

Farming System

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Farming

Farming is the activities carried out by the farmers or households on the holdings that represent managerial units arranged for the economical production of crops, livestock, fisheries, poultry, etc.

Farming system

According to the Consultative Group for International Agricultural Research, "a farming system (or farm system or whole farm system) is not simply a collection of crops and animals to which one can apply input and expect immediate results. Rather, it is a complicated interwoven mesh of soils, plants, animals, implements, workers, other inputs, and environmental influence, which the farmer manipulates according to his preferences and aspirations, attempts to produce output from the inputs and the technology available to him" (CGIAR, 1976).

In Bangladesh there are two types of farming systems:

1. Subsistence farming
2. Commercial farming

Subsistence farming

Subsistence farming implies producing enough food and fiber for the consumption of the families and nothing for sale. But in our country, there is a rare case where the farmers are not producing anything for sale.

Substantial farming is practiced by landless (0-0.02 ha, ca. 57%), marginal (0.02-0.05 ha, ca. 29%), and small farmers (0.05-1.0 ha, ca. 13%). The landless farmers generally do farming as share croppers or may lead their lives by rearing goats, poultry, and sheep.

The marginal and small farmers lead their lives by growing crops on their small land area by hiring bullock power or machinery power from other sources.

There are four types of substantial farming as follows:

- a. Monofarming
- b. Mixed farming
- c. Pastoral nomadism
- d. Shifting cultivation

a. Monofarming: Monofarming involves one enterprise. It may be crops or livestock or poultry or fisheries.

b. Mixed farming: In this farming farmers do farming in more than one enterprise with crops as well as poultry, fisheries, or livestock. In Bangladesh, it is mostly practiced.

c. Pastoral nomadism: It is practiced in very few cases. There are some nomad people of low status who rear specific animals like pigs and lead their lives.

d. Shifting cultivation: It is practiced in the hilly area of the Chattagram hill tract. It is a primitive type of cultivation. It involves slash and burning the vegetation followed by farming.

Commercial farming

Commercial farming is farming where the purpose of farming is a kind of business and the end products of the farm are mostly sold to the market. These commercial farmers are a small group of people/farmers, but they are distinct in society.

Commercial farming is of two types such as:



- a. Mixed commercial farming
- b. Mono commercial farming

a. Mono commercial farming: This type of commercial farming is practiced in Chittagong and Sylhet. The big farmers are operating tea and rubber production. Besides this mono commercial farming, now a day, the development of culture and capture fisheries is in practice. There are some farmers and people who by hiring or borrowing land are making ponds and practicing culture fisheries. Besides this culture, another mono commercial farming is the development of a nursery. In cities and towns, the nursery is based only on ornamental plants, but in the village, it is based only on fruit and timber plants. Freshwater fishing in rivers, ditches, and marine fishing in the Bay of Bengal are also examples of mono commercial farming in Bangladesh.

b. Mixed commercial farming: In this type, large farmers will be involved. They have a large area, and in these areas, they grow different types of crops as well as they grow farms of poultry, fisheries, or livestock. Here farming system varies from location to location. In the sugarcane growing area, sugar-based cropping is practiced. But in other areas such as Dinajpur, Barisal, and Tangail, rice-based commercial farming is practiced.

