

INTRODUCTION

The reasons behind the interventions of almost all countries in the world in their agricultural sectors are well known: agricultural policies have many tools that go from the organization of the markets to the direct income support of farmers to complex mechanisms that try to keep prices over certain fixed levels.

Typically, there are many small farmers producing similar products and a few buyers that either transform the products or aggregate the supply before reaching the markets. It is well known that the elasticity of the supply of agricultural products is low -especially in the short run- and that it gets higher when the products are aggregated and processed.

Constraints to the increase of the average size of the farms are usually found in the rigidity of the land market: as a result, it is very difficult for farmers to reach the advantages of economies of scale.

Most countries developed policies to aggregate the agricultural supply by following two different approaches at the same time:

- the association of farmers that produce the same products and
- the cooperative approach.

The first approach has basically the goal to aggregate the supply, while the second approach allows more easily to increase the added value of the product and to integrate additional stages of the value chain. Both can reach different degrees of vertical integration and of added value to the products that is eventually sold to the markets.

1. Value chain

The concept of value chain has its roots in the concept of “filière” that was developed in the 1960s at the INRA, France. For many years it was applied to the analysis of the vertical integration of modern farms with the agro-industry. It lost its original meaning and became more recently in the anglo-saxon world a method of identifying all different participants to the supply chain, from the producer to the consumer.

Being a vertical approach, the value chain risks to hide and to keep out of the analysis the horizontal network of relations that -at community level- are very important to understand the possibilities of a sustainable development in rural areas.

For example, the sharing of tractors among small farmers it is not simply a matter of a free market for tractors services in which a farmer needs to pay the daily price to get the service: it goes much deeper than this into the trustful relations among farmers. When these relations are broken the entire process ends abruptly and this risk is not fully appreciated by doing a vertical analysis.

Also, a vertical analysis is more useful when the supply chain is well developed and there are many actors with specialized roles. In most poor areas the supply chain is quite short. In other areas, where production of agricultural products is more significant, the supply chain mainly consists of traders that -sometimes assuring credit to farmers- get the right to acquire the largest part of the production and carry it to the larger markets of the main cities.

We would like to underline the role of the value chain approach as an instrument for identifying the value added to each step of the process that starts with the decision to produce a product at the farm level and ends with the decision to buy and to consume the same product (but mostly a derived one) at the consumer level.

Clearly, such an analysis is very helpful to highlight the reasons for competitive advantages, because those are reflected in the smaller costs associated to single steps of the chain. For example, knowing that the availability of water is very important for orchards and that water is more available in the Peja than in Ferizaj, one can understand that there is a competitive advantage in the first region.

However, the value chain approach is only a methodology for understanding some relevant aspects of the reality. The Consultant' experience is that a more fundamental aspect of the reality constitute the main obstacle to the rural development: this is best described by the set of trust, security and time horizon.

- Trust among operators of a supply chain is a very necessary condition for its stability and its development. Unfortunately the new trustful relations that are needed in underdeveloped areas are very difficult to implement: they are based on experience, which need time to happen and to be confirmed as positive
- Security of property and personal security of the operators is often at very low level, judged by western standards. Without security both commitments and sustained efforts are meaningless: it is wiser to produce the lowest possible level compatible with family needs and personal exposition to risk.
- The concept of the time horizon is simple: it describes the average length of time than an individual takes into consideration when planning his activities. In the developed economies, where security and trust are at the highest levels, it make sense to plan for the following 5 years. In very insecure regions where individuals only trust people of their families, the decision to invest or to commit to a 6 month plan of actions is simply not rational. In these areas, the time horizon in the morning coincides with the next evening.

Farmers and communities are clever enough and sometimes also have the resource to invest in technologies that increase the efficiency of their productive processes. But due to the above limiting factors, many times the decision of investing and of risking by betting on the market is simply not rational. This is one of the reason why even well designed donor projects end up in failure when the resources given by foreigners are consumed. The presence of donors allows the local stakeholders to take the risk of the seasonal investments, but when the donors and their experts are gone, everybody goes back to the rational habit of adapting to the constraints of the reality.

Even in modern and rich countries agriculture has its problems.

Commercial mega-farms — those with at least \$250,000 in annual sales — represent just 7 percent of U.S. farms but command about 70 percent of total farm sales.

- Those large farms are profitable (although they lean heavily on commodity subsidies). But “the other 93 percent of farm households have negative farm operating profits, on average, and draw most of their income from off-farm sources.
- The smaller the farm, the less profitable it is: “farm operating margins become more negative and share of household income from farm sources decreases as farm size diminishes.”

