skilled people -No employment gains observed	Men have less time for community politics	+Greater cash flow in community	+More women self-confident

Application

In project planning the GAM can be used in two ways. Firstly and ideally, it should be used during project design so that different options are assessed for their impact, and redesigned in order to either reduce negative impacts or enhance positive impact.

A list of possible strategies for more equal representation of men and women in decision-making about agricultural projects is given in Box 7.8.

Box 7.8 A checklist of strategies for more equal representation in decision-making in agricultural projects

- Strategies to increase the role of women in project design and implementation:

- Make sure that the project leader is gender-aware and that someone is 'responsible' for gender issues on the project team.
- Reserve a percentage of each funding for women-oriented activities.
- Facilitate representation of men and a women on project committees, and similar bodies.
- Inform both men and women about women's situation. Often there is a tendency to focus on women and their concerns when addressing gender issues, but men cannot be expected to understand women's concerns if they do not know on what they are based.
- Facilitate awareness of both men and women to recognise the value of women's reproductive and productive work (invisible work in the home).
- Keep men informed about the women's activities, possibly inviting them to some meetings and activities of the women (while remaining aware of the need for women to have exclusive spaces).
- Incorporate women's aspects in training and education activities for men, and vice versa.

Strategies to maximise women's involvement in project activities:

- Decentralise activities and training in order to overcome women's mobility problems: take the activities to the women, if you can't bring the women to the activities.
- Alternatively, arrange for special facilities (child care, food provision, etc.) if the activities take place at a central location.
- Adapt activities and training for women who are illiterate; and/or combine literacy with practical training (functional literacy).
- Create specific women's forums where women can express themselves freely, and involve women in women-only activities.
- Use a facilitator to allow women to speak in mixed meetings.
- Make sure that women's activities are included and maintained in projects through monitoring and ongoing support.
- Use female extension workers.
- Listen to women's expressed wishes, even if these reflect a focus on traditional 'women's activities'. Capitalise on the motivation for these activities to introduce and promote activities with a more strategic perspective.
- At the same time, we must be aware that certain barriers are impossible or extremely difficult to overcome. Plan for alternative solutions.

(Adapted from: Vinding, in Gender Planning in Development Agencies)

Box 7.8 A checklist of strategies for more equal representation in decision-making in agricultural projects (continued)

Strategies to overcome specific barriers created by language, religion, and taboo:

- Arrange for women-only activities, possibly held in homes or places where women feel safe.
- Use extensionist from the same language group of cultural background.
- Make use of traditional knowledge whenever possible, and respect ' superstitions' and taboos - but being aware, at the same time, that these may conflict with gender-fair development.

(Adapted from: Vinding, in Gender Planning in Development Agencies)

INSTITUTIONAL ANALYSIS

Institutions and sustainability

The term institution and those associated with it - institutional development, capacity and capability, strengthening - can have different meanings. In project planning it is useful to consider two definitions. The first is to consider an institution as an organisation with a particular purpose. The second meaning is to consider an institution as an established practice or custom. Examples of the former would be United Nations, the Ministry of Agriculture, Banks, Schools, Churches, local and village councils. Examples of the latter would be marriage, money, laws, and customary natural resource management. Institutions of either type can operate from international to local levels, and they may operate in a formal or informal manner. All these different types of institutions have several features in common: incentives, structures, rules and legitimacy (Box 7.9).

Box 7.9 Common features of institutions

- *Incentives* - they provide motivations for people or groups to act in particular ways.
- *Authority structures* - they have arrangements to ensure people act in certain ways, including sanctions against those who do not.
- *Rules and roles* - help institutions shape behaviour, these may be written rules or unwritten, of informal rather than formal and explicit.
- *Legitimacy* - an institution has to have some status or acceptability, either legally or socially. this may be based on precedent and cultural practice.

In our day to day lives we interact with a whole range of institutions of both types, they help shape the way we conduct ourselves in every sphere of human activity. The same is true of an agricultural project, a range of institutions will affect its design and eventual implementation. Some institutions will be responsible for the actual implementation, e.g. Ministry of Agriculture or farmers' association, others will affect its management, e.g. formal land tenure. The implementation of the project will require that the implementing institution has both the capacity and capability to do this, if not the project will fail unless it addresses these issues in its design. Without this capacity and capability, the sustainability of the institution to implement the project (and follow up actions) will be doubtful.

Some institutions may be actually harmed by a project. For example, there may already exist an informal traditional institution for the management of a community's lands for grazing. This may be disrupted if the project requires a new institution set up for land tenure and use conflicting with the traditional institution. Projects often suppose that new formal institutions are required for effective implementation and that local traditional institutions need to be "strengthened" and formalised to achieve this. In both of these cases the sustainability of new formal institutions, and the affects on traditional institutions are open to question.

In summary there are two key institutional questions which should be addressed during project design and appraisal:

- Do the project implementing institutions - both local and national - have the necessary capacity and capability to sustain its implementation?
- What will be the impact of the project on institutions - particularly local and informal institutions, and will this be beneficial?

To answer these questions it will be necessary to identify the different institutions and their potential roles in regard to the project, and to appraise the capacity and capability of these in implementing the project. The lack of attention in the past has led to the lack of sustainability of many projects, this is clearly stated in a DFID (ODA) manual on project appraisal: Experience has highlighted the importance of institutional considerations even where institutional development is not a direct component of the project. Many projects which have appeared sound from technical, financial and technical viewpoints have been partly or wholly frustrated by institutional constraints.

Analysis

The first step in institutional analysis is relatively easy. This is the identification of the different institutions which will affect the project or it will affect. This should include all national and local institutions and should not be restricted just to formal institutions. It is useful to construct a table to illustrate these institutions with a brief summary of them and the expected role they will play in the project and the potential impact the project will have on them. Table 7.9 gives a possible format to use. This is in fact similar to, or a variant of, stakeholder analysis where organisations/institutions are seen as stakeholders.

Table 7.9 Format of a table to show institutions associated with a project and their roles

Name	*Type*	*Role in project*	*Project impact*
Ministry of Agriculture			
District council			
Community resource management groups			
Farmer associations/ co-operatives			
NGOs			

The next stage is much harder and it is to appraise the capacity and capability of the institution to undertake its project role. Capacity reflects the organisational structure and resources of the institution, while capability reflects the ability of individuals or groups with the institution to achieve an acceptable level of performance. This appraisal needs to be an integral part of the project planning process, and in some cases will lead to the inclusion of an institutional strengthening component in the project.

In looking at local traditional institutions the impact of the project on these should be analysed. Wherever possible the project should work with or through existing institutions. It may be thought appropriate to strengthen these institutions, however, strengthening, or building, along formalised local institutions along "western" lines may not be essential, and could result in their decline. A careful assessment of these should be undertaken.

PARTICIPATORY APPROACHES

Background

In recent years there has been a rapid expansion in new participatory methods and approaches to learning in the context of agricultural development and project planning. Many have been drawn from a wide range of non-agricultural contexts, and adapted to local needs. Others are innovations arising out of situations where practitioners have applied the methods in a new setting. Altogether there are now over 30 different terms for these participatory approaches, as shown in Box 7.10. Some of these such as Participatory Rural Appraisal (PRA), are more widely used than others. PRA is now practised in over 130 countries, while other methods are associated with just one or two research centres. These approaches all have a number of common elements and principles which according to Pretty (1995) are:

- *A Defined Methodology and Systemic Learning Process* - the focus is on participative and cumulative learning by all the participants with an emphasis on visualisations.

- *Multiple Perspectives* - a key objective is to seek diversity, rather than characterise complexity using average values. The assumption is that individuals and groups make different evaluations of situations, which can lead to varying actions. All views and interpretations are considered to be

subject to a different bias, implying that there are many possible descriptions of any activity and no one correct point of view.

Box 7.10 Range of terms for systems using participatory methods

Agroecosystems Analysis (AEA)
Beneficiary Assessment
Development Education Leadership Teams (DELTA)
Diagnosis and Design (D & D)
Diagnóstico Rurale Participativo (DRP)
Groupe de Recherche et d'Appui pour l'Auto-Promotion Paysanne (GRAAP)
Méthode Acceleree de Recherche Participative (MARP)
Participatory Analysis and Learning Methods (PALM)
Participatory Action Research (PAR)
Participatory Poverty Assessment (PPA)
Participatory Research Methodology (PRM)
Participatory Rural Appraisal(PRA)
Participatory Rural Appraisal and Planning (PRAP)
Participatory Technology Development (PTD)
Participatory Urban Appraisal (PUA)
Planning for Real (PfR)
Process Documentation
Rapid Appraisal (RA)
Rapid Assessment of Agricultural Knowledge Systems (RAAKS)
Rapid Assessment Procedures (RAP)
Rapid Assessment Techniques (RAT)
Rapid Catchment Analysis (RCA)
Rapid Ethnographic Assessment (REA)
Rapid Food Security Assessment (RFSA)
Regenerated Freirean Literacy through Empowering Community Techniques (REFLECT)
Rapid Multi-perspective Appraisal (RMA)
Rapid Organisational Assessment (ROA)
Rapid Rural Appraisal (RRA)
Samuhik Brahman (Joint trek)
Soft Systems Methodology (SSM)
Theatre for Development
Training for Transformation
Visualisation in Participatory Programmes (VIPP)

(Source: Pretty, 1995)

- *Group Learning Process* - all involve the recognition that the complexity of the world will only be revealed through group inquiry and interaction. This implies three possible mixes of investigators, namely those from different disciplines, from different sectors, and from outsiders (professionals) and insiders (local people).

- *Context Specific* - the approaches are flexible enough to be adapted to suit each new set of conditions and actors, and so there are many versions.

- *Facilitating Experts and Stakeholders* - the methodology is concerned with the transformation of existing activities to try to bring about changes which people regard as improvements. The role of the 'expert' is best thought of as helping people in their situation carry out their own study and so achieve something, i.e. to be a facilitator.

- *Leading to Sustained Action* - the learning process leads to debate about change, and this changes the perceptions of the stakeholders and their readiness to contemplate action. Action is agreed, and changes often represent an accommodation or consensus between conflicting views. The debate and/or analysis defines changes which would bring about improvement, and seeks to motivate people to take action to implement these. This action includes local institution building and strengthening, so increasing the capacity of people to initiate action on their own.

These methodologies imply a process leading to action. More sustainable agriculture projects, with all the uncertainties and complexities, cannot be envisaged without a wide range of actors being involved in continuing processes of learning and the development of projects. When the development is participatory, all farmers, extension agents, policy makers and researchers can benefit. Researchers and extension agents learn more about technologies, as farmers are able to test them in a wide variety of conditions. They have the satisfaction of knowing that technologies they produce really are what farmers want. They also develop better lines of communication. Once it is appreciated that there are multiple sources of innovation, then this greatly increases the opportunity of helping to improve farmers' livelihoods. Policy makers and planners are also key to this process. The use of participatory methods will lead to a greater understanding of the needs and aspirations of farmers and to the development of policies, plans and projects which promote sustainable agriculture.

Participatory methods and project design

Chapter 4 discussed in more detail the benefits of increased participation by project beneficiaries in project design and development. The previous section has given the background to actual participatory methods. The next question to be addressed is how these methods can be used in project design. The type of their use will be reflected in the type of participation which is undertaken. Table 4.1 gave a typology of participation, from the manipulative to interactive and self-mobilisation. Ideally in project design participation should be interactive, where people participate in the identification, design and implementation of projects. However, much participation still tends to be functional, with people participating in the project after its objectives and scope have already been set by others - technical experts, government officers, donors etc. Where a PRA is undertaken this often has become a survey tool to gain people's opinions and views, rather than to involve them in the identification of problems and the development of solutions through a project intervention.

A challenge for agricultural and rural institutions, whether government or non-government, is how to institutionalise these approaches, and adopt structures that encourage the full participation of people in projects. The degree of participation in projects will vary according to the type of agricultural project. Project interventions at the farm or community level should aim for the fullest of interactive participation, while full participation in projects at the national level concerned for instance with economic or institutional reform will be of a very different nature as it is obviously impossible for all farmer to participate in such a process - what will be important is for their views to be represented at the national level. Fundamental to achieving participation in projects - at farm and community levels - will be in the identification of projects (chapter 6). Here the use of participatory approaches will be crucial in achieving the participation of

farmers and communities in identifying needs and opportunities which can be supported by outside project interventions. If this is not achieved then participation in project design will be reduced to more functional participation. While this can still effectively deliver project benefits as shown in the example in Box 7.11, earlier participation in the project design may well have increased the overall benefits of the project and allowed other options to be considered.

Tools of participatory methods

There are a range of different tools and techniques used in participatory approaches. These all aim to involve people and communities in describing and analysing their own social, economic and biophysical environments. For more details on these methods and their application readers are recommended to the guide on Participatory Learning and Action (PLA) by Pretty et. al. (1995) and to the PLA notes (formerly RRA notes) published by the International Institute for Environment and Development (IIED).

Some methods and principles of participation (adapted from Chambers, 1992) are:

do-it-yourself: asking to be taught to perform village tasks - transplanting, weeding, ploughing, field-levelling, drawing water, collecting wood, washing clothes, thatching.

- *key informants*: enquiring who are the experts and seeking them out

- *semi-structured interviews*. This has been regarded by some as the 'core' of good RRA. It can entail having a mental or written checklist, but being open-ended and following up on the unexpected. Increasingly it is using participatory visual as well as traditional verbal methods

- groups of various kinds (casual; specialist/focus; deliberately structured; community neighbourhood). Group interviews and activities are part of many of the methods

- *sequences or chains of interviews* - from group to group; or from group to key informant; or a sequence of key informants, each expert on a different stage of a process (e.g. men on ploughing, women on transplanting and weeding...)etc.

  they do it: villagers and village residents as investigators and researchers - women, poor people, school teachers, volunteers, students, farmers, village specialists. They do transects (field walks), observe, interview other villagers, analyse data, and present the results

- *participatory mapping and modelling*, in which people use the ground, floor or paper to make social, demographic, health, natural resource (soils, trees and forests, water resources etc.) or farm maps, or construct three-dimensional models of their land.

Box 7.11 Functional Participation: An Example of a Rural Water Supply in Mtwara

This is an example of a successful water scheme developed with the support of Finnwater during 1972-80 in Mtwara. The villagers were not involved in identification, planning, and construction stages, but were at the operational stage. At this stage people from four villages were trained in water maintenance techniques. Maintenance brochures were produced. The government produced policy on water. This involved cost-sharing. The village established a water committee and opened a bank account for the monies collected. The price of one bucket (30 litres) was Tsh 5. There was no one who complained about the price. This was seen as a successful water.

The table below shows how the beneficiaries were involved at different stages, and how their participation enabled the scheme to be successful and sustainable. The question remains as to whether the project would have been more successful with their earlier participation in the project planning process.

Stage	*Key issues*	*Village role*	*Major assumptions*
Identification	Priorities	None	Thought not to be feasible to involve villages in preliminary demand for water schemes outstrips supply. Candidate villages identified on the basis of physical criteria related to "need"
Preparation of village scheme	Acceptance	None	Demand for water exists.
Planning	Acceptance Knowledge	Village passive	Source selection and design of distribution system made by donor with sectoral ministry Water sources is acceptable. Standpipes are properly located with respect to settlements and traditional sources.
Construction	Acceptance Resources	Village provide some labour.	Village involvement was not considered important.
Operations	Knowledge, resources, control	Village fully responsible (fund, labour, organisation)	Though village was not fully involved in previous stages at later stages village actively participates. New operation procedures were developed. Government provides water policy-cost sharing.
Maintenance	Knowledge, resources, control	As above, but only with respect to distribution systems	As above; some outside assistance, funds, staff, and material needed for maintenance of transmission systems. Scheme handed over to village operation procedures established.
Monitoring and evaluation,	knowledge, resource control	Village provides project with information and makes claim on it.	Village involvement will help to ensure that it will make claims on government agencies to keep scheme running. Scheme works very well. Water Committee established.

Source: Nagu, 1990

- *participatory analysis of aerial photographs* (often best at 1:5000) to identify soil type, land conditions, land tenure etc.
- *transect (field) walks* - systematically walking with informants through an area, observing, asking, listening, discussing, identifying different zones, local technologies, introduced technologies, seeking problems, solutions and opportunities, and mapping and diagramming resources and findings
- *time lines* - time charts (histories): chronologies of events, listing major remembered events in a village with approximate dates
- *trend analysis:* people's accounts of the past, of how things close to them have changed, ecological histories, changes in land use and cropping patterns, changes in customs and practices, changes and trends in population, migration, fuels used, education, health, credit... and the causes of changes and trends
- *ethno biographies*: local histories of a crop, an animal, a tree, a pest, a weed.
- *seasonal diagramming* - by major season or by month to show days and distribution of rain, amount of rain or soil moisture, crops, agricultural labour, non-agricultural labour, diet, food consumption, types of sickness, prices animal fodder, fuel, migration, income, expenditure, debt etc.
- *participatory diagramming* - of flows, causality, quantities, trends, rankings, scorings - in which people make their own diagrams - systems diagrams, bar diagrams, pie charts etc.
- *well-being or wealth ranking* - identifying clusters of households according to well-being or wealth, including those considered poorest or worst off.
- *analysis of difference,* especially by gender, social group, wealth/poverty, occupation and age. Identifying differences between groups, including their problems and preferences. This includes contrast comparisons - asking one group why another is different or does something different, and vice versa
- *scoring and ranking,* especially using matrices and seeds to compare through scoring, for example different trees, or soils, or methods of soil and water conservation, or varieties of a crop
- *estimates and quantification,* often using local measures, judgements and materials such as seeds, pellets, fruits or stones as counters, sometimes combined with participatory maps and models.
- *key local indicators,* such as poor people's criteria of well-being
- *key probes,* questions which can lead direct to key issues such as - 'What do you talk about when you are together?' 'What new practices have you or others in this village experimented with in recent years?' 'What vegetable, tree, crop, crop variety, type of animal, tool, equipment... would you like to try out?' 'What do you do when someone's hut or house burns down?'
- *stories,* portraits and case studies such as a household history and profile, coping with a crisis, how a conflict was or was not resolved.

- *team contracts and interactions* - contracts drawn up by teams with agreed norms of behaviour; modes of interaction within teams, including changing pairs, evening discussions, mutual criticism and help, etc. (The team may be just outsiders, or a joint team with villagers)

- *presentations and analysis* - where maps, models, diagrams, and findings are presented by villagers, or by outsiders, and checked, corrected and discussed

- *participatory planning*, budgeting and monitoring, in which villagers prepare their own plans, budgets and schedules, and monitor progress

- *brainstorming*, by villagers alone, by villagers and outsiders together, or by outsiders alone

SUMMARY

This chapter has presented and reviewed a number of different tools and methods commonly used in the design and development of projects. Methods for financial, economic and environmental analysis have largely been excluded as these are covered in detail in chapters 8 and 9. How the tools covered in this chapter are actually used will be dependent upon the type of project, the institutional and policy environment. However, a common theme of these tools is the desire to understand the social, economic, and institutional environments that should be taken into account by people involved in the design of projects.

8. ECONOMIC AND FINANCIAL ASSESSMENT

Key concepts and words:

Project Viability; Economic and Financial Viability; Methods of Financial and Economic analysis; Discounted cash Flow; Discount Rates; Cost Benefit Analysis; Sensitivity Analysis; Cost-effectiveness Analysis; Economic Analysis.

INTRODUCTION

Viability for a project refers to the assessment of whether the project has the capacity to meet the defined objectives, and in addition to generate significant financial and economic gains to the stakeholders and to the economy in general. Financial and economic viability are not the overriding criteria for approval of all projects. There may be projects which appear to have very high potential for economic gain but which are very risky in terms of the technical, social and institutional factors; or have negative impacts on the environment. There may be other projects where social and environmental factors are very strong but all the economic gains cannot be easily estimated or valued. This chapter discusses the economic and financial assessment of projects, while chapter 9 focuses on the environmental assessment of projects. Issues of social and institutional viability of projects were also dealt with under sections in chapter 7 on project design and analysis.

PROJECT VIABILITY

Project viability depends on a number of factors in addition to economic ones, and the decision to go ahead with a project or not will depend on multiple criteria. But when investment funds and resources are limited, project sponsors tend to try to ensure that funds are used to enhance economic development by generating additional resources for the economy. More significantly, the appraisal of project viability must seek to identify cases where investments of scarce resources are likely to lead to actual net losses, and avoid or change these projects. In designing a project, planners must have established the social, institutional, environmental and technical base for viability. These must also be the base for financial and economic viability. The selection or rejection of a proposed project should be made on a number of different criteria, of which economic and financial viability will be necessary but not always a sufficient conditions - see multi-criteria analysis in chapter 12. This chapter however focuses on the financial and economic viability of projects. These and other common terms used with financial and economic assessment are defined in Box 8.1.

Box 8.1 Definitions of key terms

Benefit Cost Ratio (BCR) - is the ratio of total discounted benefits to total discounted costs. A BCR greater than one indicates a viable project.

Cost Benefit Analysis (CBA) - is the general term which is used to analyse present value of and future costs and benefits of a project. This involves the use of discounted cash flows.

Cost-Effectiveness Analysis (CEA) - where benefits cannot be properly valued in monetary terms CEA is used to answer the question: Which project alternative can produce a set level of benefits for the cheapest cost ?

Discount Rate - To allow for the changes in the time value of money, the terms "present value" and "future value" are used. To calculate the present value of future costs and benefits their future values are "discounted" back to the present using a discount rate.

Economic Analysis - The principal objective of the economic analysis of projects is to assess the efficiency with which resources are used. Thus, for the ex-ante appraisal of a particular project, the concerns are much related to assessing the extent to which the same objectives might be achieved using fewer resources, or whether the same resources might be used to achieve a greater range of objectives.

Economic viability: the capacity of a project for an overall gain to the economy in terms of significant net additional benefits generated and efficient use of resources.

Financial viability: the capacity of the project to generate sustainable financial returns for the various stakeholders.

Internal Rate Of Return (IRR) - is defined as the discount rate at which the NPV is zero. It is the rate at which the project's benefits are equal to the costs, and reflects the rate at which the project investment is just recovered.

Net Present Value (NPV) - is the net sum of total discounted benefits and total discounted costs. This yields a figure showing the excess (or shortfall) of benefits over costs in monetary terms. Generally if the NPV is positive after using a suitable discount rate then the project would be recommended as viable.

Opportunity Cost - the value to the economy of goods, services or resources "lost" in the development of an alternative - project intervention

Resource And Cash Flow Statements - are the basis for showing: the resources used in the project investment; the resources generated by that investment; the cash flows associated with those resource flows; and, the cash flows associated with funding the investment.

FINANCIAL AND ECONOMIC ANALYSIS

Distinction between financial and economic analysis

The differences in the definitions of economic and financial viability are reflected in the differences of financial and economic analysis. While some of the actual tools of analysis are the same, financial analysis is concerned with private profitability and is based on financial flows which relate to:

- market prices for products and inputs
- the terms of credit and borrowing in general
- tax and subsidy policy
- financial depreciation and other financial conventions

Economic viability is concerned with public "profitability" which is based on economic resource flows which relate to:

- Social opportunity costs (shadow prices) which adjust market prices to take into account differences based on:
  - taxes and subsides
    external costs and benefits
  - monopolistic pricing
  - price control and rationing
  - quantitative trade restrictions
  - over-valued (or under-valued) exchange rate
  - labour opportunity costs
- Divergence between real rate of interest and nominal (financial) rate of interest, and difference between private and social/public rate of discount.

The issues of economic analysis are described at the end of this chapter.

Methods of economic and financial analysis

To assess economic and financial viability a range of tools and methods can be used, Box 8.2. These are reviewed in this Chapter. Financial and economic analysis are concerns of those undertaking a project, while society's concerns are mainly with the opportunity cost of diverting resources to the project, i.e. macro orientated efficiency in resource allocation.

Box 8.2 Methods of economic and financial analysis

- Resource Flow Statements
- Cash flow Statements
- Discounted Cash Flow
- Cost Benefit Analysis:
  - Net Present Value
  - Internal Rate of Return
  - Benefit-Cost Ratio
- Cost Effectiveness Analysis
- Sensitivity Analysis

RESOURCE AND CASH FLOW STATEMENTS

Resource and Cash Flow Statements are the basis for showing:

- the resources used in the project investment
- the resources generated by that investment
- the cash flows associated with those resource flows
- the cash flows associated with funding the investment

The basic format for all these statements in a revenue project is shown in Table 8.1. There is usually an "investment period" during which income may be nil or lower than costs, followed by a "revenue period" when incomes exceed costs and the investment is earning its return. A year is the standard unit and it is usually used as an account period in all financial analysis. Detailed cash flows used in project implementation may require monthly units. The net cash flow is shown on one line with negative and positive values.

Table 8.1 Format for Resource/Cash Flow Statements

	Year 0	Year 1	Year 2	Year 3	Year 4
Income *(Resources Generated)*		2,000	6,000	8,000	12,000
Investment Costs *(Resources Used)*	8,000				
Operating Costs *(Resource Used)*		3,000	5,000	6,000	7,000
NET Cash Flow	-8,000	-1,000	+1,000	+2,000	+5,000

In the example in Table 8.1 the cash flow is negative for year 0 and becomes more positive for year 1 to 4. This is a common feature of many agricultural projects. In early years they are characterised by heavy investment with little or no output.

An example of resource flow statement for a simple hypothetical agricultural project is given in Table 8.2. This project involves activities such as farmer training, extension and research, assistance to small traders, and credit. The expected effects of the project are to promote improved farm management and better use of inputs to increase farm production, this will be through incremental change to existing production. The project will also assist small traders with storage and transport facilities.

Table 8.2 Resource flow statement for a hypothetical agricultural project

Description	Unit	Unit price	Year 0	1	2	3	4	5 to19
INCREMENTAL FARM OUTPUT								
coffee production	**mt**				**125**	**150**	**230**	**230**
Maize production	**mt**				**320**	**360**	**390**	**390**
Coffee	$	1200			150,000	180,000	276,000	276,000
Maize	$	100			32,000	36,000	39,000	39,000
INCREMENTAL FARM REVENUE	$				182,000	216,000	315,000	315,000
INCREMENTAL FARM INPUTS								
Labour - hired	**days**			**5,000**	**7,500**	**11,000**	**13,000**	**13,000**
Labour -family (non-expense)	**days**			**12,000**	**15,000**	**18,000**	**18,000**	**18,000**
Fertiliser	**bags**			**2,000**	**3,000**	**4,000**	**4,000**	**4,000**
Hired labour	$	3		15,000	22,500	33,000	39,000	39,000
Fertiliser	$	25		50,000	75,000	100,000	100,000	100,000
Tools and Equipment	$			45,000	9,000	9,000	9,000	9,000
INCREMENTAL FARM COSTS	$			110,000	106,500	142,000	148,000	148,000
NET FARM CASH FLOW	$			-110,000	75,500	74,000	167,000	167,000
INCREMENTAL MARKETING	$							
Trading Revenue (Value Added)	$				63,700	75,600	110,250	110,250
Transpor, Storage, Admin.	$			50,000	36,400	43,200	63,000	63,000
NET MARKETING CASH FLOW	$				27,300	32,400	47,250	47,250
NET PROJECT BENEFITS			0	-160,000	102,800	106,400	214,250	214,250
PROJECT COSTS								
Staff	**months**		**36**	**36**	**36**	**36**	**24**	**0**
Staff Costs	$	1500	54,000	54,000	54,000	54,000	36,000	0
Building and Equipment	**$**		**100,000**	**50,000**	**0**	**0**	**0**	**0**
Operating Costs	**$**		**65,000**	**90,000**	**90,000**	**60,000**	**30,000**	**0**
TOTAL PROJECT COSTS	$		219,000	194,000	144,000	114,000	66,000	0
NET FINANCIAL FLOW	$		-219,000	-354,000	-41,200	-7,600	148,250	214,250

Notes:

1. Figures in bold represent resource flows, while figures in italics represent cash flows.
2. Assumes project activities finish after end of year 4.
3. No cash flow is assumed for family labour as cash stays within household.
4. Trading revenue is assumed to 35% of farm revenue; and, transport and storage etc. 20% of farm revenue.

The costs and benefits are shown for the first 5 years (Years 0-4) and then the last column shows Years 5-19, on the large assumption that the gains will be sustained after the project activities cease in Year 4. Where possible, physical quantities are used for resources, and then their prices are used to give the associated cash flow value. In some cases only the summary value of resources such as tools and equipment may be shown. In Table 8.2 resource flows are shown in bold type, and cash flows in italics.

This resource flow statement separates the resource flows of the three parties: the farmers, the traders and the project. The traders generate "resources" by adding value to the commodities they trade. The farmers and traders have their own investment and revenue periods, that is, they are required to use resources before they earn income from generating new resources. Later financial cash flows will be devised for the funding of these initial investments through credit and other funds. Credit is not shown in the resource flow as it is purely a financial transfer, no physical resources are involved.

The annual net cash flows of farmers and traders together represent the annual "net project benefits". These may be negative during their investment periods. The combination of annual net benefits and annual project costs yields the bottom line of "net financial benefits", that is, the net value of resources used and generated at market prices. The overall worth of the project will be assessed by analysis of the net financial benefits, using discounted cash flows and cost benefit analysis.

In this example, financial analysis examines the net cash flows of the farmers and traders to find viable funding solutions. Although it can be seen that if the farmers and traders do invest in Year 1 that they will recover these investments many times over in future years, there remains the problem of how resource-poor farmers and small traders can fund the initial costs. It will be necessary to consider how a combination of farmers and traders own funds and loan funds can finance these investments. A second consideration is whether, if the investment can be funded, the resulting net earnings of the farmers and traders are attractive enough to make them go ahead. In the case of farmers, the main factors are return on earnings per day of extra work, and to a lesser extent on equity invested (the latter is not often the case for many poor farmers). In the case of traders the main factor is likely to be return on equity .

In reality, the estimates of extra production and volume of trade are uncertain such that the investments have some risk. The technique of "Sensitivity Analysis", explained later, can show how the viability is affected by changes in factors such as falls in crop prices or rises in costs, lower crop yields, or delays in project implementation.

Table 8.3 takes the farm cash flows from the resource flow statement. The farm analysis can be aggregated since we are concerned firstly with average figures. Also the aggregate figures usefully indicate the overall volume of funding required. In our example, seasonal loans at 10% interest are available for up to 75% of farm costs. The balance of funding must come from the farmers own funds (or equity) presumed to be from earnings on other activities. Funds for farm costs are needed at the beginning of the season, initially these are funded by loans and equity. At the end of year 2 there is revenue, after loan repayment, partly for household income and partly to carry forward to fund some of next season's farm costs. By the end of year 4 there is sufficient revenue that no further loans are needed.

The "net incremental household cash flow" after financing shows that the farmers investments of own funds are recovered by year 3. (Discount analysis would show a very high rate of return on this investment.). The return per personday shows how household cash earnings relate to labour effort, and in this example should rise from $3 per day to over $9 after loans are no longer required. The figures can be manipulated to change the balance between cash income withdrawn and funds carried forward, which would affect the loan required the following year. Less withdrawals would reduce loan needs and vice-versa.

Table 8.3 **Cash flow statement for a hypothetical agricultural project**

Details	*Year*					
	1	2	3	4	5	6
Before financing						
Incremental farm revenue	0	182000	216000	315000	315000	315000
Incremental farm costs	110000	106500	142000	148000	148000	148000
Net farm cash flow	-110000	75500	74000	167000	167000	167000
After financing						
Balance at start of season	0	0	46250	74138	148000	148000
Cash inflow - equity	27500	26625				
Cash inflow -loans	82500	79875	95750	73863	0	0
Cash inflow- costs	110000	106500	142000	148000	148000	148000
Cash inflow -revenue		182000	216000	315000	315000	315000
Cash outflow-loan +10% interest		90750	87863	105325	81249	0
Balance after loan repaid		91250	128138	209675	233751	315000
Carried income withdrawn		45000	54000	61675	85751	167000
Equity	-27500	-26625	0	0	0	0
Net incremental household cash flow	-27500	18375	54000	61675	85751	167000
Return to labour						
Cash income	0	45000	54000	61675	85751	167000
Days of family labour	12000	15000	18000	18000	18000	18000
Return per day of family labour	0.00	3.00	3.00	3.43	4.76	9.28

A similar analysis can be made for the net cash flow of traders. For analysis of the return on investment it is necessary to first consider the concept of resources and money over time and the techniques of discounted cash flow in the following section

DISCOUNTED CASH FLOW

A major concern of economic and financial analysis is the valuation of costs and benefits which occur in the future. A typical investment has a pattern of costs and benefits where in early years costs exceed benefits and in later years the benefits exceed costs. In analysis of whether and by how much overall benefits may exceed overall costs it is necessary to take account of the fact that the values of benefits or costs in say ten years time are less than the same values at the present time.

People have a preference for having benefits earlier than later, that is, they have a positive time preference. The saying "a bird in the hand is worth two in the bush" is at the root of this preference. People prefer benefits or cash now to benefits or cash later for reasons which include:

- The desire to consume goods now rather than delay their enjoyment.
- They can invest resources in alternative activities that give better positive returns e.g. money in a bank can earn interest.
- The expectation of receiving benefits in the future has risk and uncertainty.
- Inflation will reduce the value of any monetary benefits.

In economic analysis the problems of inflation and uncertainty are handled by the use of constant prices and by sensitivity analysis. Since a general inflation of prices does not affect the relative values of costs and benefits, and inflation is difficult to predict, it is practical to use constant prices in cost benefit analysis. Sensitivity analysis calculates the effect on the worth of a project of changes in key variables such as crop prices and various costs. This is explained in more detail later in this chapter. Financial analysis however take account of inflation.

Discounting and the discount rate

To allow for the changes in the time value of money, the terms "present value" and "future value" are used. To calculate the present value of future costs and benefits their future values are "discounted" - reduced from constant price values - back to the present using a discount rate. The concept of discounting is the opposite of compound interest (Box 8.3), whereby a present value grows to a future value because of the accumulation of interest. The discount rate is the reciprocal of the compound factor. An example of discounting is given in Box 8.4.

Box 8.3 Example of compound interest

What will be the value of TSh 100,000 in three years time if the annual rate of interest is 10%?

Each year 10% of the previous value will be added to the total as shown below, the future value can be calculated by multiplying the present/original value by a number - the compound factor:

Year	*Starting value*	*Interest*	*New value*	*Compound*
0	100,000	0	100,000	1.000
1	100,000	10,000	110,000	1.100
2	110,000	11,100	121,000	1.210
3	121,000	12,100	133,100	1.331

Where: Future value = Present value x Compound factor

This calculation can be represented algebraically as:

$$FV = PV\ (1 + r)^t$$

where r = interest rate and t = time in years

Thus after three years at 10% annual rate of interest Tsh 100,000 is worth Tsh 133,100.

Box 8.4 Example of discount rate

What will be the present value of the cost of TSh 100,000 incurred in the third year of a project if the discount rate is 10%?