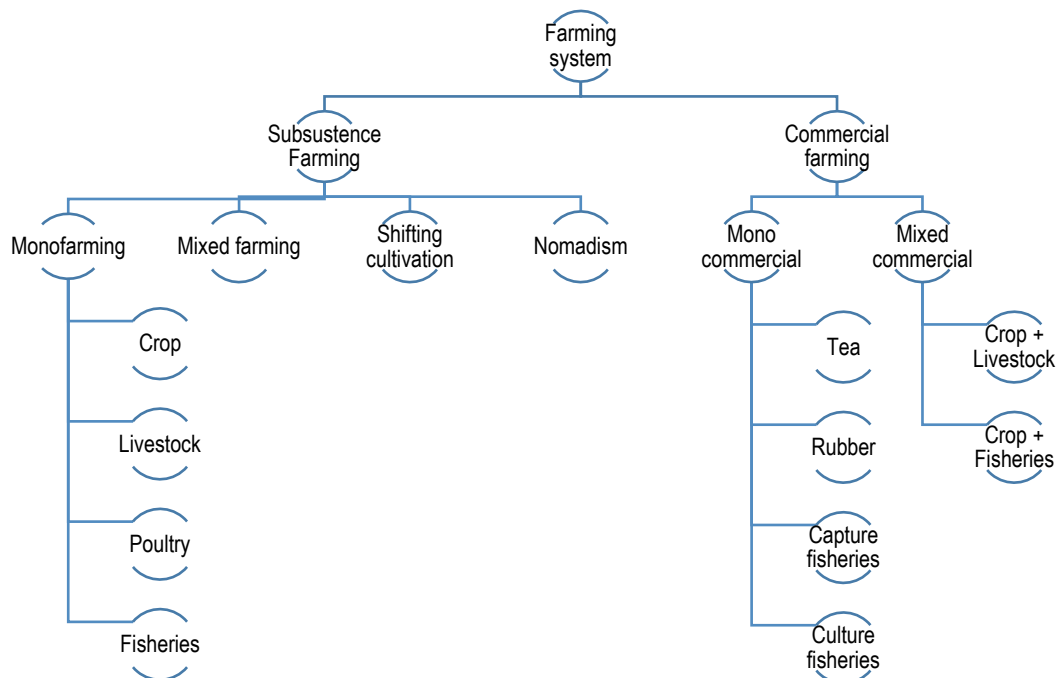


Figure 1: Different types of farming systems in Bangladesh

Beside these, homestead gardening is another farming system in Bangladesh that may belong to both subsistence and commercial farming.

Classification of the farming system

1. On the basis of the availability of land

a. Extensive farming system: When production is increased by increasing the area of land is called an extensive farming system.

b. Intensive farming system: When production is increased by intensive cropping, and with the introduction of modern technologies from a unit area it is called an intensive farming system.

2. On the basis of purpose

a. Specialized farming system: When one enterprise is involved it is called a specialized farming system, e.g., cultivation of rice or jute or wheat, etc.



b. Diversified farming system: When more than one crop is grown in a diversified condition it is called a diversified farming system, e.g., mixed cropping.

3. On the basis of ownership of the area of land

a. Estate farming system: In this case, the owner of the land is government, e.g., BADC farm.

b. Co-operative farming system: In this case, farmers form co-operatives. Then they cultivate together and share the products among themselves on the basis of their own land.

c. Collective farming system: Here the owner of the land is farmers, but the government does farming, and outputs are distributed to farmers as per the decision of the government.

4. On the basis of water availability

a. Rainfed system: It is dependent on rainfall.

b. Irrigated farming: This type of farming is done by irrigation.

Determinants of the farming system

1. Physical

- a. Radiation
- b. Temperature
- c. Rainfall, supply of water
- d. Soil condition
- e. Slope
- f. Land availability

2. Biological

- a. Insects and natural enemies
- b. Weed communities
- c. Plant and animal diseases
- d. Soil fauna and soil flora
- e. Background natural vegetation
- f. Cropping pattern
- g. Crop rotation
- h. Labor availability

3. Socio-economic

- a. Population density
- b. Social organization
- c. Technological assistance
- d. Price
- e. Market
- f. Chemical and credit availability

4. Cultural

- a. Believe
- b. Ideology
- c. Gender issue
- d. Historical events
- e. Educational knowledge



Properties of the farming system

1. Productivity
2. Stability
3. Sustainability
4. Equitability

1. Productivity: Productivity is the increment of the valued products per unit of resources (land, labor, capital, etc.) and it is generally expressed as yield per hectare or income per unit of energy or investments.

2. Stability: Stability is the degree to which productivity remains constant in spite of normal small-scale fluctuations of environmental variables like climates, the economic condition of the market, etc. It is measured by the reciprocal of the coefficient of variation of productivity.

3. Sustainability: Sustainability is the ability of the system to maintain its productivity when the system is subjected to stress or perturbation. Stress is regular, sometimes continuous but predictable disturbs like the effect of soil salinity. Perturbation is irregular, infrequent, and unpredictable disturbances like drought, flood, pest attack, etc.

4. Equitability: Equitability is how evenly the product or income is disturbed or shared among the beneficiaries or people involved in a system.