- Here's the kicker: 85 percent of U.S. farms generate income of less than \$100,000/year. These farms generate just "15 percent of [total U.S. farm] sales, and *earn negligible income from farming.*"

2. Goals For Farm and family¹

Goals set the framework and give a focus for making decisions. Farmers and their families have goals. In many parts of the world the family household and the family farm cannot be separated. Therefore, the goals of the household and the goals of the farm often interlink.

Farmers run their farm business. They are the decision-makers. A farmer can be a husband, a wife, a son or a daughter; whoever takes the many day-to-day decisions needed in farming. To ensure better farm management decisions, farmers must have control of the resources needed to produce a crop or livestock product. If they are farming for the market, they will also need to have a good understanding of that market.

Some common goals of farm families

Food security. A primary goal for every farm family

Profit maximization. Farm families need more than just food and any cash needed must often come from the farm

Risk reduction. Risks can create great losses in income

Social goals. The quality of family life may have a higher priority than just making money.

2.1 Economics in farm management: outline of key terms

Economics is about wealth, that is the use of often scarce resources to produce and exchange goods in order to create wealth. Farmers have limited amounts of land, labour, money (or credit) for inputs and other resources to use on their farms.

Farm management is about making decisions regarding use of the resources available. Wealth is created by putting resources together. How farmers use their resources affects how much wealth they can create.

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.

¹ The following text is mostly a summary of parts of *Economics for Management Extension*, David Kahan, FAO, 2008

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

$$\text{Gross margin} = \text{Value of production} - \text{Variable costs}$$

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.

3. Economics of farm management: a deeper view

3.1 factors of production

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

- natural resources
- labour
- capital

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.

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 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 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

3.2 farm enterprises

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.

3.3 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.

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.

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.

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.

3.4 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.

$$\text{Value of production sold} = \text{Quantity sold} \times \text{Sales price}$$

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.

$$\text{Value of production} = (\text{Quantity sold} + \text{Quantity consumed} + \text{Quantity stored}) \times \text{Sales price}$$

3.5 Gross margin

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

$$\text{Gross margin} = \text{Value of production} - \text{Variable cost}$$

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.

3.5 Farm profit

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.

$$\text{Profit} = \text{Total gross margin of all farm enterprises} - \text{Total fixed costs}$$

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.

3.6 Net 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.

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.

3.7 Cash flow

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 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€.

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.

3.8 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:

- 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?

Cost saved by giving up current resource input or practice	greater than	Cost added by using the new resource input or practice
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3.9 Efficiency: return to scarce resources

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.

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 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 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.

4 THE FARM AND THE MARKET

What is a market? The word "market" may mean two things:

First, it is a place where the exchange of products for money takes place. Markets are made up of sellers and buyers and their relationship influences the amount of money received in exchange for products. Markets do not have to be physical locations. Exchange can also take place over the telephone and sometimes, these days, over the Internet.

Second, a "market" represents the collective demand for a product. When farmers understand the market for their products, it means that they understand the product that consumers want, how much they want, what price they are willing to pay and what qualities and other conditions they demand. We can talk about commodity markets, maize markets or rice markets in this way.

What is marketing? Making decisions about the marketing of farm products is an important part of farm management. If farmers are to treat farming as a business they need to understand marketing and how the market works. Marketing is a series of exchanges linking the farmers who produce and sell, and the consumers who buy. Buyers can take different forms. They include:

- Customers who buy for their own use and their families;
- Rural traders who sell the produce to others;
- Processors who transform the produce and then sell it to others;
- Wholesalers who buy and sell to retailers;
- Retailers who buy and sell to consumers;
- Exporters who buy and then sell abroad.

Exchange takes place when two sides agree on a price. If they do not agree, no exchange will take place. The exchange mechanism of selling and buying depends on the price. Understanding how prices are set calls for an understanding of how the market works. It also calls for an understanding of the factors that affect supply and demand and cause prices to change. These are all parts of economics.

To make a profit, the farmer has to charge a high enough price to cover more than the costs of production and marketing. While there may be occasional price falls that cannot be foreseen, if these costs cannot be covered in the long run the product should not be produced.

In a market-oriented system price is determined by supply and demand. **Supply** is the quantity that farmers are prepared to sell at every price. **Demand** is the quantity buyers are able to buy at every price.

Market price: what both farmers and buyers are willing to accept.

4.1 How are market prices determined?

As noted in the previous section, prices are determined by supply and demand. But what does this really mean?

