Introduction to Agricultural Economics Course Module Check List

By Berhanu G/Mariam

A. Course Overview

Course Title-**Introduction to Agricultural Economics**
Course number **Econ-341**
Course Credit-**3**

B. Course Description: the course explores and brings to the surface the fundamental concepts and participles of Agriculture and food system, Farm management and Record, Farm management and production economics, budget and cost analysis, and Farm planning and enterprise analysis. In addition to this the course introduces Agricultural project analysis, strategic approaches to Rural and Agricultural development and highlights on Agricultural and food Policy

C. Course Objectives

The objectives of the course are
1. To expose Students to key terms and concepts of the agriculture and food system and to highlight t the status of Ethiopians agriculture and the food situation.
2. To acquaint students to farm mangers decision making process and to the role of farm records
3. To illustrate the application and use of microeconomics production theory in farm management
4. To enhance students ability to use instruments and rules of capital budgeting gross margin analysis and return to factors of production
5. To provide insight in farm planning with an emphasis on types of planning risk and uncertainly concepts
6. To prepare students to undertake agriculture and farm project studies by minimizing problems of design and analysis
7. To enumerate elements of pros and cons for agriculture or industry led development as well as to expose students to the major rural and agriculture development approaches
8. To expose students to the elements of policy and analytical techniques and examine alternative interventions and community programs

D. Grading

Attendance	5%
Reading Assignment	5%
Monthly Tests	15%
Team Assignment	5%
Individual Assignment	5%
Final Exam	50%

E. Required Text Book

-George W. Norton Jeffrey Alwang, 1993, **Introduction to economics of Agriculture Development**, New York: Mc Graw-hill, Inc.,
-Abbott J.C and Makeham, J.P (979) **Agricultural Economics**, **and Marketing in The Tropics,** Longman group Ltd.,
-Ellis, F. (1988) **Peasant Economics: Farm Household and Agrarian Development,** 2nd Ed, Cambridge, University Press,
A.T Mosher,1966, **Getting Agriculture moving, essentials for development and modernization**. New York: Frederick A. Praeger,
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982,
W.Y Yang, **Methods of Farm Management Investigations For improving Farm Productivity** (Revised edition) FAO agriculture Series, no 11, and FAO Agricultural Development paper No 80, FAO, 1980,Rome Italy,

F. Additional Reading

Kebede Tesfayae "Contribution of Natural Resources and Environmental policies to Ethiopia's Agricultural Development", Edit.Workeneh Negatu, Legesse Dadi, Abebe Haile Gabriel, **Proceedings of the 6th Annual Conference of Agricultural Economic Society of Ethiopia,** 30-31 August 2002, A. Ababa AESE.
-Mulat Demeke,"***The challenge of increase food production in Ethiopia***", edited by alemayehu Geda and Berhanu Nega, **The Ethiopian Economy Performance and Evaluation- Proceedings of The 8th Annual Conference In The Ethiopia Economy** Oct.30-nov.1,1999, Nazareth, Ethiopia, FRIEDRICH EBERT STIFTUNG, Addis Ababa, September 1999.
Earl O-Heady- **Agricultural production Function,** Iowa State University Press, Ames, Iowa, Fifth Print, 1972
-Development Project Study Project Agency, **guidelines to Project planning in Ethiopia**, Addis Ababa, 1982,
Keith B. Griffin and John L. Enos, **Planning Development**, Addison-Esley Publishing Coompany,Lonndon,1970
Christopher Ritson, **Agricultural Economics, Principles and Policy**, 1977, Grandad Publishing Limited,
Martin Upton, **Agricultural Production economics** and resource use, Oxford University Press, 1976,

G. Team Assignment

Instruction(do A or B)

A. 1. Identify/compute major crops of the nation and for the selected 5 regional states of the country based on 5 years of time series data
2.Indicate the share of land holding the major crops occupy both in the nation and in the regions you have selected.
Dead line
or

B. 1. Identify the major 15 flower growers of the country and examine their production situation, location and operation, and problems and opportunity in the field or

2. identify commercial farmers of vegetable or citrus fruits or cereal crops then appraise their activities, location, areas of cultivation, problems, and opportunities .

Dead line

H Individual Assignment

Instruction(od A or B)

A. Prepare a farm budget for an area of 5ha.

- Develop a farm plan, show resource use, production and income generated
- Number of enterprises not less than three
- A minimum of one cereal and one perennial crops need to be incorporated
- Assume project life of 5 years for budgeting

Dead line

B. a) Prepare a farm budget for an area of 10ha. Number of enterprises must not be less than three. (a minimum one from pulse, one from cereals, and one from livestock.)

- Assume life of 5 years for budgeting

Dead line

b) prepare a farm budget for an area of 5ha. Number of enterprise need not be less than 4. (one irrigated citrus, one from cereals, one from vegetables, one from livestock).

Due Date

Table of content

1.Agriculture and the food system: introduction
2. Farm management and records
3. Farm management and production economics
4. Budgeting and cost analysis
5. Farm planning and enterprise analysis
6. Agricultural product analysis
7. Strategic approaches to rural and agri. Development
8. Agricultural and food policy

Module I-Agriculture and the food system : Introduction

Session 1st & 2nd hr

Topic: definition, scope, and Agricultural economics Vs general economics

Session learning objective

-expose students to key terms and concepts of the agriculture and its role
-will give the insight on common characteristics of traditional agriculture
-will be described the role of livestock in traditional farming systems
-identify factors that influence the agricultural system found in a particular country at a point in time,
-explore the differences in farming systems found in various parts of the world.

Reading Assignment discussion(10 min)

-what are the potential contributions of agriculture
-what does intermixing of farm and family decision mean
-how is true that t one of the role of livestock is to provide buffers and extenders of the food supply, explain
-can you explain how George Norton compared agricultural systems and the role of women

Reading Text

-George W. Norton Jeffrey Alwang, 1993, **Introduction to economics of Agriculture Development**, New York: Mc Graw-hill, Inc., chapter 7, page 116-130, Chapter 8, and 9, in Page 133-166,
-Abbott J.C and Makeham, J.P(979) **Agricultural Economics**, Longman group Ltd., chapter 1, page 1-8
-Ellis, F. (1988) **Peasant Economics: Farm Household and Agrarian Development,** 2nd Ed, Cambridge, University Press, chapter 1, page 1-15

Synopsis of lecture (bullet)

i. Potential Contribution of Agriculture to Development

-although there are difference in resource base, stages of development, and condition across countries, agricultures precise role vary from country to country, however agriculture contributes, in general, to the economy in the following line
-1. "***Food and fiber***: Growing population, rising incomes that accompany economic development and a high proportion of income increase spent on food and fiber make increased food and fiber production a key contribution of agriculture to economic development.
-If food production doesn't keep pace with demand, food price rise, and consequently wage may increase, profit and investment decline consequently decline in employment and growth.
-2. ***Labor*** : The bulk of labor for industrial development, other things being equal , must be drawn from the agricultural sector in early stage of development.