Each year 10% of the value will be "lost" as shown below, the present value can be calculated by multiplying the future value by a number - the discount factor:

Year	*Constant price value*	*Discount*	*Value*	*Discount factor*
3	100,000	0	100,000	1/1.000=1.000
2	100,000	9,100	90,900	1/1.100=0.909
1	100,000	17,600	82,600	1/1.210=0.826
0	100,000	24,900	75,100	1/1.331=0.751

Where: Present value = Future value x Discount factor

This calculation can be represented algebraically as:

$$PV = FV \times \frac{1}{(1 + r)^t}$$

where r = discount rate and t = time in years

Thus a future cost of TSh 100,000 in three years time, using a discount rate of 10% is equivalent to Tsh 75,100 in year "0"

Discount rates can be used to determine the present value of a project's costs and benefits. A simple example of this is given in Box 8.5. Discount factors for different discount rates are tabulated in "discount tables", a copy of which would be useful for all analysts. Discount factors can also be readily calculated using pocket calculators.

Choosing a Discount Rate

Different discount rates can make big differences to the outcome of the analysis of projects. A key decision in project analysis will be the rate used at which future benefits and costs will be discounted. Projects use scarce capital funds for the investments which aim to generate a stream of future benefits, and are usually competing with other projects or investments for that scarce capital. Hence the capital has an opportunity cost which is set by the rates of return on alternative uses of that capital - the opportunity cost of capital (OCC). In its most basic form, an individual considering an investment would look to see what interest could be earned from the alternative of depositing the money in a bank. If banks offered 12% interest then he or she would want a rate of return on the investment of more than 12%. In analysing the future returns on the investment, a discount rate of 12% would be used, and if the discounted future returns of a project exceeded the initial investment then the project is a better investment than putting the money in the bank on deposit.

Box 8.5 Example of the discounting of a project's costs and benefits

The following benefits are expected from a project during its first three years: 2, 3 and 6 million Tsh. What is the present value of these benefits if the discount rate is 10%?

	Year 0	Year 1	Year 2	Year 3
Benefit	0	2,000,000	3,000,000	6,000,000
Discount Factors	1.000	0.909	0.826	0.751
Present Values	0	1,818,000	2,478,000	4,506,000
Cumulative	0	1,818,000	4,296,000	8,802,000

i.e. the total present value of the benefits over years 1-3 will be Tsh 8,802,000.

A similar calculation can be used to discount the costs of the project which for the first three years have been estimated as 4, 2 and 2 Tsh million.

	Year0	Year1	Year2	Year 3
Cost	0	4,000,000	2,000,000	2,000,000
Discount Factors	1.000	0.909	0.826	0.751
Present Values	0	3,636,000	1,652,000	1,502,000
Cumulative	0	3,636,000	5,288,000	6,790,000

i.e. the total present value of the costs over years 1-3 will be Tsh 6,790,000

For projects involving investments of public funds, the OCC will be related to: (i) rates of return possible on other projects or investments which also yield gains to the economy; and (ii), to the costs to the government of raising public finance. Society as a whole may have a rate of time preference lower than that for individuals, shown by positive preferences for long term investments in things like education and pensions. and governments can usually raise finance more cheaply than individuals or businesses. Hence the "social opportunity cost of capital" used as the discount rate in economic analysis of public projects may be lower than commercial rates which may be used in parts of financial analysis.

In practice the project analyst's choice of discount rate will be guided by the planning authorities and by reference to rates used on similar projects. For donor funded projects the donor may have a standard rate. A usual range is between 5% and 15%, and 10% is a rate commonly used although there are different views as to whether this is appropriate.

COST BENEFIT ANALYSIS

Cost benefit analysis is the general term which is used to access present and future costs and benefits of a project. This involves the use of discounted cash flows. There are three standard measures which are general used in cost benefit analysis:- Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR). These are discussed in more detail below.

Standard measures - NPV, BCR and IRR

Net Present Value (NPV) is the net sum of total discounted benefits and total discounted costs. This yields a figure showing the excess (or shortfall) of benefits over costs in monetary terms. For example the hypothetical project (Box 8.4) with discounted benefits of Tsh 8,802,000 and discounted costs of Tsh 6,790,000 would have an NPV of Tsh 2,012,000. Generally if the NPV is positive after using a suitable discount rate then the project would be recommended as viable.

Benefit Cost Ratio (BCR) is the ratio of total discounted benefits to total discounted costs. The above example would have a BCR of 8,802,000/6,790,000 equal to 1.30. A BCR greater than one should indicate a viable project.

Internal Rate of Return (IRR) is defined as the discount rate at which the NPV is zero. It is the rate at which the project's benefits are equal to the costs, and reflects the rate at which the project investment is just recovered. Since the IRR is a measure of efficiency it is the most widely used of the measures. It also has the advantage of not requiring a definite discount rate specified in advance. Usually donors and governments have a target rate or cut-off rate and projects with an IRR above the target rate are considered viable.

When considering a number of projects, the funding authorities may want to consider all three measures, but in practice NPV and IRR are most commonly used. Analysis of NPV's can relate the scale of project benefits (increase in national income) to the scale of the initial investment in ways which the relative measures of the BCR and IRR cannot. On the other hand the IRR indicates the relative efficiency of projects which the NPV does not. In the case of mutually exclusive projects, where only one can be chosen because of competition for sites or other resources, the NPV would generally be used rather than the other measures since it will indicate which project yields the greatest addition to national income.

Calculation of NPV, BCR and IRR

In practice NPV's and IRR's can nowadays be calculated very quickly by computer. The following calculations are presented as a guide to understanding the concepts of NPV, IRR and BCR. The following calculations are all based on the data on costs and benefits given in Table 8.4.

Table 8.4 Project data for calculation of NPV, BCA and IRR

Costs/Benefits	*Total*	*Year 0*	*Year 1*	*Year 2*	*Year 3*
1. Discounting Net Benefits					
Investment Costs		8000			
Operating Costs			4000	4000	4000
Gross Benefits			7500	7500	7500
Net Benefits		-8000	3500	3500	3500
Discount Factor 8%		1.000	0.926	0.857	0.794
Present Values	+1020	-8000	3241	3000	2779
2. Discounting Costs					
Total Cost		8000	4000	4000	4000
Discount Factor 8%		1.000	0.926	0.857	0.794
Present Values	18308	8000	3704	3428	3176
3. Discounting Benefits					
Gross Benefits			7500	7500	7500
Discount Factor 8%		1.000	0.926	0.857	0.794
Present Values	19328		6945	6423	5955
4. Discounting to find NPV < 0					
Net Benefits		-8000	3500	3500	3500
Discount Factor 8%		1.000	0.848	0.718	0.609
Present Values	-387	-8000	2968	2513	2132

The Net Present Value (NPV)

Net present value (NPV) is calculated either by:

NPV = Sum of Present Values of NET Benefits

or

NPV = Sum of Present Values of Benefits LESS Sum of Present Values of Costs

From section 1 of the table, discounting the net benefits is the quickest way to find the NPV which is the net figure of +1020 in the total column. Section 2 and 3 also give the same NPV calculated as the difference between the present values of benefits (PVB) and present value of costs (PVC), that is 19328 - 18308 = +1020.

Benefit Cost Ratio (BCR)

The Benefit Cost Ratio (BCR) can have two values, the Gross BCR and the Net BCR. These are calculated as follows:

$$\text{The Gross BCR} = \frac{\text{Present Value Gross Benefits}}{\text{Present Value Gross Costs}}$$

In our example this would be:

$$\text{Gross BCR} = \frac{19328}{18308} = 1.05$$

The Net BCR relates the initial investment to the net benefits in subsequent years, and can be calculated as:

$$\text{The Net BCR} = \frac{\text{Present value of (Benefits - Operating Costs)}}{\text{Present value of Investment Costs}}$$

In our example: the Net Benefits Years 1-3 = 3500 per annum; for which the Present Values = 3241 + 3000 + 2779 = 9020, and hence the net BCR is:

$$\text{Net BCR} = \frac{9020}{8000} = 1.13$$

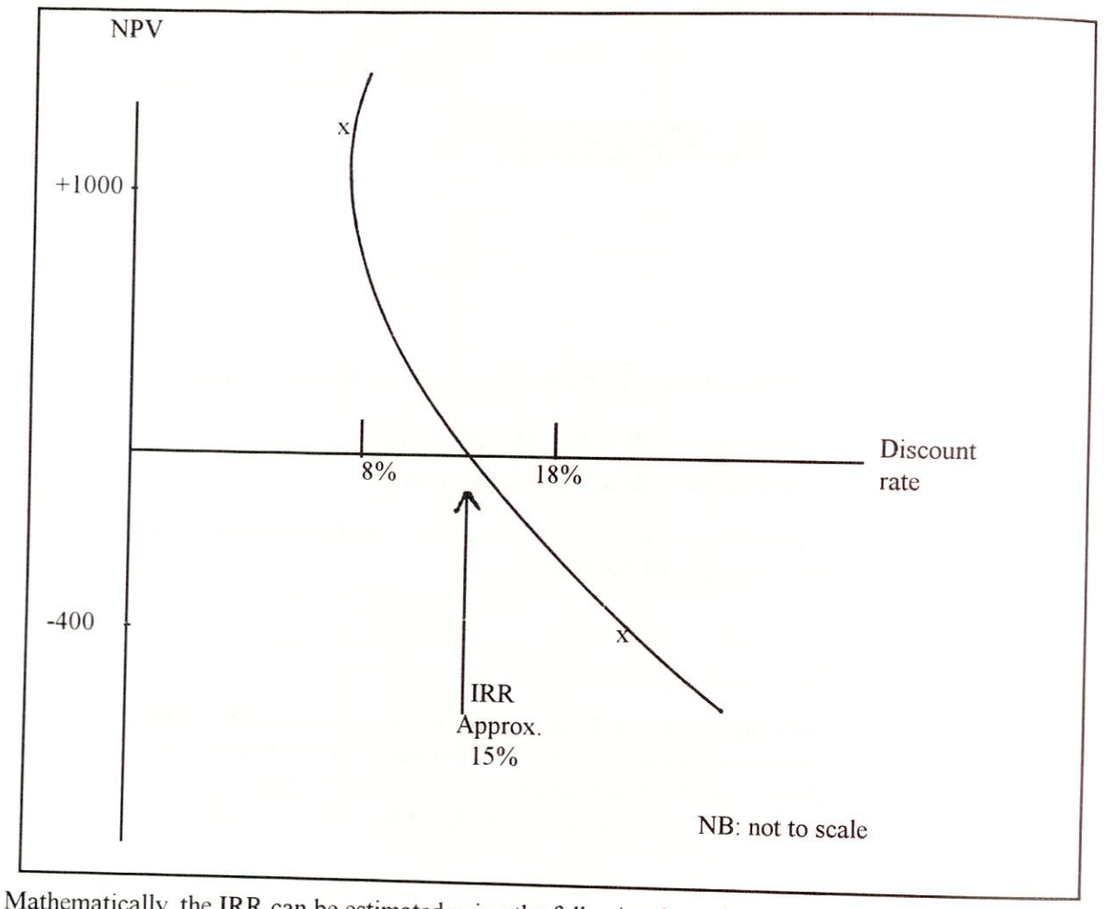
As the BCR can have two meanings and two different values it is important to specify whether the gross or net methods is being used, and not to compare projects using different methods. Since for most agricultural projects it is difficult to separate investment and operating costs and which occur over a number of years the gross BCR method is usually more appropriate. As already stated BCR is not now commonly used.

Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is commonly referred to "rate of return" but it should not be confused with the undiscounted form of rate of return used by accountants in comparing annual earnings to assets. For the above example annual net benefits of 3500 from an investment of 8000 yields a simple rate of return of 3500/8000 or 44% in years 1 to 3. This value does not take account of the time value of money, and it changes over time and is therefore not well suited to project analysis. The Internal Rate of Return is the discount rate which causes the NPV to equal zero, and so represents the discount rate at which discounted benefits equal discounted costs, that is, the rate at which the project is recovering those costs. The mathematics of calculating the IRR involves a process of trial and error or iteration to find the discount rate yielding NPV = 0. The estimation of an IRR can also be done graphically.

From Table 8.4 the NPV with a discount rate of 8% is equal to + 1020. Section 4 of the table shows that with a discount rate of 18% the NPV value reduces to - 387. Hence the IRR, the discount rate for NPV = 0, must lie between 8% and 18%. This can be seen graphically in Figure 8.1. The graph shows that the discount rate giving a zero NPV is approximately 15% which is by definition the IRR.

Figure 8.1 Graphic determination of Internal Rate of Return



Mathematically, the IRR can be estimated using the following formula:

$$\text{IRR} = \text{Lower discount rate} + (\text{Diff. between discount rates} \times \frac{\text{NPV at lower rate}}{\text{Diff. in NPV at lower \& higher rates}})$$

$$= d_1 + [(d_2 - d_1) \times (\frac{NPV_1}{NPV_1 - NPV_2})]$$

Using the example:

$$\text{IRR} = 8\% + ([18\% - 8\%] \times \frac{1020}{1020-[-387]})$$

$$= 8\% + (10\% \times \frac{1020}{1407})$$

$$= 8\% + (10\% \times 0.72)$$

$$= 8\% + 7.2\%$$

$$= 15.2\% \text{ or } 15\% \text{ rounded to nearest whole number}$$

The above graph and calculation yield estimates of the IRR. In practice the relationship between NPV and the discount rate is a curved rather than straight line. Hence a more accurate estimation of the IRR is possible by using two discount rates closer to the estimated 15%, such as 14% and 16%, and recalculating the IRR. Calculations by computer use this iterative method of using smaller and smaller differences to get closer and closer to the IRR.

Potential pitfalls

It must always be remembered that the technique of cost benefit analysis is based on estimates of costs and benefits which occur many years into the future, and that these estimates are based on numerous assumptions about conditions outside the project's control such as farmer behaviour, commodity markets and government policies. See chapter 10 for more discussion on the estimation of the costs and benefits associated with projects concerned with small farm developments. The NPV, BCR calculations shown above are based on one set of cash flows. In practical project analysis there should be consideration of:

- the effect on the NPV, BCR and IRR of possible changes in key assumptions and key variables. This is done by "Sensitivity Analysis"
- various alternative project designs which may have radically different streams of benefits and costs. For example, comparisons of the use of capital intensive construction methods and labour intensive methods.
- the relationship between the financial and economic viability and the associated social, institutional, environmental and technical viability.

There are many examples of unsuccessful projects where in the design of the project planners were tempted to forecast high rates of return based on unrealistic assumptions about aspects of the project and about the external conditions. This may have occurred because for many projects it is easier to rework figures to produce a desired result than to fully investigate the more difficult human and institutional elements. In the final analysis these difficult elements will have more to contribute to the practical success or failure of the project. This is one reason why planners are shifting towards more process projects, and away from the traditional blueprint approach with its emphasis on definitive monetary estimates of project benefits. This also is reflected in the move to attempt to evaluate all costs and benefits of projects, including environmental and social benefit (see chapter 9) to more fully reflect what actually happens and to help determine the actual costs and benefits of a project.

SENSITIVITY ANALYSIS

The calculation of NPV's, IRR's and BCR's are all based on estimates of project costs and benefits which are subject to varying degrees of uncertainty and risk. When projects are implemented the actual flows of costs and benefits may be significantly different from the estimates. Sensitivity Analysis is a technique whereby the viability of a project is tested against possible variations in the size and timing of the estimated costs and benefits. That is, there is analysis of how "sensitive" the project viability is to various changes in variables. The process of sensitivity analysis is used to recalculate the NPV, IRR and BCR according to various "what if" scenarios such as:

- What if - actual investment costs are xx% higher ?
- What if - actual operating costs are xx% higher?
- What if - actual crop prices underlying benefits are xx% lower ?
- What if - actual farm input costs are xx% higher ?
- What if - some or all of the project components are delayed by xx months ?
- What if - the number of farmers adopting new technology is xx% lower ?
- What if - there are xx months delay in achieving the target benefit levels ?

With access to computers, the format of resource and cash flow statements and their associated NPV, BCR, and IRR can be set up so that changes to various key variables such as crop prices lead to recalculation by the computer of new values for NPV, BCR and IRR. A particular approach to sensitivity analysis is to determine what size change in a variable would cause the project to become non-viable. These changes are called "switching values"

COST EFFECTIVENESS ANALYSIS

In Cost Benefit Analysis (CBA), both the costs of resource inputs and the values of resource outputs must be measurable in market prices, for financial analysis, and as opportunity costs or shadow prices for economic analysis. CBA is then appropriate for projects in the agricultural and industrial sectors where the ultimate aim is to produce tangible benefits in terms of private goods which can be sold in markets. However many occasions arise where benefits cannot be properly valued in monetary terms. In the social and infrastructure sectors, the benefits are usually some sort of public good or service which cannot be fully valued in market terms. Health services, education, water supplies and sanitation, roads, either do not have market values, or attempts at economic values are only partial. Similar cases can arise in agricultural projects where, for example, we may want to know what is the most cost effective soil conservation measure. In these cases, cost-effectiveness analysis is used to answer the question:

Which project alternative can produce a set level of benefits (or expected project results) for the cheapest cost ?

For example, what is the cheapest way to build 10 km of road? Or, should one buy a cheap machine with high running costs, or a more expensive machine with low running costs. A related analysis is efficiency cost-effectiveness where the consideration is, for a set level of costs, which project alternative will yield the maximum benefit. For example, on a budget of X, which project can build the most classrooms? The typical steps in cost effective analysis are given in Box 8.6.

In summary CEA can give good results with which to compare alternative projects or investments where the estimation of financial and economic benefits is impossible or problematic. It can also be used extensively for components within overall projects, such as the choice of machines to be used in a road or irrigation project. However while CEA adds to the information available for decision making on alternative investments or projects, the final decision will depend not only on cost information but also on the technical, social and environmental factors of the project alternatives.

Box 8.6 Steps in cost effectiveness analysis

- Definition of the scope and target population of the project
  (e.g. geographical area, number of households requiring water and sanitation facilities)
- Determination of the benefits wanted from the project
  (e.g. volumes of water, numbers of pipes and latrines, time scale for completion)
- Identification of alternative methods to give required benefits
  (e.g. gravity feed, surface pumping, boreholes)
- Calculation of the monetary costs of the alternative projects
  (e.g. differential capital costs, differential maintenance costs)
- Calculation of either the Present Value of the cost streams from discounting, or the Annual Equivalent Value.
- Selection of the project alternative according to least cost and technical, environmental, social and sustainability factors.

Calculation

There are two primary methods used in the calculation of CEA, these are:

- Present Value Method
- Annual Equivalent Value Method

These two methods used in CEA depend on the time scales of benefits and costs. For alternative projects having the same lifetimes of benefits then the Present Value method is used, and where different time spans are involved the annual equivalent method is used. To illustrate these methods two examples are given. In addition secondary methods can be used where total cost is a combination of fixed and variable costs.

Present Value Method

This example involves the construction of a rural all-weather road for which two alternative options have been identified:

- *Option A* which involves machinery-intensive methods, with high initial investment but low maintenance costs.
- *Option B* which involves labour-intensive methods, with lower initial investment but higher maintenance costs.

Initial investment costs for these two options have been estimated as Tsh 60,000,000 for option a and Tsh 8,000,000 for option B. Annual running costs are estimated as Tsh 20,000,000 for option A and Tsh 12,000,000 for option B. Using a discount rate of 10% the present value of the two options over a ten year period would be Tsh 109,200,000 for option A and Tsh 93,700,000. Thus option B, the labour-intensive

method, has a lower cost over 10 years, and therefore it is more cost-effective. In practice, the final decision will depend on other factors as well. Such as how reliable is the labour supply, are there good machinery operators, are machine mechanics and spares available, will use of the local community as labour give a sense of ownership, which method will have less impact on the environment. Again in practice, a period of 10 years as given in this example is probable too short a period to consider.

Annual Equivalent Value Method

However when alternative projects have different lifetimes then the Present Value method would not produce comparable results. For example, if two machines with the same output have different working lives then we need some annual equivalent of the total cost of original investment cost plus operating costs for each machine. The method is also applicable where there is an initial investment followed by annual operating costs. To find an annual value for the initial investment extended over the life of the machine we use a Capital Recovery Factor (CRF) which for an initial sum, a discount rate, and a number of years, gives an annual equivalent value for each year. (CRF's are found in published tables, or the calculations can be made by computer or calculator).

For example, for a discount rate of 8% and a ten year life, the CRF is 0.149. An initial investment of Tsh1,000,000 would therefore have an annual equivalent value of Tsh1,000,000 x 0.149 = Tsh 149,000. CRF's are also used in loan repayment calculations, giving the equal annual instalments to repay a loan at a particular interest rate over a set period. In the above case, the method is the same as supposing that the initial investment value is borrowed and then repaid over the life of the machine. An example of the use of this method is given in Box 8.7.

Break-even analysis and cross over discount rate

Break-even analysis can be applied whenever total cost is a combination of fixed and variable costs. As output or capacity increases the fixed costs remain the same but are spread over more output and fixed costs per unit of output fall, and hence total costs per unit fall. Similarly, when output falls, total costs per unit will rise. In comparing two machines or projects with different combinations of fixed and variable costs, one machine may have relatively lower costs per unit at low output but the other may have the lower costs per unit at higher outputs. There will then be some point where both have the same costs per unit. This is the break-even point as shown in Figure 8.2.

Box 8.7 Example of the use of Annual Equivalent Method in CEA

Two machines produce the same output but have different prices, operating costs and life span as detailed below. Which machine should be purchased?

Facts:

	Machine A	Machine B
Initial Cost	4,000,000	7,000,000
Annual Operating Costs	500,000	300,000
Machine Life	10 years	20 years

Using a discount rate of 8% the capital recovery rates for two machines are:

	Machine A	Machine B
Capital Recovery Factor (CRF)	0.149	0.102

The Annual Equivalent Value is calculated by multiplying the initial cost by the CRF which gives:

	Machine A	Machine B
Annual Equivalent Value	596,000	714,000

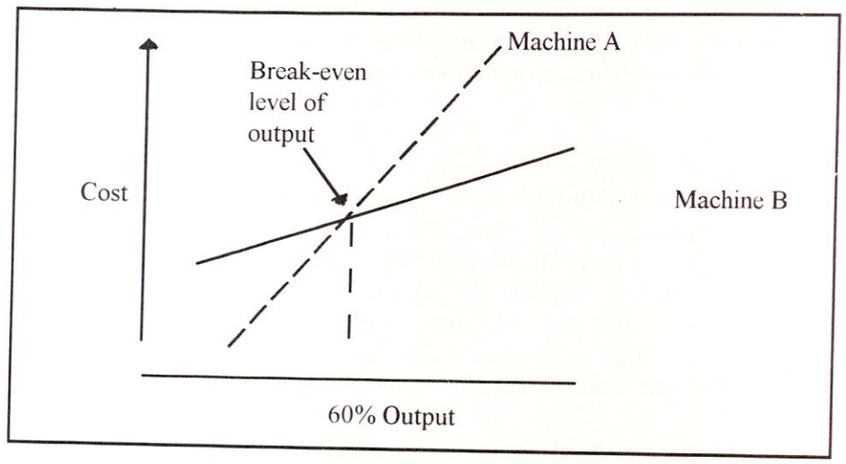
To this has to be added the annual operating costs to obtain the total annual equivalent:

Annual Operating Costs	500,000	300,000
Total Annual Equivalent	1,096,000	1,001,400

From this Machine B is shown by the calculation to have significantly lower costs over its life and on this basis alone would be chosen. However, the final investment decision will depend on other factors such as available funding for the higher investment, longer term risk and availability of spares.

Other important questions for the investment analysis would include how the relative annual cost would change if machines were operating at different levels of capacity and if other discount rates were applied. For these questions further methods of cost-effectiveness can be used.

Figure 8.2 Break-even point



In terms of cost-effectiveness, the choice of which machine to invest in will then also depend on what capacity utilisation to expect. In the example, suppose the machines might only operate at 50% capacity. The initial costs, fixed costs, would be unchanged. However the operating costs can be expected to be lower with the lower output. Three different capacities (50, 60, 100%) are considered below:

	Machine A	Machine B
Initial Cost	40,000	70,000
Original Operating Costs	5,000	3,000
Reduced Operating Costs	2,500	1,500

At 100% capacity

Annualised Investment Cost (Fixed Costs)	5,960	7,140
Original Operating Costs	5,000	3,000
Total Annual Equivalent	10,960	10,140

Therefore at full capacity, machine B is more cost effective than A.

At 50% capacity

Annualised Investment Cost	5,960	7,140
Reduced Operating Costs	2,500	1,500
Total Annual Equivalent	8,460	8,630

Therefore at 50% capacity, machine B is now less cost effective than A.

At 60% capacity

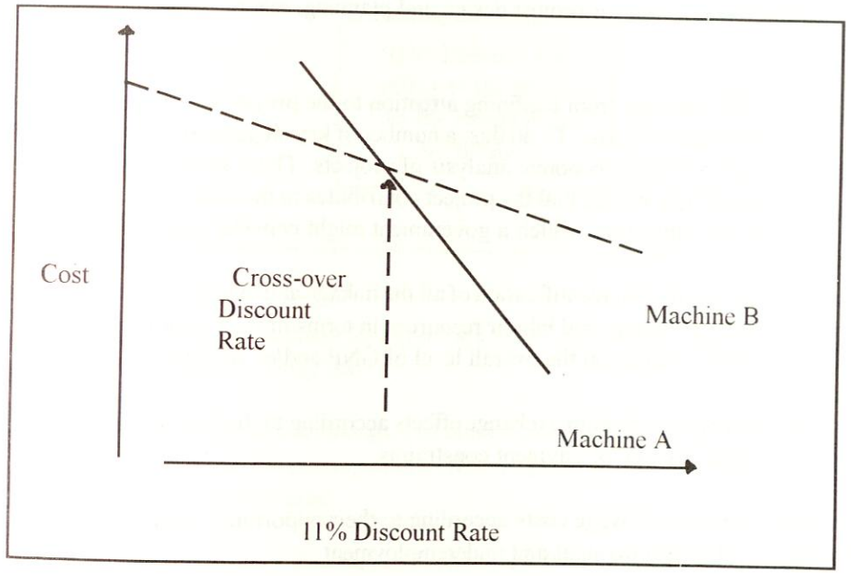
Annualised Investment Cost	5,960	7,140
Reduced Operating Costs	3,000	1,800
Total Annual Equivalent	8,960	8,940

Costs for both machines are about the same.

Thus the break-even level of capacity is around 60%. Above 60% capacity machine B is more cost-effective, but below this level machine A is more cost-effective. This kind of analysis is a form of sensitivity analysis. In terms of choosing between the machines, suppliers may claim cost figures based on full capacity. The project analyst should ask: "but what if the machines only run at lower capacities ?"

Another form of sensitivity analysis can be applied to the discount rate. Where there are different combinations of initial investment and operating costs, using a higher or lower discount rate will result in different Present Values or Total Annual Equivalents for both alternatives. At a different rate of discount, what was the more cost-effective investment may become the less cost-effective. The rate of discount where the Present Values or Total Annual Equivalents of the two investments are the same is the "Cross-Over Discount Rate" as shown in Figure 8.3.

Figure 8.3 Cross-over discount rate



In the example of two machines, we can recalculate at different rates of discount and show:

Discount Rate	*Machine A*	*Machine B*
Original 8%	10,960	10,140
Cross-Over Rate 11%	11,792	11,790
Higher Rate 12%	12,079	12,372

The analysis shows that at discount rates below 11%, machine B is more cost-effective, but that at discount rates above 11% machine A is the more cost-effective choice.

ECONOMIC ANALYSIS

Economic analysis and project planning

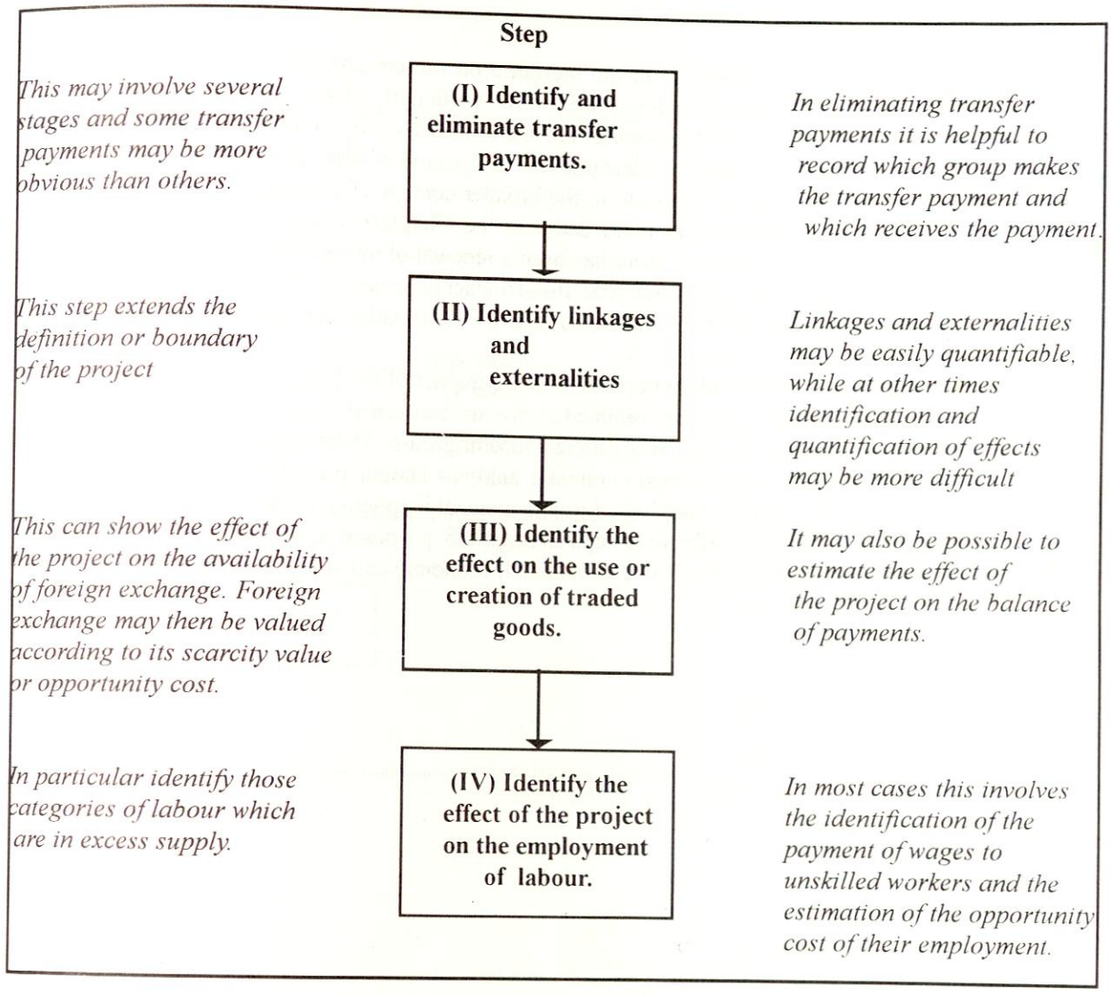
Economic analysis, when applied to projects, is an analytical tool for planning and research and is a form of the more general tool of cost benefit analysis. The use of the word 'economic' implies that the analysis undertaken is from the point of view of the nation or the economy as a whole. Economic analysis can therefore be seen as a cost benefit analysis from the national perspective. In project planning there are two main objectives to economic analysis:

- To provide information for making decisions on the acceptability of projects from the national point of view.
- To provide information of value for project design and planning, macro economic planning and economic research.

Economic analysis broadens the analysis from confining attention to the project itself to investigating the impact of the project on the national economy. To do this, a number of key steps need to be undertaken and these are common to most approaches to economic analysis of projects. These steps are shown in Figure 8.4. Following these steps should help ensure that the project contributes to the achievement of some or all the following important economic objectives which a government might consider important:

- Elimination of transfer payments, identification of all the linkage and external effects of the project and valuation of foreign exchange and labour resources in terms of their opportunity cost should indicate the impact of the project on the overall level of GNP and/or welfare.
- Identification and valuation of foreign exchange effects according to their opportunity cost should take account of possible balance of payment constraints.
- Identification and valuation of wage costs according to their opportunity cost might help to take account of problems of unemployment and underemployment.

Figure 8.4 Steps to follow in the economic analysis of projects



In addition to the four steps outlined in Figure 8.4 there are two further other steps which have been included in some approaches. These are:

- The effect of the project on the level of investment. This is usually taken to be the same thing as the effect on savings. Estimation of this effect requires some knowledge of the effect of the project on the distribution of income.
- Once the distribution of income has been specified it is possible to consider the effect of the project on the consumption of different income groups.

These two steps would relate to the following government objectives:

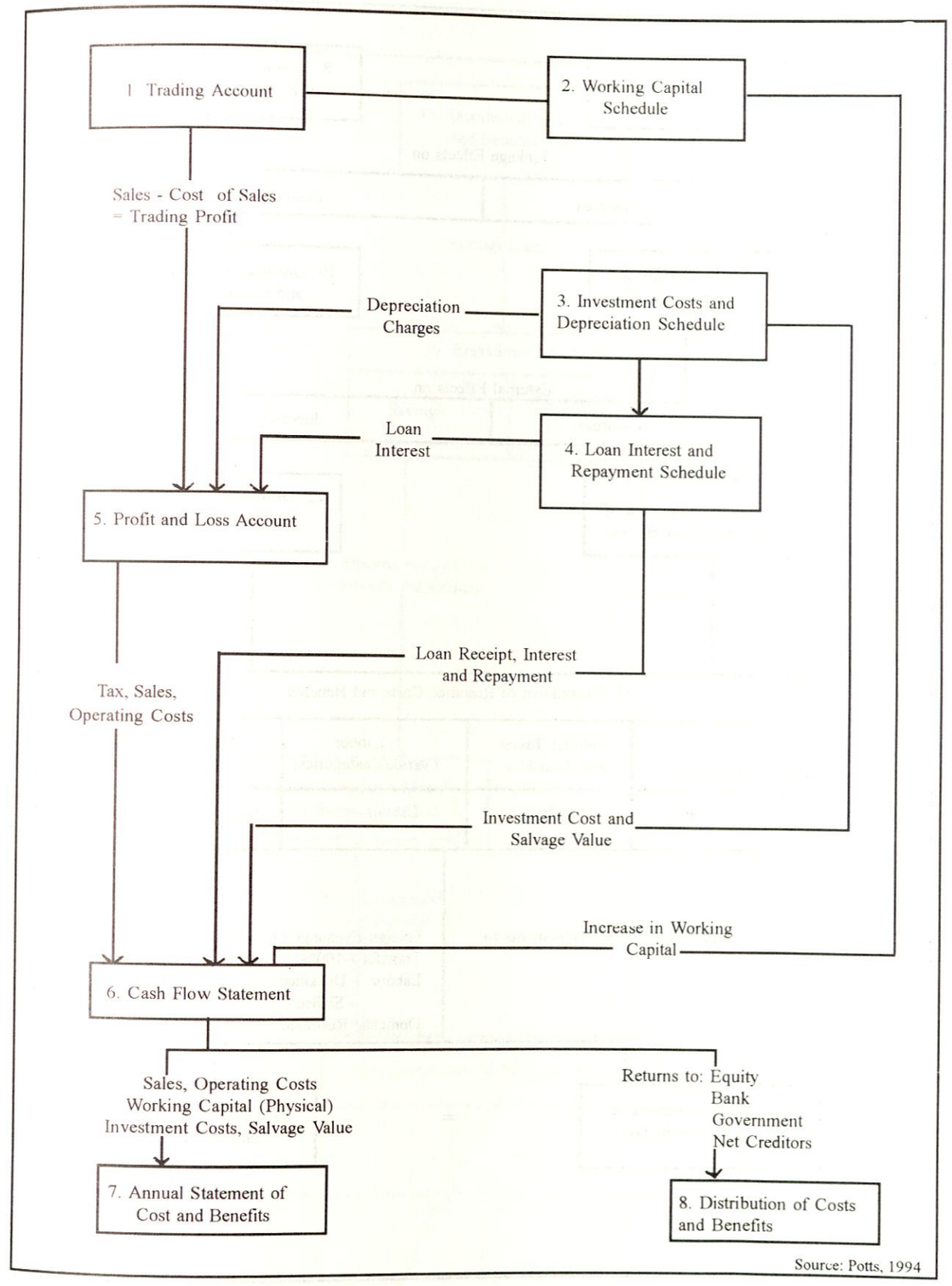
- Identification of savings effects may focus attention on the way these savings may influence the rate of growth of GNP.