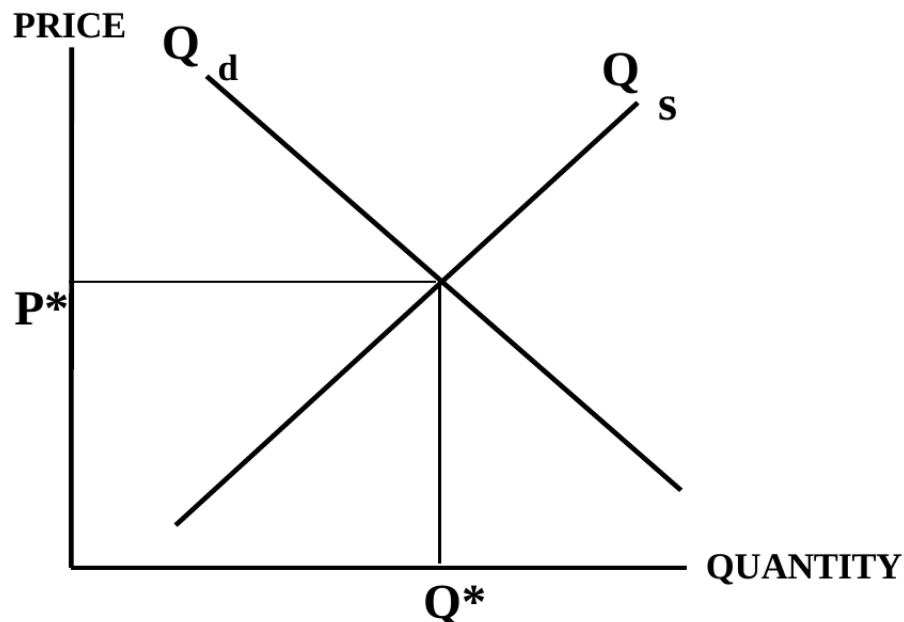
Supply. Normally, the higher the price of a product, the greater the supply of that product. For example, farmers considering producing tomatoes would be encouraged by high prices. If they do produce tomatoes and the price increases, they would be encouraged to extend the area of land under the crop. They would also try to grow tomatoes with more or better quality inputs so that a higher yield could be produced.

Demand. The demand for a product normally rises when its price is lower. If the market price is high, consumers reduce their purchases. The table below shows the amount of tomatoes in demand at different prices. If tomatoes are very expensive, consumers may substitute other vegetables. If they are cheap, consumers will buy more.

In most cases, farmers are **price-takers**. Either the markets of their products are competitive, or they face oligopolies of buyers. In very few cases there are few farmers producing for a niche market: highly specialized in terms of products or in term of the time of year when premium prices can be obtained.

The Market Clearing Price

Quantity demanded equals Quantity supplied.
Market is in equilibrium.



Market price. The market price is set at a point where supply and demand are in balance. Economists call this the equilibrium price. That is the point where the amount in demand matches the amount supplied.

4.2 Why do prices change?

Prices change depending on changes in supply and demand. As a result of such changes equilibrium prices and production levels also change. The farmer needs to recognize such changes and adjust the farm business to them.

The following factors influence production or supply

Seasonality of production. At peak season crops are more abundant than they are during the off-season.

Changes resulting from climate. Supply also varies from year to year. Changes in production frequently occur as a result of weather (including rainfall, floods and drought). Bad or good climatic conditions can decrease or increase the quantity supplied. Bumper harvests usually decrease prices, poor harvests usually increase prices. In these cases, the level of production is not affected by the price of the product but by climatic changes.

Production problems. The incidence of pests, diseases and other hazards, such as fire, can decrease the supply.

Change in the cost of production. A decrease in the cost of inputs or the introduction of more efficient technologies would decrease the cost of production. This makes it possible for the farmer to buy more inputs and produce more for the same cost of production. As a result more tomatoes could be supplied at the old price. Conversely, an increase in the cost of labour employed on the farm would have the opposite effect.

Improved techniques. The introduction of high yielding varieties could increase the level of production, resulting in a decrease in product price.

Expansion of a crop under cultivation. Farmers may decide to plant more of a crop because of the prospect of greater profits.

Changes in profitability of competitive products. Changes in the profitability of competing products also cause a change in supply. If cabbage is more profitable than tomatoes, for example, farmers will gradually shift towards growing cabbages. This change would lead to a decrease in the supply of tomatoes.

For fresh produce, such as vegetables, there are often short-term fluctuations in supply, sometimes a result of bad weather which can affect the harvest. There may also be transport disruptions.

The following factors affect the demand for a product

A change in the number of consumers. Extra people coming into a market can increase demand. Development projects, housing developments and other programmes often cause people to move to a new area.

A change in consumer demand. Changes may occur that make consumers demand more or less of a product at each price. In other words the level of demand could change. For example, farmers could join together to promote their sales of tomatoes. They might advertise the good quality, freshness and availability at times of the year when tomatoes are not usually found in the market. This may appeal to consumers, increasing demand.