-If productivity is high in agriculture, surplus labor will be released at a growing rate with out sacrificing food production.
-3. **Capital** : Capital is requital for economic development i.e. for factories, machineries, agriculture inputs, school, health, etc. At early stage of economic development, unless those with petroleum owning countries, domestic saving for capital must come from agriculture.
-Government of less developing countries use different ways to squeeze agriculture to mobilize capital: for example a) taxes (land tax, income, and export taxes). b) Relative decline in agriculture price c) direct capital formation within the sector d) and direct investment in industry by people in agriculture.
-4. **Foreign exchange**: many LDC's relied on export of agricultural commodities as their major sources of foreign exchange.
-others have attempted to reduce their foreign exchange needs by increasing agricultural production to displace imports of foods.
-5. Market demand- economics of scale in the production of industrial products often mean that large markets (demands) are needed.
-As incomes rise in agriculture, the potential is created for a substantial expansion of domestic demand for consumer goods and agricultural inputs.
-Even if inputs from industry are low the consumption demand generated by growing agricultural productivity provides a strong linkage to, and markets for, the non-agricultural sector.
-The market demand contribution of agriculture can be fostered in three ways : creation of a large potential markets for domestically produced industrial products, investment in infrastructure of rural areas facilitate transportation of output , and encourages industry to produce output required by rural people.
-6. Rural welfare. If productivity is increased farmers receive benefit both through increased home consumption and through the income generated from farm products sales.
-If agricultural growth stimulates non-farm growth and employment, landless labor can benefit from those employment opportunities.

ii. Agricultural economics Vs General Economics
-The field originated early in the twentieth century with a focus on farm management and commodity markets, and but has since moved far into analysis of issues in food, resources, international trade, and linkages between agriculture and the rest of the economy.
-In the process, agricultural economists have been pioneering users of developments in economic theory and econometrics.
-Moreover, in the process of intense focus on problems of economic science that are central to agriculture- market expectations behavior under uncertainty, multi-market relationships for both products and factors, the economics of research and technology adoption, and public goods and property issues associated with issues like non point pollution and innovations in biotechnology, agricultural economists have developed methods of empirical investigation that have been taken up in other fields.

-Economics is the sciences, which studies human behavior as a relationship between ends and scarce means, which have alternative, uses.

-A common theme in most definitions of economics is ***scarcity and choice***. Society must choose between competing uses when resources are wanted for different productive activities, and must choose between competing ends
-The science of economics is concerned with the way society organizes the allocation of scarce resources in order to satisfy alternative wants.

-An ***agricultural activity*** is one in which mankind attempts to control groups of plants or animals in order to fulfill certain human wants , mainly by producing food. This process of control normally takes a form, which we know as ***farming***.
-***farming*** is often the start of a long sequence of productive operations. The agricultural economist retains an interest in the ***process***, which leads ultimately to the satisfaction of a human want as long as a major part of what is produced is derived from agricultural activity.
-most food produced is derived from agricultural activity, this means following the process through to the point of final consumption. On the other hand, the agricultural economist would normally not retain an interest in many non-food products beyond the point at which these products are purchased as raw materials by manufacturing industry.
-The discipline of ***agricultural economics*** adapts the principles of economics to the problems of agriculture and people engaged in agriculture.

-iii. The Specific Feature Of Agriculture

-The world food – income- population problem is serious, and the solution to this problem depends in part on agricultural development .
-Before means for fostering agricultural is discussed, the current condition of agriculture in developing countries must be known.
-'***Traditional***' means to do things the way they have usually been done. Because natural resources, culture, history, and other factors vary from place to place, the way things have usually been done also differs greatly from one location to another.
-***farms*** in traditional agricultural systems do have several common characteristics.
a.)***Intermixing of farm and family decision***: Small peasant farms predominate in most developing countries. Business decisions on these farms are generally intermixed with family or household decisions. The importance of the family and the close relationship between production and consumption decisions occur because much of the labor, management and capital come from the same household.
-A sizeable proportion of the production is consumed on the same farm or at least in the same community where it is produced.
-A farm disaster usually means a family disaster. Consequently traditional farms often use crop varieties and breeds of livestock that have proven dependable under adverse conditions, such as low levels of fertility or rough terrain, even if yields of productivities are modest.
-For example ***ENSET*** grows on relatively poor land, is drought resistant, and used as staple food crop in central, south and south east of Ethiopia. Similarly, ***Cassava*** , a root crop, grows slowly, but on relatively poor soils, and under a variety of weather conditions, widely grown in the south of Ethiopia, and in many African countries.
-This can be pulled out of the ground at various times of the year to meet calorie needs when other foods may be short.

-Traditional farms are influenced by market price relationships in their decisions to allocate family resources, since the surplus they trade of sell connects them to the local market.
-traditional farms may be called ***subsistence farms***.
b) Labor and land use - Traditional farms generally are very small usually only 1 to 3 hectares. Labor applied per hectare planted, however, tends to be high. In many areas, land is a limiting factor and is becoming more limiting over time as population continues to grow.
-Labor is often under employed during certain times of the year, while the capital assets that do exist are fully exploited,
-Much sharing of work and income occurs on traditional farms so there is little open unemployment during peak times.
-This sharing means that the individual's implicit wage, may be determined by the average rather than the marginal productivity of labor.
-Traditional farms may hire some labor as well, at least during the busy times of the year. -Law wages caused by high underemployment in peasant agriculture create incentives to hire laborers. Traditional farmers can hire labor or buy a small amount of leisure and enhance their social status at relatively low cost.
-***c. Seasonality*** -Labor use in traditional agriculture tends to exhibit marked seasonal variation corresponding to agricultural cycles. During slack seasons, labor may abundant. during peak seasons, labor is in short supply. Wages often exhibit similar seasonal fluctuation.
-The seasonal nature of agricultural production also causes seasonal variation in consumption and nutritional status.
-It is common to find "lean seasons" when consumption is low and short-run malnutrition high, especially immediately prior to harvest.
-Seasonality induces migration as people search for employment opportunities and food. --Other seasonal causes of migration are trade and marketing; cultivation of secondary land holding, and pasturing cattle.
-***d) Productivity and efficiency***- Traditional farms are characterized by low use of purchased inputs other than labor. Yields per hectare, production per person, and other measures of productivity tend to be low. These factors do not mean, however that traditional farms are inefficient.
-The crop varieties, power sources, methods for altering soil fertility, and certain other factors available to traditional farms constrain productivity growth and hence return to labor and traditional types of capital.
-Efficiency, as measured by equating marginal returns to resources in alternative uses, is high.
-If productivity is to be increased, the implication is that new technologies can help to change the production possibilities available to farmers. Secondly education may be needed to help farmers learn to adjust resource use to changing condition to maintain high level of efficiency.
-***e. Rationality and risk***- Traditional farmers are economically rational. They are motivated to raise their standard of living while, of necessity, they are cautions.
-Traditional farmers are not adverse to change, but proposed changes must fit in to their current farming systems without altering too abruptly the methods they have developed overtime to reduce risk and spread out the demand for labor .