- Identification of income distribution effects may show the contribution of the project towards alleviating any income inequalities.

Since the mid 1970's many contributions to the literature on project analysis have made a distinction between economic analysis and social analysis. In the 1980's and early 1990's the attention to the use of project analysis for influencing the distribution of income lessened, partly on the grounds of practicality. This change, along with moves to widen the disciplinary background of those involved in project analysis, has led to the use of the term 'social analysis' in the broader context of examining the social impact of projects. These aspects are discussed in more detail in the Chapters 7 and 9 on project design and environmental assessment. More recently there has been a renewal of interest in the distributional impact of projects associated with attempts to determine the fiscal impact of projects (effect on government income). Estimation of distributional effects can also provide valuable information for stakeholder analysis.

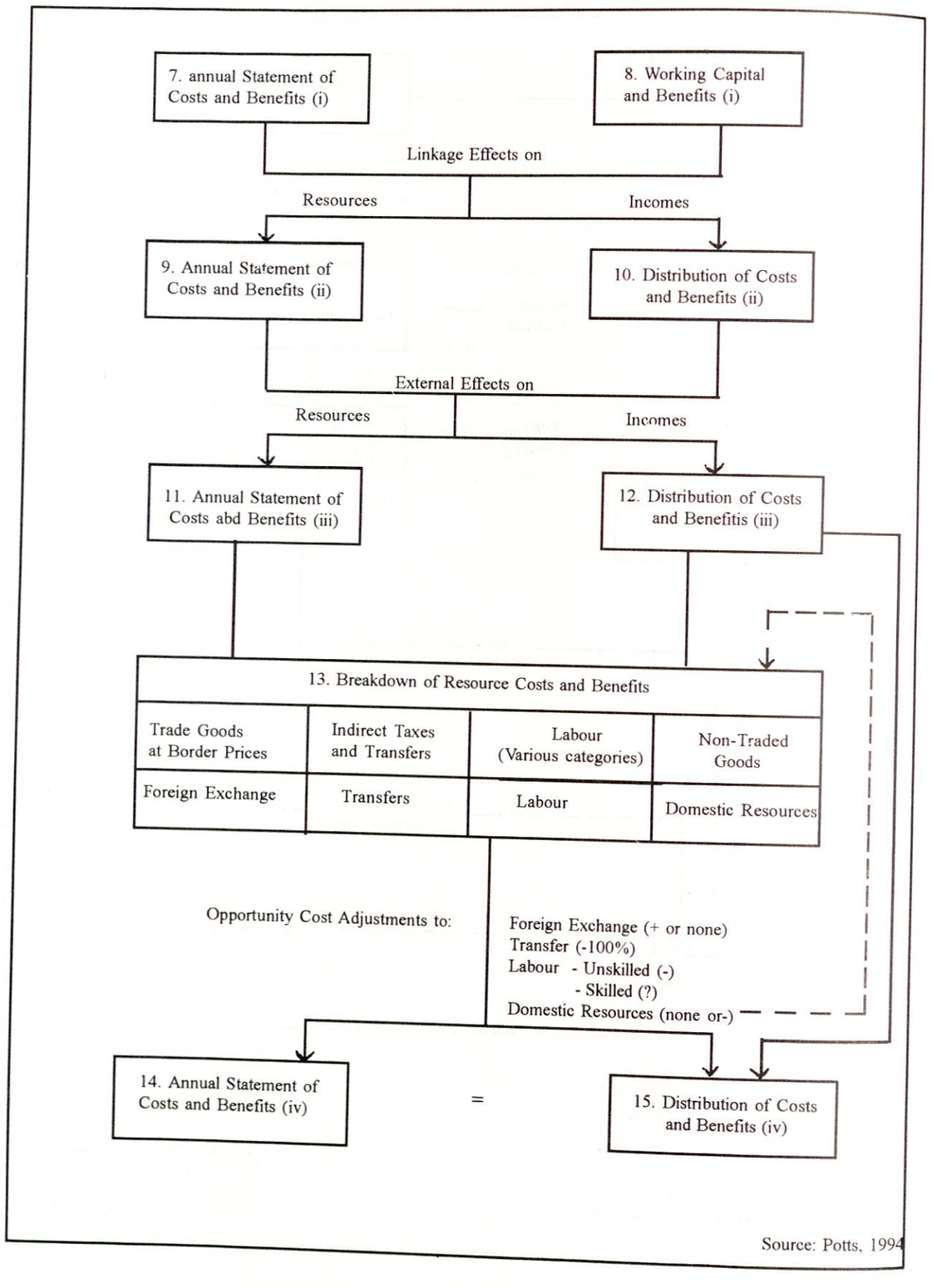
The steps outlined in Figure 8.4 are all concerned with the impact of the project on GNP, irrespective of income distribution. The further two steps outlined above are concerned with the distribution of income between savings and consumption, and between different income groups. These steps are therefore considered in social analysis. A carefully constructed economic analysis should provide all the most important information for the conduct of a social analysis, but it is unusual in practice for any attempt to be made to put different weights on income to different groups as originally proposed in the literature. Figures 8.5 to 8.7 show the structure and relationship between financial, economic and social analysis.

Figure 8.5 Structure of the financial analysis of a commercial project



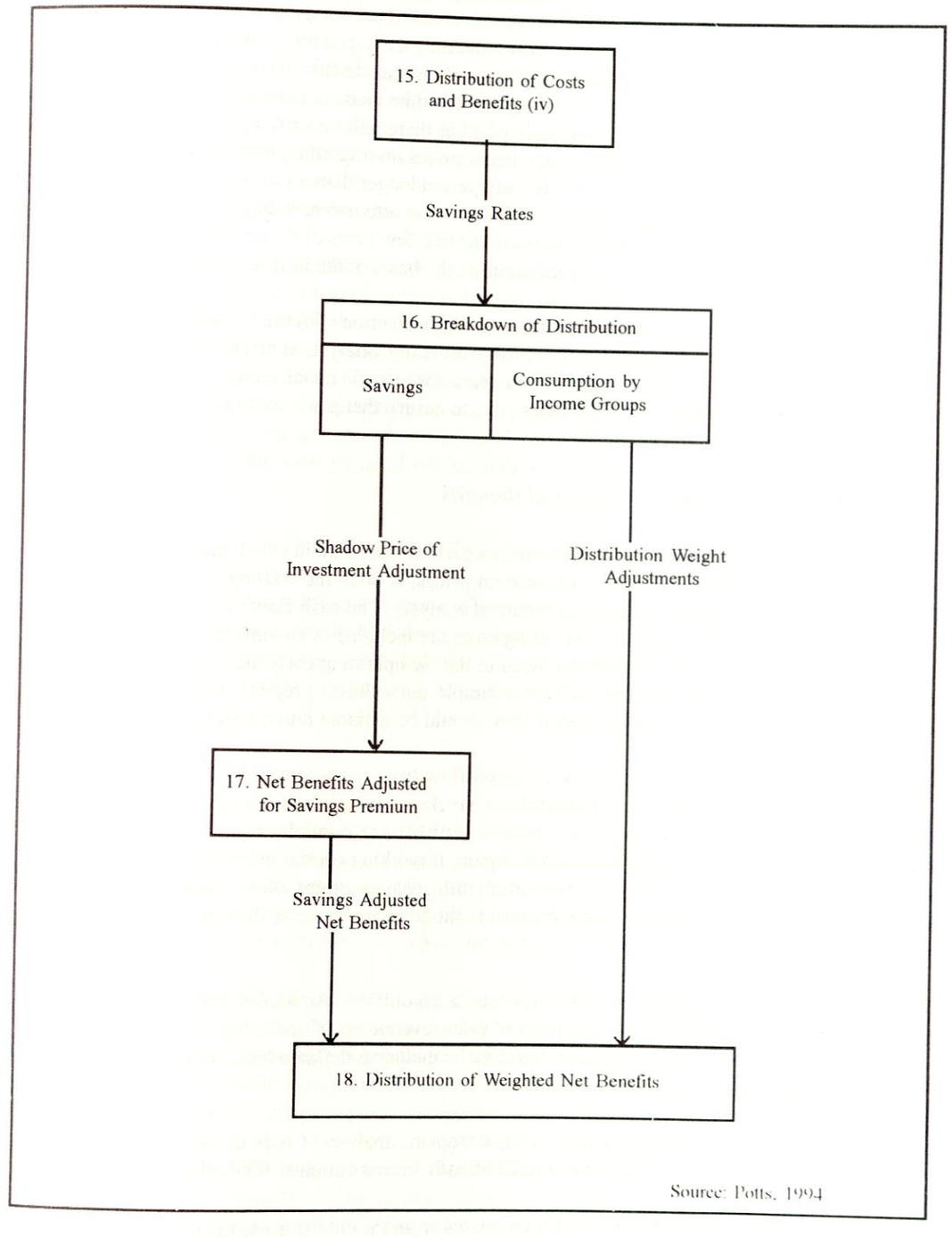
Source: Potts, 1994

Figure 8.6 **Structure of economic analysis**



Source: Potts, 1994

Figure 8.7 **Structure of social analysis**



Source: Potts, 1994

Elimination of transfer payments

The structure of a financial analysis for a commercial project is outlined in Figure 8.5. This structure may be different for agricultural projects which do not involve limited companies, but the final output for any financial analysis will be some form of cash flow indicating the expenditures to be made by the project and the sources of funds used to cover these expenditures. This was discussed for agricultural projects earlier in this chapter. If possible such a financial analysis should be made in current price terms because one of the most important questions to be answered is whether there will be sufficient money available to cover expenditure. Estimation of financial flows in current prices involves the problem of forecasting the likely future rate of inflation - a difficult problem for any period longer than a year or two. For this reason most cash flows are not in practice adjusted for inflation - the alternative being to use some form of price contingency for planning financial requirements in the first few years of the project. Nevertheless, it can be argued that it is better to try to adjust for inflation on the basis of the best information available.

The cash flow statement used for financial planning, in conjunction with the supporting statements, should contain all the information needed for a preliminary economic analysis at market prices. All that has to be done is to eliminate transfer payments and to ensure that the financial analysis is converted back into constant prices if it has been inflated, or otherwise, to ensure that price contingencies are not included in the economic analysis.

Annual Statement of Resource Costs and Benefits

One way to eliminate transfer payments is to draw up a new statement in which they are not included. Such a statement, which should be drawn up in constant prices, is often the starting point in the appraisal of a project and may be undertaken before the financial analysis. The cash flow statement will include, as an inflow to the project, the revenue. The operating costs are included as an outflow. In our annual statement of resource costs and benefits we probably want to list the operating costs and the revenues by categories (see Tables 8.2 and 8.3 for examples from a simple agricultural project). If the operating costs and revenue are expressed in current price terms they should be deflated into constant prices.

The cash flow statement will also include as an outflow from the project the increase in working capital required. Often only physical working capital (i.e. stocks of materials and finished goods) is included as resource costs. Accounts payable and accounts receivable are normally regarded as transfer payments between the providers and recipients of credit. Again, if working capital increases have been estimated in current prices, they should be deflated (converted) into constant prices. Note that accounts receivable for export goods can be considered as a resource cost to the economy because the transfer is between different economies.

The cash flow statement includes investment costs as an outflow. An annual statement of resource costs and benefits at constant market prices consists of sales revenue net of operating costs, working capital and investment costs. Investment costs should therefore be included, deflated into constant prices if necessary, and excluding any price contingency.

What items in the cash flow statement are excluded from the analysis? Credit transfers (accounts receivable ands accounts payable) in working capital have already been mentioned. The other items are:

- *Company taxes.* These are transfer payments from the enterprise to the government.

- *Loan receipt, interest and repayment.* These will normally be transfer payments between the enterprise and the local bank providing the loan. A possible exception is in the case of a foreign loan available only for the project in question. In this case, receipt of the loan could be regarded as a benefit to the economy and loan interest and repayment as a cost.

- *Equity capital.* This is not a resource cost or a benefit, but a source for financing investment costs. Again, a possible exception may exist where there is foreign investment. Where this is involved, the equity input should be treated as a foreign exchange benefit and the return to the foreign investor as a foreign exchange cost.

Distribution of resource costs and benefits

In these notes an emphasis will be placed on the idea that each resource cost or benefit identified implies a change in the income or welfare of some individual or group. Hence it is possible to draw up a statement of resource costs and benefits and also an exactly equivalent statement on the distribution of costs and benefits. At this stage of the analysis only four groups have been identified. These are the enterprise concerned (the return to equity holders in a commercial project); the government, which receives taxes; the bank which receives loan interest and repayment and pays out the loan principal; and the net receivers of credit. If the incomes to all these groups, when converted into constant prices, are added together, they add up to exactly the same as the total value of net benefits in the annual statement of resources costs and benefits.

How have the transfer payments been eliminated? Taxes are recorded as costs to the enterprise but benefits to the government. Loan payments that are costs to the enterprise are benefits to the bank and vice versa. Credit extended by the enterprise (accounts receivable) is recorded as a cost to the enterprise and a benefit to credit recipients. The reverse applies for accounts payable. In the distribution of benefits statement all transfer payments cancel each other out. In fact this statement establishes the definition of a transfer as a payment to a person or group for which there is no corresponding loss of income, welfare or opportunity to the economy.

Linkages

Often, the financial analysis of a project is confined to the activities of the organisation undertaking the project. For example, financial analysis of a sugar mill would be confined to the inputs and outputs of the mill itself. The 'boundaries' of the project are thus defined as the sugar mill. When undertaking an economic analysis of a project the boundaries are extended to take into account, in so far as possible, the impact on the whole economy. To do this properly, it is important to take account of any significant linkage effects.

In the example of a sugar mill, the most obvious linkage is the effect on the farmers who grow the sugar cane. It makes very little sense to confine the analysis just to the sugar mill, since the sugar mill could not possibly operate unless farmers were prepared to grow sugarcane. The definition of the project should therefore be extended to include the impact on farmers. The linkage from the sugar factory to the farmers is an example of a backward linkage that is a linkage back to the producers of the inputs into the project.

Other linkages are forward linkages where it is expected that additional output of an intermediate input will increase the output of industries that use that input. For example, a project designed to increase the output of rice in a particular area may well lead to an increase in the number of rice mills or in the output of existing rice mills.

The most sensible approach to the analysis of linkage effects is to include within the project all those effects expected to be significant. Thus analysis of an agro-industrial project should include an analysis of outgrowers while analysis of crop production projects should include any expected impact on processing industries.

Backward linkages are usually easier to introduce into the analysis - after all production of a certain quantity of sugar will require a quantity of sugarcane determined by technical information on the production process. This is not always the case with forward linkages - particularly where an output can be both a final good or an input into further processing activities. For example, increased output of tomatoes might just affect tomato sales, but it might also lead to an increased output of canned tomatoes or tomato concentrate. It is therefore probably safest to include only those linkages which are known and intended.

Linkage effects are regarded by some economists to be particularly important because they increase the internal integration of an economy and hence its self reliance. These economists would emphasise the importance of strategies which strengthen the links between different sectors and the complementarity of development projects. A possible result might be to analyse a cluster of closely related projects together rather than individually. This approach can perhaps be seen in some of the integrated rural development projects that have been introduced in various countries. In these projects the objective of raising rural welfare is not achieved by a road on its own or an agricultural extension project on its own, but through a combination of roads, extension, credit, water supplies etc. Such projects are usually analysed as a whole so that there is no need to trace the linkage effects, although it may be useful to appraise the contributions of different parts of the project individually as well as together.

Linkage effects are introduced in Figure 8.6. On the resource side the linkage effect will change the values of resource costs and benefits. On the income side, analysis of the linkage will probably indicate an income effect on some group. This income effect will be equivalent to the net resource cost or benefit of the linkage. The linkage argument is particularly important for agro-industrial projects which are usually established because of the complementarity of processing industries with primary production and the constraints imposed on one by lack of development of the other.

Externalities

Externalities can be defined as effects that are imposed by a project on another group of people without any direct payment being made. They can include both external costs and external benefits and both effects which are quantifiable and can be valued as well as effects which are intangible - important but not possible to value.-

Agro-Industrial projects may have very significant external effects. Processing projects can affect each other by inducing farmers to change from one cash crop to another. The introduction of cash crops related to a processing facility may affect the supply of food crops and therefore the price and availability of food. Effluent from processing facilities may affect water supplies downstream of the factory. Roads may be constructed to service a processing facility although they are also used by local people for other purposes - an example of an external benefit.

Wherever possible, account should be taken of external effects. In particular it is important to determine whether, on balance, externalities are positive or negative. If possible external costs and benefits should be valued and 'internalised' into the analysis of the project. For example, analysis of projects involving changes in crop production should include not just the crop in question, but also any effects on the production of other crops. If there is reason to believe that establishment of a new processing facility will have an

impact on the supply of raw materials to another competing factory, that effect should be included in the economic analysis.

Sometimes quantification of externalities is impossible. In such cases it is useful at least to mention the existence of the externality and to provide any relevant information to provide the basis on which a decision could be made. Environmental and social impact effects are often difficult to quantify but they should not be ignored if they are known to be significant. Decisions are not made on the basis of numbers alone and relevant qualitative information can be of equal or even greater importance. In the field of environmental analysis considerable work is now being undertaken to develop methods of including environmental impact in the analysis of projects (for further discussion on these issues see Chapter 9 on environmental assessment).

Opportunity costs

Opportunity cost is the most important concept underlying economic analysis. It is defined as the next best alternative foregone in undertaking a course of action. Whenever the opportunity cost of an item is not equal to its price there is an argument for using shadow prices. Opportunity cost can best be explained by reference to examples commonly used in the economic analysis of projects: land, labour and capital.

Opportunity cost of land

The opportunity cost of land can be investigated by asking what are the alternative uses of the land. Urban land can be used for houses, offices, shops and factories. Rural land is normally used for crops, pasture, forestry or sometimes conservation. The opportunity cost of rural land is likely to be very important in the assessment of any agricultural or agro-industrial project. Usually a financial analysis of a project will put the cost of land down as a single capital item (land purchase) or an annual payment (land rental). From the point of view of the land holder, its opportunity cost is the market value of the surplus produced by that land in its next most profitable use. If the land is rented this opportunity cost might be expressed as the present value of the expected future surplus.

The opportunity cost of land can be looked at from at least two perspectives - those of the land holder and of the national economy. The land holder may conceive of opportunity cost as the market value of foregone rent but, from the viewpoint of the national economy, it is the value of the surplus produced from that land to the economy as a whole. This may include production by people or enterprises using that land. The rent to the landlord would then be regarded as a transfer from one group to another and the value of the land would be defined as the production derived from the land net of the cost of production.

Sometimes land may be valued at its opportunity cost when backward linkages to farmers are considered. For example, a proposed sugar mill may induce farmers to change from growing bananas (the next best alternative crop). The opportunity cost of the land is the expected surplus (or gross margin) earned from bananas. Sugarcane costs may be valued in terms of the lost production of bananas net of any difference in production costs. In doing this, the opportunity cost of land has been taken into account implicitly through the specification of the 'with' and 'without' project situations.

The opportunity cost of land in any case is really the surplus foregone in changing land use. It is usually assumed that this value remains constant over the life of a project. However, it is important to recognise that if, without the project, this surplus is expected either to increase or decrease (e.g. increasing or decreasing yields) some account should be taken of the likely change in the opportunity cost of land.

Opportunity cost of labour

The opportunity cost of labour usually varies significantly between occupational groups and often between regions. Project appraisals usually distinguish between skilled and unskilled labour, the most common assumption being that skilled labour is in scarce supply and has an opportunity cost equal to or greater than its market price, while unskilled labour is in excess supply and has an opportunity cost below its market price.

The first assumption implies that skilled workers are able to obtain the same salary whether they work on the project in question or on another project. Such an assumption is probably reasonable for most countries - including Tanzania - and any other assumption is difficult to make. In some countries, particularly those undergoing very rapid structural change, there may be a shortage of skilled labour. This does not mean that skilled workers earn less on the project under consideration than in their alternative occupations (in that case they would not move) but it may mean that their employment imposes losses on other activities which lose their services and it is possible that such losses could be greater than the saving in salaries.

The opportunity cost of urban unskilled labour depends on alternative employment possibilities. Where unemployment is high and workers do not have access to land as an alternative source of income, the opportunity cost of labour may be very low. This may be the case in highly urbanised societies or where population density is high. Even in these cases it is unlikely that the opportunity cost will be zero. There are some additional costs, such as transport, involved in going to work and unemployed workers may also have some alternative sources of income at certain times of year (for example periods of peak labour demand in the rural areas). To the workers themselves the opportunity cost of going to work is also affected by social security payments even though, from a national point of view, these would be regarded as transfer payments.

Ideas about the opportunity cost of formal sector unskilled labour usually stem from theories of migration. Unskilled workers migrate from the rural areas and the 'informal sector' to the urban areas and the 'formal sector' in search of higher earnings. This has happened in the course of the development of almost every country in the world and occurs most readily when there is a significant gap between urban and rural wage levels.

It is usually supposed that the opportunity cost of formal sector unskilled labour is the value of alternative earnings in rural areas, either as a small farmer or as a casual labourer. The most common form of estimate would be the casual daily wage rate multiplied by the number of days worked in a year. Such estimates can be very crude or they could be a result of a detailed survey of unskilled labourers and migrants from the rural areas.

The opportunity cost of unskilled rural labour (e.g. casual agricultural labourers) is usually assumed to be equal to the market wage if there are no institutional regulations preventing the equalisation of the supply price of labour and the market wage. Whether this is the case or not depends on how the labour market works in the rural areas. Even where the market wage is relatively freely determined, there may be some circumstances when it is necessary to pay closer attention to the value of the commodities produced by the labourers, particularly if the opportunity cost of those commodities does not correspond to their market price.

Opportunity cost of capital

The opportunity cost of capital (investment funds) for an individual, a company or an economy is the rate of return available on the next best alternative project. For an individual or a company, commercial rates of interest may give a reasonable guide - the alternative to investing in a project is to lend your money to a bank or to some other organisation offering a rate of interest. Note that market interest rates are influenced by the rate of inflation and cannot be used in any constant price analysis unless they have first been adjusted for expected future inflation to give an estimated real rate of interest.

For an economy, estimation of the opportunity cost of capital may be difficult. It is necessary to have an idea of the likely rates of return on different possible investment projects. One way would be to rank all possible projects according to their IRR and to draw a cut off line where investment funds are exhausted. In practice it is unlikely that projects can be listed very easily in this way, particularly when funds are being used in sectors such as health and social services where benefits are hard to enumerate, or when it is difficult to transfer investment from one sector to another. Estimation of the opportunity cost of capital for the national economy is the same as estimation of the discount rate to be used in economic analysis (see later section).

Opportunity cost and traded goods

Traded goods are those goods which are imported or exported. The opportunity cost of traded goods to an economy is the border price (c.i.f. for imports and f.o.b. for exports). For example, a country may be able to produce sugar to satisfy the local market. The alternative is to import the sugar. The value of the sugar produced is then the c.i.f. price which has been saved. Similarly, a textile project may use locally produced cotton lint as a raw material, the alternative being to export the cotton lint. The opportunity cost of using the cotton lint for the textile project is the export price (f.o.b.) foregone. Note that for some commodities the relevant world price may be hard to identify. This is the case for commodities such as sugar where the world market is the small residual that lies outside commodity agreements.

All commonly used methods of economic analysis use border prices in the valuation of traded goods. This does not imply acceptance of the justice of the existing international economic order or a commitment to free trade. It is merely a recognition that trade is an alternative opportunity to local production. Some commodities may be tradable but not traded. This occurs when the import of commodities that are produced locally is restricted. Should trade be regarded as an opportunity cost? This really depends on whether there is any likelihood that the government will change its policies. If it will not there is no point in regarding trade as a possible opportunity, since the government has excluded the possibility of trade. Definitions for traded and non traded goods are given in Box 8.7.

Opportunity cost and non traded goods

Some goods are non traded because of government policies. Others may be non-traded because trade is either impossible or pointless. For many countries water supply is non traded as is internal transport and the production of many building materials. What is the opportunity cost of using these items?

The answer to the question really depends on whether use of the item in question will cause more units of that item to be produced or whether it will deprive another person of its use. If more items are produced, the opportunity cost is the cost of producing the extra items. If an alternative user is deprived of the use of that item, the opportunity cost is the price that the alternative user would have been willing to pay - normally the local market price. It is usually assumed that, over the life of a project, the production of most

non-traded goods can be expanded to meet additional demand, and therefore that the relevant opportunity cost is the long run marginal cost of production.

Box 8.7 Definitions of traded and non-traded goods

Traded goods or services - are those in which international trade occurs, and could be exported or imported by a country.

Non traded goods or services - are those for which there is no international market, and are not exported or imported by a country.

Cost breakdowns

One approach to economic analysis is to try, in so far as possible, to break down all costs and benefits into basic categories. Shadow prices can then be applied to these basic categories. A typical list of categories would be:

Foreign Exchange	(F)	Domestic Resources	(D)
Skilled Labour	(W)	Taxes and Transfers	(T)
Unskilled Labour	(L)		

Some of these categories could be further broken down into various types of skilled labour or in the case of taxes and transfers into taxes and excess profits. How can costs (or benefits) be broken down? Some items are easier than others and traded goods are easier than non-traded goods. Some examples are given in the following sections.

Labour

A project employs 410 workers at a total cost per year of $250,000. There are 60 skilled workers earning an average of $1250 and 350 unskilled workers earning an average of $500. The breakdown of labour costs is:

$$\text{Skilled (W)} = \frac{(60 \times 1250)}{250{,}000} \times 100\% = 30\%$$

$$\text{Unskilled (L)} = \frac{(350 \times 500)}{250{,}000} \times 100\% = 70\%$$

The breakdown of wage costs is therefore 30% W, 70% L.

Traded goods (export)

A project is set up to produce bananas for export. The project is paid $195 for each ton of bananas. The f.o.b. price of bananas is $240 per ton. Boxing, transport and handling cost $30 per ton. The government charges $10 per ton export duty and the marketing board makes $5 per ton excess profits. The basic breakdown for bananas is:

$$\text{Foreign Exchange (F)} = \frac{240}{195} \times 100\% = 123\%$$

$$\text{Domestic Resources (D)} = \frac{-30}{195} \times 100\% = -15\%$$

$$\text{Taxes and Transfers (T)} = \frac{-15}{195} \times 100\% = -8\%$$

Transfer payments could in turn be broken down into taxes and excess profits. If sufficient information were available, the local cost (D) of handling etc. could be further broken down. Note that, as is often the case for exports, the foreign exchange content is over 100% because the f.o.b. price exceeds the price paid to the project. The other items represent the additional costs (handling etc. and duties) which cause the f.o.b. price to exceed the price to the project. They are therefore negative.

Traded goods (import substitution)

A project is to be set up to produce tea in an area where farmers are currently growing maize. The project area normally sells its surplus maize to the urban areas which would otherwise rely on imported maize. The project is expected to result in a decline in the quantity of surplus maize. Maize is sold by farmers at $6.30 per kg. but can be imported at a c.i.f. price of $5.75 per kg. Transport costs from the project area to the wholesale market are $0.93 per kg and transport of imported maize from the port to the wholesale market costs $0.35 per kg; the government charges 20% duty on imported maize ($1.15 per kg); port charges for imported maize are $0.36 per kg.; locally purchased maize has an administrative and marketing cost of $1.20 while for imported maize it is $0.25 per kg; the maize marketing board makes an excess profit of $0.57 per kg. on imported maize. Transport costs are estimated to have a foreign exchange component of 45% and a tax component of 25%. All other costs other than duty are assumed to be local. The breakdown of the price paid to farmers is estimated in Table 8.5.

Table 8.5 **Cost breakdown for imported and locally produced maize**

Details	*Total* ($)	*Breakdown ($)*		
		F	*D*	*T*
With the Project				
Price to Farmers	6.30			
Transport from Farm to Market	0.93	0.42	0.28	0.23
Administrative and Handling Costs	1.20		1.20	
Cost of Maize to Market	**8.43**	**-0.42**	**-1.48**	**-0.23**
Without the Project				
CIF Price	5.75	5.75		
Import Duty	1.15			1.15
Port Handling Charges	0.36		0.36	
Transport from Port to Market	0.35	0.16	0.10	0.09
Administrative and Handling Costs	0.25		0.25	
Cost of Maize to Market	**7.86**	**5.91**	**0.71**	**1.24**
Net Loss to Marketing Board	**0.57**			**0.57**
Breakdown of Farm Gate Price	**6.30**	**5.49**	**-0.77**	**1.58**
		87.1	**-12.2**	**25.1**

F - Foreign Exchange; D - Domestic Resources; T - Taxes and Transfers

The local price of maize is made up of 87.1% foreign exchange, 25.1% import duties and other transfers, and -12.2% local resources. Thus if we were to convert this to Tsh then for every Tsh 1,000 worth of local maize production lost, Tsh 871 worth of foreign exchange is lost while Tsh 251 worth of duties and excess profits are lost by the government, and Tsh 122 worth of local resources that would have been used in marketing the local maize are saved.

The breakdown in this case shows both the primary breakdown into cost components and also a secondary breakdown of the cost components themselves into basic resource categories. A more detailed example of how a breakdown of transport costs can be determined is illustrated the next example of non-traded goods.

Non-traded goods

Most projects involve some road transport costs. It is therefore worthwhile to have some centrally available estimate of the breakdown of road transport costs. A typical estimate of a breakdown for road transport costs is shown in Table 8.6 (based on annual values ($) per truck).

Table 8.6 Cost breakdown for transport costs of a project

Details	*Total ($)*	*Breakdown ($)*				
		F	*W*	*L*	*D*	*T*
Diesel and Lubricants	9600	8160			960	480
Tyres	6300	2835			2520	945
Maintenance and Spares	6400	3328	768	512	1280	512
Labour	1250			1250		
Other Expenses	4000		900	600	2500	
Insurance	1150				1150	
Road Tax	350					350
Annualised Value of Capital Cost	11850	6636			1896	3318
Total Costs	**40900**	**20959**	**1668**	**2362**	**10306**	**5605**
Revenue	**42500**					
Excess Profit to Owners	1600					1600
Allocated Road Maintenance Cost	1750	1050	140	210	280	70
Government Expenditure on Roads						-1750
Total Breakdown	**42500**	**22009**	**1808**	**2572**	**10586**	**5525**
%		51.8	4.3	6.1	24.9	13.0

F - Foreign Exchange; W - Skilled Labour; L - Unskilled Labour; D - Domestic Resources; and, T. - Taxes and Transfers

The first step is to collect data on the cost composition of the activity concerned. The major difficulty lies in the estimation of an annual equivalent of capital costs. Depreciation estimates are not reliable because they are based on historic costs which do not take account of inflation and because they do not take account of the opportunity cost of capital. The most satisfactory approach if the data are available is to apply a capital recovery factor to the current value of the investment item in question. This is how the annual equivalent of the cost of the truck was calculated. In the case of transport costs a second complication

occurs because vehicles make use of roads for which they do not pay directly. In principle the breakdown of the economic value of transport costs should include an estimate for the additional cost of road maintenance incurred when extra vehicles use the roads. This item would not appear in the cost structure of transport enterprises and so a balancing item would have to be included under the transfer payments for the extra government expenditure caused by extra road use.

Other non-traded items for which such data might be collected centrally are construction, electricity, local trade and rail transport.

Semi-input-output analysis

In recent years the kind of information required for estimating cost breakdowns has been generated in a number of countries through the use of semi-input-output analysis in which an economy is divided into a number of traded and non-traded sectors and an attempt is made through the use of input-output analysis techniques to break down (decompose) the value of the output into basic categories (primary factors). This technique is used particularly in generating general sets of shadow prices for economies as discussed in the next section.

Shadow prices

Shadow prices for economic analysis are based on opportunity costs. If costs can be broken down into basic resource categories on an opportunity cost basis, all that remains to be done is to value the basic categories according to their opportunity cost. This is now discussed below.

Conversion and adjustment factors

For convenience, shadow prices are often applied using either conversion factors (CF's) or adjustment factors (AF's). These are defined as follows:

$$CF = \frac{\text{Shadow Price}}{\text{Market Price}}$$

$$AF = \frac{\text{Shadow Price}}{\text{Market Price}} - 1 \quad \times 100\%$$

Shadow values in a statement of project costs and benefits can be found by:

- multiplying the market price values by the conversion factor; or
- multiplying the market price values by the adjustment factor to give the value of the adjustment which is then added to the market price value.

Taxes and transfer payments

These are the easiest to deal with as they have an opportunity cost of zero. As always in an economic analysis taxes and transfer payments, once identified are eliminated. Two methods of eliminating transfer payments can be used. Either they are multiplied by a conversion factor of zero or they are adjusted by an adjustment factor of -100%. The effect of course is exactly the same. An advantage of the adjustment

factor approach is that the value of the adjustment will correspond exactly with the income change to the recipient of the transfer payment. In the case of taxes, the recipient is the government. Excess profits go to the company that receives the profits.

Labour

Earlier it was suggested that skilled labour is usually assumed to have an opportunity cost equal to the domestic market wage. When this is the case, no adjustment need be made to skilled labour cost items. This is usually the case for Tanzania. Again in many countries unskilled labour is assumed to have an opportunity cost below the market wage. In urbanised societies this is reflected in the level of unemployment. For the rural areas it was suggested that the opportunity cost might be estimated on the basis of the average daily wage rates of casual labourers in the rural areas and the number of days worked by such labourers in a year.

In principle the shadow wage rate is determined by the opportunity cost of labour which may be adjusted for any difference between the shadow price and market price of the commodities produced by workers in their alternative occupations. This can be important when the shadow value of output in the rural areas is either considerably above or below the market value. In many countries such workers (i.e. small farmers) produce crops whose value in domestic prices is considerably below their value at border prices. In such cases a further adjustment should be made to the shadow wage to reflect the extent to which domestic prices undervalue the output of farmers. The conventional approach to estimating the shadow wage rate is to adopt the following procedure:

- Determine the opportunity cost of labour (m) by finding out the next best alternative occupation for labour of the category under consideration and the number of days worked (n).
- Estimate the additional costs (x) associated with transfer to work with the project from the alternative occupation.
- Estimate a conversion factor for the output of the worker in the alternative occupation without the project (a).