An increase in income. As countries get richer there will be a general increase in income and people will be able to afford new products. As people become richer they tend to reduce their consumption of staples, such as rice and maize, and increase consumption of dairy products, fruits and vegetables.

A change in the prices of products that are close substitutes. In some diets spinach may be a substitute for tomatoes. If the price of spinach decreases, consumers may prefer to purchase it instead of tomatoes. Thus, even though there may have been no change in the price of tomatoes, the demand could decrease.

Availability of competing products. If a wider range of products competing with tomatoes comes onto the market, consumers have a wider choice. This may lead to a lower demand for tomatoes. However, a lower demand may lead to lower prices, which could cause demand to increase again.

A change in taste. A promotional campaign aimed at persuading consumers to purchase more of a product could also increase the demand. Similarly, changes in demand may come from changes in consumer tastes that take place gradually as a result of changes in diet.

Safety concerns. Quickly spreading consumer fears of contamination, as experienced in the Avian Flu epidemic, can have an immediate effect of decreasing demand.

Expectations of future price changes or shortages. The fear that the price of a product could rise considerably the following week, for example, because of a planned transport strike, would motivate people to increase their demand and stock up. Clearly, this would not happen so much with perishable products.

The relationship between supply and demand and prices of products is thus extremely complex. A change in the price of one product can affect the demand and, in turn, the price of an entirely different product. Supply is, however, likely to fluctuate much more than demand. Market prices are affected more by changes in production than by changes in demand.

4.3 Why do some prices changes sharply while other do not?

Normally, demand increases as prices fall and supply increases as prices rise. More people are interested in buying products that have a low price. *Single farmers* are interested in increasing their production to follow higher prices, since they are price takers.

However, the supply of some products can be adjusted far more quickly than the supply of others.

For example, the supply of mushrooms and tomatoes can be increased or decreased quickly in response to price changes. But other items such as fruit, coffee, tea and milk take longer to adjust. If the prices of such commodities fall, the decrease in supply does not come about immediately. First, changes in production would require significant changes, such as uprooting tree crops. A farmer would need to think through such changes very carefully. Second, even if the farmer were to make the required changes, it would take a long time for overall production to adjust.

Elasticity is an economic concept that can help explain changes in product prices, supply and demand. It can especially help to explain why changes are more significant for some products than for others. Different products have different elasticities.

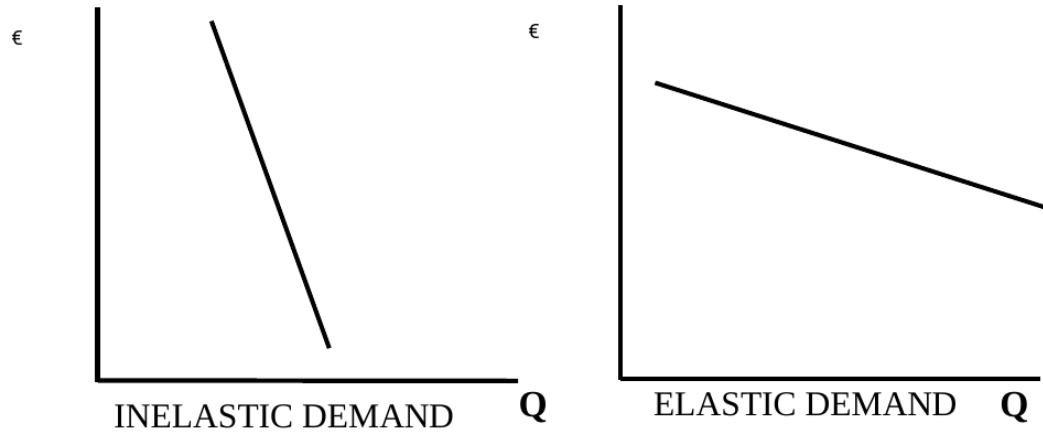
When supply or demand change a lot in response to a change in price, the product is said to be elastic. It is sensitive to price changes. When supply or demand does not change much in response to a change in price, the product is said to be inelastic. It is insensitive to price changes.

Demand for most farm products is inelastic. People can consume only so much, then they are satiated. Even if the price drops they will not buy much more.

Goods more necessary to life (e.g. medicine, water, food) usually have less elastic demand (steeper slopes) than other goods. The elasticity of processed food is usually higher than that of the contained agricultural products: beans and canned beans.

The elasticity of demand curve on each point is given by the ratio between a percent change in the quantity demanded and a percent change in the price.

