Chapter 2

Key economic concepts

This chapter outlines the main economic concepts and principles that apply to farm management

MAIN POINTS IN CHAPTER 2

Factors of production
The main factors of production are natural resources (land, water, soil, rainfall), labour and capital.

Farm enterprises
These are different products produced by farmers, each of which uses inputs to produce outputs. Farm enterprises can be divided into three types:competitive, supplementary and complementary.

Cost of production
Value of inputs needed to produce crops or livestock. Variable costs apply to a specific enterprise. Fixed costs generally apply to the farm as a whole.

Opportunity cost
When a limited resource is used on one enterprise it reduces the opportunity to use it on another. Also, time spent on a farm enterprise reduces the opportunity for social or leisure activities.

Value of production
Money received from the sales of produce, added to the value of that consumed or stored.

Gross margin
What an enterprise adds to total farm profits (Gross margin = Value of production – Variable costs).

Farm profit
Money left over after variable and fixed costs are paid.

Net farm family income
Farm profit after taking into account cost of family labour used to generate it.

Cash flow
Difference between money received (inflows) and money paid out (outflows). (Although a farm may be able to make a profit, there may be times of the year when it runs out of cash and is then unable to purchase inputs and materials).

Substitution
Replacing one method of production with another that is more efficient in terms of labour, time or money

Efficiency: return to scarce resources
The wise use of resources available to the farmer.

Risk
Weather and diseases affect farm yields. Changes in market prices and input prices vary. Farmers must take these and other risks into account.

These concepts and principles of economics will be elaborated on in the remaining chapters of this guide

FACTORS OF PRODUCTION

Factors of production are the resources needed to produce something. The main ones are:

- natural resources
- labour
- capital

Natural resources

Natural resources are what can be called “gifts of nature”. They include land, water, soil and rainfall. These are resources that are not the result of what is called “human effort”.

Land. A typical farm family may own or rent some land for cultivation. The farmer’s homestead may also have land around it that could be used for growing food, fruit or forage crops. Many farmers have the right to use what is called “communal land”. This is usually land used as a forest or for cattle grazing.

Farmers must use the resources they have in the best possible ways

Water. Farmers have access to water directly from rainfall and from springs, dams, wells and rivers or from water collected from rainfall. This water may be on the land used by the farmer or it may be from a communal source.

Labour

Labour is the work of farmers, their families and hired labourers. This is human effort and it is needed on all farms. Farmers may have three different sources of labour: the farm family (family labour), hired labour and labour provided through cooperation between members of the community. A farmer may use any or all sources of labour on the farm, depending on the situation. The total effort from labour is made up of people, skill and time available.

Capital

Land and labour can often be made more productive if land is improved. Sometimes land is cleared, cultivated, irrigated or drained. The supply of water can be increased by the construction of dams, storage tanks and canals. These improvements on the land require capital. Capital* is simply a resource that is produced as a result of human effort. Capital includes buildings, dams, roads and machinery as well as inputs and materials. It can be divided into two types: *durable* and *working capital*. Durable capital is made up of items that last for a long time, such as machinery, equipment and buildings. Working capital consists of the money used to buy stocks of inputs and materials, such as seed and fertilizer, that are generally used within a season, as well as other items of expenditure paid in advance of income earned, such as wage bills, maintenance and repairs.

Capital is essential to operate and expand a farm

Capital is used by all farmers, but small-scale farmers often have very little cash capital. Most of the capital found on their farms is in-kind. This includes livestock, tools and equipment, buildings and land improvement measures as well as stocks of seed, fertilizer and animal feed.

Capital is often referred to as assets.

Assets can also be divided into
CASH and **PHYSICAL** forms of capital

* Note that there is a difference between the concept of capital as used in economics and the more common usage where “capital” is often used to refer to the amount of money that people have.

FARM ENTERPRISES

Farm enterprises are the products farmers produce ...

... they require inputs ...

... the relationship between inputs and outputs determines what farmers produce

Most farmers have a range of different products that they can produce. These might include crops such as paddy, maize, cotton and groundnuts as well as cattle, poultry, sheep and goats. The different products are known as farm enterprises. Each farm enterprise uses inputs to produce outputs. Inputs are the things that go into production: the use of the land, farm and family labour, hired workers, seed for crops, feed for animals, fertilizers, insecticides and other supplies, tools and implements, draught animals and tractors. Outputs are the crops and livestock products themselves. They are the products of the enterprise. The relationship between inputs and outputs determines what the farmer produces. Economists call this relationship the production function.