-traditional farmers in many countries have spread risk by exchanging labor and other resources through point and extended families (relative and friends beyond parents and children).
-In many countries, there is a substantial degree of sharing, which not only adds to social status but also spreads risks.
-Some of these sharing arrangements and ties that bind extended families together may deteriorate as development proceeds, creating a need for new institutional arrangements to risk and in some cases to constrain anti social behavior.

iv. The Role of Livestock; Livestock play many important roles in traditional farming systems

A. Buffers And Extenders Of The Food Supply

-Farm animal provide a special protection to farm families, acting as a buffer between the family and a precarious food supply. Animals are like savings banks, which can be consumed or sold during crop failures.
-In most of traditional agriculture, livestock do not directly compete with crops because they eat crop residues, feed off steep slopes and poor soil, and generally consume materials, which "extend" the food supply.
-Many types of animals are ruminant that eat grass and other forages that humans cannot and can then convert the forages to products for human consumptions.
-Livestock make an important contribution to extending the quality of the diet as well, by providing meat, milk, and eggs. Fertilizer, fuel, hides and hair **-Animal manure is vitally important as a source of both fertilizer, and fuel in several countries. Animal manure adds both fertility and organic matter to the soil. In countries were wood is scarce, typical of north Shoa , Wollo, and Tigrai, animal dung is dried and burned for fuel. -In many countries, these two uses of animal manure compete. Dung that is burned cannot be used to increase soil fertility. -In India and recently in Ethiopia as a result of promotion by rural technology establishment within Ministry of Agriculture of Ethiopia (Jimma, Bako, Assela, Agarfa; wolita, Nekemte, and several towns on Northern regions) perhaps since 1976E .C., methane digesters have been developed and the gas produced is used for sources of energy in the household , and the residual nitrogen applied to crops. -Few livestock products are wasted in traditional society. Clothing and blankets are made out of animal hide and hair not only from cattle and sheep, but buffalo, goats, and other livestock.** *C. Power and transport;* **-In many countries livestock are the principal source of power. They plow the fields, transport products to market, and carry out-processing tasks like grinding sugar cane.** D. Social and cultural **-Livestock particularly cattle and goats are highly valued in some societies of Ethiopia for social and cultural reasons. The number of animals it owns may measure a family's social status. cattle are given as dowry/gifts during ceremonial occasions. -Of course, it is possible that the social and cultural values placed on livestock have evolved over the years because of their importance as capital and income earning assets.** v. Traditional Farming and Agricultural Development **-One of the striking characteristics of farms in developing countries is their diversity. Farms in much of sub-Sahara Africa are still very traditional where as farms in many parts of Asia and the pacific already have begun to intensify and modernize.**

vi. Determinants of farming systems-

-The farming systems in each region of the world show considerable variety. Farming systems are differentiated by how production is organized, by the nature of technologies employed and by the types of crops and livestock produced. Each system consists of a small number of dominant crop (or livestock) and numerous minor crops (or livestock)

-Technical, institutional and human factors determine the type of agricultural systems. These set of factors interact at each location and point in time to provide a unique environment for agricultural production.

-When these factors remain constant in a particular geographic area for several years, the farming system that involves represents a long-term adaptation to that environment. -Economic development can introduce rapid changes in several of the underlying factors, thus placing pressure on the existing system.

a.)Technical determinants of farming systems

-Technical elements including ***physical and biological factors*** determine the potential types of crop and livestock systems.

-Physical factors include climates, land, water control, capital items, and distance to marketplace, which are unique to each location. For example water control and capital items can be altered through investment and new technologies over time; consequently the life of pastorals change. Investment on water wells encourage settled agriculture.

-Biological factors include pests, crop and livestock species and are susceptible to modification. The existence of the tsetse fly in areas of the African humid tropics has created farming systems that are dramatically different from those in similar climates where the fly does not exist, for example animal traction is not an option in areas where the tsetse fly is common.

b)**Institutional and human determinants of farming systems**

-Factors largely outside the control of individual farmers include marketing systems, social and cultural norms and beliefs , population density, market opportunities, and off farm employment opportunities influence the farming system. For example in densely populated southern areas of Ethiopia root crops or enset farming may be practiced

-land size may determine size or small or big commercial farms cultivation, or the political systems may dictate collective , communes or private property

vii. Major Types of farming systems

While the specific type of farming systems in use depend on a large number of factors, Duckham and Masefield have grouped farming systems in to three basic types:

1. Shifting cultivation is on old form of agriculture still practiced in many parts of the world.

-involves shifting to a new piece of land when the fertility of the original patch runs out or when weeds and other pests take over.

-The movement may be fast or slow. Migration from one piece of land to another may be random, linear, or cyclic. When cyclic, the rotation frequency can last as long as 30 to 45 year.

-may be called ***slash and burn*** because usually the land is slashed with a machete and burned to clear the brush in the process of shifting.

-Capital investment in the farm is low; a machete, digging stick, and hoes being the primary tools. Typical crops include corn, millet and sorghum, rice, and roots. Usually the crops are mixed. Occasionally the cleared area is used for perennial crops.
-Shifting cultivation is practiced on about 20 percent of the world's exploitable soils, particularly in Africa and Latin America. It is popular where population pressures are not too severe.
-It has been linked to soil erosion and other environmental problems in several developing countries

2. Pastoral Nomadism

-involves people who travel, more or less continuously, with herds of livestock. Pastoral nomads have no established farms, but often follow well- established traditional routes.
-Although there probably only about 15 million pastoral nomads in the whole world, they occupy an area larger than the entire cultivated area in the world.
-They are especially prevalent in the arid and semi- arid tropics. Some examples include the Masai of Kenya and Tanzania, the Hima of Uganda, the Fulani of West Africa, the Bedouin of the Eastern Mediterranean, and the nomads of Mongolia.
-Pastoral nomadism can lead to a variety of problems. Because the grazing takes place on common land, there is a tendency for overgrazing because every individual farmer wishes to maximize his or her number of animals. As the number of animals increase, the grazing areas deteriorate and incomes shrink.
-As the human population grows, additional pressures are placed on the resource base supporting the nomadic system.

3. Settled Agriculture

-Settled agriculture represents a variety of agricultural systems including mixed farming systems, intensive annual crops, intensive and extensive livestock systems, and perennial crops.
-These farming systems are the survivors of an enormous amount of human experimentation.
-the environments as well as distance to market are major factors influencing the choice of the system as well as the individual commodities for particular locations.

A. ***Mixed farming*** usually involves a mixture of crops and livestock.
-what is meant by mixed farming is the integration of crops and livestock production such that multiple commodities are grown at the same time on the same land.
-Mixed farming is common in traditional agriculture because it produces relatively high returns while minimizing risk, makes efficient use of labor and land, and helps maintain fertility.

B. Intensive annual crops are extremely important in the world. About 70 percent of the cultivated area of the world is planted to the major grain crops, which include wheat, rice and corn.
-Other important annual crops are barely, millet, sorghum, roots, tubers, vegetables, and pulses. Pulses include such crops as beans, soybeans, peas, and peanuts.

C. Perennial crops are grown harvested over several years and include crops such as cocoa, coffee, bananas, and sugarcane.
-Some of these crops are grown in large plantations but often in very small farms as well, even in the same country. They tend to produce high- value products that are often exported.