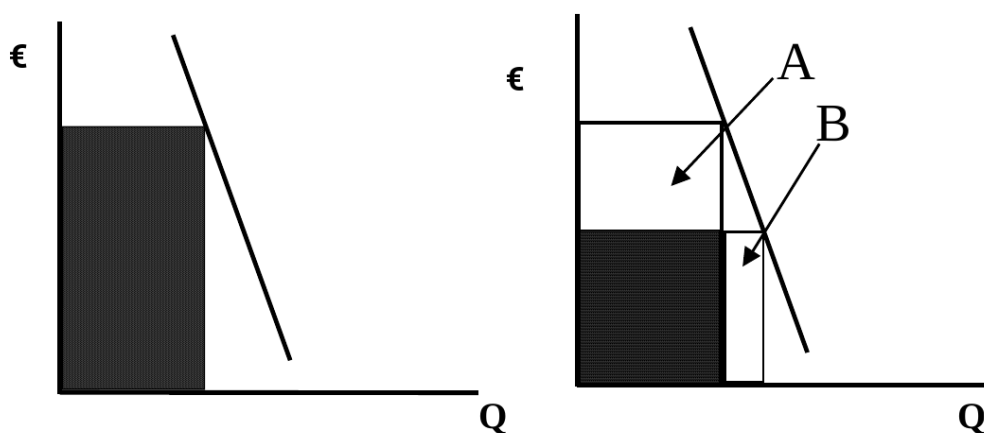
$$\text{Price Elasticity} = \frac{\% \text{ change in Quantity Demanded}}{\% \text{ Change in Price}}$$



$$E_d = \frac{Q_1 - Q_2}{Q} \div \frac{P_1 - P_2}{P}$$

The trainee can make some examples and see that even if the supply curve is straight and has constant gradient, E_d changes over it, due to its percentage nature. E_d is different from point to point of the curve, so it is important to understand which part of the demand curve we are dealing with. Consider now what happens in case of a drop in price to the revenue of the producer.

Inelastic Demand and Revenue



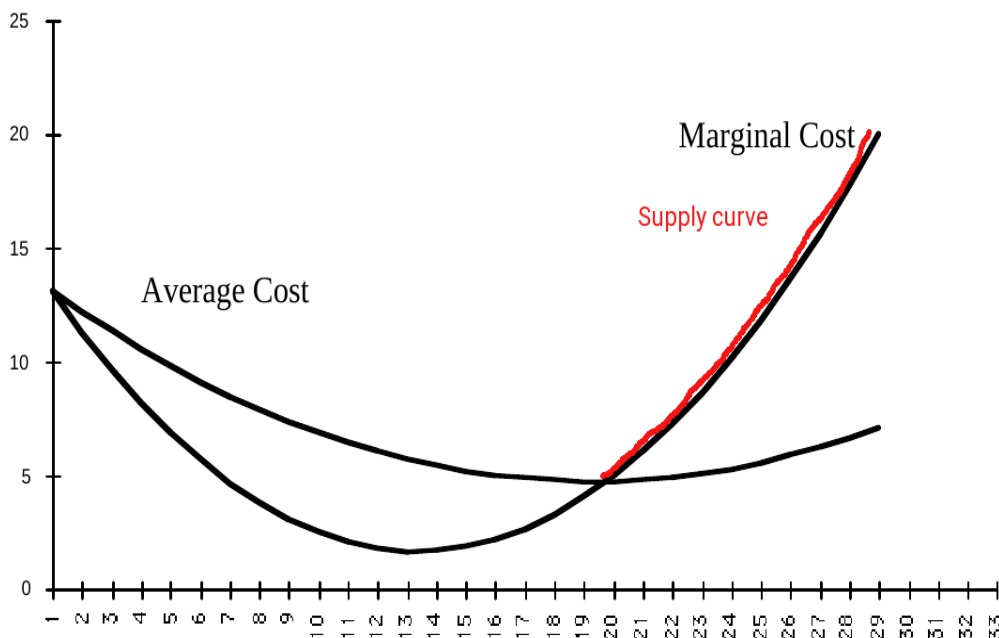
The black area is the product of the price time quantity: that is, the revenue of the farmer. When price drops, the area A (lost revenue) is larger than the area B (added revenue). In this case we say

that E_d is relatively inelastic. Remember that total revenues are simply given by $R=P \times Q$ so that if price increases (or viceversa) we have two effects: the increase of revenues because P is larger and the decrease of Q , the demanded quantity.

4.4 Cost curves and supply curve

We have seen the classic form of the demand and supply curve in the figure above. Demand curve is due to consumers. What is the reason for the increasing form of the farmer's supply curve? Sure enough, it is increasing because if price is higher the farmer is ready to produce and sell more. But its real form depends upon the cost of production.

To every quantity produced is associated a total cost. Dividing the total cost by the quantity produced we get the **average cost**. The **marginal cost** is, at every level of production, the cost of producing an additional unit. Both are not constant, they changes with the level of production.