Farm enterprises can be divided into competitive, supplementary and complementary

Competitive enterprises

Enterprises are said to *compete* when they use the same resources. For example, if a farmer doesn't have enough labour to harvest two different crops at the same time, the output of one crop can only be increased if the other is reduced.

Supplementary enterprises

Enterprises *supplement* one another when they use resources that might otherwise not be used. For example, if a farm is located in an area that has early and late rains it may be possible to grow one crop to make use of the early rains and a second crop that makes use of the late rains. The resource, water, is not left unused. The two crops do not compete for water because they require the resource at different times of the year. These two enterprises are supplementary.

Complementary enterprises

Enterprises *complement* one another when they interact in a supportive way, such as where poultry produces manure. The manure can be applied as a fertilizer to crop enterprises. Similarly, poultry or animals can be fed the crops produced. This relationship between the livestock and crop enterprises shows that the two are complementary.

ENTERPRISE COMPARISONS

Competitive enterprises use the "same" resources

On her three hectares of land a farmer grows maize, beans and pumpkins which use many of the same factors of production. Introducing a new crop will mean that one or more of her current enterprises will have to be reduced or not planted at all. These enterprises are competitive.

Supplementary enterprises use "otherwise unused" resources

The farmer allows her cows to graze on land she cannot use for growing crops. She does not feed her chickens excessively and allows them to scavenge for feed so they do not use other food resources that may be used profitably elsewhere on the farm. These are supplementary enterprises.

Complementary enterprises "support one another"

The farmer collects chicken and cow manure to use as fertilizer on her beans and pumpkins. She also uses maize harvest residues and by-products to feed her chickens and cows. These enterprises are complementary.

COST OF PRODUCTION

Cost of production refers to the value of the inputs involved in the production of crops and livestock. For the purposes of farm management it is useful to divide costs into two kinds: *variable costs* and *fixed costs.*

Variable costs

Costs vary according to the size of the enterprise, the amount of inputs used, and the yields achieved. If the area of land under a particular crop increases or more inputs are applied, then variable costs also increase. If less land is planted or fewer inputs are used, the variable costs decrease.

Variable costs apply to specific farm enterprises and vary with changes in production

Examples of variable costs

A farmer has to hire labour for weeding and harvesting. If the farmer increases the area that needs to be weeded or increases the number of times the land is to be weeded, the cost of hired labour will also increase. Similarly, the amount of labour needed for the harvest is linked to the yield.

If a low yield is attained
the amount of hired labour
at harvest time will also be low.

If a high yield is attained
the labour costs will be higher.

The same is true of other inputs. If the farmer decides to increase the amount of land planted to maize, the amount of seed and fertilizer applied will increase, so increasing the farmer's costs.

Fixed costs

Costs which can be termed fixed usually apply to a specific enterprise and they do not vary with changes in production. These costs include the costs of using a tractor, farm equipment and draught livestock as well as payment for permanent labour.

Examples of fixed costs

A farmer has a small storeroom for fertilizer, seed, animal feed and farm tools. Any costs associated with the storeroom (e.g. maintaining or cleaning it) are shared by all of the farmer's enterprises. These costs are not affected by production or yield. Whether production is increased or decreased, or the yield is high or low, the costs are fixed. It would be difficult to divide such costs and allocate them to the farmer's individual enterprises.

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Concerning draught power and equipment, most of the costs of keeping a tractor, draught cattle and farm equipment remain the same whether the item is or is not fully used. A tractor can be used for a mix of farm operations, cultivating a crop, transporting feed for livestock and even transporting people to town (although this is a very expensive form of transport). The cost for different activities cannot be easily allocated to any one enterprise. Portions of fixed costs, such as fuel or hours of draught animal use, can be allocated between enterprises but this usually requires good information, which is often unavailable to smallholder farmers.

Fixed costs apply to the farm as a whole and remain steady as production changes

For the most part, fixed costs only become important in more commercialized agriculture when farmers have mechanized equipment. Smallholder farmers usually have few fixed costs. Most often they need not worry about allocating fixed costs between enterprises. Practically all their costs are variable costs.