D. Intensive livestock systems include both ruminants (for example, cattle, buffalo, sheep, and goats) that produce milk, meat, fiber, dung, and other products, and non -ruminants (for example, pigs and poultry) that are particularly important for their meat and eggs.
-These animals are often feed grains in addition to pasture and forage. In a few countries, intensive livestock systems can involve carefully managed grasslands or pasture.
E. Extensive livestock systems include a wide variety of grazing systems on semi-arid range, high and cool mountain pastures, wet lowlands, and more. Livestock may graze on leaves as well as grass

Wrap-up discussion question/activities(10Min)

(please note that at the end of the week you will be given next weeks ;assignment)

Session 3rd & 4th hr

Topic: Ethiopia's Agriculture : resource and constraint, and the food situation in Ethiopia

Session learning objective
-Enables student to be enlightened on the agricultural land resources of the country
-Enables to understand agriculture in the Ethiopian economy
-Assess the farming system in Ethiopia-based on practical observation of the country at large
-Give the real role of women in farming system
-Discuss and raise issues on the challenge of increasing food production in Ethiopia before and after EPRDF

Reading Assignment discussion (10 min)
-What are the basic differences in the farming system in Ethiopia?
-What do you think the role of women in your areas?
-What are the common features of agriculture before and after EPRDF
-which ones are more important issues among the problems mentioned hindering the development of agriculture in Ethiopia

Reading Text

-George W. Norton Jeffrey Alwang, 1993, **Introduction to economics of Agriculture Development**, New York: Mc Graw-hill, Inc., Chapter 8, and 9, in Page 133-166,

-Abbott J.C and Makeham, J.P(979) **Agricultural Economics**, Longman group Ltd., chapter 5, page 130-163

Kebede Tesfayae "Contribution of Natural Resources and Environmental policies to Ethiopia's Agricultural Development", Edit.Workeneh Negatu, Legesse Dadi, Abebe Haile Gabriel, **Proceedings of the 6th Annual Conference of Agricultural Economic Society of Ethiopia,** 30-31 August 2002, A. Ababa AESE. page, 41-49

-Mulat Demeke,"***The challenge of increase food production in Ethiopia***", edited by alemayehu Geda and Berhanu Nega, **The Ethiopian Economy Performance and Evaluation- Proceedings of The 8th Annual Conference In The Ethiopia Economy** Oct.30-nov.1,1999, Nazareth, Ethiopia, FRIEDRICH EBERT STIFTUNG, Addis Ababa, September 1999. Page 49-73

Synopsis

I. Resources

-economic growth entails damage to biological capital such as fertile soils, forest and natural ecosystem. As a result, long term benefits to society are undercut.
-Effort to achieve economic growth and full employment in the long-run, and price stabilization and a viable balance of payment in the short-run may degrade the environment and natural resource management in the form of sustainable depletion of natural resource and increased waste emission and energy use.
-Trees and grass for example, provide fuel and fodder, build soil fertility and prevent erosion, ameliorate climate change, and provide water catchments and wildlife habitats. These systems are underpinning to human welfare and survival.
-the most serious agricultural problems in Ethiopia include climatic change, soil gradation, bio diversity destruction and natural resources (such as forest).
-The root causes of those phenomena are population pressure, current patterns of production and consumption, technological incompatibility with current levels of economic activities and adoption of environmentally harmful short- term strategies that rely heavily on intensive use of natural recourses.

1. Conservation of natural resources for sustainable development.

-views about the importance of sustaining resources use in developing countries and the value of conservation to these countries differ significantly.

-Some prefer sacrificing their natural resources to attain economic growth or extend period of their economic survival.
-Other whose population heavily depends on natural resources for their livelihood, conservation of natural resources, should be a high priority for them if they act in their self interest.
-There are other views.: inhabitants of developing countries are much more dependent for their livelihood on living resources than inhabitant of developed countries.
-Most of the population in developing countries is typically employed in agriculture, fishing, forestry, and industries directly dependent on a living resource base. Disturbance to the ecosystem can have widespread economic consequence .Fact of non-substitutability and irreversibly of many resource like carbons at some forms of life once they are lost

demand that people become more cautious about depletion of the existing natural resources.

2. Natural Resource and Environmental threats and Issues.

-Ecological and Environmental problems that were not fully perceived have emerged with the rapid growth of agricultural activities to increase production- to feed the growing population, supply agro -industries with needed raw materials, and improve foreign exchange earning capacity of the country through increased production of exportable.

-These method of cultivation have already ruined fertile and productive areas in the North and East and all other areas of the countries.

-The prevailing farming practices (crop production, irrigation development schemes, animal husbandry-poultry ant cattle rearing etc) have led to over exploitation and degradation of natural resources on which agriculture it self ultimately depends

-Soil erosion is a major ecological catastrophe caused by slash and burn agriculture, deforestation and farming on steep slopes-while reduce harvests and poverty will reign over their life.
-Deforestation is major causes of the prevailing land degradation. The spread of agriculture out side the traditional farming zones, overgrazing, the emergence of new settlement, and the increasing demand for fuel and construction wood material have bean the major human made causes of deforestation that contribute to the dwindling of the country natural forest cover and resources.

-In the low land, the spread of cultivation has squeezed herder in to ever more restricted areas- there by causing over grazing. Its impact reduced feed supply leading to under nutrition and malnutrition of animals, increased surface run off, erosion on steep terrain, reduction of ground water and reduction of water flow in streams and rivers.

-Though irrigated agriculture represents only 4.6% of total cultivated area, its inadequate use of technology in irrigation caused problems such as leaching of chemical products of salinization of arable soil. In particular, the accumulation of salts in the soil can lead to irreversible damage to the productive soil structure.

-Consequently, environmental abuse leads to loss of arable land⇨declines income and diminishing qualities of rural life.
-Thus requires to strike a balance between ***agricultural activities*** , ***natural resources*** and the ***environmen*** t.

II **Agriculture in the Ethiopian Economy**

1. Introduction

-characterized by its great dependence on agriculture. Estimate shows that agriculture accounts for more than 41% of the GDP, 90% of the annual foreign exchange earnings and 85% of the employment.

-it is assumed that this dependency relationship will continue for quite sometimes. In fact the Governments economic development strategy calls for Agriculture Development led industrialization for the years to come.

-Agricultural operation in Ethiopia can be viewed from three perspectives. A) the small holder (peasant) sub-sector that accounts for over 95% of the crop production. B) the pastoral /agro-pastoral activities which are carried out in the drier parts of the country. C) commercial farms, which was completely wiped out and replaced by state farms during the last 20 or so years by government proclamation, in spite of revival in apiculture currently.

- the introduction of new laws and policies encourages private farming. At their peak in the late 1980's the State Farms had a maximum land holding of about 220,000 hectares.

-Due to man- made and natural factors, growth in the agricultural sector has been very low or even negative in the last two decades. For instance, agricultural growth during the five years, between 1987-1991 averaged no more than 0.2% per year. At the same time, population was growing at the rate of 2.9% per annum, therefore, resulting in rapidly declining per capita food availability.
-According to the FAO WEP Food Availability in 1992/93 was estimated at about 163 kg/ yr, which converts to 1515 cal/per/day. This is only about 72% of the 2100 cal/per/day considered minimum requirement for a healthy living.

2. Agro Ecology and Land Use Potential

-***Table 1*** below shows the total area of the country categorized by land use patterns. Some 66% of the totals area is considered suitable for agricultural purposes.
- no more than seven million ha.have rarely been used for annual crop production in any one year in the past, although a sizeable amount is used for gazing purposes.

Table 1. Current land use in Ethiopia (000ha)

Land Use	Total	Average
Cultivable land	16,640	14.8
Annual crops	14,729	13.1
Per Annual Crops	1,911	1.7
Grazing/browsing land	57,341	51.0
Forest, Shrubs, etc land	13,155	11.7
Forest	4,048	3.6
Shrubs and others	9,107	8.1
Currently Unproductive land	4,272	3.8
Currently unutilized land	21,025	18.7
Total	112,434	100

Source: Land use planning and Regulatory Department (MNRCD)

-The physio-graphic of the country gives rise to a wide array of climatic zones, which ranges from tropical to temperate.
- the eastern and southern low lands are arid while the central and western highlands enjoy in tropical highland (almost temperate) climate.