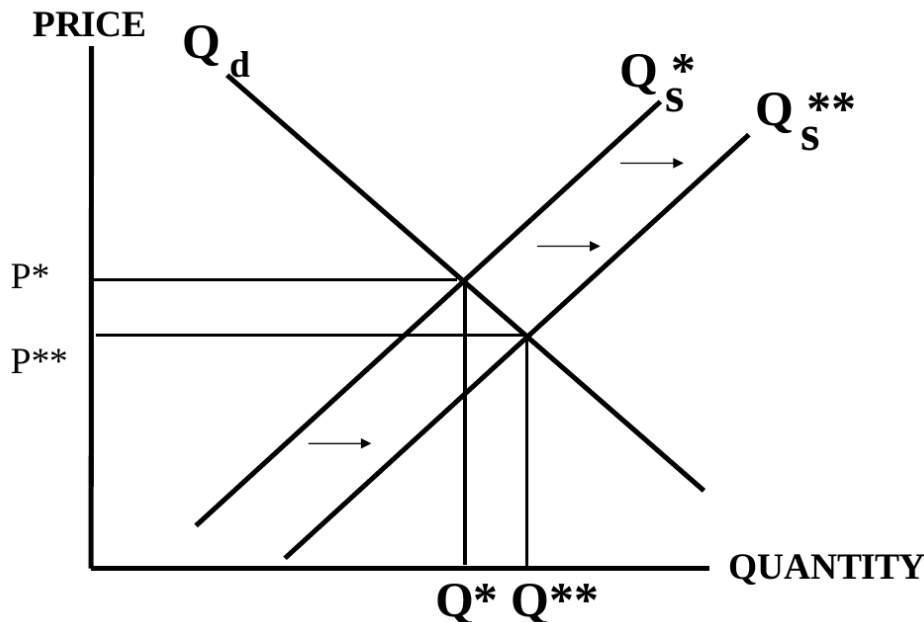
With a market price below the average cost the farmer should not produce at all (in the short period she can afford to produce at a price that is larger than average variable cost).

In competitive markets, for prices that are larger than average cost the optimal quantities to produce are the ones that equal price with marginal cost: if the cost of an additional unit is smaller than the unit price, it is worth to produce that unit.

This is why the supply curve of the farm is equal to the part of its marginal cost curve that starts after the minimum value of the average cost curve.

4.6 Fundamental farm sector problems

A part from other non favorable market and sector conditions, the main problem of the farm sector is that technology regularly increases yields. The large, capitalistic farms adopt innovations and the total supply increases. But the quantity demanded does not increase at the same rate and prices drop. In the next figure the movement to the right of the supply curve shows why this happens.



To summarize the farm problem, here is a list of the main issues:

- Technology increases yield and thus supply (productivity raise was much larger than in the manufacturing sector)
- Inelastic demand for farm products
- Limited ways to exit the market (the main asset is land)
- Input purchased from a few big firms
- Output sold to a few large firms (the output markets are consolidated)
- Many products are highly perishable

Given these basic problems, can farmers improve the prices of their products?

The quality of a product influences its market price. Consumers pay more for a product that is clean and free of dirt, insects and damage. Large eggs sell for a higher price than small eggs. Fat animals sell for a higher price than thin ones.

Farmers can improve the quality of crops and livestock by using better production and post-production practices. Using different breeds or varieties and improving practices on the farm can

increase returns. By improving post-harvest handling practices, farmers will ensure better quality and could obtain higher prices. However, in order to make these improvements, it is sometimes necessary to make special efforts that may involve extra costs. These extra costs have to be covered by an increase in money received for the higher quality product.

Improved production

Large eggs and creamier milk, for example, will bring higher prices compared with small eggs and milk with a lower cream content. But it is important that farmers consider the extra costs involved in the production change and compare them with the extra money that improvement will bring. If the profit is higher than that previously obtained, the extra effort will be worth it.

Organize marketing groups

Farmers acting alone to improve their prices may not gain. A single farmer improving quality will have to sell to the same trader as all other farmers. The trader will probably not pay a premium as it will not be possible to keep good quality and poor quality produce of different farmers separate.

However, farmers working together can often increase their bargaining power. This helps them to deal with buyers and negotiate contracts. Marketing groups may also be in a position to offer their members other benefits such as better market information.

Farmers acting in groups may also be able to improve packaging. In some countries, working together has successfully increased prices by using a brand name or by stressing the geographical origin of the product. Farmers in groups can also work with retailers to ensure that produce reaches the store quickly and can thus command a premium for “freshness”.

