Lecture No.12

Concepts of Risk and uncertainty - types of uncertainty in agriculture - managerial decisions to reduce risks in production process

i) Perfect Knowledge: Under this situation, technology, prices and institutional behaviour would be known with certainty for any period of time in future. However, this situation does not reflect the real world situation.

ii) Imperfect Knowledge: An imperfect knowledge situation can be classified either as risk or uncertainty. Risk represents less imperfection in knowledge than does uncertainty. Under risk, the occurrence of future events can be predicted fairly accurately by specifying the level of probability. When a risk situation prevails, at the time of harvesting paddy, the chances for a cyclone are 5: 95 or 20: 80. *A priori* risk prevails, when sufficient advance information is available about the occurrence of an event. E.g. the probability of a head or a tail turning up is 50: 50, if an unbiased coin is tossed. Contrary to this, statistical risk can only be predicted on the basis of occurrence of several observations made in the past. Mortality tables of insurance companies provide good examples of statistical risk. An insured vehicle meeting with an accident or an insured house catching fire or being burgled can be assigned probabilities based on the past experience of any country. Because of the quantification of imperfect knowledge-under risk situation, the event can be insured. If the occurrence of an event cannot be quantified with the help of probability, then that situation is

called uncertainty. Thus, future occurrence of an event cannot be predicted. Therefore, it becomes essential to formulate some estimates, however wild, of the most likely outcomes. E.g. price uncertainty.

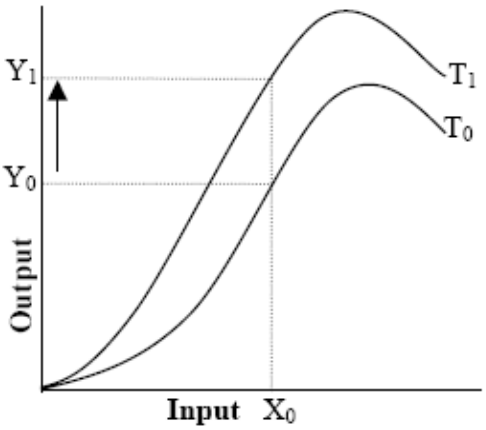
iii) Types of Risks and Uncertainties: Risks and uncertainties can be classified into the following five categories.

a) Economic Uncertainties: In general, farmers in most countries face differences in price for the inputs and outputs from what they might have anticipated at the time of preparing farm plan.

b) Biological Uncertainties: Rain or storm, drought and also by increased incidence of pest and diseases may all affect the yield in agriculture directly or indirectly

c) Technological Uncertainties:

Technological improvement necessarily implies that the same level of input can now produce larger quantity of produce. The upward shift in the production function signifies that more output can be produced at each level of input after technological progress. This effect would-be due to the delayed operation of the law of diminishing marginal returns. Thus, improvement of knowledge or technological progress, which is a



a continuous phenomenon, may render some techniques less efficient and finally

obsolete. In the fig.15.1, for the same input level X_0, the yield is increased from Y_0 to Y_1 due to technological improvement from T_0 to T_1.

d) Institutional Uncertainties: Institutions like government, bank, etc may also cause uncertainties for an individual farmer. Crop cess, credit squeeze, price supports, subsidies, etc. may be enforced or withdrawn without taking an individual farmer into confidence. This type of uncertainty may also result in non-availability of resources in appropriate quantity and at the appropriate time and place.

e) Personal Uncertainties: The farm plan may not be executed or delayed

n or co-efficient of v

$\Sigma (Xi - X)^2$.

i =1

Variance =

.n n

$\Sigma (Xi - X)^2$

. i =1

n .