-The mean annual rainfall is highest in the south western highlands, reaching a high of over 2,500 mm. From there is shows a gradual decline in the general direction of both to the northeast.
-The central and south western high land plateaus receive a mean annual rainfall of 1,000 -2,500 mm while the eastern escarpments adjoining the highlands plateaus receive in the range of 600- 1,000 mm. The north-eastern and south eastern lowland plains get less than 600 mm per year.

-Based on climatic and physiographic as well as on other relevant information, identified seven major agro-ecological zones (AEZ's) and 62 sub zones **(Table 2).** The identification of these AE's is based mainly on three important factors, length of growing period, thermal regimes and land forms (physiography).

-As noted from ***Table 2,*** the length of the growing period in Ethiopia ranges from less than 45 days in the low land plains to over 300 days in the south western high land plateaus. The Arid, Semi-Arid and Sub Moist AEZ's with a restricted growing periods of no more than 120 days comprise a little over 64 million hectares of 57% of the total area of the country.
-Because of its high altitude and cold temperatures, the per-humid Zone has also limited utility for agricultural activities, particularly for annual crop production. Thus only about 42% of the total area of the country has suitable CPG for crop production. However, this is more apparent than real semi other factor such as topography soil degradation/fertility, etc. limit it's agricultural activities.

Table 2-Regional Distribution of Agro-Ecological ones (AEZ's)

No	Major AEZ	No of sub-zones	CPG (days)	Total Area 000 ha %	Main

1	Arid	8	<45	42272	37.0	Pastoral	1,2,4,5 SPAR
2	Semi-Arid	6	46-60	2,900	2.6	Pastoral, agro-pastoral	3
3	Sub-moist	11	61-120	18963	17.0	Mixed/Annual crops	1,3,4,5,6,SPSR
4	Moist	15	121-180	24540	22.0	” ”	3,4,6,SPAR,
5.	Sub-Humid	11	181-240	16732	15.0	” ” & Pernnial Crops	3,4,6,SPAR,12
6	Humid	8	241-300	6358	5.8	” ”	4,SPAR
7	Per-Humid	3	>300	669	0.7	Mixed/per email Crops	4,SPAR
TOTAL	62	-	112,434	100	-	-	-

III. The Farming System In Ethiopia

-The farming systems in use and the types of crops grown vary according to the characteristics of each agro-ecological zones. The two major farming systems prevail in in the country are pastoral (agro-pastoral) and mixed farming.
-The Arid and Semi Arid zones are almost wholly used for pastoral or agro-pastoral activities, with few exceptions.
-Mixed farming dominated by crop-production is the norm in all other AEZ's. Livestock mainly cattle, is an important component of mixed farming as livestock provides draught power, milk, meat and manure.
-two-thirds of the country's livestock population is found outside the Arid and Semi-arid Zones where crop dominated mixed farming is practiced.

-The major cereal crops grown in Ethiopia are tefff (Eragrastis teff) wheat, barely, maize, sorghum, and millets; the later three being typically grown in the lower altitude areas of the various zones.
-Faba beans, field peas, chick peas and lentils are high-to mid-altitude crops while haricot beans is grown in lower altitudes areas mainly as cash crop. There is a wide array of oil seeds grown, the most important of which include niger seed(Gizotia abysinica) and flax in the high lands and sesame and ground nuts in lower altitude areas.

-The annually cultivated land ranged(1989/90-1991/92) from 5.1 to 5.4 million hectare, which is 31-33% of the potentially cultivable land. Crop productivity is quiet low, ranging from 1.2-13 mt/ha for cereals 0.9-1.4 mt /ha for food legumes and about 3.6 mt/ha for root and tuber crops.

-In terms of land use efficiency, it would be noted that cereals crops, occupy 72-74% of the annually cultivated land, account for 59-62% of the annual production while the root and tube crops contribute 24-28% of the annual production from a land area of around 11%.

- Though the comprehensiveness of the remarks made for each region ,(as classified by EPRDF government of Ethiopia), is subjected to additional inputs by students of agricultural economic from the respective regions, the traditional agriculture prevailing seems to appear the following:

1. AFAR and Ethiopian Somali

- Mostly Arid; rainfall precipitation is very low;
- Primarily pastoralist /agro-pastoralist
- In settled area grow sorghum and corn in addition to perennial crops such as banana and other fruits.
- Raising livestock, are the primary sources of livelihood.
- Commercial farms (fruits, cotton) are converging both by private and government along river tributaries.

2. Harar-(whose part is merged with and among Oromia, AFAR, Somalia, Harari) mainly of Oromia.

- Is Arid, Semi-Arid, and Humid.
- Mainly settled and is mixed farming (grown mainly maize, Sorghum and other cereals,) as a staple food crop
- Chat, citrus, ground nuts, and vegetables are widely grown.
- Harar coffee fetches high price premium more than any other domestic unwashed coffee in international market.
- Also is famous for livestock production.

3. Arisi and Bale-Oromia

- Settled and mixed farming,
- Rainfall distribution ranges from location of high to low rainfall precipitation.
- Cultivated land may be called the wheat and barley growing belt of the country.
- Known also for modern livestock production.
- locally produced and modern imported farm implements appear to prevail-and is widely practiced.

4. Southern Region

- Diverse agricultural practices prevail.
- Pastoral, agro pastoral and settled agriculture
- Ranges from extremely densely populated(example, Gurage, Kambata and Hadiya, Wolaita, Sidama zones) to sparsely populated nationalities co-exist.

- Major crops are root crops, Enset, Maize, Sorghum, Citrus Fruits, vegetables.
- Livestock is raised with different intensity.

5. Wollega-Oromia

- Semi-Arid and Humid
- Agro pastoralists, and settled agriculture, and mixed farming.
- Perennial crops, primarily coffee, are grown, in additions to citrus, and root crops.
- Maize and cereals are also grown.
- Livestock is largely raised inspite of the prevalence of livestock disease.
- Wild life potential exists.

6. Gojjam and Gonder

- Mainly humid
- Settled agriculture and mixed farming
- Cereals and pulses are widely grown, and is net exporter.
- Wide range of livestock exists.

7. Wollo and Tigray

- Arid, Semi Arid, and partly Humid
- Mostly settled agriculture and mixed farming
- Soil fertility is depleted in many areas
- Land use competition(between man and livestock) is intense.
- Relatively, intensive infrastructure, manufacturing, and industrial setup particularly in Tigray, is under way.

8. Gambella and Gumuz

- Partially settled, and agro-pastoralists, mixed farming exists.
- Maize, root crops and fruits are grown.
- Tse-Tse fly inhibit production livestock.
- Relatively, is sparsely populated.

IV. The Role of Woman In Farming Systems

-Women have key roles to play in farming systems through out the world. Women are involved not only in house hold chores and child rearing in rural areas but are a major source of labor for food production and account for a large proportion of economic activity.

1. Dual Roles of Women

-With the notable exceptions of strongly Islamic societies, women play two major roles in the rural areas of the vast majority of developing counties. First they have household responsibilities for child rearing, food preparation, and other chores. Second they are paid or unpaid workers in agriculture or off the farm activities.

-They produce, process, and preserve food. They work in the fields, tend livestock, thresh grain and carry produce to market. In many area women manage the affairs of the household and the farm.

-They work in small industries and in the informal sector, producing goods and services for sales locally or beyond.