Economies of scale

Scale is used to describe differences in the overall size of farms or businesses. Economies of scale are achieved when the cost per unit of production or output marketed is reduced as the scale of the activity increases. Savings (economies) can be achieved by spreading costs over a larger scale of operation. They can also be achieved when farmers organize themselves into groups to buy inputs, use capital or market produce. These group activities can bring about a cost reduction per unit of inputs purchased or produce marketed.

Economies of scale can also come about through specialization. As output of one product increases there is a possibility of using more specialized management and introducing mechanization to take the place of labour in field operations. Increases in scale of output allow savings to occur in the time spent on these tasks.

The following are examples of some of the economies that can be achieved when working at a higher level of marketing and input purchases.

- Groups of farmers involved in marketing could share transport arrangements to sell their produce. This very often results in lower unit costs. If each individual farmer were to transport produce separately the amount of produce transported would be smaller and per unit transport costs would be higher than those of the collective effort.

- Farmers can look for ways to produce collectively. They could share a tractor, infrastructure for livestock production or mechanical harvesting.
- Collective buying of inputs could also result in economies of scale. By ordering in bulk, the farmers would be able to buy their materials at reduced prices and transport them more cheaply.

5 Management and farmers' decisions

Given the number of possible products, the number of different technologies and procedures for each of them and the uncertainties of the weather and of the market, farmers have to make many important decisions every year.

- Selecting the most profitable combination of enterprises
- Determining the most profitable size of the farm business
- Using credit wisely
- Deciding on the most profitable methods and practices of production
- Determining the most profitable level of production
- Timing production
- Making marketing decisions
- Determining quality of the produce to be sold
- Managing risk

There are many factors that affect the decisions that farmers make, such as the market and the resources available to them. There are also other, less economic, considerations, such as the desires and expectations of the farmer's family and the need to balance leisure and cultural activities with productive activities. The farmer must take these into account when identifying:

- the range of varieties that it is possible to grow;
- the best market and marketing channels;
- the most appropriate time to sell produce;
- the best combination of enterprises to have;
- the amount of each crop and livestock enterprise that should be produced;
- the amount of resources and inputs that should be used to produce these products;
- the best way of producing for the market;
- types of farm practices and technologies to use;
- the ways of reducing risks.

Although the list above is long most of these decisions are interconnected, simplifying the decisions to be made. The four key decisions to be made by farmers are:

- What to produce?

- How much to produce?
- How to produce?
- For which market to produce? (Who is your client?)

All of these questions can be answered by economic principles that look at the relationship between farm inputs and outputs (the production function) and at the relationship between cost of production and expected prices.

Farmers usually make decisions through the following means

Tradition. Some farmers base their decisions on tradition. They may rely on traditional methods of management and follow established patterns of farming. These methods have evolved over a long time. For example, a farmer might decide on a cropping pattern based on a crop rotation that is widely used.

Comparison. Some farmers base their decisions on comparison with other farmers. For example, a farmer may apply fertilizer at rates used by others cultivating the same crops.

Economics. Other farmers may base their decisions on economic considerations – looking for ways to make profits. They may look at prices of products and their costs of production and marketing, and then calculate costs and profit. Often these decisions are taken by farmers without complete information. Farmers may not know the prices and costs of products and inputs. In that case profit may be calculated without including all the cost items and without making a proper assessment of the value of production. This may mean that farmers will not maximize profits.

Farmers' skills and knowledge of management are limited. Farm records are not usually kept and information on prices and costs is often unavailable. Farmers also have difficulty in calculating profits and assessing how much input to apply. Improvements in farmers' managerial knowledge must go hand-in-hand with improvements in technical skills. Better knowledge of farm management should help farmers to obtain the type of information they need to make better decisions and to better manage the choices that they have.

This is why the role of extension and of private advisors is very important. One of the most practical decision to be made is whether to buy farm assets. A simple approach to this problem is in the following paragraph.

5.1 Return on capital

If farmers want to buy equipment, machinery or livestock how do they decide what to do? This decision is different from the questions raised in the previous sections. Why? Machinery, farm equipment and livestock last longer than a single season or year. Therefore the purchase of these items requires decisions with long-term implications.

The concept that is frequently used in economics to decide whether or not to buy items of machinery, equipment or livestock is called the **return on capital**. This is the total benefit derived from using the capital, less the extra costs incurred, including depreciation, maintenance and

repairs. The return on capital expresses the profit expected from the investment, which is, in turn, related to the capital required to give a percentage rate of return on the capital.