SD

Co-efficient of Variation = × 100 %

MEAN

Standard Deviation =

because of some mishap in the farmer's household or in his permanent labour force.

iv) Safeguards Against Risks and Uncertainty

Some farmers take more risk than others. However, all farmers use one or more measures of different types to safeguard themselves against risks and uncertainties on their farms. The various measures generally used to

counter risks and uncertainties in agriculture are as follows: 222

1) Selection of enterprises with low variability: There are certain enterprises where the yield and price variability are much lower than for others. For example, rice has relatively much less variability in its yields and prices than tomato. Thus, the inclusion of enterprises with low variability in the farm plans provides a good way to safeguard against risks and uncertainties. In practice, the data on yields and prices of different enterprises over a period of time may be used to measure the extent of variability by using statistical concepts like. variance or Co effiecient of Variation.

$$\text{Variance} = \frac{\sum_{i=1}^{n} (Xi - \bar{X})^2}{n}$$

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{i=1}^{n} (Xi - \bar{X})^2}{n}}$$

$$\text{Co-efficient of Variation} = \frac{SD}{MEAN} \times 100\ \%$$

Table 15.1 Estimates of Farm Income

Year	Farm Income (Rs / Year)	$(Xi - X)^2$ (
1996	2500	688900
1997	3000	108900
1998	3200	16900
1999	3800	220900
2000	4150	672400
Total	16650	1708000

Mean = 3330; Standard Deviation = √1708000/5 = 584.4656
CV = 584.4656 / 3330 = 17.55 per cent.

2) Discounting Returns: At this stage, we refer to discounting only as a function of risk and uncertainty, and not time. In terms of the profit maximization
condition of VMP = Px, discounting means that either the output price (Py) is decreased or input price (Px) is increased by some proportion or it can be of both. Thus, the profit maximization level of the variable input X_1 may now be lower with discounting than otherwise.

3) Insurance: Insurance covers the cost to some extent so as to minimize the loss.

4) Forward Contracts: They reduce the future prices of both inputs and outputs into certainty. Pre-harvest contracts of mango, share cropping, i.e., forward contract in kind are some examples for this.

5) Flexibility: This refers to the convenience with which the organization of production on a farm can be changed.

a) Time Flexibility: Time flexibility may be introduced either through proper selection of products or production methods or partly by both. Orchard plantation is a relatively rigid enterprise than annual crops. A short-lived farm structure is more flexible that the durable.

b) Cost flexibility: Wherever time flexibility is of limited use, cost flexibility becomes important. Cost flexibility refers to variations in output within the structure of a plant of a longer life. Extension or concentration of output, whenever desired by favourable prices or yields can be brought about at lower cost for a given farm (plant). Owning rather than custom hiring a power tiller may have more cost flexibility.

c) Product flexibility: Product flexibility aims at changes in production in response to price changes. In this category, machines, farm structure, etc, can be readily shifted from one product to another.

6) Liquidity: This refers to the case with which assets in a farm can be converted into cash, the most "liquid" of all assets. If some of the assets are held in the form, which can be easily converted, into cash, it provides a safeguard to the farmer by enabling him to make necessary adjustments in response to risks and uncertainties of various types.

7) Diversification: It is a means of stabilizing incomes rather than profit maximizing technique relating to receive benefits of complementarity or supplementarity. Under risky environment, a farmer may not specialize in a single enterprise over a period of time even if substitution and price ratios may so dictate as discussed under product-product relationship. Instead, he may

choose several enterprises in some proportion overtime, so as to distribute the risk factor. Like flexibility, it has no provision to reap large gains due to high prices or yields over time, but serves as a good method to prevent heavy losses. However, the diversification of farm activities may deprive the entrepreneur of all the advantages of specialization.

8) Maintenance of resources in reserve: Many a time, there is a risk or uncertainty about the availability of the right inputs, in the required quantity at the right time and place and at a reasonable price. This may be due to the imbalance between demand and supply of the resources. To overcome this problem, the best way is to maintain sufficient stocks of such inputs. Maintenance of sufficient stocks depends on the availability of funds, his ability to fore cast prices and the availability of resources and storage facilities in the farm.

9) Adjustment to uncertain of Inputs: When a resource is not available, the best way the farmer can safeguard against such risk and uncertainty is by exploring the use of some other resource as a substitute. If a farmer is uncertain about the availability of inputs, he would do better by choosing the best alternatives, i.e., sowing the second best variety, using the second best fertilizer, using the second best method of harvesting etc.