OPPORTUNITY COST

There is another cost that is often overlooked but is important in economics: opportunity cost. We have mentioned before that, because resources are limited, when a decision is made to allocate resources something else has to be given up. If a farmer spends money on buying tools, he or she will have less money to spend on other items. In all aspects of life, having one thing often means going without another. And there is a cost to giving something up.

The income lost by using scarce resources for one purpose instead of another

An example of an opportunity cost

A farmer grows maize and earns $55. If the farmer had grown tomatoes instead of maize earnings may have been $95*.

The opportunity cost of growing tomatoes
is the $55 that was lost (given up)
from not growing maize

In both situations the farmer would have made money, but the point is that more money would have been made from tomatoes than from maize.

The concept of opportunity cost can also be applied to labour. The cost of hired labour is very easily measured by the wage paid. *But how is the time of farmers and their families valued?* It is done by deducting the value of the time they are absent from other activities. As an example, a farmer works part-time in town and decides to take a day off in order to work on the farm. The farmer

* Throughout this guide the dollar ($) sign is used to indicate a monetary unit, not a particular currency

will be giving up a day's wages from the other job.This cost is just as real as paying a hired labourer to do the work. Another example concerns time available to farmers. Where time is spent on a farm enterprise it is not available for social or leisure activities so there is an opportunity cost also associated with non-business activities.

There is also an opportunity cost of capital. *If a farmer allocates scarce financial resources to a farm enterprise, is this the best use of that money?* Perhaps the farmer would have made more money by leaving the cash in the bank and earning interest. Perhaps the satisfaction would have been maximized by adding a new room to the family house.

VALUE OF PRODUCTION

Once a crop has been harvested, the farmer (and family) can do three things: sell it, consume it, or store it. The value of production is the money received from the sale of produce together with the value of produce that is consumed and stored (i.e. unsold produce). It is sometimes referred to as the "value of output".

The value of sales is very easily measured by the amount of money the farmer receives. This is calculated as the quantity of production sold multiplied by the price that the farmer receives.

Value of production sold =
Quantity sold x Sales price

Production consumed and crops stored make up part of the family's income

As noted before, the value of production also includes the value of unsold produce. This is produce consumed by the farm family or stored. A convenient method of valuing produce is by using the market price for which the produce could have been sold. A more precise way to measure the value of food produced and consumed by the family is to ask: *"What would we have had to pay for the food if we had not produced it?"* However, in rural areas there is little difference between selling prices and buying prices and thus the sales value can be used as a convenient approximation. Then, the total value of production includes produce sold, produce consumed by the farmer's family and produce stored.

Value of production =
(Quantity sold + Quantity consumed
+ Quantity stored) x Sales price

An example of value of production

After the maize harvest a farmer had 50 bags of maize. She sold 10 bags of maize at $5.50 each and earned $55. She put 20 in her storage shed; 4 bags for cow feed and chicken feed; 14 bags for her family and 2 to give to a farmer friend.

If the farmer wanted to know the value of her maize production, she would have to add together the bags of maize that she sold in the market, the bags she put in storage and the bags she gave away, and multiply the total by the market sales price.

This would be 50 bags x $5.50 = $275

GROSS MARGIN

Gross margin of an enterprise is a measure of what that enterprise can add to farm profits

The gross margin for a crop or livestock product is obtained by subtracting the variable costs from its value of production.

Gross margin =
Value of production – Variable cost

An example of gross margin

A farmer who produces a crop worth $600
at a variable cost of $100
generates a gross margin of $500 ($600 – $100).

Calculating gross margins is essential when deciding between different enterprises. If a farmer wants to know whether to continue with a certain crop or grow another, he or she could compare the gross margins of the two crops. If a farmer changes enterprises, the fixed costs will probably not change. But what will change are the variable costs and value of production. Using a gross margin will help the farmer to see if the change in enterprise will be profitable or not.

Understanding the basic economic concepts discussed in this chapter ...

Using land, water and labour – Mozambique

... factors of production (land, water, soil labour, capital) ...

Better watering for production – Burkina Faso

... farm enterprises, cost and value of production ...

A successful pumpkin enterprise – Tuvalu

Intercropping for better farm profits – Ecuador

... gross margin, farm profit and net income ...

Seasonal flooding is a risk to consider – Peru

... substitution, efficiency, and risk ...