- the true extent of involvement of women in agriculturally related activities is under estimated because of cultural reasons as well as when survey are taken women often describe their principal occupation as a house wife.

-***2. Regional Differences***

-In many African countries nearly all the tasks connected with food production are left to women. Men may tend livestock or produce cash crops. In Malawi, for example, over two thirds of those working full time in farming are women.

-In areas of Africa where men migrate to work else where, the entire administration of the house-hold is often left to women.

-***3. Determinants of the Role of women in Agriculture***

-Social, cultural, and religious factors; population pressure; farming techniques; off-farm job activities, colonial history, and many other factors determine the roles of women in farming systems. Sometimes in area with apparently similar physical conditions, women assume very different roles.

-As off farm job opportunities, population pressures, and farming techniques change, so too does the role of women. V-The Challenge of Increased Food Production In Ethiopia *1. Introduction* **-The performance of the agriculture sector in Ethiopia has remained weak and it is heavily influenced by weather conditions. Agricultural growth rate averaged 2 % between 1980 /81 1990/91; mean time population grew by nearly 3%. -One of the consequences of the poor performance of Ethiopia agriculture is widespread food insecurity problem. An estimated 50 to 60 % of the countries populations' food insecure, or live below to poverty line. The domestic food supply has failed to meet the food requirement of the country.**

-2. Development strategies and policies.

A. Pre-1991.

-The first major development effort to help small holder agriculture came in to being in the late 1960s. An integrated development projects, CADU (1967), WADU (1970) Ada district development project ,ADDP (1972), Tach Adiabo and Adakti (1972) were established with the aim of integrated agronomic research, dissemination of research results, provision of modern farm inputs, marketing and credit facilities as well as promotion of cooperative societies in the highly potential areas.

-the imperial government launched minimum package project (MPP) in 1971. The MPP was designed to achieve an increasing and eventually nation -wide diffusion of essential in puts tested and developed by the comprehensive projects such as CADU.

-The number of adapting farmers and production increased rapidly in all the project areas. Landowner, businessmen and government officials were also impressed by the yield gains and many took the initiative to set up commercial farms.

-Tax and credit incentives offered to buyers of tractors and other farm machinery favored mechanized farming and resulted in large scale eviction of landless farmers.

-The number of commercial farms rose to 2,626 and the size of mechanically cultivated land increased to 481,659 hectors by the early 70s.

-After the overthrow of imperial government in 1974, the official polices in agriculture become expansion of collective and State- Owned farms.

-All rural lands were made public properties and private ownership of land by individuals and organizations was prohibited as a result of the 1975 land reform proclamation. Peasants

were entitled to use fructify rights to cultivate a maximum of 10 ha. Tenancy was abolished and hired laborer was banned.
-Peasant association→ service cooperative →producer cooperative→ villagization program which aimed to bring scattered households in to small village cluster, was also launched in the mid -1980s.
-Production was dramatic with serious shortage and high prices of food grain in the urban areas.
-Government established Agricultural Marketing Corporation (AMC) to minimize urban food shortage. Bought at low price (than the free market) compulsory delivery imposed (at least 50 % to for private grain dealers). This reduced the incentive to produce more.
-Most donors (USAID, IDA, SIDA) found the drive for collectivization and price control incompatible with the original idea of developing smallholder agriculture and refused to extend their support further.
-A new project, replacing MPP, under the name of Peasant Agricultural Development Program (PADEP) was launched in the early 1980s with the aim of increasing food production and promoting service and producers cooperatives.
-A total of 8 PADEP zones were established with semi- autonomous status under MOA, however, due to disagreement with donors and GOE on the role of farmers and state interventions in grain markets (AMC), its operation delayed.
-The general uncertainty and negative attitude towards private farming discouraged agricultural production.

B.A*fter 1991*
-The Ethiopian Peoples Revolutionary Democratic Front (EPRDF) declared among others, collectivization and villagization as undesirable and liberalized both agricultural markets.
-An economic reform program was imitated, which included the removal of substantial taxation of agriculture, market liberalization and devaluation. The fertilizer market was liberalized creating a multi- channel distributive system.
-A development strategy known as agricultural development led industrialization (ADLI) was formulated to focus on agriculture. The strategy views agriculture as the engine of growth, on account of its potentially superior growth linkage, surplus generation, market creation, and provision of raw materials and foreign exchange.
-A new system of agricultural extension, known as the Participatory Demonstration And Training Extension System (PADETES) was launched in 1994/95. The system tries to merge extension management principles of the training and visit system with the technology diffusion experience of the SG 2000 program.
-The major elements of the extension packages are fertilizer, improved seeds, pesticides and better cultural practices mainly for cereal crops (teff, wheat maize, barley, sorghum, and millet). Need to earmark plots for demonstrations (¼ → ½ ha). Farmer under the supervision of extension agent manages plots.
-The plots increased, for example, from 3, 200 in 1994/95 to 600,000 in 1996/97.
-In put packages have also been developed for wet areas, drier areas, livestock and high value crops such as vegetables, pulses and oil seeds.
-Total fertilizer consumption increased, for example, from 171,000 tons in 1994 to 260,258 tons in 1998. So is improved seeds and fertilizers.

-Common feature of all development activities in agriculture is ***dependent on donors*** for ***funding and technical assistance***. It appears that extension system can operate only if donors are willing to finance.
-Agricultural development ***strategies and policies*** also ***lacked continuity***. People's ***participation top-down approach eroded farmers confidence*** on new schemes, and sustainability in Agricultural development.

3. Trends of grain production and yields level.

-Cereal production averaged 5.7 million tons over the period 1980 to 1997. On the average 4.8 ; Pulse production averaged 0.7 million Tons over the period 1980 to 1997. On the average 0.75 ; Oilseed production averaged 0.1 million tons over the period 1980 to 1997. On the average 0.27 ;
-Millions hectare of land was cultivated to grow cereals, giving a yield of 11.9 quintals/hector , giving a yield of 9.3 quintals/hectare for pulse, giving a yield of 4.6 quintals/hector for oilseeds .
-Ethiopian agriculture is still as vulnerable as it was 20 or 30 years ago. There is no much progress on productivity, if there is an increase is due to fertilizer, and increase in hectare.
-The area expansion was achieved through cultivation of hill sides with high slopes, reducing or eliminating fallow land, and converting pasture, wood land and forest areas in to farmland, with obvious negative implications for sustainable farming.
-The major factor behind the low and stagnating yield is limited application of modern inputs: only 35 and 2 percent of the total cereal area receives chemical fertilizer and improved seeds, respectively. The rate fertilizer application is only 35 Kg per ha(than 200 kg) compared with the recommended rate of 200 kg per hectare.
-Agriculture is dependent on rainfall which has become increasingly erratic in recent years.
-Weather problems have also caused extreme fluctuation in food grain production.

4.Key problem and issues in increasing food production

-Agricultural development efforts of the last three decades have failed to address the problem of food in Ethiopia. It is argued that deficiency in land policy, inadequate system of technology development and dissemination, underdeveloped markets, and limited people's participation in the development effort are among the key constraints to increasing food grain production in Ethiopia.

4.1 The problem of efficient land utilization

-The average farm size in Ethiopia has declined to just one hectare due to the rapidly growing population. Over one third (36%) of the rural holdings are less than 0.5 hectare.
-The probability of adopting fertilizer and improved seeds decreases with decline in farm size. Sub-economic holdings, operated by poverty stricken farmers, are not favorable for widespread dissemination of new agricultural technology.
-Apart from population pressure, the land policy has significantly contributed in declining farm size and tenure insecurity because holdings continued to be redistributed.
-General belief that the next round of land redistribution will take place any time, the incentive to invest on land improvement is minimal.
-Removal of the distortions in the land market is a major prerequisite for agricultural transformation in Ethiopia.