The shadow wage rate (SWR) is then given by:

$$SWR = mna + x$$

For example, if the average daily casual wage rate is Tsh 2,500 and workers are able to obtain 150 days work in a year, the conversion factor for the alternative output of the worker is 0.8 and the extra cost of transferring the worker to the new occupation is Tsh 120,000 per year, the SWR for unskilled workers would be [(2,500 x 150 x 0.8) + 120,000] = Tsh 420,000 per year.

When the SWR is below the market wage rate, use of the SWR for project selection will encourage projects which employed unskilled labour. Although it is useful to have an average national estimate of the SWR, it is also likely that there may be considerable regional variations so that the SWR will be at least regionally specific and possibly even specific to a particular project. The conversion factor or adjustment factor for unskilled labour may also be project specific because market wages may differ. For example:

if SWR = 420,000 per year

Market wage for workers in Project A = 500,000 per year

Market wage for workers in Project B = 600,000 per year

$$CF\ (A) = \frac{420,000}{500,000} = 0.84$$

$$CF\ (B) = \frac{420,000}{600,000} = 0.70$$

$$AF\ (A) = \frac{420,000}{500,000} - 1 \times 100\% = -16\%$$

$$AF\ (2) = \frac{420,000}{600,000} - 1 \times 100\% = -30\%$$

Although the shadow wage itself is the same, the CF's and AF's are different.

The conventional approach to the estimation of the shadow wage rate and its associated conversion factors assumes that the various parameters used in the calculation are easy to identify and measure, and reasonably stable.

Foreign exchange

Shortage of foreign exchange is a significant constraint in many countries. Where this is so, it may be argued that the official exchange rate understates the value of foreign exchange and that a shadow exchange rate (SER) should be used in project analysis. Use of an SER should encourage those projects which either save or earn foreign exchange and discourage those projects which use foreign exchange.

Shadow exchange rates are usually expressed as conversion factors or adjustment factors to be applied to the official exchange rate rather than as a rate of Tsh. to the US$ of £. The reason is that we are concerned with the value of foreign exchange as a whole rather than the value of particular currencies. The only exception is that a different CF and AF might be used for currencies that are not freely convertible and may therefore be less valuable than freely convertible foreign exchange.

The most commonly used method of estimating shadow exchange rates is to measure the extent to which the local prices of traded goods exceed the world prices of such goods. This difference between local prices and world prices is usually reflected in the levels of import duties and export subsidies. The shadow exchange rate should really be an estimate of the opportunity cost of foreign exchange. This can be interpreted as the relationship between the value of imports no longer available (or the value of additional exports required and therefore not available for local consumption) and the amount of foreign exchange spent. For example, a project may require an imported machine costing Tsh. 10 million c.i.f. at the official exchange rate. That Tsh 10 million of foreign exchange expenditure must either be covered by decreased imports or by increased exports.

Suppose that imports are reduced by Tsh 6 million and exports increased by Tsh 4 million and that import duties are charged at a rate of 20% while exports are taxed at 5%. The local market value of the imports and exports no longer available is (6 x 1.20) + (4 x 0.95) = Tsh 11 million. The local market price of imports is higher than the world price because of import duties, but the local price of exports is lower

because of the export tax. Expenditure of an additional Tsh 10 million in foreign exchange has reduced the value of goods available on the domestic market by Tsh. 11 million. The government has lost Tsh 1.2 million in import duties and gained Tsh. 0.2 million in export taxes. The ratio of the value of traded goods at domestic prices (Tsh 11 million) to the value of those goods at world prices (Tsh 10 million) is 1.10. The shadow exchange rate CF is therefore 1.10 and the AF is + 10%.

Two common formulae for calculating shadow exchange rate are shown in Box 8.8.

Box 8.8 Formulae for calculating shadow exchange rate

Formula (i)

$$SER = \frac{M + Tm + X - Tx + Sx}{M + X}$$

where:
M is the total value of imports
Tm is the total value of import duties
X is the total value of exports
Tx is the total value of export taxes
Sx is the total value of export subsidies

This formula assumes that additional foreign exchange expenditure affects the level of imports and exports in proportion to their value in total trade.

Formula (ii)

$$SER = \frac{(M + Tm)}{M}$$

This formula assumes that additional foreign exchange expenditure only affects the level of imports.

Formula ii) usually gives a higher value for the SER than formula i) because, in most countries, the rate of import duty is much higher than the rate of net export subsidy. This can be seen by an example:

Example

M = 100
X = 60 (there is a deficit on the balance of trade)
Tm = 25 (average 25% rate of duty)
Tx = 6 (average 10% rate of duty)
Sx = 3 (average 5% rate of subsidy)

Under Formula i) $SER = \frac{100 + 25 + 60 - 6 + 3}{100 + 60} = 1.14$

Under Formula ii) $SER = \frac{100 + 25}{100} = 1.25$

More complex formulae for the SER than those in Box 8.8 can be derived if information is available to

indicate the types of imports or exports which change with a change in the availability of foreign exchange. It is also possible to try to take account of non-tariff trade restrictions such as import quotas, which may have the same effect as import duties in raising local prices. The question as to which formula is appropriate is essentially an empirical question, but it is probably fair to suggest that the appropriate value will, in most cases, lie between the values given by formulae i) and ii) and will probably be nearer to formula ii) if account is taken of quantitative trade restrictions.

In cases where quantitative restrictions are very significant the value of the SER may be well above the estimate given by either formula. Under such circumstances estimation of the SER becomes very difficult and the only approaches readily available are direct comparison of local and world prices or reference back to a period when quantitative restrictions were not so important and tracing movements in local prices, world prices and exchange rates.

As with the estimation of the shadow wage rate, the estimation of a shadow exchange rate is particularly difficult in a country undergoing rapid economic change. This is because the exchange rate is likely to be at a real level that is significantly different from the likely level in the long run. As with the shadow wage rate, a sensitivity analysis approach might be appropriate and this would imply use of the domestic resource cost of foreign exchange measure (see later section for more details).

The discount rate

The discount rate appropriate for economic analysis is the opportunity cost of capital measured at shadow prices. Three possible approaches to estimating this parameter are:

(i) *Evaluation studies.* A number of projects could be evaluated at shadow prices to find out their economic rate of return. A rough estimate of the opportunity cost of capital might be obtained by using the lower end of the range of rates of return.

(ii) *Macro-economic data.* Using national accounts data and input output tables, it is possible to estimate the total amount of value added in the economy and the value of the capital stock used to produce it. Though measuring the value of capital is one of the central theoretical problems of economics and is beset by difficulties. Some of the value added will represent a return to various types of labour and land. Both the value added and the returns to labour and land should be measured in shadow prices. The remaining value added may be assumed to be the return to capital and the ratio of this value added to the value of the capital stock gives an estimate of the opportunity cost of capital. Such estimates are almost invariably overestimates for a number of reasons:

- It is an average figure while the opportunity cost of capital is a marginal concept - the lowest acceptable rate of return before investment funds are exhausted.
- Use of the shadow wage rate understates the contribution of labour. It may be possible to use unskilled workers on an additional project at a relatively low opportunity cost in terms of foregone production, but it would not be possible to transfer all workers at such a low cost in production.
- Historic cost data on the value of the capital stock understate its value.

- The residual method of apportioning returns to capital tends to lead to overstatement - all technical progress is assumed to be a return to capital.

Macro economic approaches to the estimation of the opportunity cost of capital are therefore not very reliable unless very carefully conducted.

(iii) *Trial and error.* The discount rate can be treated as an unknown. An initial figure might be selected - most countries seem to choose about 10% although this may be rather high. That figure could then be adjusted in the light of experience. If too many projects are accepted, the discount rate could be raised; if not enough are acceptable, a lower discount rate could be used.

iv) *The real cost of borrowing.* Many countries borrow money from abroad to finance at least part of their investment requirements. It can be assumed that borrowing money from abroad is one possible option and that, if a country is considering this option, the economic rate of return on the project should be at least equal to the real cost of borrowing. In practice this approach is quite common and, for this reason discount rates for most countries tend to lie in the range 5% to 15%.

Application of shadow prices

If all cost and benefit items have been broken down into basic resource categories, the application of shadow prices is very simple. The value of each category in each year can be multiplied by the CF or AF for that category. If CF's are used, the converted values for each year are added up to give the economic value of net benefits. If AF's are used, the adjustments are added to the net benefits at market prices to give the economic net benefits. The result can be discounted at whatever is the selected discount rate. A summary of the effects of using shadow prices on the valuation of the various categories is given in Box 8.9.

Box 8.9 Effects of shadow prices of the valuation of different resources

Resource Category	Effect of Shadow Pricing	CF	AF
Taxes and Transfers (T)	Eliminated	0	-100%
Skilled labour (W)	Probably unchanged	1	0%
Unskilled labour (L)	Reduced	<1	- ?%
Foreign Exchange (F)	Increased	>1	+?%
Domestic Resources (D)	Unchanged	1	0%

Economic analysis using a world price numeraire

Two of the most influential works on economic analysis of projects are those by Little and Mirrlees (LM) and Squire and van der Tak (SVT). These works were commissioned by the OECD and the variants of the same method and they share in common what has been described as a world price numeraire.

The numeraire

A numeraire is simply a French word for numerator or unit of account. In any system of measurement there must be a unit of account. For example weight can be measured in kilograms or pounds - it doesn't matter which because the weight is the same and there is a constant relationship between weight measured in kilograms and weight measured in pounds, i.e.2.2 lbs = 1 kilogram).

Costs and benefits are usually measured in the local currency. When we calculated the shadow exchange rate (SER), in effect we stated that Tsh. 1.00 worth of foreign exchange was worth more than Tsh. 1.00 of domestic resources and that the SER measured the value of a unit of foreign exchange in terms of domestic resources. Units of domestic resources were left unchanged in the analysis while units of foreign exchange were multiplied by the SER. Costs and benefits were therefore measured in units of domestic resources which could be called the numeraire of the system.

The methods of LM and SVT leave units of foreign exchange unchanged and adjust the value of domestic resources. They therefore count in units of foreign exchange. A unit of foreign exchange at the official exchange rate is therefore the numeraire of their system. This means that, other than transport and handling cost adjustments, world prices for traded goods can be used as shadow prices unadjusted by the SER. This is why these systems are said to have a world price numeraire.

Standard conversion factor and SER

In the LM and SVT systems the standard conversion factor (SCF) can be defined as the average value of a unit of domestic resources in relation to a unit of foreign exchange. It is the inverse of the SER. In the LM and SVT systems domestic resource costs and benefits (when not further broken down) are multiplied by the SCF. An example in Box 8.10 shows how this might work.

Box 8.10 Example of the use of standard conversion factor

Assume the SER is calculated by the formula which assumes that changes in foreign exchange availability only affect imports. Then using the second formula for SER, and assuming in figures for total imports of $100 million, import duties $25 million then:

$$SER = \frac{(M + Tm)}{M} = \frac{100 + 25}{100} = 1.25$$

If we used a world price numeraire we would not use an SER. Instead we would use an SCF.

$$SCF = \frac{1}{SER} = \frac{1}{1.25} = 0.80$$

Suppose that there is a project with one non-traded input and one traded output and investment costs which are entirely imported. At market prices the costs and benefits are:

	Year 0	Year 1-5
Investment Costs	100	
Operating Costs		50
Benefits		100
Net Benefit	-100	+50

Using the method so far outlined we would break down these items:

	Year 0	Year 1-5
F	-100	+100
D		- 50

Then we would apply shadow prices:-

	Year 0	Year 1-5
F (x 1.25)	- 125	+125
D (x 1.00)		- 50
Net Benefits	- 125	+ 75

Using a world price numeraire we would have:

	Year 0	Year 1-5
F (x 1.00)	- 100	+100
D (x 0.80)		- 40
Net Benefits	- 100	+ 60

The measure of costs and benefits is 25% smaller as the numeraire is 25% more valuable.

The Shadow wage conversion factor

The CF for the shadow wage (CFL) using a world price numeraire is different. For the domestic price numeraire, assuming no transfer costs and that the alternative output of workers has an economic value equal to its domestic market price, then:

CFL = m where m is the opportunity cost of labour divided by the market price.

Assume m = 0.5

For the world price numeraire:-

CFL = ma where a is the SCF

= 0.5 x 0.8 = 0.4

The conversion factor for labour is lower using a world price numeraire (25% lower if the SER is 1.25). Sometimes a value for a conversion factor specific to the output of labour is used which may be different from the SCF. This case is equivalent to the case when the alternative output in the domestic price numeraire approach has an economic value different from the domestic market price.

Composite conversion factors

The approach taken so far has been to break down all the costs and benefits of a project into basic resource categories and to apply the shadow prices for these resource categories. This is not the approach taken by LM and SVT. Their approach is to estimate specific conversion factors for each of the cost and benefit items listed in the annual statement at market prices. They also argue that such conversion factors should be available centrally. Some examples of how this may be done are shown in Box 8.11.

Box 8.11 Examples of use of composite conversion factors

a) *Traded Good (export)*

f.o.b. price	120	x	1.00	=	120
Transport to border	- 5	x	0.80	=	-4
Export tax	-15	x	0.00	=	0
Market price	100		Shadow price	=	116

$$CF = \frac{116}{100} = 1.16$$

b) *Traded Good (import substitution)*

c.i.f. price	75	x	1.00	=	75
Import duty	20	x	0.00	=	0
Transport to market	5	x	0.80	=	4
Market price	100		Shadow price	=	79

$$CF = \frac{79}{100} = 0.79$$

c) *Non-traded good (cost broken down)*

Imported inputs	40	x	1.00	=	40
Duties	5	x	0.00	=	0
Skilled labour	10	x	0.80	=	8
Unskilled labour	25	x	0.40	=	10
Other local costs	20	x	0.80	=	16
Market price	100		Shadow price	=	74

$$CF = \frac{74}{100} = 0.74$$

Procedures, advantages and disadvantages

The distinguishing features of both the LM and SVT approaches are:

- the world price numeraire; and
- the use of composite conversion factors.

Once the CFs have been calculated the procedure is simply to multiply the market price values for each item by the relevant conversion factor. A new annual statement at shadow prices is then drawn up and discounted at the opportunity cost of capital, also known as the accounting rate of interest (ARI).

The advantages and disadvantages of these approaches are summarised in Box 8.12.

Box 8.12 Advantages and disadvantages of using a world price numeraire

Advantages:

- Once the CFs for different items are known, all that is required is simple multiplication. If the CFs are provided centrally, all the project analyst has to do is the multiplication.
- World prices can be used unadjusted as shadow prices - a rough estimate for a CF is obtained simply by dividing the world price by the market price although, to be strictly correct, account should be taken of local transport and handling costs. The method does not require estimation of an SER although the inverse, the SCF, is required. Some authors contend that, when most inputs and outputs are traded, using the wrong SCF is not as serious as using the wrong SER. From a strictly mathematical point of view, this argument is false since the domestic price and world price numeraire methods give equivalent results.

Disadvantages:

- Central determination of composite CFs means that project analysts can apply shadow pricing without understanding what they are doing. This might be a cause of serious mistakes.
- Composite CFs do not allow ready access to information on distribution effects or the impact on foreign exchange, tax revenue and employment. They also make it difficult to conduct sensitivity analysis on key parameters such as the relative value of foreign exchange and domestic resources.
- Use of the world price numeraire can lead to misunderstanding - particularly the mistaken view that the LM/SVT method necessarily means advocating of free trade.
- It can be argued that the concept of a shadow exchange rate is easier to understand than a standard conversion factor.

Economic analysis using a domestic price numeraire (UNIDO approach)

Use of an SER rather than an SCF implies the use of a domestic price numeraire. Costs and benefits are measure in terms of average domestic prices. The most well known expositions of the domestic price numeraire approach are two publications commissioned by UNIDO - the original 'Guidelines for Project Evaluation' (UNIDO, 1972) followed by a 'Guide to Practical Project Appraisal (UNIDO, 1978). The latter guide is, in most respects, a condensed version of the 'Guidelines' and this approach is now outlined. Only the differences between the 'Guide' procedures and those already discussed will be dealt with, many of the features are common to both the 'Guide' and the method described in the notes.

The integrated documentation system

The 'Guide' was the first major work on SCBA to pay much attention to the relationship between economic analysis and financial analysis. The Guide uses what it calls an 'integrated documentation system' in which there is a 'Net Cash Flow Real' concerned with resource costs and benefits which is balanced by a 'Net Cash Flow Financial' which shows the financing of the project and the distribution of benefits. Shadow pricing adjustments are made to the resource costs and benefits included in the 'Net Cash Flow Real'. The equality between the two statements is similar to the equality between the Statement of Resource Costs and Benefits and the Statement of the Distribution of Costs and Benefits which was shown in the method described earlier in this section on economic analysis, however the presentation in the 'Guide' becomes rather confusing in later stages of the analysis.

The use of present values

All costs and benefits in the 'Guide' are presented in terms of present values at selected discount rates. Hansen suggests using 0%, 10% and 20% if the discount rate is unknown. Discounting is therefore the first step in the analysis before the application of shadow pricing. This approach, which was also adopted in the original Guidelines, reduces the amount of multiplication in later stages of the analysis at the expense of a lot of discounting in the early stages. It helps to have a micro computer with spreadsheet software including a present value function for discounting when using the 'Guide' approach.

The use of adjustment factors

The 'Guide' approach uses AFs rather than CFs. The value of each adjustment is estimated by multiplying the market price PV of the item concerned by the AF. The total value of each adjustment is obtained by up the values of the individual adjustments and then adding the adjustment to the NPV of the 'Net Cash Flow Real' at the previous stage of the analysis.

The use of different stages

The 'Guide' approach works in stages. The first stage is the NPV at market prices after taking account of linkages and externalities.

Stage two of the analysis involves adjusting for 'market price distortions'. Traded goods are valued at border prices thereby eliminating tariffs and other transfer payments. Labour is valued using an opportunity cost shadow wage adjustment.

Stage three involves the shadow exchange rate adjustment. The AF for foreign exchange is applied to the foreign exchange component of each cost and benefit item.

Stages four and five concern 'social analysis' which is not covered by these notes.

The procedure is additive. The final economic NPV of the project is the stage one NPV plus the transfer payment and labour adjustment plus the foreign exchange adjustment.

Switching values and sensitivity analysis

The 'Guide' puts a lot of emphasis on the uncertainty surrounding shadow price estimates and therefore recommends the use of sensitivity analysis for some of the key parameters. In this way switching values

can be estimated. The most obvious switching value is the IRR which gives the rate of discount at which the NPV changes from positive to negative.
A second switching value might be the AF for foreign exchange at which the NPV is zero. Calculation of this value gives the domestic resource cost of foreign exchange criterion, sometimes called the Bruno Test (after an economist called Bruno). This test is useful if the discount rate is known and projects are to be ranked according to the efficiency with which they earn foreign exchange. It is also used in the assessment of the competitiveness of different industries and has therefore been used quite widely in formulating specific recommendations for structural adjustment programmes.

Advantages and disadvantages of the UNIDO approach

The main advantages of the UNIDO 'Guide' approach are:

- The approach is flexible and can be taken to whatever degree of complexity is felt advisable.
- The approach shows the link between financial and economic analysis - although the 'integrated documentation system' is not as clear as it might be.
- The procedures are designed to allow easy use of sensitivity analysis where shadow price estimates are uncertain. This may be particularly valuable for economies in a stage of rapid transition.
- The approach can be adjusted to show clearly the income distribution effects of the project as well as the effects on foreign exchange, employment and tax revenue.
- The approach relates more closely to the sort of approximate shadow pricing that have been used in some countries for many years and can be introduced relatively quickly i.e. (rough adjustment of foreign exchange, labour and taxes).

The main disadvantages of the UNIDO 'Guide' approach are:

- The use of present values obscures information on the timing of different effects. The use of present values however is not an essential part of the approach.
- The 'Guide' contains methodological errors. These do not affect the economic analysis and have been resolved in the book by Weiss also published by UNIDO (Practical Appraisal of Industrial Projects).
- The 'Guide' approach has not been so extensively used as the LM/SVT approach and is not backed up by so many published case studies. It is also not used by major international donor agencies, although its use would probably be acceptable to most of these agencies.

Problems of Economic Analysis

Economic analysis is just a planning tool. Like any tool it should be used for those tasks which it performs best - providing information on the effects of projects on the economy to improve the planning of projects in the context of some form of planning system. It must certainly be adapted to the particular circumstances of the country it is being used in and so, while general approaches and systems have their attractions, they should be sufficiently flexible to allow concentration on the parameters that are important for the country

using them. One of the main sources of confusion in the literature on economic and social analysis is the use of different terms to mean the same thing. A list of some of the more important terms, and the letters used to signify them is given in Box 8.13. Other specific problems and criticisms of economic analysis are discussed below.

Partial Analysis

Some economists who believe in the importance of macro-economic planning argue against economic analysis of projects on the grounds that analysis of one project at a time is 'partial'. The implication of this argument is that the whole is greater than the sum of the parts. Economic analysis has a tendency to ignore important linkage effects and the benefits of greater internal integration of the economy. This argument relates to the role of economic analysis in planning systems. If economic analysis of projects were to be seen as a replacement for macro-planning, the argument might have greater force than if economic analysis were seen as part of an iterative planning process. There is now much greater scepticism about the usefulness of forms of macro-economic planning that do not allow for a considerable degree of flexibility.

Complexity of economic analysis

Some people argue that the data requirements and conceptual complexities of economic analysis are too great for practical use in many countries. They imply that the effort involved in undertaking economic analysis would be better spent in other ways. This could simply be regarded as an argument that an economic analysis system should be flexible so as to allow short cuts when there are shortages of planning staff or when projects are too small to justify the cost of an elaborate economic analysis.

World prices

Use of world prices as opportunity costs assumes that such prices can be discovered and that they are sufficiently stable to be used in a medium term project analysis. For many primary commodities, world prices are unstable and difficult to predict, while many capital goods are specific to particular projects and do not have widely known world prices. These problems are forecasting problems and do not invalidate the general approach. However, they do point to the importance of sensitivity analysis and also to the possibility that self sufficiency might be regarded as a goal in itself for reasons of stability. Similarly unstable world prices indicate the desirability of export diversification - the old saying that 'you should not put all your eggs in one basket'.

Box 8.13 Common terms and their equivalents used in economic analysis

Shadow Price	=	Accounting Price
Conversion Factor (CF)	=	Accounting Ratio (AR)
	=	Shadow Price / Market Price
Premium	=	Conversion Factor - 1
Adjustment Factor (AF)	=	(Conversion Factor - 1) x 100%
Economic Opportunity Cost of Capital	=	Economic Accounting Rate of Interest
	=	q (UNIDO or SVT)
Social Opportunity Cost of Capital	=	Social Accounting Rate of Interest
	=	r (UNIDO) or SARI
Social Discount Rate	=	Consumption Rate of Interest
	=	i (UNIDO) or CRI (LM and SVT)
Shadow Price of Investment	=	Value of Public Income
	=	Pinv (UNIDO), s (LM) or v (SVT)
Marginal Rate of Savings	=	s (UNIDO and SVT). [No LM equivalent, but sq = LM parameter r.]
Standard Conversion Factor (SCF)	=	1 / Shadow Exchange Rate (SER)

LM - Little and Mirrlees approach; SVT - Squire and van der Tak approach

SUMMARY

This chapter has looked at the economic and financial viability of agricultural projects and at some of the methods used in their assessment, in particular resource and cash flow statements, cost benefit analysis, sensitivity analysis and cost effectiveness analysis. While assessing the financial and economic viability of projects is important, they are not always the overriding criteria for approval of all projects. Some projects which appear to have very high potential for economic gain may be risky in terms of the technical, social and institutional factors; or have negative impacts on the environment. While other projects may have significant social and environmental benefits which are difficult to assess in financial and economic terms. Thus in assessing the overall viability of a project it is important to look at all aspects: financial, economic, social and environmental.

EXERCISES

Compounding and discounting

In solving the following exercises you will need a copy of discounting tables and a calculators.

1. Calculate the future value of:

a)	$1	compounded for 10 years at	7% interest per annum
b)	$10	compounded for 5 years at	8% interest per annum
c)	$50	compounded for 15 years at	9% interest per annum
d)	$128	compounded for 8 years at	12% interest per annum

2. Calculate the present value of:

a)	$1	payable in 10 years' time discounted at 6% per annum
b)	$1	payable in 5 years' time discounted at 7% per annum
c)	$1	payable in 15 years' time discounted at 8% per annum
d)	$384	payable in 2 years' time discounted at 12% per annum
e)	10	annual instalments of $10, paid at the year end, discounted at 5% per annum

3. a) What is the present value of $1000 payable in 26 years' time when the discount rate is 9% per annum?

   b) From the result of part (a), (i.e. without using compounding tables) how would you calculate the future value of $100 compounded at 9% per annum for 26 years?

4. The capital cost of a project is estimated to be $10,000 spread over three years. It is expected that $6,000 will be spent in year 0 and $2,000 in each of the following two years. If the discount rate appropriate to this economy is 8%, what is the present value of the project's capital cost?

5. The benefit of a project are expected to be $100,000 annually for 10 years. What is the present value of this benefit stream? The discount rate is given as 10 per cent.

   What difference will it make if the benefits start to accrue in year 3 instead of year 1 and continue on the same regular basis of $100,000 per annum through to the end of year 8, after which year 9 has no benefits and year 10 has $28,000 from the terminal scrap value of the plant?

NPV and IRR

1. An agricultural public sector project is expected to yield a stream costs and benefits of a life of 8 years as indicated in column (i) when properly maintained, and as in column (ii) when not maintained.

Year	(i)		(ii)	
	Costs	Benefits	Costs	Benefits
0	100	-	100	-
1	40	50	-	50
2	30	50	-	60
3	30	60	-	40
4	20	70	-	30
5	20	120	-	20
6	20	140	-	10
7	20	150	-	10
8	20	150	-	10

(a) Given a discount of 10%, what is the total net present value of the net benefit stream (i)?

(b) Given a discount rate of 10%, what is the total net present value of the benefit stream (ii)

2. Calculate the IRRs of the following cash flows to one point of decimals:

a)	When discounted at 6% NPV is -	$6,000
	When discounted at 5% NPV is +	$6,000
b)	When discounted at 9% NPV is -	$150,000
	When discounted at 8% NPV is +	$30,000
c)	When discounted at 20% NPV is +	440,000
	When discounted at 22% NPV is -	£600,000
d)	When discounted at 6% NPV is +	$140,000
	When discounted at 5% NPV is +	$20,000

3. Consider the following cash flow:

Year	0	1	2	3	4	5
Net Income	-5,500	-200	-400	+1,000	+2,000	+2,500

a) Would you accept this project?
b) What can you say about the IRR?

4. A feeder road would cost Tsh. 40,000,000 and last 10 years. If it were built there would be savings on existing vehicle operating costs of Tsh. 2,000,000 per year. New crops would be grown worth Tsh 20,000,000 per year - but the cost of growing them, transporting them and marketing them would be Tsh 16,000,000 per year.

   a) Calculate the IRR of building the feeder road using a discount rate of 10%.

5. One project option has an NPV of 450 at 5% discount rate, 188 at 10% and -144 at 20%.

   a) Plot these values on a graph with NPV on the vertical axis and discount rates on the horizontal axis using a normal scale. Find the IRR by interpolation.

A second option has NPVs of 1020 at 5%, 300 at 7% and -600 at 10%. Plot these on the same graph. What is the IRR in this case. Which option is the most profitable? How is your choice influenced by the discount rate?

ENVIRONMENTAL ASSESSMENT

Keywords and concepts:

Environmental Impact Assessment; Potential Impacts of Agricultural Projects; Assessment of Impacts; Monitoring and Environmental Auditing; Environmental Economic Valuation Methods; Environmental Costs and Benefits; Community Participation and Environmental Assessment.

INTRODUCTION

Many, if not all, agricultural projects have significant impacts on the environment. These can be both positive and negative. For example, in a soil conservation project one of the major objectives is often the protection of the environment as well as other economic and social objectives. The positive environmental effects need to be enhanced and the negative effects prevented or reduced through appropriate mitigation measures. To achieve this, projects should be subject to an environmental assessment. This should be undertaken at the same time as the analysis of its financial and economic viability (chapter 8). Today, the financial, economic and environmental viability of projects is a now a prerequisite of most funding agencies and governments. This chapter reviews the environmental assessment of projects, and an overview of how to value the costs and benefits of impacts.

BACKGROUND

Public and government awareness of the negative impacts of development on the environment has increased over the last thirty years in developed and developing countries. The first moves to assess the environmental impacts from development projects originated in the USA in the seventies. This led to the development of environmental impact assessment (EIA) methods, which have been increasingly adapted and adopted by many other countries.

Today environment and development have become increasingly linked, and it was agreed at the 1992 UN Conference on Environment and Development (UNCED) that environmental assessment and EIA should be used by all countries to assess significant impacts by proposed activities. This view was further endorsed during a meeting in Durban of African Ministers responsible for the environment in 1995. This has been followed by a World Bank and IUCN (1997) led initiative to strengthen environmental assessment in sub-Saharan Africa.

Tanzania, the government has developed the institutional and policy framework for the implementation of environmental assessment in the country. This was result of inputs from various institutions in the early 1990s. The National Conservation Strategy for Sustainable Development also mentions and recommends the use of EIA. Following a workshop in 1993 guidelines on EIA in National Parks were prepared (TANAPA, 1993). The Institute of Resource Assessment (IRA) with the International Institute of Environment and Development (IIED), undertook a needs assessment for EIA. IRA and IIED have developed training course and guidelines for EIA.

The present situation in Tanzania is therefore in a state of change. However, it appears likely that policies on the environment and agriculture, amongst others, will provide the institutional backing and the requirements for the implementation of EIA in the country. It is already a requirement of many bilateral and multilateral donors that an environment assessment is undertaken of any major project they are likely to fund. Donors such as the World Bank and DFID have published guidelines for the environmental assessment process they require (World Bank, 1991 and DFID, 1992).

It is important to understand that environmental assessment should be seen for what it is. A method for determining the potential significant impacts of development activities; and to identify ways to increase positive effects and to mitigate, or prevent, adverse effects. In essence it is not anti-development and a means to preserve the environment, but it is actually for the sustainable development of the country's resources. This is an important point as some often see environmental assessment as the means to stop development. This is not the case.

ENVIRONMENTAL IMPACT ASSESSMENT

This chapter is only intended to give the reader an overview of the EIA process, and in more detail the likely impacts of agricultural projects. For more on EIA readers are referred to Wathern (1988), Biswas and Asgarwala (1992) which provide more comprehensive coverage.

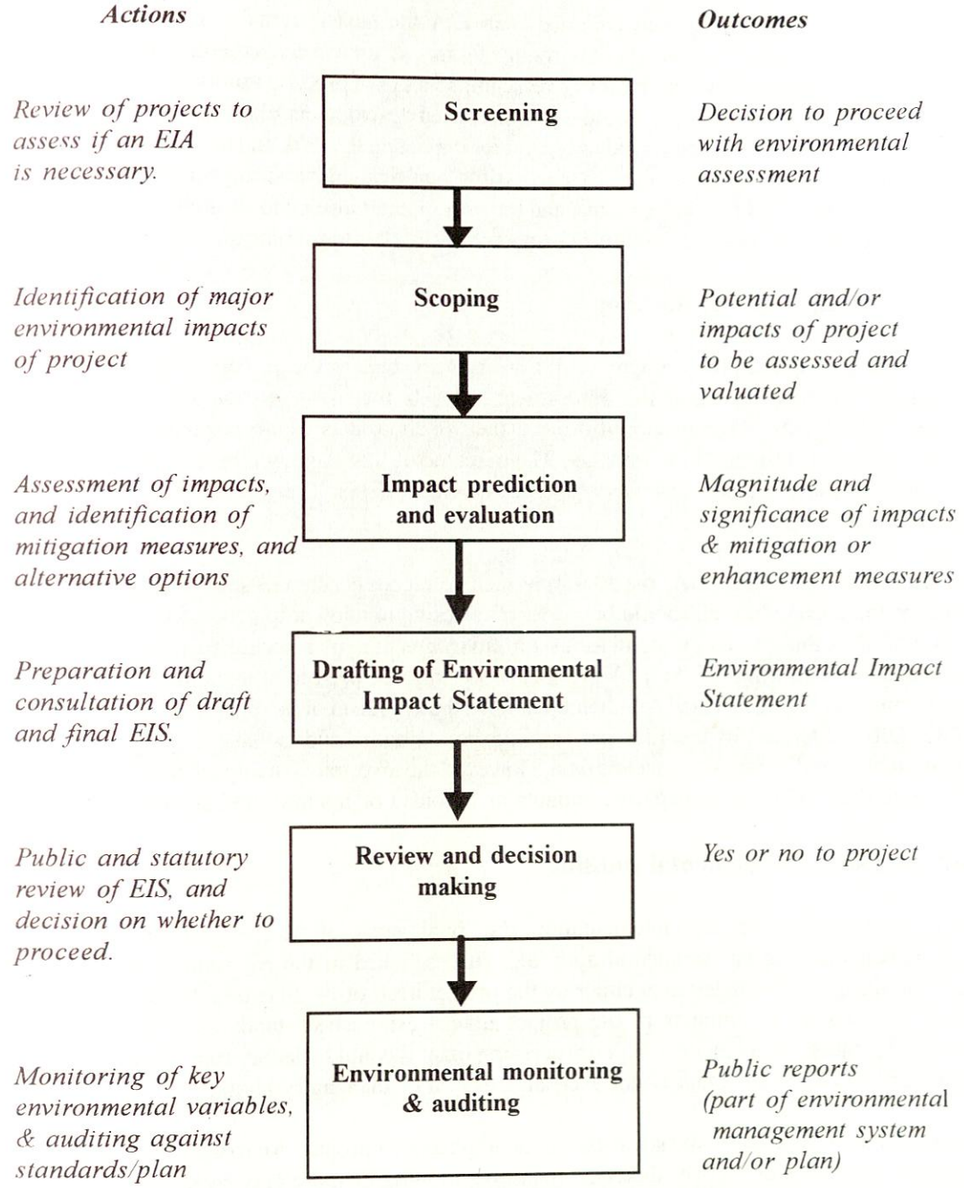
In environmental assessment there are two main levels of assessment: one for impacts of projects - EIA; and, one for the impacts of policies, plans and programmes - strategic environment assessment (SEA). The later is becoming an increasingly powerful tool to assess the impacts at the national or regional level of existing policies and plans, and the effect changes or new ones will have on the environment. This is likely to include those of the agricultural sector where the feasibility of conducting project EIAs on a wide scale is likely to be impractical for anything but major projects. For example, to conduct EIA of projects implemented at the farm household level would be impossible. However, it would be possible to assess new policies and programmes for their overall impact on smallholder farming using SEA, or the impacts of a major irrigation or plantation project using EIA.

In EIA there are four major stages to the process:

- Screening.
- Scoping.
- Impact assessment and evaluation - preparation of environmental impact statement.
- Monitoring and auditing.

These four stages are summarised in the following sections. The overall EIA process is illustrated in Figure 10.1

Figure 10.1 Flow chart of simplified EIA process



Screening

Screening is the initial review of projects to determine if an EIA is required. For certain types of projects it can be a mandatory requirement to undertake an EIA. For others it will be a matter for decision by the relevant regulatory authority. For all major agricultural projects it is likely that an EIA would be required, and desirable.