Good management practices bring high yields and profits – Dominica

... will add to the knowledge needed by families to deal effectively with the management of the farm business.

FARM PROFIT

Farm profit needs to take into account both variable and fixed costs

Farm profit refers to the money left over after the variable costs and the fixed costs are paid. Each enterprise has a gross margin, which, as noted before, is determined by subtracting the variable costs of the enterprise from the value of production. The total gross margin on a farm is the sum of the gross margins of all enterprises. But, remember, this does not include fixed costs, which still have to be paid. The money to pay for the fixed costs comes from the total gross margin.

Profit =
Total gross margin of all farm enterprises
– Total fixed costs

If the amount obtained by subtracting fixed costs from the total gross margin is positive, there is a profit. If the amount obtained is negative, there is a loss. Because fixed costs do not vary much with changes in production, it is almost always the case that if farmers can increase the gross margin on their farms they will also increase profits. Further, because the smallholder farmer usually has few fixed costs, the total gross margin is almost the same as total profit.

NET FARM FAMILY INCOME

Family labour is an important input for most farmers, particularly when they are running farming systems that are only partially or not at all mechanized. Different enterprises require very different levels of labour input. For example, vegetables require a much higher level of labour input than maize. Therefore, it is unreasonable to compare the gross margin of vegetables with the gross margin of maize without considering the labour required.

In the calculation of the gross margin, the payment for hired labour is already included in the variable costs. However, in many cases, labour on small farms comes largely from family sources. In order to meaningfully compare different enterprises, or technologies relating to the same enterprise, it is necessary to allocate a cost for this family labour. Estimating the cost of such family labour is done by valuing what it would cost to hire such labour instead of using family labour.

It is important to take into account the cost of family labour

Very often, the smallholder farmer should not be as concerned about increasing profit as about increasing net farm family income. This is the farm profit after taking into account the cost of family labour used to generate it. After the farm profit is calculated, family labour costs are deducted.

If the opportunity cost of family labour is low, the net farm family income could be increased by using family labour more intensively in farming operations. Farmers often have to decide between hiring a tractor to speed up cultivation and carrying out farm operations, such as sowing, weeding and fertilizing manually. In a situation where the family has limited work opportunities and the opportunity cost of family labour is low, the gross margins may be increased if much of the work is carried out by the farm family, rather than by hiring a tractor.

CASH FLOW

Cash inflow and outflow vary greatly throughout the year

The cash flow is the flow of money into the farm from sales and the flow of money out of the farm through purchases. Money received from the sale of farm produce is called *cash inflow*. Money paid out for inputs and materials used is called *cash outflow*. The difference between the cash inflow and the cash outflow at different times of the year is known as the *net cash flow*.

Farmers need to consider their likely cash flow on a monthly or quarterly basis in order to know whether they will have sufficient cash when it is required. If the cash inflow is less than the cash outflow at any particular time all cash commitments cannot be covered.

Cash flow is not the same as profitability. Remember, profit is based on the value of production less the variable and fixed costs. However, if the farm family consumes a lot of the produce, it is possible that although the farm is profitable, it may not generate enough cash to cover its cash requirements.

In the previous example on page 25 a farmer produced crops worth $600 at a variable cost of $100. There were no fixed costs. Based on this information the farmer has a profit of $500 ($600 – $100).

When we investigate further, however, we find that the farmer only sold produce to the value of $50. The farmer's family consumed the rest of the produce. Therefore the cash inflow is $50 and the cash outflow is $100, which means that the farmer would not have the $100 needed to cover variable costs unless the farmer had money saved or another source of income.

SUBSTITUTION

Because there are many technical ways of producing a crop or livestock product the farmer must choose the method of production that is most efficient. The most efficient method is the one that uses scarce resources wisely. Again, we speak of a choice a farmer must make – the choice between methods of production. *Given the alternatives, which is the best way of producing an enterprise?* The principle of substitution can be usefully applied when farmers consider whether or not to use a new technology or farm practice. As an example, farmers have three alternatives for preparing a seed bed. They can:

Substitution requires comparing different methods of production and selecting the best

- use hand tools
- hire additional labour
- use a draught animal or a small tractor

Which alternative should the farmer use? How can the farmer assess the options wisely? The decision depends on many factors: the size of the farm, whether the farmer has money or needs to borrow money and the cropping pattern. In order to make such a decision the farmer needs to know about the factors of production and their cost for each of the alternative methods. The following simple principle of economics can be applied.