Resources of farming system

Resources will be discussed under 4 headings:

1. Natural
2. Human
3. Capital
4. Production

1. Natural resources: Natural resources are the elements of land, water, and climate. In respect of land, the resources will be the area will be found in topography, location, soil condition, etc. with respects to water availability of surface and underground water. In respect of climate, radiation, temperature, rainfall, etc. Natural vegetation is exploited to supply food, feeds, construction materials, fuel, medicine, etc.

2. Human: Human resources consist of the people who live and work on a farm to exploit the natural resources for the production of crops livestock, fisheries, poultry, etc.

Factors that influence human resources in a system is:

- Number of people having support from a system compared to its production.
- Ability to work with people who depend on nutrition and health.
- Inclination to work depends on social status and facilities or attitude to leisure.

3. Capital resources: Capital resources are the goods and services created, purchased, or borrowed who exploited the resources for production. Capital resources may be grouped into four as follows:

- i. Permanent
- ii. Semi-permanent
- iii. Operational
- iv. Potential

i. Permanent: Permanent capital resources are the modification of land and water for use in production. Examples – irrigation, drainage, etc.

ii. Semi-permanent: Semi-Permanent capital resources are those which depreciate and have to be replaced. Example - buildings, equipment, furniture, etc.

iii. Operational: Operational capital resources are those which are used in every operation. Examples – fertilizers, seed, manures etc.



iv. Potential: Potential capital resources are the availability of credit and technical assistance from the government or private sectors.

4. Production resources: Production resources are the output of the farm. Example – crops, livestock etc.

Components of the farming system in Bangladesh

- i) Crop component (14.27 M ha)
 - Normal area (7.35 M ha)
 - Drought-prone area (3.5 M ha)
 - Saline area (1.056 M ha)
 - Char land (0.83 M ha)
 - Haor area (0.25 M ha)
 - Hill area (1.28 M ha)
- ii) Livestock component (130.2 M)
- iii) Fishery component (4.6 M ha)
- iv) Agroforestry component (2.6 M ha)
- v) Homestead component (0.5 M ha)
- vi) Coastal component (coastal line 710 km~25000 km² coastal area)

Interaction between components

This is an intensification of crop production. There are several production systems.

1. Crop and Livestock interaction (Crop + Animals)

a) Ecological interaction: One component of cultivation influences another component. In the fallow or harvested land, animals and birds graze for their feed/fodder. On the other hand, their wastes improve soil fertility.

b) Exchange interaction: Two farms can exchange their services for the cultivation of crops and livestock or their products are also exchangeable.

c) Competition interaction: The same piece of land is equally suitable for both crop production and animal grazing or one is not a competitor to another.

d) Investment interaction: The livestock is an additional investment or risk coverage against crop failure or an incentive to crop production.

e) Food interaction: The cereal diet is supplemented with meat, milk, egg, etc.

f) Feed interaction: The crop residues, stalks, and by-products of crops and grains are the feed and fodder of animals and birds.

g) Manure interaction: Livestock adds manure to crop cultivation.

h) Draft interaction: The livestock provides draft power for crop cultivation.

i) Fuel interaction: The waste crop residues, stalks, cow dung, dry leaves, and grasses are the fuel source of farmers'.

2. Crop and fishery interaction (Rice + Fish)

a) Ecological interaction: Rotten crop residues are feeds for fish. Wastes of fish are the source of soil nutrients.

b) Exchange interaction: Services and goods are exchangeable.

c) Competition interaction: The same piece of land is equally suitable for both crops and fish.



d) Investment interaction: Fish is an additional investment besides crop production.

e) Food interaction: The cereal diet is supplemented with fish protein.

f) Feed interaction: Crop by-products such as rice and wheat bran and oil cake are the sources of feed for fish.

g) Manure interaction: Fish adds manure to the crop cultivation. About 15% rice yield is increased when fish is introduced.