Scoping

Once a decision has been made to commence an EIA the next exercise is to assess the likely major impacts the project may have on the environment. This is known as scoping - an initial environment evaluation. This may identify very major adverse impacts of the proposed project which mean an outright rejection of the project. an example could be the proposed development of a portion of a National Park for a plantation development, which would have a major impact on the Park and be outside national policy. On the other hand the evaluation may identify no possible significant adverse impact of the project. When this is the case a full EIA will not be necessary and the project can move on to its implementation stage. There are unlikely to be many major agricultural projects which fall into this category.

Impact assessment and evaluation

Following the decision to proceed with a full EIA the next stage of the process is the most exhaustive and consequently expensive part of the assessment. This is the identification and prediction of all the environmental impacts of the proposed project, their likely affects - both positive and negative, and the ways to enhance or mitigate these impacts. The outcome of this stage will be a report of the assessment, this is commonly called an environmental impact statement (EIS). The typical contents of an EIA or EIS are given in Box 9.1.

Depending upon the actual EIA, the EIS may include recommendations on whether the project should proceed, of the changes which should be made to its design to allow it to proceed to implementation. The EIS should also include recommendations on environmental monitoring to take place after project implementation. This stage of the EIA process should also be used to attempt an economic valuation of the environmental impacts which can then be used in the appraisal of the project to help assess its overall viability. Often this part of the EIA process can be a lengthy and expensive, particularly where it is necessary to assemble or survey baseline data. However, the investment in impact assessment and valuation can be more than offset when negative impacts are avoided or reduced, and positive impacts enhanced.

Monitoring and environmental auditing

When a project has moved to implementation, the "final" stage of the EIA process, or a component of project management, is environmental auditing. This is linked to the environmental monitoring of the project. Auditing can be undertaken either by the project itself or by an external agency. The objective of auditing is to assess the impacts of the project against established standards. For example, where an agricultural project has included a major processing plant it could be monitoring of water quality to make sure that effluent from the plant is not exceeding agreed or mandatory levels.

Auditing can also be linked to the socio-economic impacts of a project. An irrigation project may have the potential to increase water borne diseases, measures to mitigate these may have been part of the project design, monitoring of health statistics and auditing of these figures can be used to assess if this impact has occurred or been mitigated against. Monitoring and auditing require resources and a commitment by the project operator and regulatory authorities.

Box 9.1 Typical contents of an environmental impact statement (EIS)

- Background information of project and area, including history of project and its stakeholders and beneficiaries.
- Biophysical and socio-economic environmental description of the area, and assessment of the quality and reliability of this data.
- Review of legislative and institutional environment affecting the project.
- Assessment of significance and degree of potential impacts (positive and negative) with ranking of importance and, where possible, a quantitative and economic evaluation. Including the active participation of project beneficiaries and those local communities affected by project.
- Analysis and appraisal of different project options, including a "without project" option.
- Description of recommended mitigation measures for negative impacts, and of measures to enhance positive impacts.
- Any institutional changes or requirements if the project is to be implemented.
- Recommendations on environmental monitoring, evaluation and auditing.

TIMING OF ENVIRONMENTAL ASSESSMENTS

A crucial factor with environmental assessments is when is it to be made in the development of a project. In the past the environmental assessment of a project, if it happened at all, took place towards the end of the development of the project. This would often have been after the identification, design and financial/ economic appraisal of the project. But the environmental viability of a project is essential for a successful and sustainable project. Thus to undergo the preparation of a project leaving the environmental assessment to the end makes no sense, especially if this assessment indicates that the project is not environmentally viable and sustainable.

It is therefore important that environmental assessment of projects and project options commences as soon as a project has been identified. This could be only an initial evaluation (scoping) to rule out various options which have serious environmental impacts. Later as the project develops, more detailed assessments should take place alongside the more traditional economic and financial assessments of projects. As discussed later in this chapter the environmental economic valuation should be a part of the overall cost benefit analysis of a project.

COMMUNITY AND PUBLIC PARTICIPATION

Chapters 4 and 5 discussed the importance of participation of local communities as one of the key elements in the design of successful projects. Participation of project beneficiaries is also crucial when undertaking an EIA. Unless local communities have been involved in the original identification and design of a project, the onset of an EIA may be the first thing they know about the project.

It is important to allow the participation of local communities in the assessment of potential project impacts and possible alternatives. It is often they who will have to bear any adverse impacts, but hopefully enjoying the positive impacts the project may bring - though this not always the case with some projects. To achieve this very early in the EIA process the local communities as beneficiaries and stakeholders should be identified.

Purely consultative mechanisms are unlikely to be adequate to ensure participation of local communities. All too often consultations with local communities give them little opportunity to influence the EIA. Meetings and channels of communication should be set up to allow effective participation of local views and priorities. To avoid this becoming purely consultative appropriate feedback mechanisms should be set up with local people. Chapter 4 provides more background on participation, while chapter 7 provides details on participatory approaches and methods.

ENVIRONMENTAL IMPACTS

Types of impacts

In the past there has been a perception that most of the impacts of an agricultural project by the very nature of the projects would be beneficial. This is not the case. As well as positive impacts and benefits, there have been poorly designed projects which have caused negative biophysical and socio-economic impacts.

Irrigation projects have caused salinisation of soils, increase in water borne diseases amongst local populations. The development of large plantations and farms have led to significant deforestation, loss of land and land use rights to local people through the alienation and acquisition of land for these uses. Degradation of the land has resulted from the promotion of inappropriate land use leading to increase soil erosion and decline in soil fertility. Some of the impacts occur on site, others can occur off site or down stream of the project. An example of a downstream impact would be the reduction in surface flow of water below an irrigation scheme during the dry season. Another would the increase in sedimentation of rivers from soil erosion, or the loss of water quality for domestic use.

Potential impacts of agricultural projects

For convenience the potential impacts of agricultural projects can be grouped into seven broad headings These are given below with some of the main areas of impact in brackets:

- *Ecological* - loss of fauna and flora (including deforestation).
- *Soil* - erosion, salinisation, alkalinisation, fertility and structure.
- *Hydrology* - water quality, surface flows, flooding, pollution, and lowering of water tables.
- *Socio-cultural* - cultural sites, and archaeological sites.
- *Land use* - land tenure, land rights.

- *Socio-economic* - crop production, wealth generation, employment, nutrition, and health
- *Infrastructure* - roads, transport, and buildings.

A checklist of these potential impacts divided into negative and positive effects is given in Tables 9.1 and 9.2. These tables include possible measures to enhance positive benefits, and measures to mitigate against negative impacts.

The two project examples at the end of this Chapter illustrate some of these impacts in Tanzania.

Table 9.1 Potential negative environmental impacts of agricultural projects

Potential Impact	*Possible Mitigation Measures*
WATER RESOURCES/HYDROLOGY Water pollution from: - pesticides and insecticides - fertilizers - fuel and oils - sewage	Control the use of agro-chemicals and do not use them near watersourses. Training of farmers in use of agrochemicals. Maintain fuel storage facilities and prevent accidental spillage, provide facilities for disposal of waste oils.
Increase in surface run off	Provide proper sewage disposal and treatment facilities.
Higher risk of flooding with increase in river flows	Reduce soil compaction and soil erosion and increase soil infiltration.
Higher sediment loads in rivers and siltation down stream	Preservation or creation of vegetated protection strips for watersourses.
Lowering in water table, particularly in arid areas	Drainage design should include water control devices (check gates, sluices, etc.) to maintain water levels
Drainage of wetlands: loss of flood control and increase in flows	
Reduction in surface flows from water extraction for irrigation schemes	
SOILS Increase in soil erosion	Use appropriate land clearing and conservation techniques which reduce soil erosion and soil compaction.
Soil compaction	Avoid the use of heavy machinery particularly in wet conditions, use of animal traction or light machinery.
Loss in soil fertility	Improve soil fertility by preserving top soils and using good land husbandry to increase organic matter in the soil.
Soil acidification	Use of nitrogenous cover crops and tree species (agroforestry) to improve soil fertility
Soil salinisation/alkalisation due to irrigation	Better water management on irrigation schemes with adequate drainage

ECOLOGY Reduction in biodiversity through removal of natural forest and replacement by agriculture. Destruction of unique or endangered ecosystems and species - including wildlife and migration routes. Introduction of exotic trees and crops can lead to the uncontrolled weed like spreading to the local ecosystems. Introduction of pests and diseases to the area.	Use of non-forested lands for agricultural expansion or intensification. Creation of protection/conservation areas of remaining natural forest. Use of indigenous and exotic tree species in mixed plantations. Protection of habitats and creation of reserves and buffer zones around parks and reserves. Creation and maintenance of corridors between indigenous habitats. Preference should be given to indigenous tree species. Regular monitoring for outbreaks of pests and diseases and research into the best measures to control them.
LAND USE Displacement of other users from agricultural scheme. Loss of goods and services by local communities. Loss of grazing and pastoral rights. Destruction of cultural, historical and scientific sites	Identify all land uses and users of land. Identification of important sites and protection of these with guaranteed access for local communities. Do not deprive other land users of the use of the land except with their consent and compensation for any loss.
LAND TENURE Loss of customary tenure by local communities when tenure is acquired by agricultural schemes - especially resettlement schemes. Loss of tenure, or possibility of tenure, by groups occupying state reserves/lands. Disputes over actual ownership of land and increase in social tensions. Increase in land values and land speculation by outsiders.	Use customary tenure systems to secure agreement of local communities. Identify the legal and traditional owners of land. Delineate and agree all boundaries with local communities. Establish good communications with the local community through regular meetings and agree on a method of settling tenure disputes. Establish land ownership and preferably buy or leaselocally owned land.

Table 9.1 **Potential negative environmental impacts of agricultural projects (cont.)**

Project Impact	*Possible Mitigation Measures*
INFRASTRUCTURE Poorly planned roads, buildings, dams and other utilities Increase in traffic flows. Physical disturbance during construction phase of an agricultural development.	Selection of ridge tops for roads and avoidance of poorly drained areas, construction of side drains and culverts. Regular maintenance of all roads and infrastructure. Consideration to environmental health factors in location of any accommodation, office and workshop areas. Traffic controls on use of heavy lorries and plant.
ECONOMIC Insufficient economic benefits to local groups, or perceived insufficient returns. Lack of access to facilities and services.	Ensure all components of the local community receive material benefits from the agricultural development. Use local businesses to provide services where this possible. Establish profit sharing schemes where appropriate. Give the community access to clinics, schools, communication facilities etc. provided by the development. Provide extension services to local farmers/forest users.
HEALTH Increase in water borne diseases on irrigation projects Increase in cash crops can lead to less food crops and nutrition problems.	Siting of households away from irrigated areas. Access to better medical facilities. Nutrition programmes and maintenance of food crops.
MIGRATION Introduction of settlers/outsiders to the indigenous community through improved access and need for outside labour. Breakdown in traditional social structures. Law and order problems	Use as much local labour as possible. Obtain the consent of local community and government for the introduction of migrants. Identify and provide land and housing for migrants.

Table 9.2 Potential positive environmental impacts of agricultural projects

Potential ImpactPossible	*Enhancement Measures*
WATER Increase in soil water storage. Reduction in flooding downstream of site	Increased use of conservation and good land husbandry practices.
SOILS Improvement in soil structure, soil organic matter and nutrients through implementation of good land husbandry. Increase in soil infiltration and reduction in runoff. Reduction in soil erosion.	Increased use of conservation and good land husbandary practices.
ECOLOGY Increase in conservation value where sustainable agriculture development is achieved and less need to develop more land. Protection of natural vegetation and ecosystems.	Use non-forested land for development, and avoid using marginal lands. Create more protection zones around rivers. Establish buffer zones around parks and reserves. Create corridors of natural vegetation between 'islands' of remaining natural habitats.
INFRASTRUCTURE Provision of infrastructure: roads, ports, airstrips, health facilities, schools, communications, etc.	Identification of communities' infrastructure and utility needs. Use of these in planning future improvements to development and how these can benefit the locally community.
ECONOMIC Increase in agricultural yields for local people and increase in incomes. Increase in local wage earning opportunities. Increase in economic developments for local people and rural development.	Continue to employ local labour wherever possible, paying attention to the equal distribution of opportunities to all in the local community, particularly to women. Use local businesses or groups for provision services to plantation. Develop markets for agricultural products.
HEALTH Increase in food availability and better nutrition.	Increased production of food crops and nutrition advice
LAND TENURE Resolution of land tenure disputes and recognition of customary tenure systems. Physical delineation of land boundaries.	Ensure regular communication between plantation and local communities is maintained. Assist local communities to mark out land boundaries.

ASSESSMENT OF IMPACTS

Once the potential environmental impacts of the project have been identified it is then necessary to assess and predict their significance and severity. From the previous section it is obvious that it is easy to produce a list of all the potential impacts a project may have. It is far harder to predict the significance and severity of these impacts. To do this requires a knowledge of the current situation and how ecological and social situations will change if the project is implemented. In an ideal world this would mean we had available detailed baseline studies on a range of biophysical and social factors., e.g. soil and ecological surveys, demographic data, household information etc. and an understanding of systems and models to predict change.

There are few instances where a comprehensive data set is available, and the costs of obtaining all this information for many agricultural projects will be prohibitive. Furthermore, ecological and socio-economic systems are often still poorly understood. Over time this will improve, but at present it is necessary to make use of the information and understanding available. In a major agricultural project it will be necessary to utilise specialists in the final assessment of the significance of environmental impacts. These assessments can be of a qualitative or quantitative nature.

Table 9.3 Ratings for significance of impacts

Rating	*Description*
+5	Highly significant positive change
+4	Major positive change
+3	Significant positive change
+2	Moderate positive change
+1	Slight positive change
0	No change
-1	Slight negative change
-2	Moderate negative change
-3	Significant negative change
-4	Major negative change
-5	Severe irreversible change
+/-	Simultaneous positive and negative change

Rating and ranking of impacts

One common approach is to give ratings for each potential impact and to produce a matrix which compares a range of project options. These ratings are somewhat arbitrary but often a -5 to +5 system is used (Table 9.3). This method was used for the Dakawa Irrigation Project (Table 9.7) for four different project options. Ratings for each option can then be added to give a simple overall rating for each option. An example of this is given in Table 9.4. However, this does not allow for a comparison of the importance of different impacts. Some impacts have a far greater importance or effect than others. For example consider two impacts of a project which have been given the same rating of -3 (significant negative effect). The first is the permanent acquisition of land from local people, and the second is a reduction in livestock. Of these it is clear that the first impact is far more serious than the latter and should be given more weight in any final rating. This can be achieved by ranking all potential impacts. Similarly one impact may be so

serious that it only rules out this particular project or option. For example if an agricultural project was given a -4 or -5 rating (severe irreversible change) for forced resettlement of local people, this in itself would or should result in the project being rejected.

Example of rating impacts

A hypothetical example of a proposed soil conservation project is used in this section to illustrate the use of ratings of environmental impacts. The objective of the project is to reduce land degradation in a watershed where there is intensive use of sloping land for arable production by smallholder farmers. Two project options have been proposed:

Option (I) - The intensification of agriculture and flatter lands with increased inputs of agrochemicals and mechanisation to increase yields, and the removal of people farming on steep slopes followed by reforestation by Forestry Department and zoning of this area as a protection forest

Option (II) - The development of agroforestry and conservation techniques, and the planting of fruit and timber trees on steep slopes by local people for their own use.

Table 9.4 Ratings and sum for impacts of a soil conservation project

Potential Impact	*Project Option*		
	Without	*I*	*II*
1. Ecology			
Deforestation	-3	+4	+1
Flora and fauna	-2	+4	+1
2. Water			
Risk of flooding downstream	-1	+3	+3
Water quality of surface waters	-2	+3	+3
Pollution from agrochemicals	0	-1	0
3.Soils			
Erosion	-3	+3	+3
Fertility	-2	+2	+2
4. Socio-economic			
Crop yields	-2	+3	+2
Manual Labour	0	-1	-2
Resettlement of villagers	0	-4	0
Cost of inputs	0	-3	-2
Fuelwood	-3	+1	+3
Household nutrition	-1	+2	+2
Overall rating	-19	+16	+16

The ratings of the different impacts identified for the project are given for the two project options and the no project situation in Table 9.4.

In this example a simple sum of the ratings show that the two options are equal, while the rating for the "without situation" shows that without a change land degradation will continue. However, some more impacts are more important than others, to adjust for this weightings can be given to each impact. This is illustrated in Table 9.5. In this table the original rating is multiplied by a simple weighting (scaled from 1 to 3) given to the impact. When the ratings are now summed for each option, option II is now shown have a more favourable impact than option I, the without option is still very poor. It should be emphasied that these ratings are qualitative and the numeric values do not necessarily correspond to any quantitative impact. A further inspection of the ratings for option I shows a -4 rating for the resettlement of farmers from steep sloping lands, unless this can be mitigated against through the agreement of farmers this alone would be a severe enough of an impact to stop this option, regardless of whether overall it had a higher rating.

Table 9.5 Example of weighted ratings for impacts of a soil conservation project

Potential Impact	*Project Option*						
Description	*Weighting*	*Without*		*I*		*mII*	
	a	*b*	*c*	*b*	*c*	*b*	*c*
1.Ecology							
•Deforestation	1	-3	-3	+4	+4	+2	+2
•Flora and fauna	1	-2	-2	+4	+4	+1	+1
2.Water							
• Risk of flooding downstream	2	-1	-2	+3	+6	+3	+6
• Water quality of surface waters	2	-2	-4	+3	+6	+3	+6
• Pollution from agrochemicals	1	0		-1	-1	0	0
3.Soils							
• Erosion	3	-3	-9	+3	+9	+3	+9
• Fertility	2	-2	-4	+2	+4	+2	+4
4. Socio-economic							
•Crop yields	2	2	-4	+3	+6	+2	+4
•Manual Labour	1	0	0	-1	-1	-2	-2
•Resettlement of villagers	3	0	0	-4	-12	0	0
• Cost of inputs	2	0	0	-3	-6	-2	-4
•Fuelwood	2	-3	-6	+1	+2	+3	+6
•Household nutrition	2	-1	-2	+2	+4	+2	+4
Overall rating			-36		+23		+36

Notes:
b - original rating
c - adjusted rating obtained from multiplying the original rating by its weight (a x b).

Quantification of impacts

It will be particularly useful if impacts could be quantified. This will be especially useful in any economic valuation of impacts. Quantification of may environmental impacts both biophysical and socio-economic, are difficult but not impossible. For instance it is possible to estimate soil erosion and land use: soil erosion"

from a water catchment and the loss of soil nutrients and relate these to loss in crop production. Similarly it is possible to make an assessment of other products form a project such as supply of fuelwood or fodder. Again the use of non-timber products from a forest can be estimated quantitatively - an example from Kilombero at the end of this chapter illustrates this. However, other impacts such as loss of biodiversity, landscape values, human health impacts are much harder. The quantification of impacts and their economic valuation is discussed in the following section.

ECONOMIC VALUATION OF IMPACTS

Environmental costs and benefits

Unless the real cost and benefits of projects are adequately known, it is not possible to provide a complete analysis and appraisal of a project. It has only relatively recently that attempts have been made to value in economic terms the environmental costs and benefits of projects. In the past these were frequently ignored, and "bad" projects developed which did not take into account the cost of some of the impacts a project would have.

Two good examples would be: the human and financial costs of increase in diseases from poorly designed irrigation projects; and, the down stream effects of pollution from an agricultural processing plant such as a sugar refinery associated with a major plantation or small holder agricultural project. Conversely, the positive benefits on the environment have also been ignored, or not evaluated. Examples here would be the on-site and downstream benefits of improved soil conservation measures, another would be benefits of conserving forest lands for the non-timber products and values they provide (e.g. water quality, medicinal plants, biodiversity values etc.).

Since the nineteen eighties there have been made strides in the development of environmental economics, and methods have been developed for the better economic valuation of environmental impacts. Texts by Panayotou (1993) and Pearce et. al. (1989) give good and readable introductions to environmental economics and policy. However, the application of environmental economics at the project level is still in its early days and is rapidly developing. The remainder of this section gives a brief review of the economic valuation of environmental impacts associated with agricultural projects in a Tanzanian context. A practical guide by OECD (1995) is recommended for a clear and concise introduction to the environmental economic appraisal of projects.

Environmental economic valuation methods

Three types of methods are now used to value the costs and benefits of environmental impacts. These are:

- Market valuation of physical effects (MVPE)
- Stated preferences - Contingent valuation method (CVM)
- Revealed preferences.

These methods are briefly reviewed, and then their use in Tanzania discussed.

Market valuation of physical effects (MVPE)

The MVPE method attempts to make a direct market valuation of an effect caused by the environmental impact. For example soil erosion would be expected to lead to a decline in crop production through the loss of soil and nutrients. If it was estimated this would cause a 5% loss in production this could then be equated to an economic loss based on market prices for the crop. Again soil erosion can lead to the siltation of rivers and reservoirs. The cost of this can be estimated on the lifetime of the reservoir or decline in fishing from a river. MVPE is also used to value the impact of human health of a project, for example the increase in waterborne diseases on an irrigation project can be valued to determine the loss in productivity this could cause - human capital method (NB this does not include the pain and human suffering disease may cause).

A further method under MVPE is to value the cost to repair or replace the damage caused by the impact - replacement cost method.

Stated preferences - Contingent valuation method (CVM)

In this method people are directly asked what value they place on an impact. This is often in the form of a question(s) asking what people would pay to avoid an impact occurring or for a positive impact to occur. This could apply to improvements in air and water quality (use values), or to the existence of National Parks to conserve and view wildlife (non-use or existence values). The later is of particular importance in Tanzania when it comes to the debate of the continuation of National Parks and Reserves as against development for the needs of local people (see example in Box 9.4).

Revealed preferences

People will often pay to avoid negative environmental impacts or to gain from positive impacts. This method uses these preferences to pay as a valuation that people place on different impacts. For example, the price of property varies according to location. This is a reflection of a range of characteristics among which are environmental variables - this type of valuation is called hedonistic pricing method. Differences in prices can then be correlated to environmental characteristics to give it a value.

When considering the value of a National Park the time and cost of people visiting the park can be used to give a measure of the value people attached to entering it - the travel cost method (see example in Box 9.4). People will also pay to avoid certain environmental impacts e.g. purchase of bottled water to avoid drinking mains water (avertive behaviour and defensive expenditure).

Choice of method

The choice and applicability of the evaluation method depends upon the nature of the impact -as shown in Table 9.6 - and the availability of information and data to apply it. Most of the major impacts of agricultural projects tend to fall under a productivity heading - soil erosion, changes in crop yields etc. and would therefore need to be assessed using MVPE methods.

Evaluating amenity and existence values in Tanzania is both difficult in terms of obtaining the necessary information and also illustrates the asymmetry in the distribution of costs and benefits. For instance in valuing the existence and amenity values of a National Park the costs mainly fall on local people - e.g. loss of access to land - while the benefits measured through contingent valuation accrue to mainly foreign visitors. This indicates a clear economic argument for a mechanism to fairly distribute benefits from Parks in a country such as Tanzania.

Four recent examples of valuations with relevance are given in Boxes 9.2 to 9.5. These are adapted from case studies in OECD, 1995.

Table 9.6 Environmental impacts and appropriate valuation methods

Nature of Impact (with positive and negative examples)	*Possible valuation method(s)*
Productivity: • loss of crops production from soil erosion, • increase in fuelwood from agroforestry • loss of non-timber products from deforestation • siltation of reservoirs	market valuation of physical effects avertive behaviour defensive expenditure replacement cost
Human health: • waterborne diseases on irrigation project • better nutrition from increase in food crops • disease from pollution of domestic water supplies	human capital contingent valuation avertive behaviour defensive expenditure
Amenity/cultural: • continuance of National Parks • preservation of cultural/archaeological sites • value of land after improvement	contingent valuation travel cost hedonistic pricing
Existence values: • maintenance of tropical forests • conservation of endangered wildlife	contingent valuation

(adapted from OECD, 1995 - Table 3.2)

Box 9.2 Afforestation project in Northern Nigeria

The objective of the project was to undertake afforestation to reduce erosion and conserve forest resources. The project had two components: shelterbelts and farm forestry. The expected outcomes of the programme are:

- stopping a decline in soil fertility and improving existing levels
- increase of tree products (fruit, fuelwood, building materials etc.)
- increase in the supply of fodder

The study assumed that the shelter belts would improve crop yields by 15-25% (based on international research), and by 5-10% for farm forestry. These impacts were expected to be reached after 7-10 years for the shelter belts and 8-13 years for farm forestry. The expected value for the wood and fruit products from shelterbelts was estimated as $22 and from farm forestry as $7 after labour costs. Costs for fencing and planting was estimated as $150 per hectare for shelter belts and $40 for farm forestry. Other costs were the opportunity cost of the land occupied by trees ($12 and $25 for shelter belts and farm forestry respectively), and costs of setting up seedlings, distribution and extension services.

The study calculated for the shelter belts an Internal Rate of Return (IRR) of 15%, sensitivity analysis on yields, costs and erosion produced a range for IRR of 13-17%, an assessment of the benefits of wood production alone showed an IRR of 4.7%. For farm forestry the IRR of 19% was calculated with a range of 15-22% in sensitivity tests, similarly the IRR for wood and fruit benefits alone was lower at 7.4%.

These IRR's clearly illustrate the importance of valuing all the impacts of the project. If only the wood and fruit products had been used to assess the IRR, then the project would have appeared to be only marginally viable. A further conclusion of the study was that if there was no project invention then after 17 years net farmer income would become zero, i.e. the land would be abandoned. Another important point was that it was not until after 9 years that the net income from the shelter belt/farm forestry option was greater than the without option. This has important implications for the adoption of the project technologies by farmers who may not be prepared to wait 9 years to see the returns from their efforts bearing fruit, and therefore means the project will have to offer incentives to adoption or carry some of the costs of implementation.

(Source: Anderson, 1987 in OECD, 1995)

Box 9.3 Impacts of soil erosion in Zimbabwe

There has been a long history of soil erosion research in Zimbabwe. This has been used to correlate soil erosion with the loss of soil fertility, and from this an estimate in the loss of fertilisers this represents. Specifically the study found:

- On average 1.6 million tons of nitrogen, 156 million tons of organic matter, and .24 million tons of phosphorus are lost annually through soil erosion, and for only arable lands 0.15, 1.5 and 0.02 million tons per year.
- The losses of nitrogen and phosphorus alone are three times the level of the total fertiliser application in Zimbabwe in 1985.
- The equivalent cost of fertilisers of the loss would be $1.5 billion, and for the arable lands $150 million
- On a hectare basis this is the equivalent of $20-50 for arable lands and $10-80 for grazing lands.
- The cost of replacing nutrients per hectare is $50 - 13 to 60% of the gross returns per hectare.
- In terms of GDP the costs of soil erosion from arable land in Zimbabwe could exceed 3% of total GDP and 16% of agricultural GDP.

These figures even if over estimates indicate the significant impact of soil erosion. In the past this environmental impact has not been evaluated and included in project assessments. There are now obviously strong arguments that it should. The impact of soil erosion in Tanzania is every bit as likely to have a similar impact.

(Source: Norse and Saigal, 1993 in OECD, 1995)

Box 9.4 Value of National Parks in Kenya

A contingent valuation of the Parks and Reserves of Kenya was undertaken in light of the controversy over keeping large areas of land devoted to wildlife and forgoing their conversion to agricultural use by local people. In Kenya it was estimated by Norton-Griffiths, 1993, that the equivalent of $192 million pa income was "lost" to parks which is much greater than the net profits of $42 million attributed to wildlife and tourism. However, the study uncovered a far greater willingness to pay from tourists visiting the parks - a consumer surplus of $248 million p.a. This is more than the opportunity cost of the forgoing the land and indicates the scale of the benefit in maintaining the Parks. However, most of the costs fall on local people and most of the benefits accrue to foreign tourists. Thus there is a strong argument for either some form of income redistribution or compensation to local people to help ensure the long term survival of Parks. A similar analysis and conclusions may well be expected for Tanzania.

(Source: Moran, 1994 in OECD, 1995)

Box 9.5 Irrigation and Health in Cameroon

This irrigation project started in 1970 and follow a series of extensions covered 6,800 hectares and was occupied by 12,600 farm households with rice as the main irrigated crop. The scheme is managed by the government and records have been kept on productivity and incidence of disease. Seasonally transmitted malaria is endemic and bilharzia is prevalent with incidences varying from 10 to 60 % by village. The level of the production of rice for each household was estimated as a production function of a number of possible variables including:

- experience of the farmer
- size of available labour force
- prevalence of malaria and bilharzia
- duration of transplanting
- cultivated area
- rice variety
- number of millet fields cultivated (millet competes for labour with rice)

Other inputs, management and resource factors were assumed to be equal including the operation of irrigation scheme and provision of extension advice. Productions levels were compared between rice-growers on irrigated and those from non-irrigated areas.

No significant difference was noted in the prevalence of malaria between the two groups of farmers on their productivity, but as malaria is endemic this may well be have been expected. The story was different for bilharzia. Bilharzia was much more prevalent in irrigated rice growers, this had shown a correlation with output - a 10% increase in bilharzia was associated with a 5% fall in output.

(Source: Audibert, 1986 in OECD, 1995)

ENVIRONMENTAL MONITORING AND AUDITING

An environmental assessment should also recommend the environmental monitoring of key biophysical and socio-economic parameters to assess the actual impact of the project. This was the case for the Kilombero Hardwood Project and the suggested monitoring system is shown in Table 9.8. The system should also indicate the method and frequency for assessing these parameters. It will of course be necessary to check the impact of the project against accepted or agreed standards. This is known as environmental auditing and will normally be undertaken by an independent body. An example would be the monitoring and auditing of water levels in rivers down stream of a major irrigation scheme to check that levels and water quality are being maintained and that down stream effects alleviated.

TANZANIAN EXAMPLES

Two case studies of recent environmental assessments undertaken in Tanzania are given in this section to illustrate the proceeding sections. The first is of the rehabilitation and extension of an irrigation scheme at Dakawa, and the second is of a hardware plantation and smallholder scheme in Kilombero. The Dakawa

example illustrates the use of an environmental rating matrix to assess impacts. The Kilombero example illustrates the importance of assessing socio-economic impacts and recommendations for an environmental monitoring system.

Environmental assessment of the Dakawa Integrated Irrigation Project

An environmental assessment of the Dakawa Irrigation Project was undertaken as a component of a feasibility study of this scheme in February 1995 for the National Agricultural and Food Corporation (NAFCO). This study evaluated the impacts of three proposed alternative development options against a without project option. The study used a matrix to show the ratings for a range of different impacts. An adapted version, summarising the major impacts in this matrix, is given in Table 9.7

Table 9.7 **Environmental change rating matrix for Dakawa Irrigation Project II**

Impact	*Priority*		*Status*		*Development options*				*Mitigation*
	expert	*Local*	*'81*	*'95*	*WO*	*A*	*B*	*C*	
Biophysical environment									
1. Hydrology									
• flooding	*	*	0	-2	-2	0	0	0	
•surface water availabilitydownstream	*		0	-1	0	-2	-2	-3	PCO
•groundwater availability			0	0	0	0	0	0	
•pollution from agrochemicals			0	-1	0	-2	-2	- 2	
2.Soil									
•salinisation	*		0	-1	-1	-1	-1	-1	PO
•alkalinity (increase in soil pH)			0	-1	-1	-2	-2	-2	PO
•soil erosion			0	0	0	0	0	-1	
3. Ecology									
•flora			0	+1	+1	-1	-1	-2	N
•deforestation			0	-1	-1	-1	-1	-2	
•fauna (land)			0	-1	-1	-2	-2	-3	N
•fish			0	+1	+1	+2	+2	+3	
Socio-economic environment									
1. Land tenure and use rights									
• settlement and in-migration			0	+/-	+/-	+/-	+/-	+/-	
• pastoral rights	*	*	0	-1	-1	-2	-2	-3	VD
• farm land availability			0	+1	-1	+1	+5	+5	
• land values			0	+1	+1	+2	+4	+4	
• fishing rights			0	+1	+1	+2	+3	+3	
• grazing rights	*	*	0	-1	-1	-1	-1	-3	MDCO
• fuelwood			0	-1	-1	-1	-1	-2	MD
• building materials			-1	-1	-1	-1	-1	-1	
• water rights for livestock			-1	- 1	-1	-1	-1	-2	PO
2.Economic									
• risk			0	+1	+1	+2	+3	+4	
• agriculture - arable			0	+1	0	+3	+4	+5	
• agriculture - livestock			0	-1	-1	0	-1	-3	
• fishing			0	+1	+1	+3	+3	+4	
• paid employment	*	*	0	+2	0	+3	+4	+5	
• access to roads & transport	*	*	0	+1	0	+3	+3	+4	
3. Cultural									
• archaeological and cultural sites			0	0	0	0	0	0	
• graveyards			0	0	0	0	0	-3	
4. Human health									
• water quality	*		0	-1	-2	-2	-3	-3	PO
• bilharzia	*		0	-1	-2	-2	-3	-3	MD
• diarrhoea	*		0	-2	-2	-2	-3	-3	PO
• malaria	*		0	-1	-1	-2	-3	-3	MD
• nutrition			0	+1	0	+2	+3	+4	
Direct construction impacts									
• permanent land acquisition	*	*	0	-1	-1	-1	-1	-3	PO
• forced resettlement			0	0	0	0	0	-1	PO
• temporary land acquisition			0	0	0	0	0	-1	

Adapted from: NAFCO 1995

Notes for Table 9.7

Mitigation codes:

MD moderately difficult
MDCO moderately difficult and costly
N not possible
PCO possible but costly
PO possible
VD very difficult

For ratings of impacts see Table 9.3
Shaded areas indicate significant changes and * indicates a major issue.

Development options:

WO Without new project
A Rehabilitation of existing farm and irrigation scheme for sole use by NAFCO
B Rehabilitation of existing farm and irrigation scheme for joint use by NAFCO and smallholders
C Rehabilitation of existing farm and irrigation scheme for sole use by NAFCO and construction of new extension of scheme solely for smallholder use.

Environmental assessment of the Kilombero Valley Hardwood Project

In 1992 the Commonwealth Development Corporation (CDC) was proposing the Kilombero Valley Hardwood Project. The project aimed at growing 10,000 ha of teak (Tectona grandis) and managing natural forest over a further 25,000 ha in the Kilombero Valley, in the Ifakara and Ulanga Districts in Morogoro. An environmental assessment was undertaken in 1992 by IIED (London) and IRA of the University of Dar es Salaam at the request of the UK Overseas Development Administration (ODA) of the proposed project (IIED and IRA, 1992). This assessment was used by CDC to help finalise the project design which is now into its fifth year of implementation

This assessment included recommendations on an environmental monitoring system, and an assessment on the economic and financial valuation on land compensation taken for the plantation. These are given as examples in Tables 9.8 and 9.9.