4.2 technology development and dissemination

-Low level of technology utilization is one of the major factors behind the poor performance of food production. Improved seeds and fertilizer usage is low. Crop loss is high due to insects. Many farm operations are carried out with simple and basic hand tools.

-Transport activities are carried out mainly with humans. Oxen's are widely used for land preparation.

-Lack of technical progress in Ethiopian agriculture reflects weakness in the system of technology development and dissemination.

-Agriculture research, extension, and seed production suffer from serious capacity and institutional limitation

A. Agricultural research.

-Agricultural research in Ethiopia has produced over 250 improved crop varieties, animal breeds, farm implements, and various other technologies over the last three decades.

-Improved crop varieties (mainly wheat and maze) constitute the largest proportion of the technologies generated so far.

-The improved seeds are local specific or fit to the agro-ecology where they are generated.

- Budgetary requirement to technology improvement has to increase. For instance agricultural research expenditure amounted to 26.6 millions Birr(or 5.3 million USD) in 1993/4 compared to agricultural GDP of roughly 14 billion. This would mean that research expenditure in Ethiopia (only 0.2% of the agricultural GDP is 1993/4) falls far below the recommendation which calls for a target of 2% of agricultural GDP to be invested in agricultural research.

-Weak institutional base to provide adequate and predictable guidance and frame work for governance, coordination, follow up and evaluation system of the Ethiopian NARS is another major impediment to effective research.

-The mode of research administrative and priorities have changed with government changes and policy shifts of hence research program and emphasis in Ethiopia have lacked stability and continuity.

B. Extension

-Agricultural extensions in Ethiopia is an entirely a public sector activities and suffers from lack of institutional stability and shortage of funds.

-Extension agents are public employee deployed very close to farmers. They are expected to serve about 1000 H.H currently and responsible for introducing some seven or more different packages to farmers under his domain.

-The agents largely handle distribution and collection of input loan.

-The problem is compounded by lack of resources and means of transport to move from one house hold plot to the next. Most developments agents have only nine month of training after gradation from high schools.

-Extension system operates based on recommendation that show little variation across different environment.

C.Seed production

-The quality of improved seed in Ethiopia is low due to various reasons. It is adversely affected mainly by loss of genetic quality due to long period of repeated use and seed production under rain fed conditions.
-For example maize (BH-660) faced germination problems is Oromia and SNNP during the 1998/99 cropping season. A similar problem is reported for wheat in all areas where the variety HAR 1685 was distributed.
-Seed quality can be adequately maintained when produced under irrigation.

4.3 Undeveloped Market

-Under developed out put, inputs and capital markets could negate any efforts aimed at increasing agricultural production and productivity.

a) Output marketing.

-Output marketing in Ethiopia suffers from inadequate transport network, limited number of large inter regional traders with adequate storage and working capital, high handling costs, inadequate market information system, week bargaining power, and under developed processing industrial sector.
-Transport and communication system leaves much to be desired in Ethiopia.

b) Input marketing.

-Liberalization of fertilizer market has removed price regulation and allowed private sector participation. However, privates enterprises are restricted by quota, etc in some regional states.
- Fertilizer imports in Ethiopia is financed mainly through foreign grants and loans that are obtained at unspecified times of the year and are often granted with restrictive conditions such as source of supply.
-Improved seeds are not always available in the open market. Private sector participation in marketing improved seeds is minimal.
-ESE' sales to farmers are carried out largely by the bureaus of agriculture not by retailers of seeds. Non-participant farmers in the extension program, have no access to improved seeds.

C) Rural credit market

-The capacity of the formal banking sectors to serve the rural areas is limited. For example in 1997 the CBE and DBF had only 150 and 35 branches, respectively. Because of massive default both CBE and DBE are reluctant to supply seasonal input loan.
-Recognizing the need to improve the provision of financial services, the government issued proclamation No 40/1996 for promoting micro financing institution. The proclamation provides the legal basis for investing in medium and small banks, which specialize in catering the credit and saving needs of the urban and rural poor who are willing to undertake productive micro-ventures.

4.4 Rural infrastructure

-Irrigation works, soil and water conservation structures, drainage systems, and transport infrastructure are poorly developed in Ethiopia.
-Public investment in irrigation, (especially in small scale irrigation) , road and communication, check-dams, surface & sub surface drainage structures have contributed to the growth of agricultural out put and reduction of rural poverty in several Asian countries.
-Increasing cropping intensity through irrigation has been the major instrument to increase income and productivity in countries, which experienced a successful green regulation.

-Infrastructure will not, however raise crop yield without complementary investment in social services such as education, health, water supply, sanitation and nutrition- to improve quality of life as well.

4.5 Peoples participation

-Peoples participation in the economic social, cultural and political process helps maximize the use of human capabilities, increases the level of social and economy development and contribute to the attainment of sustainable, balanced and equitable patterns of growth.

-Local people's institution with strong organization capacity are essential for effective mobilization of resources and formulation as well as execution of development projects.

-Delegating governance to local officials and politicians which are more accountable to local communities is an important means of enhancing people participation.

Module II-Farm Management and Record

Session 5th 6th hr

Topic: Farmer vs. farm manager and decision making process

Session learning objective

-enlighten the phenomena in which agriculture operates, specifically the variability of soils, temperature and moisture
-to allow students realize the implication of this variability in the process of development
- To allow students realize the function of the farmer as a cultivator, manager, and as person.
- To give insights on the characteristics of the farmers
-To let students of agriculture the type of the influence farmers are subjected.

Reading Assignment discussion (10 min)

-Why is each change in farming practice calls for additional change?
-Discuss the reasons for the timing of the farming operation must be fitted to weather conditions
-Define the terms : agriculture, farm, manager,

Reading Text

A.T Mosher,1966, **Getting Agriculture moving, essentials for development and modernization**. New York: Frederick A. Praeger, chapter 1, Chapter 2. Page13-35

-George W. Norton Jeffrey Alwang, 1993, **Introduction to economics of Agriculture Development**, New York:Mc Graw-hill, Inc., chapter 7, page 116-130,
-Frank Ellis, **Peasant Economics -Farm households and agrarian Development**, Second Editiuon, 1993, Cambridge University Press, page 17-18

Synopsis

1. Agriculture

-***Agriculture*** is a special kind of production based on the growth process of plants and animals.
-***Farmers*** manage and stimulate plant and animal growth on farms. The production activities on each farm are a ***business*** in which costs and returns are important.

-***Plants*** are the primary factories of agriculture. They take in carbon dioxide from the air through their leaves. They take in moisture and chemical substances from the soil through their roots. Using the energy of sunlight, they make seeds, fruits, fibers and oils that man can use.
-***Livestock*** are important secondary factories of agriculture. Depend on the plant for their food. They can eat many parts of plants that man doesn't, such as the stems and leaves of grasses. They transform plant materials in to still other products of use to man: meat, hides, wool, eggs and milk.

-The growth of plants and animals goes on in nature without any participation by man. Thousands of kinds of plants have evolved over time in different parts of the world in response to difference in ***sunlight, temperature, amount of available moisture*** and the nature of the ***soil***. Each kind of plant has its own special requirements.