When substituting resources or inputs
the farmer must be certain that the savings
in the method replaced are greater than
the added cost of the new technique or practice.

Cost saved by **giving up current resource** input or practice	**greater than**	Cost added by **using the new resource** input or practice

EFFICIENCY: RETURN TO SCARCE RESOURCES

There are many ways of looking at efficiency on the farm. One useful way is to look at efficiency from the point of view of the factors of production: natural resources, labour and capital. In most cases, one of these factors will be the one that limits profits the most. This is the most limiting factor or the *effective resource constraint*. This really means that the resource is in short supply. The effective resource constraint is used as the basis for examining farm efficiency.

Efficiency

A farm that is efficiently run is more likely to be profitable than a farm that is not

Efficiency is expressed in two forms: *technical* and *economic*. Technical efficiency involves producing farm products with the best combination of resources or inputs. It is expressed as attaining the maximum level of output from a given level of inputs or, alternatively, a given output with the use of minimum inputs. Economic efficiency measures the financial returns on resources used and looks at the cost of using resources to produce a given level of output. Low profitability is often traced to poor efficiency in one or more areas of the farm business.

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Efficiency and land. Land is a natural resource. If it is the most limiting factor, the farmer has no more land to use. If this is the case, the farmer will want to measure efficiency in terms of land by determining the farm's gross margin per unit of land (e.g. hectare or acre) or the profit per unit of land. To improve the efficiency of the farm, the farmer should consider ways to increase yields to try to obtain higher returns from the produce.

Efficiency and water. The most limiting factor may be water. A farmer may consider deep ploughing, which is good to maintain water in the soil. In order to save water the farmer could also construct canals and transplant vegetables on raised beds. In this way the farmer uses less water per hectare and makes more efficient use of this scarce resource.

Efficiency and labour. Assume that labour is the limiting resource. This means that labour is in short supply. When this is the case, the farmer will want to measure efficiency in terms of labour by determining the farm's gross margin or profit per labour input or person-day. To improve the efficiency of the farm, the farmer should look for ways to increase production using the same amount of labour, or produce the same amount using less labour. This can be done by introducing a labour-saving technology that reduces the amount of time spent on farm operations.

Efficiency is concerned with the wise use of the resources available

Efficiency and capital. Capital is nearly always in short supply and needs to be used efficiently. If capital is the most limiting factor, the farmer will want to measure efficiency in terms of capital by determining the farm's gross margin or profit per unit of capital, such as per $100 or whatever value is most appropriate. To improve the efficiency of the farm, the farmer would look for ways to increase production, perhaps by investing money in high yielding seeds (instead of ordinary seeds) or by investing money in a more efficient technology.

RISK

One of the facts of farming is that many future events cannot be known with complete accuracy or certainty. This makes farming risky. Risk occurs when the outcomes of a decision are not known in advance or cannot always be predicted. Farmers need to make decisions that take these risks into account*.

The most common sources of risks in farming are:

Risk exists in many different forms ...

... and with potentially devastating effect

- *Production risks*: crop and livestock performance are affected by biological processes (weather, pests and diseases);
- *Marketing or price risk*: market prices vary from year to year or in some situations daily;
- *Financial risk*: when it becomes necessary to borrow money to finance the farm business;
- *Institutional risk*: unpredictable changes in the provision of services from support institutions;
- *Human and personal risk*: risk to the farm business caused by illness or a family situation.

Risk influences the amount of inputs that are used as well as their cost. In rain fed agriculture, for example, farmers may experience poor rains one year in five. They will not risk using large amounts of fertilizer if there is a possibility that the rains won't come. Farm profits are always uncertain. Not all factors have the same effect on the riskiness of farm profits but all must be taken into account. As a result of risk, farmers often have to balance between maximizing profits and minimizing risks.

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* Economists often differentiate between risk and uncertainty. Risk is associated with events for which a probability of occurrence can be attached. For example, the risk of no rain in a given period can be calculated, based on past rainfall patterns. Uncertainty, on the other hand, refers to events for which no objective way to assign a probability exists. An example is the prediction of prices. For most practical purposes, however, the two concepts can be used interchangeably.