Table 9.8 **Potential environmental monitoring parameters for Kilombero Project**

Area	*Parameters*	*Measurements*	*Frequency*
HYDROLOGICAL			
water courses rivers and streams wells and boreholes lakes and ponds	water quality flows availability flood events	chemical tests physical measurement of flow and sediment loads reported floods and their extent	annually and after application of pesticides and harvesting floods - when they occur
SOILS			
erosion	soil loss	erosion plots/silt traps	monthly in rainy months
fertility	nutrient levels	soil chemical tests	annually until canopy closes
compaction	bulk density, porosity etc.	soil physical tests	after harvesting operations
CLIMATE			
regional effects	rainfall temperature humidity solar radiation wind speed and direction	from meteorological stations	daily
site effects	soil temperature soil humidity solar radiation	from permanent sample plots	seasonally
SILVICULTURAL			
plantation inventory	height bole volume stand density wood properties foliar nutrient levels pest and disease pollution damage	physical tests chemical tests qualitative assessments	annually but dependent upon plantation operation

Adapted from: IIED and IRA, 1992

Table 9.8 **Potential environmental monitoring parameters for Kilombero Project** (continued).

Area	*Parameters*	*Measurements*	*Frequency*
CONSERVATION (Ecology)			
biodiversity	types of fauna and flora	fauna and flora surveys	annually or seasonally
protection of conservation areas	width and length of protection strips	report on condition	annually
protection of water courses		physical measurement and assessment	annually
pests and diseases	outbreaks	report on outbreaks and control measures	annually
exotic species		effects of introduction of exotic species	annually
POLLUTION			
biocides	water quality	residue measurements	before and after applications
effluent and emissions	water and air quality rainwater pH	physical and chemical tests	annually
SOCIO-CULTURAL			
cultural, historical and scientific sites	condition community access	report on condition and access to sites	annually
INFRASTRUCTURE			
workshops offices housing	health and safety standards	environmental health and safety inspections	annually
fuel storage agro-chemical stores effluent treatment works roads and bridges	physical condition of roads and bridges	inspection of roads and bridges	annually or seasonally
	traffic flows	report on average flows	annually
ECONOMIC			
benefits to local community	employment wage levels outgrowers local business local/regional domestic product	report on survey of local economy creation of local markets	annually

Table 9.8 **Potential environment monitoring parementers for Kilombero Project (continued)**

Area	*Parameters*	*Measurements*	*Frequency*
DEMOGRAPHIC	population of indigenous and migrants households gender and age splits level of education etc.	survey and report	biannually or longer
FACILITIES/SERVICES			
benefits to local community	clinics schools community buildings extension services	report on services and facilities available to local community	annually

Adapted from: IIED and IRA, 1992

Table 9.9 **Land compensation Issues: An example from Kilombero Hardwood Project**

	Comparison of Benefits Foregone and Gained by Villagers in Moving from 'Without' to 'With' Project Scenario	
	A. Benefits Foregone From Alienated Land	B. Benefits Gained From Project
Financial	1.'Sustainable' timber sales* 2.'Sustainable' fuelwood sales* 3.Agricultural benefits	1.Employment*
Economic	4.Fuelwood 5.Building Poles 6.Honey 7.Hunting 8.Medicines 9.Wild Foods 10.Rituals	2.Outgrower assistance 3.'Project' Spin-offs* 4.'Development' Spin-offs*

Adapted from: IIED and IRA, 1992

SUMMARY

This chapter has stressed the importance of assessing the environmental impacts of agricultural projects on the biophysical and socio-economic environment. Agricultural projects can, and do, have major impacts. These can have both positive and negative effects. It is important to enhance the positive impacts and mitigate against the negative affects. These can be identified by undertaking an environmental assessment which wherever possible should include an economic valuation of a project's impacts which can be used in the overall financial and economic appraisal of the project. By undertaking an environmental assessment the full impact of a project can be truly determined, and ultimately this will lead to better and more sustainable projects.

EXERCISES

Identification of environmental impacts

Irrigation farming in Tanzania has been emphasised since independence with a focus on developing large scale Government projects. in more recent years there has been a move to the development of more small scale projects. In 1993 the Ministry of Agriculture with the support of a donor agency to explore a project to support sprinkler irrigation for existing smallholder farmers to produce horticultural crops for Dar es Salaam, Iringa and Mara regions; the proposed project had six main components:

- provision of sprinkler irrigation facilities for exploitation of local water resources
- establishment of a credit scheme for the purchase of farm inputs
- training and recruitment of staff for MOA
- purchase of vehicles and marketing system
- construction of godowns and MOA staff housing
- support to women groups.

Identify the potential biophysical and socio-economic impacts of this project and their positive and/or negative effects. Present these impacts in a table, or matrix, with appropriate enhancement or mitigation measures.

10. PROJECT PLANNING FOR SMALL FARM DEVELOPMENT

Key concepts and words:

Tranformation and Improvement Projects; Features of Small Farm Projects; Selecting Farm Models; Enterprise Budgeting; Resource Constraints; Livestock Projection; Farm Plan; Farm Programme; Aggregating and Amalgamating Farm Budgets; With and without scenarios; Adoption Rates.

INTRODUCTION

This Chapter considers the planning of agricultural projects which focus on the development of small farms and farming enterprises. As discussed in chapter 2, agriculture is the main stay of the Tanzania economy and the source of livelihood for the majority of the people. Successful agricultural expansion and increased (sustainable) production from agriculture can increase food security and cash income for farmers, and help alleviate poverty in the country. This chapter discusses farm models and budgets which can be used in the development of successful small farm projects.

Increased and sustainable farm production requires a range of physical inputs: finance; technical knowledge; markets; and, transport. Small farmers cannot provide all these things for themselves. Successful small farm development calls for the adequate integration and participation of farmers and with each other, and assistance from government, non-government and private agencies. It does not depend solely on the farmers' resources, motivation, and abilities, but involves the provision and development of off farm agencies in a participatory approach to development.

DEVELOPMENT APPROACHES

In developing small farms there are two fundamental approaches to their development. These are: the improvement and transformation approaches (Box 10.1). The first involves improving on the existing situation and developing better practices and services to enable farmers to maintain and increase production, while the second involves a completely new approach to agricultural production. The first can be participatory in nature, where farmers are actively involved in the process, while the second tends to be much more top-down and directive. As discussed in early chapters the participatory and incremental approach is much more likely to be successful than the transformation approach where farmer involvement in the process is often very limited.

Box 10.1 Approaches to small farm development

Improvement approach - involves accepting an existing land use situation and seeking to intensify production by changing the resources and facilities available to farmers. Farmers can participate in the improved practices, and individual farmers decide for themselves whether to take part. Improvements can include: credit, new varieties, land husbandry practices, fertilisers, extension advice, road development, stores, new crops, changes in land tenure and land use. Most small farm development occurs in this way, and often without the intervention of government.

Transformation approach is interventionist, top-down and involves planners/decision makers designing a new pattern of land use and production, either replacing an existing system (e.g. new irrigation scheme), or for the occupation of previously "unused" land (e.g. settlement schemes). A new uniform environment is created (or assumed), in a disciplined, controlled setting, with a high level of inputs intended to achieve high-intensity production by "selected" farmers.

FEATURES OF SMALL FARM PROJECTS

Management units

Farm development projects envisage increasing production on a large number of separately managed units. There is not one overall management that controls everything, as in the case of estates or large-scale farming. The main benefits will come from increased production by many farmers, each acting independently and with a degree of freedom over what to do, and how to do it.

With and without scenarios

Farm planning may emphasise aspects of the new situation to be created, but concentrating only on the new will not be sufficient for project analysis. Unless the projects are for settlement schemes on land that was previously unused, the project will always involve changing the land use situation. In these cases, the net production attributable to the project will be the net output of the land with the project minus the net output that would have occurred without it. To allow various analyses, we need estimates in project planning of what farmers would have done without any new developments, as well as our plans of what they might do with it.

Farm models

A major implication of this is that almost all small farm development planning requires the study of existing land use and farming systems. This need brings major resource and conceptual problems. Getting information about farming, and from farmers is difficult and takes time. Using whatever information is available in ways that are practical is also problematic. Individual farms, and farmers, will vary greatly one from another. Even if a project is aimed only at some very specific groups of farmers (e.g. farms of less than 4 ha with land that is suitable for growing cotton), the individual farms will vary in respect of land

quality, labour force, finance available for crop production, management capabilities and objectives i.e. there is no such thing as the average farm or farmer. However, it is possible to make some generalisations about small farms, some common features are given in Box 10.2.

Box 10.2 Some general features of small farms

- Each farm is small in practically all respects: land area; capital employed; inputs, output, and labour.
- Farm activities are managed by the household (in practice by one or more members) on behalf of the household, and members of the household contribute much of the required work input.
- Most work is undertaken by hand with little or no mechanisation.
- The production of food for consumption in the household is the primary objective of many households.
- Net household income is probably less than the national average.
- The household has limited or no savings that can be used to finance farm production
- Availability of credit for many households is limited.

In project planning, it is clearly impossible to prepare new budgets and plans for each different farm, or even for every small group of similar farms. In practice, in whole farm planning it is only realistic to handle a few farm models - up to 4 or 5 at the most. Consequently, for the modelling of both the with and without scenarios, it is simplified by looking at only a few farm plans. Where a new transformation development is in view (e.g. in irrigation settlement schemes) the planners can plan to create homogeneous situations that include only one or a few types of holding, for which a single set of plans may be adequate. Where it is improvements to an established situation, great diversity is likely to exist and in looking for "representative" farms to use as models it is important to concentrate on the most common relevant types. These models will usually be based on the major characteristics identified during the data collection process. The general size of farm, soil types, and suitable enterprises to be included in the farm plan should be specified. This will then produce a "typical" or "representative" farm plan. An enterprise budget can then be developed for each potential enterprise.

Whatever the way in, "typical" model farms are chosen It is inevitable that basing planning on them can allow at best only a crude approximation to what will happen in aggregate amongst a varied groups of farms. Thus there will be a degree of uncertainty surrounding all planning for small farm developments.
planning Stages

In planning for small farm programmes there are nine basic steps. These start with problem (or opportunity) identification and setting of objectives, followed by the collection of information and development of models and plans. These are illustrated in Figure 10.1 and described in the following sections.

Stage 1 - Project objectives

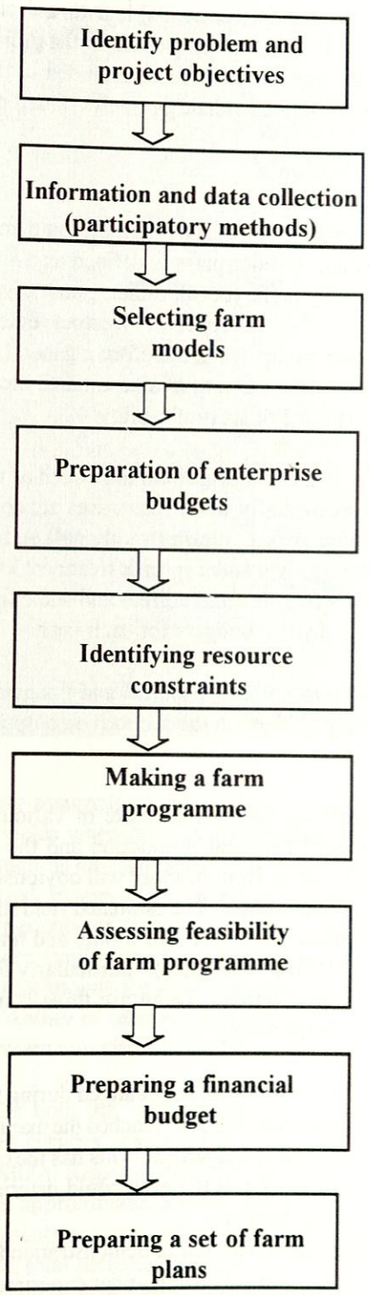
An early essential is to establish as clearly as possible a clear statement of the problem (or opportunity), and the main objectives of the project and which should prevail when objectives conflict. Production goals (i.e. increasing food supply or expanding exports to the fullest level) may need to be resolved in relation to equity (allowing only small farmers to participate, and each assisted only up to a certain level) and technology choice (high intensity or extensive; hand working or mechanised; etc.) The geographic limits of the project used must also be defined. Prior to serious planning, the crops (or livestock) to be improved and the level of technology to be used must be determined, at least in general terms. If the project is following a process approach, stakeholders and beneficiaries should be identified, and the means to follow a participatory approach identified and adopted.

Stage 2 - Information and data collection

An early need will be to gather information about the project area. For the project to have been identified, a certain amount must already be known about the situation, though much of it may be impressionistic. Some new data may be obtained from existing records and sources, but very often a new field survey will be required. Where the project is following a process approach this will often involve the use of participatory approaches such as PRA or PLA (chapters 4 and 7). The information collected is likely to include:

- Land area, in total and of different qualities;
- Labour force available, both family and employed;
- Land use pattern followed, and livestock numbers of each main type;
- Input-Output relations of the crops grown and the livestock kept, and the levels of farm income;
- Finance from different sources used for production and available for intensification;
- Water available, if irrigation is used, and the availability of any other critical resources.

Figure 10.1 **Stages in the planning of small farm development projects**



Stage 3 - Selecting farm models

On the basis of the information collected and other available data, a decision must be made on the number and broad features of the model farms that will be developed for the project plan. The general size of farm, soil types and types of suitable crops and livestock to be included in the farm plan should be specified. Much underlying variability will probably be evident, but only a small number of models can be handled.

Stage 4 - Preparing enterprise budgets

Once farm models have been developed these can then be translated into implementation by making individual enterprise financial and physical plans. An enterprise is defined as a single crop or livestock commodity being produced on a farm. For example maize (corn), millet, potatoes, wheat are crop enterprises. Dairy herds, beef cattle, sheep, pigs, poultry are all types of livestock enterprises. Most farms consist of a combination of several enterprises. An enterprise is therefore a general name that includes both livestock and crops. An enterprise budget is therefore a listing of all estimated income and expenses associated with a specific enterprise to provide an estimate of its profitability.

Each enterprise budget is developed on a basis of a small unit, such as one hectare for crops and head for livestock. This enables a comparison especially when enterprises are competing for the same resources. If one enterprise is using different technology e.g. maize (traditional) and hybrid, these should be treated as separate enterprises. Similarly, livestock grown under specific treatment levels must also be treated separately. Where crop yields vary between years (e.g. tea and coffee) and some livestock enterprises (e.g. breeders, calves), there should be a separate enterprise budgets for each year.

Each enterprise budget should show a mixture of physical and financial data. Enterprise budgets can be presented in different formats, but they all contain the sections on output, income, variable costs and fixed costs, Box 10.3.

The computation of enterprise budget depends on estimate of various aspects of output, input prices, labour and product prices. Estimates of the total production and the estimated output price both form important components of revenue estimates. Both of these will obviously have a great effect on enterprise profitability, and they should carefully be estimated. The estimated yield should be the "average" or "expected" yield. This is the outcome of the weather, soil, levels of inputs and management. Thus the projection of yields even one year in advance is a difficult proposition - particularly for livestock enterprises. Projection over the project period is obviously even harder. There are three commonly made mistakes in making projections, which arise from weak assumptions:

- Assumptions that current yields will remain unchanged during the life of the project are naive and misleading. It presumes that yields have already reached the maximum levels and cannot be increased by introducing new technologies or management. This has the effect of overestimating the benefits of the project. Second, the conditions in the area could deteriorate if there was no project, thus underestimating the value of the project.
- Using data derived from experimental stations or demonstration farms at its face value and assuming conditions in project area are the same as those under experimental conditions. This is unrealistic as geographic conditions and cultural practices in the two situations are usually very different. Unadjusted yields may overstate the benefits of the project. Adjustment of experimental data downwards is therefore necessary. Some professional analysts think that maximum yield that can be achieved under the field conditions is only 50-60% of the experimental farm yield. The use of results from farming systems or farmer participatory research are likely to be closer to reality.

- Using past or historical data to forecast future yields. The assumption being that technology remains constant. This would under estimate project benefits as shown under the first assumption.

Box 10.3 Enterprise budget: typical inputs and outputs

Output (distinguished into types and major different grades, if relevant)	Physical yield Price per unit Value of Production (Gross Output)
Variable production costs	Quantities of all inputs Prices of all inputs Costs of all inputs
Labour	
Enterprise gross margin	Annual Gross Output minus Variable Operating Costs
Investment costs (where relevant)	Quantities of all inputs Prices of inputs Cost of all inputs
Water inputs	If irrigation is used, the water requirement per month.

It is necessary that these misleading assumptions be avoided in the process of projecting yield of an enterprise. It is difficult to project yields when there is no baseline data for the new crop. One solution would be to undertake field trials such as on farm trials and demonstrations. This may be practical for annual crops with short gestation period. However, for perennial crops taking five to ten years, experimental data may not be a practical one. Experience of farmers or experimental farms in other areas or countries where the crop has been grown under similar conditions/practices to those in the project area, may be sufficient to project the yield. Once this knowledge has been obtained, it must be adapted to the particular farming system in the project area. Ability of research and extension systems to transfer technology and the knowledge of the indigenous farmers must be thoroughly analysed.

Enterprise budgets will be needed for both the "without project" and the "with project" situations. The former may be derived from the area surveys. The latter may be put together from a variety of sources. (Surveys, District Planning Office, MOA, Regional Agricultural Office, Regional Economist, Universities etc.) The enterprises budgets, though approximate, are the building blocks from which farm plans will be built up. Any enterprise budget represents only one point on a production function. For example changing the fertiliser level would change yield, total revenue, and cost. This would also change the expected profit. A project must be prepared on the given technology and possible foreseen technological changes. As enterprise budget represent only one point on the production function the budget does not automatically determine the profit by maximising input levels. This should be done prior to computing the enterprise budget. Gross Margins are important because they represent a rough measure of profitability. They reflect returns to fixed factors.

Enterprise gross margins should not be confused with the concept of "profit". Gross margins are returns to a number of fixed factors used in the production process. This is why the term "gross" margin is applied. As long as the enterprise can meet its variable expenses in the short run, the farmer can continue operating. If gross margins are unable to meet the variable expenses in the long run, then the enterprise is abandoned. Estimated gross margin from different crop enterprises can then be compared with each other to select the "best" crop enterprise alternative if the project objective is maximising profitability.

Stage 5 - Resource constraints

For, each type of model farm, 'typical' and maximum levels of resource availability may be established. These should relate to:

- Total land available;
- Total cultivable land available;
- Area suitable for each type of crop;
- Labour available each month in work days, family and hired;
- Draught animals available each month in work days, if used;
- Water available each month, if irrigated;
- Money available to finance seasonal production and long term development; and
- Area to be planted for subsistence crops, or amount of output required for home food needs.

These estimates will set limits that must not be exceeded or which must be met by any farm programme that is devised.

Stage 6 - Preparing a farm programme

Once an enterprise budget has been prepared for a potential crop/livestock enterprises, and project objectives are defined, the next task is to produce a farm plan. A farm plan will show a resource inventory, and possible enterprises. In most smallholder farming systems, the farmer goals revolve around two key objectives: to meet subsistence requirements and cash income. One of the typical farm plan would comprise of food crops and cash crops/livestock. From the knowledge of: existing practices in the area and elsewhere; objectives and strategies for the project; broad features of the enterprise budgets; and an understanding of the constraints; a farm development programme is developed for each model farm. This consists of a statement of the area of land to be planted to each crop each year, and the annual numbers of each different type of livestock.

Stage 7 - Feasibility of a farm programme

The farm programme discussed above is basically a 'land budget' which will show for the main cropping season how the available land will be used. Obviously land use must be planned within the constraint of the maximum amount of land available. If successive cropping is possible, (i.e. more than one crop on a piece

of land in one year), the land budget must be made on a less-than-yearly time basis, season-by-season, or even month-by-month).

A similar budget must be made for labour. On a monthly basis, the number of work days required each month for each enterprise in the programme is calculated and all are added to show monthly labour needs. These can be compared to labour availability. The feasibility of meeting labour input needs from farm sources can be assessed. If needs exceed availability and labour hiring is possible, the budget should show the extent and timing of when hired workers will be needed. Similar resource budgets may also be made for irrigation water, farm machinery, or draught animals, if these are important. With water especially, the main point will be to see whether planned needs will ever exceed estimated availability.

It is quite possible that the labour or water budgets that correspond with the first-proposed crop programme (the land budget) will not be feasible. They may call for more labour or water in some months than is available. Unless the deviation is very minor, the farm programme must be changed, to reduce the level of the enterprise(s) that demand(s) most resources at the critical period. The preparation of a new land budget will be followed by new labour and water budgets, and the process of adjustment and trial may need to be followed several times until a crop programme has been defined for each model farm that looks workable in regard to the objective and resource constraints established.

Stage 8 - Finance budget

The farm programme that is feasible in technical terms can now be projected in financial terms. The per hectare output and cost figures in the enterprise budgets are multiplied up by the number of acres (or hectares) concerned. This allows the calculation of:

i) Value of Total Gross Output during the year;

ii) Value of Total enterprise Costs over the year;
iii) Value of Total Gross Margins for the Whole Farm Programme for the year [(i) - (ii)]

From this sub-total is deducted the cost of all Fixed Cost Items - expenses that the farm as a whole unit has to meet during the year, but which are not directly associated with any enterprise. (Examples are full-time labour; rents; maintenance of fences and buildings; and other 'overheads'). Another sub-total is now obtained, the value of Net Farm Income. This is the money surplus from farming that will arise from following the chosen farm programme. It is the amount from which loan charges can be met; personal income taken for the family; and new investments made.

These figures show: the cost of inputs and resources needed to follow the programme; what changes in earnings might arise, and judge how this compares not only to the costs of generating them and to possible earnings if there were no project. These all indicate whether farmers might find the new proposals attractive from the financial viewpoint. Finally, the value of Enterprise Costs and Fixed Costs, and of Annual Net Farm Income, will help to indicate whether outside finance will be required for each model farm, and how much would be needed in the 'typical' case. Various credit possibilities might then be considered, showing inflows of credit and outflows of interest and capital repayment to find a pattern that matches the cash flow situation on the farm over the years.

Stage 9 - Set of farm plans and optimisation

If all the stages described have been successfully completed, the end product will be a set of annual farm plans for each year during which the farm programmes evolve from a starting point to an expected 'maturity'

state - the land use pattern and levels of outputs and inputs that are assumed to persist in the long term. In its simplest form, farm planning consists only of modelling this target 'maturity' annual farm programme, but more generally it is recognised that this level is not reached in one step. Improvement takes time to work through, as farmers learn and adopt new practices, become convinced of their value and reliability, and decide to apply them in full on their holdings. This adjustment could take several years on any particular farm, and it would be very difficult to model this process every year. However, it is common to prepare at least one 'intermediate' plan for a year between no change and maturity, in which yield levels are lower than those projected for the long term.

Where perennial crops are involved, there may be no alternative to preparing individual crop programmes, labour budgets and finance budgets for each of the years up to the time of 'mature' yields for long-term crops, (tree and bush crops especially), or for a completed cropping cycle for limited-life perennials like sugar. The situation may become even more complex where perennial crops are planted a little each year. Very varied and complex cropping patterns could in principle be developed for farm programmes that vary each year for a long time until the long run maturity level is reached.

An example of the changing land-use pattern for a model farm for where a new cash crop, coffee, is to be introduced gradually to a farming system based on annual crops is shown in Table 10.1.

Table 10.1 Example of changing land use pattern for a model farm (area in hectares)

Crop	Year						
	1	2	3	4	5	6	7
Coffee: age 1yr	0.25	0.25	0.25	--	--	--	--
2yr	--	0.25	0.25	0.25	--	--	--
3yr	--	--	0.25	0.25	0.25	--	--
4yr	--	--	--	0.25	0.25	0.25	--
+5yr	--	--	--	--	0.25	0.50	0.75
Maize	3.75	3.75	3.50	3.50	3.50	3.50	3.50
Sorghum	1.00	0.75	0.75	0.75	0.75	0.75	0.75
Beans	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Total Farm	5.50	5.50	5.50	5.50	5.50	5.50	5.50

In principle, each year might be budgeted separately. If only one farm model applies in the project or programme in view, then budgeting separately each of several years may be practical, but doing this for several models in a single development project may be very difficult. It must always be remembered that the farm models being worked out are only stereotype approximations that are needed as aids to indicate how a scheme might develop and what, in broad terms, the associated costs and benefits are likely to be. Seeking fine detail in annual budgets could be misplaced effort. Consequently, some years may be amalgamated to allow a manageable number of broadly adequate annual farm plans to be derived.

The problem of a multiplicity of annual plans with each model may be rather less in "Transformation projects". Under controlled conditions, the evolution of farm programmes can be speeded up. Perennial crops will not mature any faster, but the full acreage may all be established at one time, and farmers are helped to adapt and be efficient with new crop technologies much more quickly than in most improvement situations. As a result, fewer annual farm budgets may be needed for each model farm.

If the annual farm programmes have been realistically prepared and their feasibility has been tested, it may be possible to believe that they are plans that could work and could bring the benefits shown in them. However, the plans arrived at may have been developed in a variety of ad-hoc ways, following the whims or rationale of whoever prepared them. Although these plans might work, there could be other plans with different combinations of enterprises that might also work and would produce even better results.

An example of an enterprise budget for a tobacco project is given in Table 10.2.

Table 10.2 **Example of an enterprise budget for smallholder Burley Tobacco**
(estimated returns and expenses per hectare)

Item	Description	Unit	Quantity	Price (TShs)	Amount
Revenue	Burley Tobacco	kg	2400	600	1,440,000
Expenses:					
Seed	Hybrid	1/2kg	2	5000	10,000
Fertiliser	NPK/SA	1kg	250	300	75,000
Canvas	Polyester	100x9	1	18,500	18,500
Insectcontrol		kg	1	834	834
Disease control	Zineb 75 WP	kg	1	1014	1014
Herbicide	Eride 90w	kg	0.6	1716	360
Fumigant	Methl bromide	litres	6	924	5,544
Hired labour					
Tractor		days	169	699	96,000
Transport		hrs	2	1200	24,000
		Shs			15,000
Total Expenses (variable)					246,252
Gross Margin					1,193,748
Investment Costs		Shs			900,000

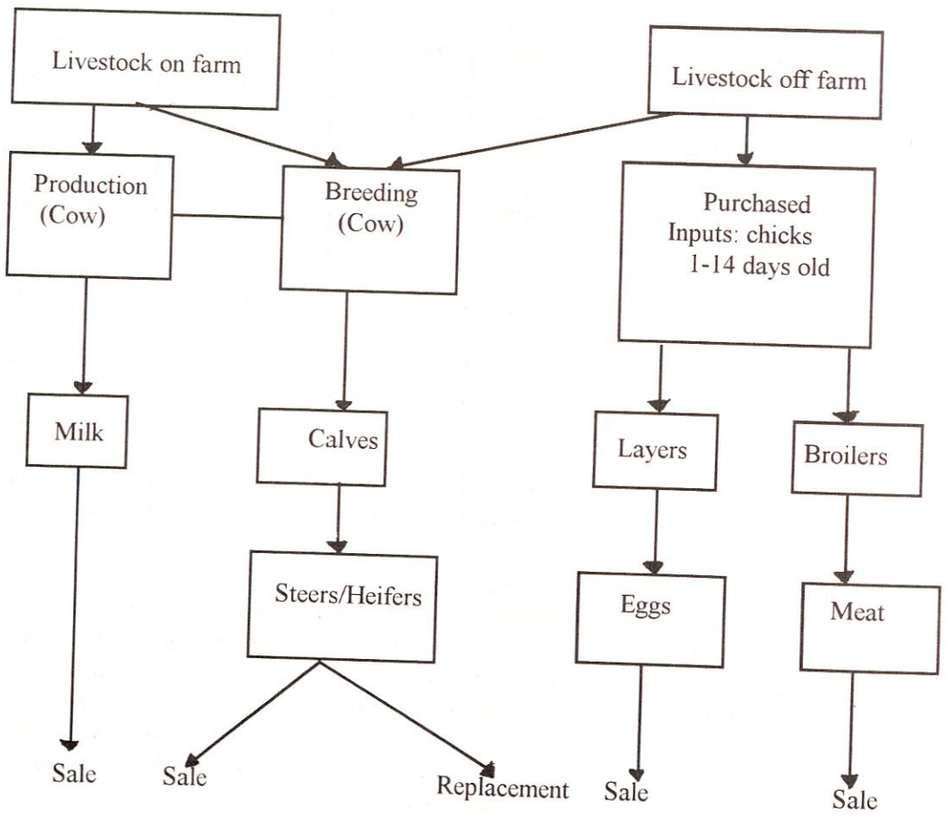
Optimisation and maximisation are objective-related concepts that economics and economic models are often directed towards. Various forms of programming exist as quantitative methods that could be used to show, for any given level of enterprise data and resource constraints, what combination of crops and livestock would give the highest farm cash surpluses under the assumptions given. These methods could be applied to small farm planning in development programmes and projects. However, in practice they seldom are, for a variety of operational and conceptual reasons. Most planning is done using models that are thought to be practical and beneficial. Often it is enough to know that there are workable programmes of this kind. If there are others that are better, then well and good.

LIVESTOCK ENTERPRISES

Livestock is a feature of many farming systems in Tanzania and, as an agricultural enterprise, it is one of the most difficult to make projections on. In livestock enterprises different outputs occur at different times, and different operations may be possible, e.g. dairy combined with breeding. Livestock projections are related to the number of livestock which is not necessarily related to land area,. Unlike land, which is merely a producing unit, livestock are reproducing (breeding, fattening) as well as producing units (dairy, beef, milk, meat). Livestock could be produced on the farm (heifer produced on farm for reproduction) or it can also be purchased (chicks, breeding cow) as shown in Figure 10.2. Overall four operations can be distinguished:

- breeding operations which involve the production of offspring on a farm from animals reared on the farm
- producing operations may involve the rearing of animals for final consumption as meat
- operations for the regular production and market e.g. milk and eggs
- production of livestock products from animals reared but not born on the farm e.g. fattening of purchased pigs, cattle, broiler meat and eggs not produced on the farm.

Figure 10.2 Example of some cattle and poultry operations on farm



Production of weaners may be classified as breeding. If some weaners are retained for fattening, the production may be classified as breeding and producing operations. For purely producing operations (milk, beef)) total production of the commodity being produced is based on the average yield per animal. For breeding operations, it is necessary to determine the parent's stock reproductive capability on the basis of the family history and managerial practices on the farm. Appropriate yield levels are then applied to the various categories of producing operations on the farm to determine total production each year.

In most developing countries there is no accurate and reliable data for livestock projection, and expert opinion and on-farm experiences have to be used. Information on mortality, weaning, culling and carrying capacity is central for projecting livestock enterprises. This information is usually provide by animal experts e.g. Universities, Agricultural training institutions. Examples of boiler chickens, beef cattle fattening and breeding combined with fattening are given as illustrative examples. The total livestock at the end of each year (closing stock) becomes an opening stock for the following year.

Box 10.4 Example of a farm plan

In a typical farming system four crops are grown: maize, beans, cotton and sorghum, i.e. there are four different enterprises undertaken by the farmer. A proposed plan is for the expansion of land under maize and cotton. This can be achieved through a combination of crop substitution, increased productivity of existing (cotton and maize) enterprises and area expansion. If half of land under sorghum could also be utilised for the other three crops, and additional land of 0.8 hectare is also available, a total of 3.8 ha is available when other constraints are satisfied (e.g. labour, capital). These areas and Gross Margins are also summarised in the table below.

The allocation of land is generally based on the objective of the project (and farmer). In this example food security and cash crops are given priority over other goals. Land allocation to maize and cotton is gradually increased over the three years as shown in the Table. Land under maize is increased from the existing one hectare to one and a half hectares in year 1 and 2. In year 3 it is increased by 0.5 ha. The total land allocation to maize becomes two hectares. Similarly, land under sorghum is reduced to provide additional land for maize and cotton.

At the end of year 3, the gross margins increase to Tsh 456,400 for maize and 266,210 for cotton while that for beans remains unchanged and sorghum gross margins are reduced from Tsh 244,54 to 114,120. In maize and cotton, gross margins increased by 33% and 132% respectively. As it can be seen in the case of maize, both variable costs and output have increased. This shows an increase in inputs compared to the existing situation. Food production has increased from 336 kg to 504 kg. This has been partly achieved through increased in yield (2000kg to 2800 kg) and area expansion from 1 to 2 ha. A similar case can be stated for cotton. Once these farm programmes are made, under similar conditions, they can be aggregated. This can be done through multiplying the single farm plan by the number of participants in the project.

Box 10.4 Example of a farm plan (continued)

Table showing Gross Margins from the four enterprises

	Beans	Cotton	Maize	Sorghum
Existing situation				
Area (ha)	0.3	0.2	1	1.5
Yield (kg/ha)	400	600	2000	2000
Production	120	120	2000	3000
Price (Tsh/kg)	600	450	120	0.11
Gross revenue (Tsh)	72,000	54,000	240,000	330,000
Variable Costs	26,590	23,370	107,800	85,460
Gross Margins	45,410	30,630	132,200	244,540
Fixed Costs (Farm)				150
Proposed farm programme				
Years 1 and 2				
Area (ha)	0.3	0.5	1.5	1
Yield (kg/ha)	400	900	2800	2000
Production	120	450	4200	2000
Price (Tsh/kg)	600	450	120	110
Gross revenue	72,000	202,500	504,000	220,000
Fixed Costs (Farm)				153.75
Year 3 onwards				
Area (ha)	0.3	0.8	2	0.7
Yield (kg/ha)	400	1200	2800	2000
Production	120	960	5600	1400
Price (Tsh/kg)	600	450	120	110
Gross revenue	72,000	432,000	672,000	154,000
Variables Costs	26,590	165,900	215,600	39,880
Gross Margin	45,410	266,210	456,400	114,120
Fixed Costs (Farm)				117.45

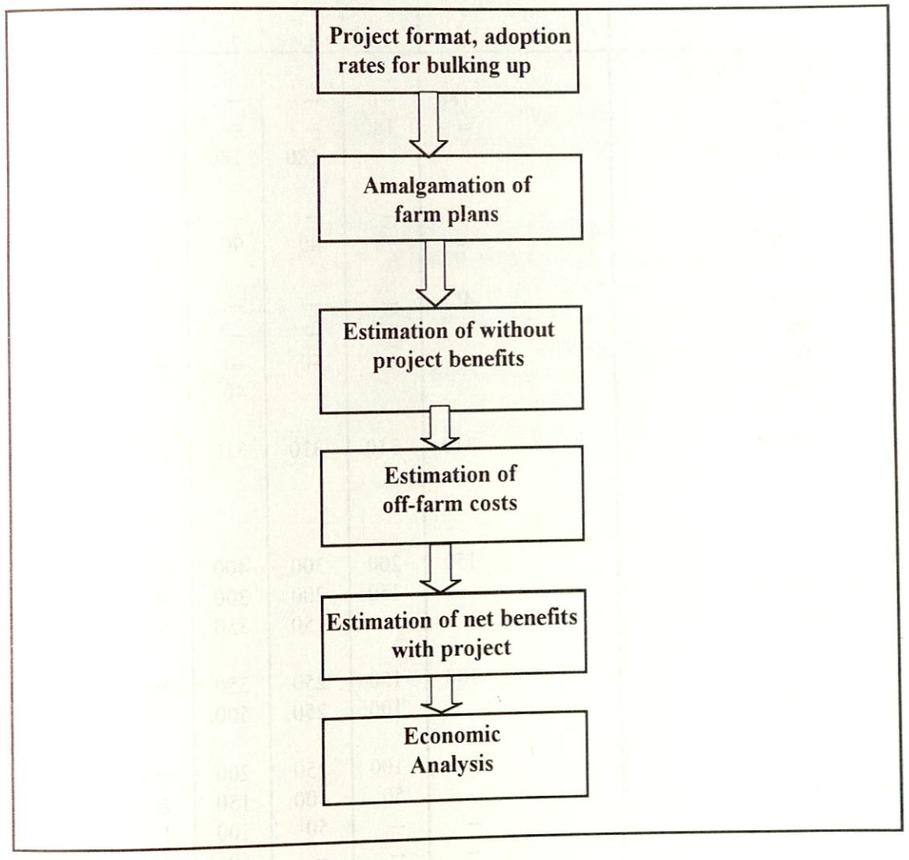
AGGREGATING FARM BUDGETS

In summary, budgets, output projections and price forecasts, form building blocks in determining which farm plans are arrived at. The next important step is to aggregate the individual plans. These are then aggregated into a project as a whole. Aggregating the plans is crucial for assessment of the impact of the project, developing various financial statements to arrive at whether the project incremental benefits outweighs incremental costs. Identifying sources of funding is also crucial to translate the plan into action. The stages of aggregating budgets and estimating net project benefits are shown in Figure 10.2.