First, the amount of capital required has to be calculated. This is simply a question of adding up the sum required for livestock, buildings, machinery or equipment as well as the extra working capital required for seeds, fertilizer or other inputs. Second, the additional profit is calculated by budgeting out the additional income against any additional costs. As explained before, the use of gross margins considerably simplifies such budgeting. One must not, of course, forget any increase in fixed costs, and costs of rent, labour, or machinery. Included also in the additional costs should be an allowance to cover depreciation in the capital investment and also any additional maintenance costs.

$$\text{Rate of return} = \frac{\text{Additional annual profit}}{\text{Investment cost}} \times 100$$

An example of estimating capital required

A maize farmer with two dairy cows is considering doubling the herd to four animals. The decision calls for a number of changes to be made on the farm. It requires buying more animals, and involves introducing some equipment and constructing a shed, as well as making sure that enough fodder is grown to feed the animals.

The additional capital required is assumed to be:

Livestock	€ 360
Equipment	€ 60
Shed	€ 250
Working capital	€ 100
	€ 0
Total additional capital required	€ 770

The extra profit from increasing the dairy herd size has been budgeted as follows:

Additional gross margin from milk sales		€ 413
Maize gross margin	-€ 46	
Additional labour	-€ 10	
Additional maintenance costs	-€ 5	
Depreciation of shed and equipment (10 years)	-€ 31	
Total additional costs		-€ 92

Additional profit		€ 321

Notice that in order to have more fodder to feed the additional cows, some of the land under maize cultivation would have to be given up: that means the loss of the gross margin from the sale of the maize. This is an example of the opportunity cost of the alternative use of the land.

Eventually, the rate of return can be calculated ($321/770 \times 100$) and it is 41,7%. It surely seems worthwhile to make the investment.

6. How do farmers deal with risks?

As noted earlier, one of the facts of farming is that the farmer faces numerous risks because many future events cannot be known with complete accuracy or certainty. Risk influences the amount of inputs that the farmer uses as well as their cost. Similarly, there is uncertainty in crop yield and product prices. As a result, farm profits are always uncertain and this makes farm operations risky. The more common sources of farm risk can be divided into the five areas outlined below.

Production risk. Factors that affect the farm yields such as pests or diseases, poor weather, low rainfall or drought.

Marketing risk. Uncertainty about market prices, and the supply of and demand for products.

Financial risk. Availability of funds for development, the possible need to borrow money and the ability to make repayment.

Institutional risk. Changes in the provision of services from institutions that support farming, for example banks, cooperatives, governments or social organizations.

Human risk. Availability and productivity of farm workers as affected by accident, illness or death, or political or social unrest.

As manager of the farm business, the farmer has to cope with the many different types of risk. Different ways that farmers deal with risk depend on their personality and the extent to which they are willing to gamble. Farmers are different, some will take more risks than others. So the farmer's decision is complicated and depends on many factors. In particular, the higher the demands on the farmer for cash, the less likely he or she will be to take a risk.

Risk-reducing strategies

Decisions on what to do vary among farmers but there are some common ways of dealing with risk. Some of these may require either a reduction in the level of production or, alternatively, an increase in the costs of production over a period of years. This often means that in order for farmers to manage risk they may have to give up a part of their profits in the short term.

Use risk reducing inputs. Buy inputs and materials that better control crop diseases, pests and use of water, and reduce animal health problems. Such inputs could include drought-resistant varieties, pesticides, fungicides and vaccines for animals.

Select low risk enterprises. Choose enterprises that are more stable than others. For example, those employing reliable crop varieties or those with well-established channels of marketing.

Ensure system flexibility. This allows the farmer to shift from one cropping pattern to another. For example, with some enterprises land used can be increased or reduced easily without affecting profitability.

Product diversification. This can increase the number of enterprises on the farm so that if one fails, the income from others will be sufficient to keep the farm going. Not all enterprises are likely to fail together.

Maintain input, finance, product reserves. Farmers can keep reserves such as money, physical inputs, final products, food. Such reserves would help protect the farm family from the risk of price changes. Food reserves also provide some security against the risk of crop failure, although storage losses can be a problem.

Contract farming. Price uncertainty may be eliminated by making advance contracts with buyers. Farmers may contract with suppliers to provide inputs at specified prices and also to avoid the risk that key inputs will be unavailable at critical times.

Collecting market information. Good information on seasonal price variations and changes in prices over the years can be used to plan when produce should be marketed. The more knowledge farmers have about price change and the past profitability of enterprises, the better their position when they plan for the future.

Insurance. Private companies or governments may guarantee a certain amount of money in the event of a major catastrophe, in return for an annual premium. Some countries will ensure against crop loss from hail or hurricane. Farmers must give up a certain amount of their yearly income in return for this security .

Better management practices. If farmers recognize early on that their crops or livestock are diseased they can respond more quickly to spray crops or inoculate livestock. However, these precautions are likely to increase costs and reduce profits and such actions would need to be set against the greater security that is gained.