3. Poultry and fishery interaction (Birds + Fish)

4. Crop, livestock, and fishery interaction (Rice + Fish + Livestock)

Farming system research and development (FSRD)

Resource-poor farmers constitute the bulk of the farming community in Bangladesh. Marginal and small farmers (holding 0.02 to 0.2 and 0.21 to 1.0 ha, respectively) and landless households constitute more than 70% of the farm families. With increasing population and fragmentation of land, small farmers are becoming marginal. Farmers in Bangladesh grow crops and trees, raise livestock and fish, and use their homesteads for various agricultural activities. These activities are interlinked and aimed at improving household welfare. Agricultural research, therefore, must take all these aspects into consideration in developing technologies. The need and the advantage of the farming systems research and development (FSRD) approach in generating clientele-specific technology and improving the problems of resource-poor farmers have been recognized for quite some time.

Evolution of Systems Research in Bangladesh

Although formal agricultural research began in 1906, on-farm research was initiated in 1957 with fertilizer trials to disseminate knowledge and encourage farmers to use fertilizers. On-farm research on wheat was initiated in 1973 to select location-specific suitable varieties. Systems research began in 1974 with trials involving rice and sugarcane-based cropping patterns and component technologies. In 1979 a National Coordinated Cropping Systems Research Project was initiated by the Bangladesh Agricultural Research Council with the participation of several national agricultural research institutes, Bangladesh Agricultural University, and the Bangladesh Water Development Board. Farming Systems Workshop (1984) summarized research progress and suggested an integrated approach. Consequently, a National Coordinated Farming Systems Research Project was initiated in 1985, which was renamed as National Coordinated Farming Systems Research and Development Programme (NCFSRDP) in 1989. The evolution continued with an emphasis on systems aspects. Technologies were designed on several farm components like crops, homestead production, livestock, agroforestry, and fisheries for marginal to small farms. The farming systems research and development (FSRD) program became an integral part of several research institutes where a holistic approach of integrating commodities and searching for interdependences is being pursued.

Systems research in Bangladesh was started based on the methodology suggested by Zandstra *et al.* (1981) at the International Rice Research Institute (IRRI). BARC (1979) prepared a mimeographed guideline for cropping systems research based on the IRRI methodology. Farming Systems Research and Development Guidelines prepared by Shaner *et al.* (1982) was available in 1984 but it has been used less extensively than the IRRI guidelines. The ideas contained in a paper of Norman and Collinson (1986) are also in use. After the program was broadened to the perspective of farming systems research, BARC published an updated version of the methodological guidelines in 1989 (Rahman *et al.* 1989). The broad methodology followed in FSRD is a 5-step problem-solving approach in which existing farming systems are described or diagnosed, farmers' problems are prioritized, and improvements are designed, tested, evaluated and extended within similar AEZs



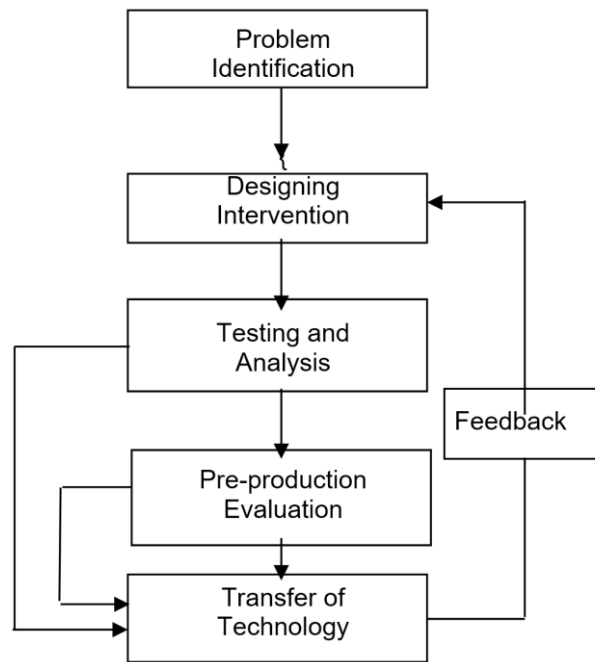


Figure 2: FSRD approach showing the principal stages of research

Future scope for FSRD

- Improvement of farmers' participation and DAE personnel in all phases of FSRD process.
- Interactions between on-station component researchers and FSRD practitioners.
- Understanding farmers' innovation.
- Incorporation of some emerging issues like risk analysis and gender issues, sustainability, and technology transfer.
- Pluralism in technology transfer activities.
- Evaluation of technology adoption/adaptation, and subsequent impact on farmers' welfare.
- Extension-research-farmer linkage.
- Bottom-up planning.