Bulking up

The data to be amalgamated will involve firstly bringing together year by year figures for each of the different types of representative farms that were identified and modelled for the proposed development e.g. farm type A, B, and C. Each type of budget is multiplied year by year by the number of farms of that kind and at each stage that are expected to be developed under the project. This multiplication stage is called "bulking up". It must follow very careful consideration of the numbers of farmers of each type likely to have participated and adopted technologies and changes developed under the project each year. Many considerations may influence this very significant aspect of planning: farmer acceptance and degree of participation in project; capacity and capability of the extension, research or administrative agencies; financing and motivation of project supply and marketing organisations; physical infrastructure and its developments.

Figure 10.2 Stages for amalgamation of data and estimating net benefits of project



This process may be seen at its simplest (and easiest) in transformation projects, which tend to be organised in individual units (separate settlement schemes for example) of such a size that all farms can be occupied and started on their development programmes at the same time. The situation will be complex in improvement situations, since not all participating farmers will start at the same time and farm variability will be much greater. The principle may be for a given number of new farms of each type to join the project every year. Consequently, there may be farms of the same kind at different stages each year, which increases the number of different kinds of farm that have to be brought into account in varying proportions in each year of the project. The two extreme situations are shown in Table 10.3.

Table 10.3 Farm number patterns for different types of small farm project.

Farm Plan Type	*Numbers of farms by year*						
	1	2	3	4	5	6	7+
Transformation projects							
Model A Year 1	180	--	--	--	--	--	--
Model A Year 2	--	180	--	--	--	--	--
Model A Year 3+			180	180	180	180	180
Model B Year 1	90	--	--	--	--	--	--
Model B Year 2+	--	90	90	90	90	90	90
Model C Year 1	40	--	--	--	--	--	--
Model C Year 2	--	40	--	--	--	--	--
Model C Year 3	--	--	40	--	--	--	--
Model C Year 4+				40	40	40	40
Total No. of Farms	310	310	310	310	310	310	310
Improvement projects							
Model A Year 1	150	200	300	400	600	--	--
Model A Year 2	--	150	200	300	400	600	--
Model A Year 3+	--	--	150	350	650	1,050	1,050
Model B Year 1	100	150	250	350	500	--	--
Model B Year 2+		100	250	500	850	1,350	1,350
Model C Year1	50	100	150	200	200	--	--
Model C Year 2	--	50	100	150	200	200	--
Model C Year 3	--	--	50	100	150	200	200
Model C Year 4+	--	--	--	50	150	300	500
Total No. of Farms	300	750	1,450	2,400	3,700	3,700	3,700

Amalgamation

When the individual farm details are amalgamated, the question arises of how much detail for each farm plan needs to be retained in the summary tabulations. Some loss of detail will often have to be accepted, to limit to manageable proportions the volume of data handled. The farm budget data needs to be amalgamated mainly to allow economic analysis, though it can also be useful to allow estimates to be made of physical volumes of inputs and outputs concerned each year. To meet both of these needs, quite a lot of detail will need to be retained. Each main output should be shown separately, and each major input, especially such things as seed, fertiliser, hired machinery, employed labour, and crop sprays and dusts. Minor items can be lumped together. Outputs and inputs should be shown separately for each farm type and year, and in the aggregates for the whole project in the developing situation expected to evolve over the years after the new activities have begun.

The amalgamation procedure is given in Table 10.4. This shows a tabulation for amalgamating farm model data for a transformation project shown in the top half of the table. Table 10.4 covers only three years and "Bulked up" data for each of the three types of farm is shown on each horizontal level. The figures put in each cell of the table (spreadsheet) would be the product of the value of that item in the model for that type of farm in that year of the farm's development multiplied by the number of farms of that type assumed to be operational that year.

The bulked up values for each type of farm in each year are amalgamated for the whole project in the lowest section of Table 10.4. Symbols in the cells show which farm model values each year will contribute to the whole-project aggregate for that item. One output (I) is presumed to occur in all types of farm, others in only one (IV, V) or two (II, III). A similar pattern applies to inputs. Eight specific inputs are allowed for, with a final category (ix) which may be 'other inputs' - everything else not specified earlier (usually only minor items). The final line is the value of the Net Surplus each year from all the farms as amalgamated. It should equal both the value of the bulked-up net surplus for each type of farm, and the difference between the value of all Outputs and all Inputs for the project as a whole.

Table 10.4 Amalgamation of data for model farm types for a transformation project

Farm Type	*Budget Items*	*Project Year 1*	*Project Year 2*	*Project Year 3*
Model A		*180 Farms*	*180 Farms*	*180 Farms*
	Output I	A	A	A
	Output II	A	A	A
	Output III	A	A	A
	Input i	a	a	a
	Input ii	a	a	a
	Input iii	a	a	a
	Input iv	a	a	a
	Input ix	a	a	a
	Net Surplus	α	α	α
ModelB		*90Farms*	*90Farms*	*90Farms*
	Output I	B	B	B
	Output II	B	B	B
	Output IV	B	B	B
	Input i	b	b	b
	Input ii	b	b	b
	Input iii	b	b	b
	Input v	b	b	b
	Input v	b	b	b
	Input ix	b	b	b
	Net Surplus	β	β	β
Model C		*40 Farms*	*40 Farms*	*40 Farms*
	Output I	C	C	C
	Output III	C	C	C
	Output V	C	C	C
	Input i	c	c	c
	Input ii	c	c	c
	Input iii	c	c	c
	Input v	c	c	c
	Input vii	c	c	c
	Input viii	c	c	c
	Input ix	c	c	c
	Net Surplus	X	X	X
Wholeproject		*310Farms*	*310 Farms*	*310 Farms*
	Output 1	A+B+C	A+ B+C	A+B+C
	Output II	A+B	A+B	A+B
	Output III	A+C	A+C	A+C
	Output IV	B	B	B
	Output V	C	C	C
	Input i	a+b+c	a+b+c	a+b+c
	Input ii	a+b+c	a+b+c	a+b+c
	Input iii	a+b+c	a+b+c	a+b+c
	Input iv	a	a	a
	Input v	b+c	b+c	b+c
	Input vi	b	b	b
	Input vii	c	c	c
	Input viii	c	c	c
	Input ix	a+b+c	a+b+c	a+b+c
	Net Surplus	$\alpha+\beta+X$	$\alpha+\beta+X$	$\alpha+\beta+X$

Note: Capital initials are used to denote a bulked up value of each specific Output from a particular model in each year, and lower case initials denote bulked-up Inputs in the same way. The Net Surplus value for each model each year, denoted by a Greek symbol, is the difference between the total bulked up value of Outputs that year, minus the total bulked up value of Inputs.

NET PROJECT BENEFITS

With and without project

The procedures outlined in the last section only provide forecasts for the value of Net Benefits from the project while it is in operation. This is not the total value of net benefits attributed to the project if the land would have been used for another productive purpose in the project's absence. The existing land use system would have produced net benefits that can no longer be obtained. Thus the value of the without project net benefits must be estimated for each year, and deducted from the value of the 'with project' net benefits that may be expected if the project is undertaken.

In principle, the estimation of 'without project' net benefits should follow the same procedure as has been outlined for the 'with project' situation. Surveys of the pre-change situation will allow the identification of a number of representative types of farm. Survey data can also allow the estimation of enterprise budgets, and will reveal the farm programmes that are followed. These can be budgeted to show for each farm type the whole farm values of output, input and net benefits. These can then be bulked-up and amalgamated to allow a composite picture of production from the whole area covered by the proposed project.

The basis for projecting 'without project' production and benefits will be the 'before- project' situation, as revealed by the basic survey or other data collection. (In improvement developments, the 'with-project' projections may start from the same base). However, it is not correct to assume that if there were no project, the before-project pattern of farming and levels of technology, inputs and outputs would remain unchanged. Farm systems are not static, but are dynamic, and farmers do make changes to improve their systems. Various patterns of without-project change can be predicted: steady decline (especially from over-cultivation as population increases); little of no change; and, sustainable slow expansion, as 'traditional' methods are slowly modified and improved. Unless there is clear evidence to the contrary, the assumption is generally made that the 'without-project' situation would reflect a slow expansion of output and net benefits. The difficulty is to predict how fast this change would occur, and what path it would follow. The uncertainty in predicting what will happen without intervention may be much greater than forecasting what will happen when a project is undertaken.

Due to this uncertainty, a simple approach is usually used to make projections on the without project situation. This assumes that the same basic pattern of farming as in the 'before-project' situation will continue, with either gross output or net benefits increasing slowly over the life of the project - a figure of one per cent growth per annum is a common figure used. Numerically this means expanding the value of the before-project value of aggregated net benefits by a compounding factor. In practice this method can be rather tedious for manual calculation, as it will produce a different annual value each year. A simpler and probably no less accurate approach over a couple of decades or longer is to assume a periodic stepped increase, like a five per cent increase every five years.

Net Benefits and off-farm costs

The proceeding sections have shown how to estimate net benefits with and without a project and net benefits. The difference, each year, between these two values will be an estimate of the increased net benefits generated on the farms as a consequence of the project's activities. This does not allow for changes in off-farm costs, which are often a major feature of small farm development (Box 10.5). These costs would include: the capital, personnel and operating costs of the different agencies involved in implementing and managing the proposed project; and, the cost of investments in physical works, roads and structures that are part of the overall project. Planning and budgeting of these costs are major features of preparing

agricultural development projects and will be produced as year-by-year statements of itemised costs. Capital items will fall predominantly in the early years of the project and may be substantial. The costs of institutions for project operation, services and administration will develop later, as farmers become involved in new activities. These are unlikely to be as large as the capital costs, but they will probably be incurred for the duration of the project.

Box 10.5 Potential off-farm agencies and services

- Input supply organisations
- Credit institutions
- Extension and farm planning services
- Research activities and services
- Irrigation supply and administration
- Veterinary services
- Mechanical services
- Crop purchase agencies, including sorting, grading and inspection
- Crop storage
- Transport for input delivery and product evacuation
- Breeding farms to supply livestock
- Seed production of improved varieties
- Nurseries for perennial plants
- Special health provisions
- Environmental protection and monitoring agencies
- Administrative agencies for project implementation and operation

The above services can be provided by government, non-government and private sector organisations.

Care must be exercised in entering the costs of the services provided by off-farm agencies to make sure that everything is included and to avoid double counting. Some of these services, or the products from them, are supplied to the farms at full cost (e.g. unsubsidised fertilisers), so they appear in the farm finance budgets and not need to be accounted for again. Others will not be costed to the farm, these would include: the full cost of those services and activities that are not the subject of any charge to farmers; and, the difference between actual cost and projected recoveries for those items where a charge is made that does not cover all costs, e.g. irrigation fees, tractor hire charges. In calculating the cost of off-farm services, it should be remembered that some costs of these kinds might have been incurred in the 'without project' situation.

Data for Economic Analysis

The proceeding sections identified four types of cost and benefit data required for the economic analysis of small farm development projects. These are:

- On-farm output, costs and net benefits with the project;
- On-farm output, costs and net benefits without the project;

- The cost of off-farm investments; and
- The costs of participating off-farm agencies that are not recovered from farmers.

These can be combined to give the net annual benefit of the project as shown in Box 10.5. Where a discounting appraisal (Chapter 7) is to be made, the last series of annual values are the ones to be discounted. The calculation of net project benefits is summarised in Box 10.6, and an actual project example in Table 10.5.

Box 10.6 Calculation of net project benefits

A. Farm net benefits with the project
MINUS

B. Farm net benefits without the project
EQUALS

C. Increased net farm benefits from the project
MINUS

D. Cost of off-farm investments
MINUS

E. Costs of off-farm services that are not recovered
EQUALS

F. Net annual benefit of the project

Table 10.5 **Example of an annual statement of economic costs and benefits for an irrigation project (Constant prices in $ '000)**

Years	With the Project				Lost Net Benefits without project	Net Benefit on Farms	off farm costs	Capital Cost	Net benefits of Project
	Output	Non-Labour Costs	Labour Costs	Net Farm Benefits					
0	0	0	0	0	21	(31)	4	682	(717)
1	0	0	0	0	62	(62)	18	962	(1,045)
2	419	120	21	278	92	186	78	273	(165)
3	419	120	21	278	123	155	78	-	77
4-5	629	180	32	417	154	263	100	-	163
6	734	210	37	487	154	333	112	-	221
7	957	234	42	681	162	616	112	-	407
8	957	234	42	681	162	665	112	116	291
9-10	1,068	245	45	778	162	657	112	-	504
11	1,124	251	46	827	162	657	112	-	553
12-14	1,124	251	46	827	170	657	112	-	545
15	1,124	251	46	827	170	649	112	116	429
16	1,124	251	46	827	170	649	112	-	545
17-19	1,124	251	46	827	170	649	112	-	537
20	1,124	251	46	827	170	649	112	304	233
21	1,124	251	46	827	170	640	112	-	537
22	1,124	251	46	827	170	640	112	116	412
23-26	1,124	251	46	827	170	630	112	-	528

UNCERTAINITIES

While estimates of capital costs and the cost of many off-farm services may be regarded as relatively reliable, less certainty applies to the on-farm estimates. The latter will include the project benefits. The main reasons for this uncertainty are:

- Small farm development relies to varying degrees on changes in the behaviour of many individuals, households and groups. The direction, extent and implications of their changes can be unpredictable, this can be partly overcome by the increased participation of these groups in actual project planning.
- To make planning practical only a few farm models can be used. It can be difficult for them to be satisfactorily representative of all the farms likely to be affected by the project.
- Often 'with project' enterprise budgets cannot be based on hard evidence, since new innovations are involved, so they cannot be much more than informed guesses.
- As in all projects, the figures are all forecasts, some of them for over 15 or 20 years which increases the uncertainty - it is difficult to predict the future.

Agricultural production is subject to many risks: variations in weather (short term) and climate (long term); the risks of pests and diseases; fluctuations in commodity prices; government policies on outputs and inputs etc.

SUMMARY

This chapter has reviewed the development of projects for small farms, and the models and assumptions made to arrive at an estimate of project benefits. In developing the farm models, enterprise budgets and farm programmes there are many uncertainties. Any farm plans developed are indications of what may happen but not what actually will happen. They may be inaccurate, and almost certainly they will be changed for the better during implementation. Despite their inherent uncertainty, these plans and estimates are essential as a basis for planning and to judge which projects are justified and should be undertaken. A painstaking, realistic and rigorous approach to planning will help ensure the success of small farm development projects. In this three stages of the process are especially important.

- The definition of the 'typical' farm situations which provide the basis for projecting both the 'with' and 'without' farm programmes.
- The estimation of the farm programmes for each type of typical farm that are both feasible and likely to be adopted by typical farming households.
- Projection of the numbers of farms which will, each year, take up the new practices envisaged and move along the development path envisaged with the project'.

The approach to farm budgeting outlined in this chapter is practicable for projects which can be studied and planned in relatively small units - up to a few hundred farms. There are two particular types of situation in which a full farm-planning base for project preparation would not be used.

Firstly, some improvement projects seek only to make a change in the production technology of one enterprise. Examples would be introducing new practices for crop or livestock sanitation; new types of seed; better genetic types for livestock breeding. In these cases, it may be expected that only the production and inputs of the enterprise concerned will change, not other parts of the farm system. Where such an assumption is valid, only change in the enterprise itself would need to be planned, tested and projected.

The second situation would be where very large numbers of farms are expected to be affected by a programme or project - many hundreds, thousands perhaps, even tens of thousands in some cases. In these situations, no meaningful typical farms could be defined - the overall variety would be too great. Only the enterprises affected could realistically be assessed and projected.

11. MONITORING AND EVALUATION

Keywords and concepts:

Functions of Monitoring and Evaluation; Data and Information Requirements; Indicators; Management Information Systems; Participation and Monitoring and Evaluation; Monitoring Reports.

INTRODUCTION

While monitoring and evaluation are more strictly management functions, which occur during project implementation, it is important that these aspects are considered and included in the design and preparation of projects covered by this handbook. Monitoring and Evaluation are quite different functions but are brought together by their use of similar data and information. Both are concerned with the collection, processing and analysis of data for measuring performance.

However, project monitoring is essentially a management function undertaken by those implementing a project - this may involve project beneficiaries where project's have been developed along participatory lines. Additional monitoring may be carried out by project sponsors. Evaluation is essentially an external function carried out by the project's sponsors. This chapter explores the functions of monitoring and evaluation, data and information requirements and the management systems required for effective monitoring and evaluation (M&E).

FUNCTIONS

Monitoring

Both M & E are key parts of the project cycle, and of the overall Management of the project cycle. According to Casley and Lury:

"Monitoring assesses whether project inputs are being delivered, are being used as intended (to create outputs), and are having the initial effects as planned.....(it) is an internal project activity, an essential part of good management, and therefore an integral part of day to day activity"

The primary function of monitoring is to provide and use data in such a way that management can improve performance in the future. This means the continuous collection of data, and converting it into information, to guide management decisions, to identify problems or delays for corrective action, and to ensure that implementation and operation of the project is going according to schedule and is within budget. Monitoring is forward looking - is the project progressing towards meeting its objectives - data collection is ex-ante of decisions and provides a guide to "how well we are doing".

A secondary function of monitoring is some form of external measure of progress of the project. That is, project sponsors (Ministries, Donors) also monitor progress as part of overall management of the project cycle. This may be either through demands for regular reports from the project managers, or by actually collecting information independently of the managers.

Monitoring can also be by project beneficiaries, especially where the project has been developed along participatory lines. This may well be informal but it will still serve the same purpose, to help assess whether the project is meeting the expected benefits and targets as defined by the project stakeholders during its design stage. Examples of the active involvement of project beneficiaries in monitoring are still rather limited. Projects design has changed to incorporate a process approach and more participation, but much M&E is still undertaken following the traditional approach. This is likely to change with the increasingly development of participatory M&E.

Evaluation

According to Casley and Lury:

"Evaluation assess the overall project effects, both intentional and unintentional, and their impact. It involves comparisons requiring information from outside the project either in time, area or population."

The primary function of evaluation is to use data on the performance of projects in such a way that new projects can learn from their experiences. This is the part of the project cycle where evaluation of a project is fed into identifying and preparing the next set of projects. Evaluation is essentially a backward looking assessment - asking "did the project achieve the expected objectives, effects and impacts, and if not, why not?" However, it may also have an interim function, which is a form of mid-term review, where progress to date is assessed and possible revisions to objectives and targets are formulated. An associated function of evaluation is an audit of the project, particularly of the management and implementation, this can include an environmental audit of the project. In the case of contracted management, a project completion report may be required before final payments are made.

Again the evaluation of projects by project beneficiaries is still very much in its infancy, and much evaluation is undertaken by those external to the project who provide the means for a project, rather than those who are expected to gain from a project's benefits.

DATA AND INFORMATION REQUIREMENTS

Obviously the various functions of monitoring and evaluation overlap in that the information required by both managers and sponsors (and beneficiaries in a participatory approach) is the same or similar. Hence data collection and data processing should not be duplicated. Particularly in the design of monitoring systems it should be recognised that management should be the primary concern, that their needs are for timely flows of information geared to project management decisions. Information is processed data, and a relatively small amount of good information can reduce uncertainty in decision-making, while a large amount of unprocessed data may confuse.

Unfortunately as Coleman (1992) records, many agricultural and rural development projects were required by sponsors to produce excessive amounts of data for monitoring, without adequate resources for processing and using it, such that the monitoring activity distracted managers from the task of management without giving them the information they really needed. There has been a tendency to see external monitoring as trying to solve some of the problems of project management, and where management problems are perceived to exist, to add more and more monitoring.

The burdening of management with more and more demands for data and information reduces the scope for managers to attend to more pressing concerns. This external monitoring is often really evaluation, and is not geared to current management needs for information, but to demands from sponsors which may

overwhelm managers. It is also noted that much of the data required was never actually processed and used. Elaborate surveys took scarce resources and much time, and information finally obtained was often too late for management purposes, or was never used to learn lessons for the next set of projects.

The design of M & E systems needs to make distinctions between the information needs of different participants. Managers need regular up-to-date supplies of information which can be quickly processed and available for decisions, sponsors need less regular flows of information on progress towards objectives - such that they can spot problems and intervene if necessary. For evaluation, sponsors want more detailed information on effects and impacts, but less urgently, so there is scope for more extended surveys and sophisticated analysis. For monitoring of project inputs and outputs, indicators need to be comprehensive in terms of covering all inputs and all outputs. However, many of the records required will be part of management control systems - such as stock records, budgets and accounts, and staff records. The monitoring system may be largely an extension of these records into regular reports.

A distinction should be made between private production projects, where benefits are essentially from net revenues of the enterprise to the individual or groups, and public services projects where the benefits of investments in health, infrastructure or agriculture services are derived by many people, and where the uptake of project services is beyond the direct control of the project. In the private case, most data for M & E will come from the project's accounts and records of sales and costs. In the public case, the effects and impact of the project are much more difficult to first predict and later measure, and will require various surveys, with uses of samples and statistical methods for analysis. In public services projects, for time and cost effectiveness, monitoring should try to focus on a relatively small number of key indicators of project effects and impact, with more extensive surveys for evaluation purposes.

A mid-term review should be timed for when the project should have had some effect and impact, such that the viability of initial predictions and plans can be tested against demonstrated gains, and the project design also reviewed, and if necessary revised. This will be particularly so where the project is following a process approach.

INDICATORS

Chapter 7 described the logical framework and objective orientated planning approaches. A large part of these approaches involved setting measurable outputs, setting the indicators of achievement of these and the means of verification of these indicators. This approach is often used as the basis for an M & E system. The "means of verification" for monitoring purposes correspond to the differing needs of managers and sponsors, and should not require excessive resources, time and cost in collection and analysis. Data collection and analysis should be "minimised" or "maximised" according to requirements. Minimal systems should focus on key indicators, use "quick and dirty" methods of collection, use existing knowledge of field staff and line officers, be multi-disciplinary in nature as a means to extract multi-faceted data from a situation, and tend to use proxies where direct measurement is unreliable, or expensive. For example, where accurate information on small farmer incomes is difficult to obtain, proxies such as purchases of consumer durables or house building may be a proxy indicator of changes in income.

In summary before choosing an indicator of progress and including a monitoring system it is worth asking three key questions about the information to be collected:

Can it be measured? - While it is possible to measure the number of extension officers in post, how can the extent of construction of a building be measured? Would it be possible to determine what percentage of a building is complete? What would be taken into account when measuring this? There are areas where

information is needed but which is hard to measure. In these circumstances we have to find measurable indicators or look at particular events. For example with a building, progress in construction could be indicated by stages such as foundations laid, walls constructed and roof in place.

Is the indicator a valid measure of progress? - Cement delivered to a site is not a valid measure of houses completed. Similarly, the number of seedlings distributed from a nursery is not a measure of the number of plants established by farmers. In some cases, while not a completely valid measure of progress, such indicators have to be used. For example, it might be too expensive and difficult to collect information on the number of plants established and growing on a farmer's plot. Hence, it might be possible to use a percentage of the plants distributed from a nursery as an indicator. The percentage would reflect the number of plants which are distributed but do not survive.

Can the information be collected easily? - If information is difficult and expensive to obtain, it may be worth looking for a more easily obtained and cheaper indicator. Primary data is more difficult to collect, more time consuming to process and more expensive than secondary data. Data that is collected by sample survey is always expensive to collect and should only be considered if the information is essential and cannot be obtained in any other way.

CONTENT AND TIMING OF EVALUATION

In the project cycle the main purpose of evaluation is to provide feedback; a non-automatic process of transmitting information on current projects to designers of future projects and programmes. Non-automatic means that those responsible for commissioning the next set of projects must create some system for communicating findings of evaluations to designers. All too often evaluation reports, especially negative ones, are filed away when projects close and are not generally available. Evaluations need to assess both the design features and the management performance of the project in terms of why a project was more successful or less successful. A summary section on "lessons to be learned" or "design implications" should be a requirement.

In terms of indicators, the evaluation should be looking for both positive and negative indicators of both relative success and relative failure. This would look for relations of cause and effect between project actions and both expected and actual effects and impacts. For lessons to be drawn, it should attempt to separate:

- Design factors affecting success/failure
- Management factors affecting success/failure
- Environment factors, beyond design expectations or management control
- Policy factors, also beyond design expectations or management control

Evaluation should also seek to identify unexpected results, both positive and negative, and the causes of these. Evaluations usually occur at three stages in a project's life:

- Mid-term reviews, which may revise objectives and methods for the project in progress
- Project completion reports, at the end of the "investment" phase, and possibly including a revised estimate of the internal rate or return
- Post-project evaluation, perhaps some years after "investment", and assessing the impacts and sustainability of the project's actions/effects

The first two are essentially interim evaluations of the project's effects and impacts. For many projects, the full effects and impacts are not realised until some time after the project is implemented, and a real judgement of lasting and sustainable impact can often only be made well after the project has finished. Unfortunately these post-project evaluations are rare, since they come outside the sphere of project cycle management, where the "cycle" generally ends at completion.

Methods of evaluation include cross-sectional and longitudinal studies. The first would seek to compare results, say increased agricultural production, in the project area, with activity in a non-project area. This is the follow-on to the with-project/without-project method in appraisal. This approach would try to isolate the effects and impacts of project actions from other influences such as prices, policies and geographical factors. However, problems may arise in finding a true "control area" for comparison.

Linear methods seek to identify cause and effect over the project life, and later if possible. An essential requirement for this is a baseline study before the project outputs start, in order to measure progress against pre-project conditions. In practice, evaluations usually combine both cross-section and longitudinal studies.

MONITORING

Design of Monitoring Systems

Designing and setting up a monitoring system involves a number of elements. These are set out below as a series of eight steps:

1 - Identify the ways in which the outputs from monitoring will be used.

- Who will use the information that monitoring produces? (At which levels of management are the users of the information? At the project level or the ministry level?)
- Where does monitoring fit into the overall management information system for the project (i.e. what other reports and information flows exist? Are there any overlaps and duplications?)
- Is any of the information to be collected for monitoring purposes of use, or required by, those responsible for project evaluation (i.e. is there any information that must be provided to an evaluation unit outside the project?)

2 - Determine the resources available

- What staff and financial resources are available for project monitoring?
- Is it appropriate and/or feasible for a special monitoring unit to be established in the organisational structure of the project?

3 - Determine what is to be monitored

- In conjunction with the users, determine the key aspects which each user of monitoring information needs to know about.
- Ensure that all information to be provided is essential. Excessively detailed reports and lack of timeliness undermine the effectiveness of monitoring in project management.

4 - Define the content, form and frequency of reports

- Draw up the format of the report for each user (or group of users).
- The format should show the key information to be presented.
- There should also be a decision on the frequency of each report, i.e. monthly, quarterly, yearly or some other period.

5 - Decide how the information will be obtained

Show how each item of information to be reported is to be obtained.
Specify how frequently each item of information to be reported is to be collected.

6 - Set out arrangements for data processing and analysis

Who will do the data processing and analysis?
This is particularly important where primary data collection is envisaged. Failure to make adequate arrangements for data processing results in late monitoring reports.
Identify any special arrangements for data processing (such as a computer and the software required).

7 - Decide who will do what

- Identify who will be responsible for providing information and preparing reports.
- If there is to be a monitoring unit for the project, identify:
  - The position in the organisational structure of the project
  - The terms of reference of the unit

8 - Review the system with users

- Check that the key users are in agreement and will use the outputs of monitoring.

Monitoring financial progress

Assessing financial progress is critical for all projects. The major difference between financial and physical measures of progress is that financial measures can be aggregated. In other words, we can examine expenditure on the project as a whole, on individual components, on sub-components and on individual items. The expenditure can also be classified according to different periods of time - weeks, months, quarters, years or the life of the project. Measuring financial progress is usually easier than measuring physical progress since it involves the simple comparison of target versus actual expenditure.

Over-expenditure in comparison with target expenditure is the main indicator of deviation from the plan. It clearly indicates the need for management action. Marked under expenditure can also suggest the need for action. In making this comparison, it is necessary to divide the budget into periods shorter than one year. Managers need to take corrective action on a weekly or monthly basis rather than annually. The budget period used by managers needs to be related to the cycle of review and control required by the organisation or project. Costs should be grouped into categories which are useful from the point of view of maintaining control over project activities. The way this is often done is to establish 'cost centres' which are often the different components of the project. This allows management to monitor the performance of each project component as well as the project as a whole.

Monitoring physical progress

Project managers generally wish to monitor progress in physical as well as financial terms. This is particularly true in the public sector where projects often do not involve revenue. What to monitor is the main decision in monitoring physical progress. Selecting the indicators of physical progress is an important element of designing an M&E system since information on these indicators will appear on the monitoring reports to project management. In broad terms, the fewer the indicators of physical progress the better. This is because timely, reports (even if complete) are nearly always better than complete but late reports. Second, too much detail is usually distracting to decision-making.

Designing monitoring reports

Information reported must be matched to the level of manager because different people in the management hierarchy need different information. The way in which the information is presented should also vary. At higher levels of management:

- The emphasis is on the whole project rather than components;
- More attention is paid to financial progress through comparing actual against targeted costs and revenues (this is because financial indicators can be presented in a more aggregated form than physical indicators); and
- The emphasis is on outputs and performance rather than use of inputs.

In general, the information about a single project in a quarterly report form will be too detailed for use by senior managers or policy and planning units. Usually a summary report (based on quarterly results) will need to be prepared using aggregated information. Key components of summary reports include:

- Comparison of actual with planned expenditure
- Comparison of expenditure with physical progress (against schedule)
- Unit costs for services

At lower levels of management:

- Individual managers are most concerned with the project components for which they are responsible;
- There is strong interest in physical progress in that component;
- There is emphasis on staying within budget for that component; and
- Information will be less aggregated.

The report will apply to a given period, which is usually either a month or a quarter. A new form is used for each report period. Most monitoring reports have a similar structure. The basic layout is usually as follows:

- Period covered
- Activity or work area
- Budget and actual expenditure
- Progress indicator and milestones
- Work scheduled for the period
- Work achieved during the period
- Problems experienced
- Action taken or proposed

In addition, there may be details of manpower changes. The forms are usually completed in a mixture of narrative comment and quantitative data. Monitoring reports are an invaluable source of sequential information about project activities. Often, however, they are lengthy documents with poor or incomplete coverage of issues. Furthermore, they often fail to focus on necessary management action in response to findings. To avoid this, check that the report specifies targets. Comparison of performance with target is a good method of measuring progress. However, reports with a consistent planning horizon are easier to interpret. It is easier to interpret a report if all the targets are annual and much more difficult if some are annual, some quarterly and some monthly.

The purpose of writing a progress report is to identify progress towards objectives. The narrative should explain how activities have contributed to reaching objectives; in other words it should be output oriented. Many reports just tell what has happened in the style of a diary which may be interesting but not so helpful. The narrative should distinguish between problems which affect implementation which are manageable and those which are more fundamental and damaging. Specific attention should be given to distinguishing the following types of problems:

- Project design weaknesses
- Resource constraints (manpower, equipment, finance)
- Co-ordination problems (where joint action is needed)
- Management problems internal to the department or division
- Accuracy of planning and budgeting
- Is management action clearly specified?
- External factors causing problems over which the project has little or no influence

SUMMARY

This chapter has reviewed the important functions of monitoring and evaluation. It is important that the elements of an effective M&E system are already in place in the original design of a project. However, it is important that this is a workable system that does not depend upon large amounts of information and data. The collection of this can then lead to too much time being spent on this task. M&E should be an aid to the implementation of a project and not a hindrance. The role of project beneficiaries in M&E is still in its infancy. While participation in other aspects of the project cycle and design are now well developed, the practice of the participation by project beneficiaries is still very much a rarity. However, the logic of increasing participation in projects to achieve more sustainable results applies equally to M&E as to any other area.

12. FEASIBILITY AND APPRAISAL STUDIES

Keywords and concepts:

Project appraisal; Appraisal techniques; Format of Feasibility and Project studies; Project Documentation.

INTRODUCTION

The preceding chapters have presented in depth the background to agricultural project planning, the identification of projects, their design, and the economic, financial and environmental appraisal of projects. This chapter discusses the format of project reports, and briefly reviews the process through which projects are assessed (appraised) before they receive approval for implementation. This assessment of appraisal may be undertaken both by a government agency, and by an overseas funding agency such as the World Bank, a bilateral agency like DFID, or an international non-government organisation. Increasingly assessments and appraisals are undertaken in-country by national agencies and consultants, in part to strengthen the national capacity and capability in this area. In Tanzania, GTZ is supporting this through assistance to the Tanzania Association of Consultants (TACO).

PROJECT APPRAISAL

Appraisal can have two meanings in project planning. Firstly there is an appraisal stage in the project cycle, when project plans are scrutinised for viability and sustainability prior to a decision whether to fund the project or not. This appraisal will usually be done by the financing organisation (Donor, Ministry of Finance, Bank, and/or Private Investor). A second meaning is the set of appraisal techniques which are used not only in the appraisal stage but in project plans and feasibility studies prior to that final appraisal (Chapters 8 and 9).

Appraisal techniques

Appraisal techniques are divided into five areas: financial and economic; technical; social; environmental and institutional appraisal. These are briefly summarised in the following sections.
Financial and economic

In financial and economic appraisal the main techniques are cost benefit analysis (CBA) and cost effectiveness analysis (CEA). For CBA it is necessary to be able to value in monetary terms both the resource costs of the project and the additional resources generated by the project. For projects where it is not possible to properly value financial benefits of the project (e.g. health, water, roads) then CEA is used to determine the most cost-effective way of generating benefits.

Financial CBA uses prevailing prices in the market, that is actual cost prices and revenue prices faced by the project and beneficiaries. Economic CBA seeks to adjust prevailing market prices to social or efficiency prices which give values for benefits and costs to the economy. This requires adjustments for transfer payments (taxes, subsidies) allowance for any overvalued exchange rate, and use of opportunity costs of resources where these differ from market prices. The result of CBA is usually the calculation of an internal rate of return or net present value for the project, using discounted cash flow methods.

Technical

Technical feasibility: the project plan should show that the chosen technology for manufacturing, construction, farming or conservation is the best technical solution chosen from available alternatives. Key issues may be choices between capital-intensive and labour-intensive methods, or a low cost-high maintenance technology versus a high cost-low maintenance one. Raw material and human resource requirements are also issues. There are strong links to social, environmental and institutional factors in the choice of technology.

Social

Social appraisal may include whether the project has desirable or undesirable effects on local communities, such as improving quality of life or alternatively causing disruptions to local traditions. This should include gender analysis, and analysis of whether the project may cause some groups to gain at the expense of others' livelihoods, and any methods of compensation. Social factors may be closely linked to institutional factors in terms of old and new community organisations.

Environmental

Techniques of environmental assessment (e.g. EIA) should be used in the project planning process to identify, quantify and if possible value the positive or negative effects on the physical environment. This should include the identification of mitigation and enhancement measures. If there are negative effects then the costs of prevention or compensation may be included in the economic analysis.

Institutional

Institutional appraisal involves consideration of issues such as land tenure, legal arrangements, and threats or opportunities for existing institutions. Institutions may include community organisations, co-operatives and associations, financial institutions for savings and loans, and any institutions such as local councils which may contribute to the management of the project. Where new or reorganised institutions are part of the project plan, then the means for sustainability of these institutions beyond the project life must be considered.

Overall viability and sustainability

Clearly the various appraisal factors for both viability and sustainability must be positive not just singly but as a combined whole. That is the project "works" in terms of all six factors. Too often in the past apparently good technical and economic projects failed to be sustainable, or achieve their objectives, because of neglect of the other factors, or too optimistic assumptions about the behaviour of people, communities and institutions.

Multiple criteria analysis

A technique sometimes used to assist in the overall appraisal of a project is multiple criteria analysis. This is a technique which attempts to take into account all the different factors affecting the overall viability of a project: economic; financial; technical; social; institutional; and, environmental. At its simplest multiple criteria analysis involves the following steps:

- Identification of criteria
- Initial screening of criteria - pass/fail
- Weighting and rating of criteria
- Scoring and ranking of project

The first step is to identify the key criteria which a project should meet at an initial screening. An example of key criteria is given for the example of a hypothetical agricultural project in Table 12.1. The identification of these criteria may be made by the project analyst or other stakeholders in the potential project through a participatory process. This is similar to the weighting and ranking of potential solutions - projects - in a participatory development process (see PLA in chapter 7).

When an initial set of criteria have been developed these can be used in an initial screening of projects that have been identified. This assesses if the project broadly meets these criteria i.e. does it pass or fail. If it passes all the criteria a more detailed weighting, scoring and ranking of criteria can take place. If on the other hand the project fails to meet one of the criteria then it is unlikely the project would achieve its goals and needs to be re-designed or rejected.

The next step - ranking of projects - involves the development of a more detailed set of criteria. Table 12.2 gives an example for our agricultural project. In this table different criteria are given different weights to reflect the importance attached to the criteria in the overall assessment of the project. The weighting attaches to different criteria is of a qualitative nature, and can either be obtained from the experience and judgement of project planners and technicians, or with the involvement of project stakeholders in a participatory process.

Table 12.1 Criteria for the initial screening of an agricultural project

No.	*Criteria the project must pass to proceed*	*Pass/fail*
A.	Must result in increased production by farmer	
B.	Must not increase permanent civil servants or public sector capital	
C.	Must assist farmers (men and/or women) of low socio-economic status	
D.	Environmental issues must be identified in project proposal	
E.	Net income of beneficiaries must be sustainable without funding after 2-3 years	
F.	Project proposal must include management and organisation of activities	
G.	Project technology must be innovative for target group	
H.	Project targets must be realistic (yields per ha., production)	
	Financial and economic viability criteria	*Value*
1.	Financial IRR > xx % for private cash flows	
2.	Financial IRR > xx % for private and public cash flows	
3.	Economic IRR > yy %	
4.	Sensitivity of EIRR - incomes (% fall in incomes making IRR < yy %)	
5.	Sensitivity of EIRR - costs (% rise in costs making IRR< yy %)	

When the set and weighting of criteria have been established the next step is to score the project against each criteria. This scoring can either be qualitative or quantitative in nature, although the former is more common. Again it will be a matter of judgement or through a group decision making process involving stakeholders and project beneficiaries. Once a score has been given for each criteria these can then be totalled to give an overall score for a project. The whole process can be repeated for different projects or project options which would then allow projects to be ranked against each other. This ranking can then be used in the overall appraisal process to decide whether to proceed with a project.

However, it should be emphasied that this technique and the final score are essentially qualitative in nature, allowing for the relative comparison of different projects and the screening out of poor projects. Therefore caution should be used when applying this method.

Table 12.2 Detailed criteria for the ranking of an agricultural project

No.	*Criteria*	*Low*	*Med*	*High*	*Score*
	Support to sustainable private activity				
1.	Economic sustainability of activity HIGH (positive cash flows will continue)	2	4	6	
2.	Private management sustainability HIGH (Beneficiaries will be able to manage activity in short/medium term.)	2	4	6	
3.	Private organisation sustainability HIGH (Suitable beneficiary organisation can be established to manage inputs and funds)	2	4	6	
4.	New technology has HIGH value added	2	4	6	
5.	Potential for commercial finance or NGO support or other public support is LOW	6	2	Fail	
	Sub total				/30
Project will benefit disadvantaged group					
6.	Target group has LOW socio-economic status	4	2	1	
7.	Practical benefits to women HIGH	1	2	4	
8.	Improvement in status of women HIGH	1	2	4	
9.	Project labour for women LOW	4	2	1	
10.	Potential for income capture by rich LOW	4	2	Fail	
	Sub total				/20

Table 12.2 Detailed criteria for the rankiing of an agricultural project (continued)

No.	Criteria	Low	Med	High	Score
	Project environmentally sound/sustainable				
11.	Potential for negative impact LOW	7	3	Fail	
12.	Potential for positive impact HIGH	2	4	6	
13.	Need for safeguards is LOW	7	3	0	
	Sub total				/20
	Project technology is innovative				
14.	New technology is HIGH for area/country.	2	4	6	
15.	New technology is appropriate for skills of beneficiaries HIGH	2	4	6	
16.	New technology needs HIGH testing/study	1	3	Fail	
17.	New technology has HIGH capacity for copying in other projects	2	4	6	
18.	Technical Risk of failure is LOW	6	2	Fail	
19.	Will have HIGH increase in experience for extension staff	1	2	3	
	Sub total				/30
	Project score				/100

FORMAT OF FEASIBILITY STUDIES

Overview

One of the critical issues in the project development is what should be the contents of the appraisal studies? There is no one standard format for all the projects under-taken by government or funded by international agencies such as DFID, EU, GTZ, USAID, NORAD, etc. Each donor agency or local financing institution has its own format. An example of the format used by the EU is given in Box 12.1.

Box 12.1 Standard format of a feasibility study for the European Union

Preface
1. Summary
- Sectoral framework
- Overall design
- Implementation procedures
- Cost & financing plan building
- Assumptions & prospects for sustainability

2. Background
- Main features of the sub-sector
- Problems to be addressed
- Documentation available

3. Objectives & expected results
- Wider indicative programme objectives - goal
- Project-specific objectives - purpose
- Project results - outputs

4. Project/programme implementation
- Physical & non-physical inputs
- Implementation procedures
- Timetable for implementation

5. Factors (other than economic & financial) ensuring sustainability Special conditions)
- Policy support measures
- Appropriate technology

5. continued
- Environmental protection measures
- Socio-cultural, legal aspects & community participation
- Institutional and management capacity
- Assumptions, risks & flexibility

6. Economic & financial sustainability/viability
- Internal rates of return & cost effectiveness
- Sensitivity analysis & risk
- Incremental benefit distribution

7. Monitoring & evaluation
- Definition of indicators
- Management information system
- Reviews/evaluations

8. Conclusions & proposals
- Major issues & recommendations
- Important assumptions and conditionalities
- Cost estimate and financing plan

9. Appendices
- Logical Framework (Project Planning Matrix
- Technical annexes

The content of appraisal studies are normally given in the Terms of Reference (TOR) of the team making the appraisal. However, it is increasingly becoming clear, that certain key elements are common to these reports. The adoption of approach to project appraisal using Logical Framework Approach (LFA), described in chapter 7; has facilitated the presentation in a general format in this section. The following are usually now components to most feasibility studies and reports:

- Summary
- Background
- Nature of the intervention - Project description
- Technical appraisal
- Resources
- Economic and Financial analysis and justification
- Social, institutional and environmental appraisal (may be separated)
- Implementation details
- Monitoring and evaluation
- Risk Analysis

The contents of these components are summarised below.

Summary - This is a narrative summary about the findings and conclusions of the evaluation. It comprises a simple statement whether the overall project appraisal is technically, financially economically and socially sound.

Background - This is an explanation of the origin of the project. It must identify the problem to be addressed. Some of the elements include:

- Government/Sectoral policy
- Features of the sector
- Beneficiaries and parties involved
- Problem to be the addressed
- Other future, present and past interventions
- Documentation available

Intervention - project description - This section gives the type and nature of intervention. Specifically the section must clearly state the following:

- Overall objectives
- Project purpose
- Expected results
- Activities
- Project inputs
- Major assumption at different levels

Technical appraisal - This section deals with how to intervene. It provides assessments by relevant advisers (engineers, physical scientists etc.). It provides answers to questions such as whether the project uses appropriate technology, cost effectiveness i.e. producing output at a minimum cost or maximum output at given input levels.

Resources - .This section provides information of arrangements necessary to procure services that are not part of the project e.g. labour, power, water, procurement of necessary materials from within and outside the country.

Economic and Financial analysis and justification - This section deals with both financial and economic justification. Various indicators must be given.

Social, institutional and environmental appraisal - This section is very often neglected in most conventional ex-ante evaluation. However, increasing concern about the environment requires statement on the environment. This should include:

- Who are the major beneficiaries?
- Who are the major losers?
- What are effects on direct and (if possible) indirect employment?
- What changes in the social status are to be expected?
- Cost statement in both constant and cut-rent market prices
- Sources - farmer equity, borrowing from savings and credit societies and commercial banks.
- What are the major negative and positive environmental impacts? Appropriate mitigation and enhancement measures for inclusion in project design.

Implementation - This should include details of how the project is to be implemented, this should include:

- Physical and non physical means
- Organisation and implementation procedures
- Capability of the individual farmer or agricultural institution
- Timetable
- Special conditions including measures taken by the government.

Monitoring and Evaluation - A statement of the criteria established and agreed by the farmer for measuring, progress in achieving the objectives and necessary arrangements for collecting information, processing and interpreting. Including:

- Monitoring indicators
- Reviews/evaluations

Risk Analysis - A statement on likely causes for project failure covering:

- Factors Ensuring Sustainability
- Policy Support (how indicated)
- Appropriate technology
- Environmental protection
- Social-Cultural aspects/women in development
- Institutional/household management capacity

SUMMARY

This chapter has illustrated how the outcome of the previous chapters on the design and analysis of agricultural projects are brought together into a comprehensive project report. Depending upon the requirements of the government and/or donor this report will form the backbone of the project documentation and will be used to appraise its feasibility. Once this has been undertaken, and provided the project is approved, it will move on to the implementation stage. Comprehensive details on project implementation are described in one of the sister handbooks in this series.

REFERENCES AND FURTHER READING

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II. ABBREVIATIONS

The following abbreviations have been used in this handbook.

AEZ	Agro-ecological zone
AF	Adjustment factor
CBA	Cost benefit analysis
CDC	Commonwealth Development Corporation
CEA	Cost effectiveness analysis
CF	Conversion factor
CIDA	Canadian International Development Agency
CRBC	Co-operative and Rural Development Bank (CRDB).
CVM	Contingent valuation method
DALDO	District Agricultural and Livestock Development Officer
DFID	United Kingdom Department for International Development (formerly ODA)
DPPC	Development and Project Planning Centre, University of Bradford
EIA	Environmental impact assessment
EIS	Environmental impact statement
ESAP	Economic and Social Action Programme (Tanzania)
FPR	Farmer Participatory Research
FSR	Farming Systems Research
GTZ	Deutsche Gesellschaft fur Technische Zusammenabeit
GDP	Gross Domestic Product
GNP	Gross National Product
IDM	Institute of Development Management
IFAD	International Fund for Agricultural Development
IIED	International Institute of Environment and Development
IRA	Institute of Resource Assessment, University of Dar es Salaam
IUCN	World Conservation Union
LFA	Logical framework analysis
LM	Little and Mirrlees' method of economic analysis
MOAC	Ministry of Agriculture and Co-operatives
MVPE	Market valuation of physical effects
NAFCO	National Agricultural and Food Corporation
NARLEP	National Agricultural and Livestock Extension Rehabilitation Programme
NBC	National Bank of Commerce
NORAD	Norwegian Agency for Development Co-operation
ODA	United Kingdom Overseas Development Administration (now DFID)
OFCOR	On Farm Client Oriented Research
PLA	Participatory learning and action
PPMB	Project Planning and Monitoring Bureau
PRA	Participatory rural appraisal
OOIP	Objective orientated intervention planning
RALDO	Regional Agricultural and Livestock Development Officer
RAS	Regional Administrative Secretary
RDD	Regional Development Director
RPFB	Rolling Plan and Forward Budgeting
RRA	Rapid rural appraisal
SCBA	Social cost benefit analysis

SCF	Standard Conversion Factor
SER	Shadow exchange rate
SEA	Strategic environmental assessment
SGR	Strategic Grain Reserve
SUA	Sokoine University of Agriculture
SVT	Squire and van der Take's method of economic analysis
TACO	Tanzania Association of Consultants
TARDTF	Tarime Rural Development Trust Fund
TFA	Tanzania Farmers Association
TFC	Tanzania Fertiliser Company
TOR	Terms of Reference
TRIC	Tanzania Resource Information Centre
UNCED	United Nations Conference on Environment and Development
UNIDO	United Nations Industrial Development Organisation
URT	United Republic of Tanzania
ZOPP	German abbreviation for OOIP

III. GLOSSARY OF TERMS AND DEFINITIONS

This Appendix provides a glossary of terms and definitions which are commonly used in agricultural project planning.

APPRAISAL - can have two meanings in project planning. Firstly there is an appraisal stage in the project cycle, when project plans are scrutinised for viability and sustainability prior to a decision whether to fund the project or not. This appraisal will usually be done by the financing organisation (Donor, Ministry of Finance, Bank, Investor). A second meaning is the set of appraisal techniques which are used not only in the appraisal stage but in project plans and feasibility studies prior to that final appraisal.

AREA OF OPERATION - most general agricultural projects will work in a set geographical area or with a set group of farmers.

ASSOCIATED ACTIVITIES AND INSTITUTIONS - projects operate within both a local and a wider economy and the project and farmers will have relations with institutions such as markets, traders, co-operatives, banks and credit organisations, local governments etc. A project may include giving advice and assistance to some of these institutions so as to achieve its broad objectives. The success of the project will depend to some extent on the activities and decisions of these associated institutions; while the project may have some influence over their decisions it will not have control over those decisions.

BENEFICIARIES - in a general agricultural project the main beneficiaries are large numbers of small farmers. Then the actual gains achieved from the investment depend to a large extent on the activities of those farmer beneficiaries. The project may provide services such as advice and support, and will influence farmers decisions, but the final decisions on farming practice, production and marketing are taken by the farmers and not the project. This distinguishes these general agricultural projects from estate or industrial projects where the organisation making the investment controls the revenues resulting from the investment.

BENEFIT COST RATIO (BCR) - is the ratio of total discounted benefits to total discounted costs. A BCR greater than one indicates a viable project. BCR's are used when the total investment costs of a number of proposed projects with positive NPV's exceeds the investment funds available, and the projects are then ranked by their BCR to determine their priority for funding.

BORDER PRICE - the price of traded goods or services at the point where they enter or leave a country, and enter the international market.

CONTINGENT VALUATION METHOD (CVM) this is a method for the economic valuation of environmental impacts where people are directly asked what value they place on an impact. This is often in the form of a question(s) asking what people would pay to avoid an impact occurring or for a positive impact to occur. This could apply to improvements in air and water quality (use values), or to the existence of National Parks to conserve and view wildlife (non-use or existence values). The later is of particular importance in Tanzania when it comes to the debate of the continuation of National Parks and Reserves as against development for the needs of local people.

COST BENEFIT ANALYSIS - is the general term which is used to analyse to present and future costs and benefits of a project. This involves the use of discounted cash flows. There are three standard measures which are generally used in cost benefit analysis:- Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR).

COST-EFFECTIVENESS ANALYSIS - in Cost Benefit Analysis (CBA), both the costs of resource inputs and the values of resource outputs must be measurable in market prices, for financial analysis, and by opportunity costs or shadow prices for economic analysis. CBA is then appropriate for projects in the agricultural and sector where the ultimate aim is to produce tangible benefits in terms of private goods which can be sold in markets. However many occasions arise where benefits cannot be properly valued in monetary terms. In the social and infrastructure sectors, the benefits are usually some sort of public good or service which cannot be valued in market terms. Health services, education, water supplies and sanitation, roads, either do not have market values, or attempts at economic values are only partial. Similar cases can arise in agricultural projects, e.g. what is the most cost effective conservation measure. In these cases, economic cost-effectiveness analysis is used to answer the question: Which project alternative can produce a set level of benefits for the cheapest cost ?

DEMAND BASED PROJECT - is one which satisfies a particular demand for an agricultural project. In the agricultural sector demand for the product is usually reflected in terms of: consumer demand for agricultural products; export opportunities; demand for agricultural inputs into agro-industries; or, subsistence consumption

DISCOUNTED CASH FLOW - A major concern of project analysis is the valuation of costs and benefits which occur in the future. A typical investment has a pattern of costs and benefits where in early years costs exceed benefits and in later years the benefits exceed costs. In analysis of whether and by how much overall benefits may exceed overall costs it is necessary to take account of the fact that the money values of benefits or costs in say ten years time are less than the same values at the present time, i.e. we need to use discounted values.

DISCOUNT RATE - To allow for the changes in the time value of money, the terms "present value" and "future value" are used. To calculate the present value of future costs and benefits their future values are "discounted" back to the present using a discount rate. The concept of discounting is the opposite of compound interest, whereby a present value grows to a future value because of the accumulation of interest. The discount rate is the reciprocal of the compound factor.

ECONOMIC ANALYSIS - The principal objective of the economic analysis of projects is to assess the efficiency with which resources are used. Thus, for the ex-ante appraisal of a particular project, the concerns are much related to assessing the extent to which the same objectives might be achieved using fewer resources, or whether the same resources might be used to achieve a greater range of objectives.

ECONOMIC NUMERAIRE - The measurement and summation of a diverse range of resource inputs and outputs requires that an acceptable numeraire (measure of value) be used. The economic numeraire needs to be expressed in the form of the value of resources at a particular time based a particular year's prices - in the discounting this can be described as the present value at constant prices in year zero.

ECONOMIC VIABILITY - the capacity of a project for an overall gain to the economy in terms of significant net additional benefits generated and efficient use of resources.

ENTERPRISE AND ENTERPRISE BUDGETS - An enterprise is defined as a single crop or livestock commodity being produced on a farm. For example maize (corn), millet, potatoes, wheat are crop enterprises. Dairy head, head of sheep, swine, beef cow/head, birds flock are types of livestock enterprises. Most farms consist of a combination of several enterprises. An enterprise is therefore a general name that includes both livestock and crops. An enterprise budget is therefore a listing of all estimated income and expenses associated with a specific enterprise to provide an estimate of its profitability.

ENVIRONMENTAL AUDITING - This is linked to the environmental monitoring of the project. Auditing can be undertaken either by the project itself or by an external agency. The objective of environmental auditing is to assess the impacts of the project against established standards. For example, where an agricultural project has included a major processing plant it could be monitoring of water quality to make sure that effluent from the plant is not exceeding agreed or mandatory levels. Auditing can also be linked to the socio-economic impacts of a project.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) - a method for determining the potential significant impacts of development activities; and to identify ways to increase positive effects and to mitigate, or prevent, adverse effects. In essence it is not anti-development and means to preserve the environment, but it is actually for the sustainable development of the country's resources. This is an important point as many often understand environmental assessment as the means to prevent development.

EVALUATION - The primary function of evaluation is to use data on the performance of projects in a way that new projects can learn from their experiences. This is that part of the project cycle where evaluation of a project is fed into identifying and preparing the next set of projects. Evaluation is essentially a backward looking assessment - asking "did the project achieve the expected objectives, effects and impacts, and if not, why not?" However, it may also have an interim function, which is a form of mid-term review, where progress to date is assessed and possible revisions to objectives and targets are formulated. An associated function of evaluation is an audit of the project, particularly of the management and implementation. In the case of contracted management a Project Completion Report may be required before final payments are made. the evaluation of projects by project beneficiaries is still very much in its infancy, and much evaluation is undertaken by those external to the project who provide the means for a project, rather than those who are expected to gain from a project's the benefits.

FINANCIAL VIABILITY - the capacity of the project to generate sustainable financial returns for the various stakeholders.

GENDER ANALYSIS - gender refers to the different roles men and women play in the development process, this technique helps identify these roles and how a project will affect these different groups.

GOAL - This is the overall goal that a project operates under. This may be a national or sectoral goal, or a goal of a particular organisation. Under a particular goal there can be a range of different programmes and projects, which together, are all working towards achieving this goal.

IMPROVEMENT PROJECTS - is the approach to small farm development projects which involves accepting an existing land use situation and seeking to intensify production by changing the resources and facilities available to farmers. Farmers can participate in the improved practices, and individual farmers decide for themselves whether to take part. Improvements can include: credit, new varieties, land husbandry practices, fertilisers, extension advice, road development, stores, new crops, changes in land tenure and land use. Most small farm development occurs in this way, and often without the intervention of government.

INDICATORS - are parameters which for use in indicating if a project purpose, objective, activity and output has been reached. Indicators can be of quantitative or qualitative in nature. Indicators should be practically and objectively measured and verified. Indicators are one of the essential elements of logical framework analysis (LFA).

INTERNAL RATE OF RETURN (IRR) - is defined as the discount rate at which the NPV is zero. It is the rate at which the project's benefits are equal to the costs, and reflects the rate at which the project investment is just recovered. Since the IRR is a measure of efficiency it is the most INTERNAL RATE OF RETURN (IRR) - is defined as the discount rate at which the NPV is zero. It is the rate at which the project's benefits are equal to the costs, and reflects the rate at which the project investment is just recovered. Since the IRR is a measure of efficiency it is the most widely used of the measures. It also has the advantage of not requiring a definite discount rate specified in advance. Usually donors and governments have a target rate or cut-off rate and projects with an IRR above the target rate are considered viable.

INSTITUTIONAL ANALYSIS - techniques to assess the current status of institutions and their future sustainability.

INVESTMENT - projects involve investments of funds, time and manpower from which it is expected that the flow of economic benefits will over time exceed the costs of the investments. This is the foundation of Cost Benefit Analysis. Projects use scarce resources, and the funds for investment may have to be repaid, so it is important that there are demonstrable economic or other gains - including social and environmental - which justify investment in a particular project rather than in another investment.

LOGICAL FRAMEWORK ANALYSIS (LFA) is a method for project planning developed in the 1980's. The terms "project framework", "project matrix", "ZOPP" and "logframe" may also be used to describe this method. LFA analysis is most of all a powerful planning and management tool. It can be used in the preparation of the project, and then later applied in management of the project, in monitoring and evaluation, in any re-examination and revision of the project. One of the key presentational features of the logical framework is that an overview of the objectives, the means of achieving these, and the main assumptions behind a project, can all be presented on a one page statement.

MARKET VALUATION OF PHYSICAL EFFECTS (MVPE) - this method attempts to make a direct market valuation of an effect caused by the environmental impact. For example soil erosion would be expected to lead a decline in crop production through the loss of soil and nutrients. If it was estimated this would cause a 5% loss in production this could then be equated to an economic loss based on market prices for the crop. Again soil erosion can lead to the siltation of rivers and reservoirs, the cost of this can be estimated on the lifetime of the reservoir or decline in fishing from a river. MVPE is also used to value the impact of human health of a project, for example the increase in waterborne diseases on an irrigation project can valued to determine the loss in productivity this could cause - human capital method (NB this does not include the pain and human suffering disease may cause). A further method under MVPE is to value the cost to repair or replace the damage caused by the impact - replacement cost method.

MONITORING - The primary function of monitoring is to provide and use data in a way that management can improve performance in the future. This means the continuous collection of data, and converting it into information, to guide management decisions, to identify problems or delays for corrective action, and to ensure that implementation and operation of the project is going according to schedule and is within budget. Monitoring is forward looking - is the project progressing towards meeting its objectives - data collection is ex-ante of decisions and provides a guide to "how well we are doing". A secondary function of monitoring is some form of external measure of progress of the project. That is, project sponsors (Ministries, Donors) also monitor progress as part of overall management of the project cycle. This may be either through demands for regular reports from the project managers, or by actually collecting information independently of the managers. Monitoring can also be by project beneficiaries, especially

where the project has been developed along participatory lines. This may well be informal but it will still serve the same purpose, to help assess whether the project is meeting the expected benefits and targets as defined by the project stakeholders during its design stage

NEED BASED PROJECT - Need based projects are an important element in the agricultural sector, particularly in relation to better conservation practices and improvement in the production of subsistence crops and/or drought resistant crops. Sometimes agricultural development may be promoted in relatively poor areas as a means of increasing income earning opportunities and poverty alleviation. Promotion of projects oriented towards particular target groups (e.g. women or under-privileged ethnic minorities) or polices (poverty alleviation).

NET PRESENT VALUE (NPV) - is the net sum of total discounted benefits and total discounted costs. This yields a figure showing the excess (or shortfall) of benefits over costs in monetary terms. Generally if the NPV is positive after using a suitable discount rate then the project would be recommended as viable.

NON-TRADED GOODS OR SERVICES - are those for which there is no international market, and are not exported or imported by a country.

OBJECTIVE - A project will often have several objectives. These should be achievable during the lifetime of the project.

OBJECTIVE ORIENTATED INTERVENTION PLANNING (OOIP)- this is an approach to project planning which combines the use of logical frameworks a process which attempts to ensure the participation of project stakeholders (especially beneficiaries) in the process. It follows a group, or team, approach to obtain all available knowledge and information for a proposed project, and based on this a consensus on best design for a project. To achieve this a range of participatory approaches (see PRA/PLA) and team exercises are used to identify problems and their causes the project is proposing to address, and through this to arrive at its objectives and activities. It usually has six elements: identification of stakeholders - participation analysis; problem identification and analysis.; setting of objectives.; identification alternatives and activities; identification of indicators; and, finalisation of design and project logical framework/planning matrix.

OPPORTUNITY COST - The value to the economy of goods, services or resources "lost" in the development of an alternative - project intervention.

PARTICIPATORY METHODS - a series of approaches which emphasise participative and cumulative learning by all the participants, with an acceptance of multiple perspectives which through group learning leads to sustained action where experts are facilitators and people play a leading role in any project.

PRIORITISATION - the ranking and selection of projects against a set of criteria to identify the "best" projects to move actively into the design stage and development.

PROJECT - Projects come in many forms, shapes and sizes. A common feature of all types of projects is that they have an objective or objectives which is to be achieved over a set period of time. This may be an individual objective, we often have personal projects, for instance to pass a diploma or to purchase a car. Households or villages may have projects: for instance, a household may have decided to plant a new crop or expand the area of an existing one; or, a villager may have decided to improve their water supply

by constructing a new hand pump. Formal agencies and institutions will develop projects to help achieve their goals, for example the MOA may develop a training project to increase the capacity of its staff to undertake research and extension; or, to develop a new irrigation scheme. These projects may be part or component of an overall programme - a series of projects and activities - to achieve a wider sectoral goal such as increased food production and poverty alleviation.

PROJECT ACTIVITIES - To achieve each project objective it is necessary to implement a number of well defined actions or activities, these will require specific inputs from which certain outputs are expected.

PROJECT ANALYSIS - can be used as the overall term covering the process of project appraisal, or as the term to cover particular elements of a project, such as logical framework analysis, social and gender analysis, stakeholder analysis, and participatory approaches to analysis, and economic analysis.

PROJECT CONCEPT OR PROFILE - Once a project idea has been conceived the next stage is to describe the idea so that it can be prioritised and move on to the next stage in the process. This may involve the preparation of a project identification report or project concept or profile. It might be part of a more general sectoral or regional planning exercise or the result of a participatory approach at the village level by a district officer. Whereever it is developed it is essential to have a clear idea of what the proposed project is supposed to be and what it hopes to achieve. A project concept or profile should be short, and can sometimes be only a couple of pages.

PROJECT CYCLE - The process of planning and developing a project goes through several stages, this is known as the project cycle. In the 1970's the World Bank developed a cycle which is now known as the traditional or Baum cycle. This cycle followed a linear progression from project identification to implementation through design and appraisal stages. This cycle was largely universally adopted in the 1970's and early 1980's for agricultural and rural development projects. Following the development of new ideas and the experience of less than universal success with this cycle a new approach has been adopted. This emphasises the participation of all stakeholders in the process, particularly beneficiaries, and that the cycle is circular and not linear with feedback between the different stages of the cycle, i.e. the cycle is seen as a process rather than a blueprint - the approach of the traditional cycle. This new cycle is frequently called the process approach, and is leading to the inclusion of more participation by farmers and other stakeholders in project planning and management.

PROJECT DESIGN - is the term used to cover the tasks of preparing and formulating project plans prior to any formal appraisal.

PROJECT FUNDING - The implementation of a project will almost always require some additional finance to purchase inputs and services. This will be in addition to other human and institutional resources the project needs, although the expansion of these under a project will frequently require additional funding. For agricultural projects in Tanzania there are five main sources of finance for projects, these are: government recurrent national budget; multi-lateral and bilateral donor grants; multi-lateral and bilateral loans; beneficiary contributions; and, cost recovery and charges. Some projects will be reliant upon only one of these sources but many projects will rely on several of these for project finance.

PROJECT IDENTIFICATION - is the first and, perhaps, the most crucial stage of both the traditional or new project cycles. It is from this idea that the project will be based, and a poor idea or lack of ideas is likely to lead to poor or no projects. Ideas for projects can come from a range of different sources and organisations including: the Ministry of Agriculture (MOA); individuals; local communities; non-government organisations; and; donor and international agencies. There will usually be more project ideas than resources to implement them, and therefore only a small portion of these are ever likely to lead to the full implementation of an actual project.

PROJECT SCALE - Projects operate at different scales or levels, ranging from the very local - a farm and village - to the regional and national level.

PROJECT TIMESCALE/PERIOD/TIMEFRAME - A project will have a finite length during which it should achieve its objectives, the benefits of which should last and be sustained after completion of the project.

PROJECT TYPE - Projects can be characterised by what they are expected to produce, or what focus the project has: infrastructure and capital development, others on training, capacity building and institutional strengthening, increasing agricultural production through improved technologies or better marketing.

PROJECT UNIT - in many cases a project will be part of a programme or set of wider operations, but there is usually a set of project activities carried out separately from other operations, with separate financing and management. The nature and scope of a project is often fixed by its separate budget and its separate "project management".

PROJECT VIABILITY - Viability for a project refers to the assessment of whether the project has the capacity to meet the defined objectives, and in addition to generate significant financial and economic gains to the stakeholders and to the economy in general. Financial and economic viability are not the overriding criteria for approval of all projects. There may be projects which appear to have very high potential for economic gain but which are very risky in terms of the technical, social and institutional factors; or have negative impacts on the environment. There may be other projects where social and environmental factors are very strong but all the economic gains cannot be easily estimated or valued

PURPOSE - A project will have a specific purpose which it aims to achieve through its implementation in the furtherance of an overall goal.

RESOURCE AND CASH FLOW STATEMENTS - are the basis for showing: the resources used in the project investment; the resources generated by that investment; the cash flows associated with those resource flows; and, the cash flows associated with funding the investment.

RESOURCE BASED PROJECT - Resource based identification is important in the agricultural sector. Many agricultural projects are identified because of the availability of land that is suitable for production of particular crop. Surveys of land capability or suitability may lead to the identification of potential new areas of economic activity.

REVEALED PREFERENCES - is a method for the economic valuation of environmental impacts, people will often pay to avoid negative environmental impacts or to gain from positive impacts. This method uses these preferences to pay as a valuation people place on different impacts. For example, the price of property varies according to location. This is a reflection of a range of characteristics among which are environmental variables - this type of valuation is called hedonistic pricing method. Differences in prices

can then be correlated to environmental characteristics to give it a value. When considering the value of a National Park the time and cost of people visiting the park can be used to give a measure of the value people attached to entering it - the travel cost method. People will also pay to avoid certain environmental impacts e.g. purchase of bottled water to avoid drinking mains water (avertive behaviour and defensive expenditure).

SCREENING - an initial review of project ideas and concepts to see if they should be advanced or abandoned at an early stage.

SENSITIVITY ANALYSIS - The calculation of NPV's, IRR's and BCR's are all based on estimates of project costs and benefits which are subject to varying degrees of uncertainty and risk. When projects are implemented the actual flows of costs and benefits may be significantly different from the estimates. Sensitivity Analysis is a technique whereby the viability of a project is tested against possible variations in the size and timing of the estimated costs and benefits. That is, there is analysis of how "sensitive" the project viability is to various changes in variables. The process of sensitivity analysis is used to recalculate the NPV, IRR and BCR according to various "what if" scenarios.

SHADOW PRICES - One starting point for the economic appraisal of a project is to take a set of resource flows valued at market prices of a particular year (i.e. current market prices). If from these market price resource flows we eliminate transfer payments on domestic costs and revenues (i.e. convert from market prices to factor costs) by subtracting taxes and social security contributions (which raise market prices above factor costs) and add subsidies (which reduce market prices below factor cost), then we have a starting point for economic analysis in the absence of any better estimate of "shadow prices". A better approach though for economic analysis is to use the border price.

SOCIAL ANALYSIS - rural households operate in the context of a larger socio-economic system, this is a technique to gain a better understanding of the interaction between the farm and this wider system.

STAKEHOLDERS - are all those persons and organisations which have a substantive involvement or interest in the success of the project. Recent approaches to projects have stressed the benefits to project identification, planning and management from the active participation of stakeholders in the initial design and further development of projects.

STAKEHOLDER ANALYSIS - stakeholders are defined as all the people and institutions who have an interest in a project, this technique helps identify these groups and their interests in a project.STANDARD CONVERSION FACTOR - is the factor used to convert market prices to shadow prices.

SUSTAINABILITY - this refers to the capability and capacity for the project's benefits to be maintained beyond the life of the project, particularly after the specific project funds are exhausted. A key element in project planning and management is therefore geared to institutional development, training and generally creating the conditions for sustaining the project benefits beyond its actual life. The early and continuing participation of stakeholders may be an important element in this sustainability.

TIME PERIOD - projects have set time periods and are planned such that their activity objectives can be achieved between a specific starting point and a specific finishing point. The benefits of the project may extend for many years after the project is completed.

TRADED GOODS OR SERVICES - are those in which international trade occurs, and could be exported or imported by a country.

TRANSFORMATION PROJECTS - is the approach to small farm development project which is interventionist, top-down and involves planners/decision makers designing a new pattern of land use and production, either replacing an existing system (e.g. new irrigation scheme), or for the occupation of previously "unused" land (e.g. settlement schemes). A new uniform environment is created (or assumed), in a disciplined, controlled setting, with a high level of inputs intended to achieve high-intensity production by "selected" farmers.

IV. INDEX

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