-The plants that grow in a particular region determine what kinds of animals, birds and insects live there, since some of these feed on the particular kinds of plants found in the region, while others feed on each other. As a result, different combination of plants and animals are found in different parts of the world. These combinations are different within very short distance because of pronounced differences in temperature, direct sunlight, and moisture and soil conditions.

-***Agriculture arises*** when men begin to take control of this growth of plants and animals, rearranging it to his own benefit.
-The difference between ***primitive*** and ***scientific agriculture*** lies in the degree to which this control has advanced.
-In a scientific agriculture man applies his ingenuity to increasing his control over all the factors that affect plant and animal growth (irrigation, drainage, plants nutrient to the soil, breeds, etc.). He developed scientifically prepared feeds for his livestock's and scientific methods to protect them from disease.
-Certain characteristics of the biological production process of agriculture are beyond our control. We can not eliminate the great diversity of many combination of climate, topography, and soil that favor the growth of different types of plants and animals.

2.Implication For Agricultural Development
The following implication follows from the nature of the biological production process of agriculture
-***2.1. Agriculture must remain widely dispersed.***
-Because the energy for plant growth comes from sunlight, agriculture cannot concentrate in urban factories that can have their energy brought to them in the form of fuel or electrical energy. Agricultural will always require large area's of the earth's surface on which sunlight falls.
-This means, that a widespread transportation network is necessary for scientific agriculture, to take improved seeds, fertilizers, pesticides, and other modern production supplies and equipments to the various parts of the wide expanse of fields exposed to sunlight, and to bring agricultural products to markets.
-The changes necessary to increase productivity must be carried on in the midst of traditional family and village influences.

-***2.2. Agriculture must vary markedly from place to place frequently with in short distances.*** We are not likely in the near future to able to modify climate substantially, except in green houses agriculture. Even if we could, existing soils are the result of long evolution under various past climatic conditions.

-The difference in climate and soils calls for different crops, adopted to differences in local environment. Minor differences in soil and topography make different crops and soil treatment most productive. Other regions are much more varied.
-implication is that they call for such close adaptation of crops and methods to varying local conditions that only the individual farmer can have the specialized knowledge of his farm necessary to make intelligent decisions about its use.
-the importance of minor variations in soils and climates even in a regions that seem similar means that crops or methods imported from other regions or even from elsewhere in the same region, require careful testing to make sure they would prove satisfactory of adopted locally.

-2.3.The timing of farming operations must be fitted to weather conditions and to attacks by pests and diseases.

-Factory production processes are carried on under controlled conditions that permit each operation to be performed at any time and all the time. Agricultural production, on the other hand, is subject to weather and to other factors such as the incidence of insect, pests, or diseases that vary from time to time and from place to place.
-Thus, many agricultural operations cannot be rigidly scheduled in advance or from a distance. Schedules must be left flexible for on- the -spot decisions by each farmer, based on local conditions at the time.

-2.4.The time factor in plant and animal growth favors diversification in agriculture.

-The basic biological production process of agriculture have built in time sequences and time requirement i.e maize, wheat and other plants have their seasonal patterns of growth from sowing to harvest. Only at certain times in these growth cycles is human labor required.
-Growing different crops with different sowing times and harvest-times spreads the use of labor over the year. Tending livestock also helps to achieve a better distributing of labor, particularly where the livestock requires the most attention during the time of the year when crops are not in the field.
-Diversification can permit greater total production through more continuous use of labor.

-2.5.Most farm operators and labors must have a wider variety of skills than factory workers.

-Farmers and farm laborers need to be more versatile in their skills than workers in industrial plant where seasons play no part and all of the different stages of the production process can be carried on at the same time, each by a different set of workers.
-In most of agriculture specialization of labor cannot go so far: each man must have a variety of skills.

-2.6. Each change in a farming practice calls for additional changes.

-one change of cultivation practice makes other changes advisable. The addition of fertilizers is usually necessary for any substantial increase in crop yields, but the full increase that might be brought about by fertilizer cannot be realized without introducing or breeding new strains of crops that can respond to it.

- in many areas substantial increase in yields requires more moisture than the rain fall or existing irrigation makes available. When more moisture is made available it is usually necessary to introduce new varieties of crops that can respond to it.

-2.7.A progressive agriculture is always changing

-A progressive agriculture is always changing. Each step forward makes other forward ste ps possible.

-With scientific plant breeding the possibilities of crop improvement are enormous. Each new variety permits improvements in cultural practices; these in turn open additional opportunities for varietal improvements. New crops or varieties often prove susceptive to disease or insect pests that were not previously a problem.
-new control methods permit the growing of crops or varieties not previously successful. a higher yield from a feed crop permits the raising of more livestock.
-New implements and power sources can transform farm practices. Farms can change in size. Productivity can sometimes be increased several fold.

-None of these will change the basic nature of the agricultural process: Utilizing the energy of the sun through the growth of plants, and of plant products through the grows of livestock. This process can be increased in efficiency almost indefinitely.
-To do that its special features- including its differences from factory production-must be recognized, honored, and used with intelligence, imagination, and hard mark.

-3.The Farmer

-The energy of the sun hits the surfaces of the earth everywhere, whether any human being is present or not. Wherever the temperature is right and moisture is present plants grow and animals live.
-It is the man who takes control, learning to use the product of plant and animal life, modifying plant and animals and the nature of the soil to serve his purposes better and the man who doese this is the **farmer**.
-In the operation of his farm, each farmer plays two roles :he is at the same time a ***cultivator*** and a ***manger***.

-3.1 The farmer as a cultivator:

-This role is to take care of plant and animal in order to get useful product. With respect to plant growth includes preparation of seedbed, the sowing of the crop, the elimination of the weed, the management of soil moisture and measure for the control of pest and diseases.
-With respect to animal growth includes controlling the breeding of livestock, herding and feeding them, protecting them from disease, where necessary housing them.
-All farmers have to learn to do the old operation of plowing, seeding and weed controlling in new ways

-3.2 The farmer as a manager

-where as the skills of cultivation are mostly the skills of the hand, the muscles and eye, the skills of management involve activities of the mind backed up by the will. They involve primarily the making of decisions, or choice between alternatives.

-The decisions each farmer must make as a manager include choosing different crops that might be planted in each field, choosing what livestock are to be kept on the farm, and deciding how to distribute available labor time among different tasks, include choices as to what and how many draft animals are to be kept for work in the fields.

-As agriculture progresses, must develop more skills in buying and selling, purchasing improved seed, fertilizer, insecticides, etc employ additional labor, decide on amount to be kept for home consumption, etc.
-In subsistence agriculture buying and selling are not a great role, because farmers consume what they produce. But as agriculture become more commercial, more purchase of supplies and equipment, and more sales of products takes place.
-It is important to agricultural development that farmers grow in managerial ability so that they may competently take advantage of every opportunity open to them, each to make his farm as productive as possible, with an increasing margin between the costs and the return of his farming operations.

-3.3 The Farmer As A Person.
A farmer being not only a ***cultivator*** , and a ***manager*** , he is, as a ***person*** , a member of a family and a member of local community or a neighbor. As a person, farmers have four capacity of important of agricultural developments: to ***work*** , to ***learn*** , to ***think imaginatively*** and ***creatively*** , and to ***aspire*** .

-4.The characteristics of farmers.
a) Farmers vary enormously as ***a persons*** - most may work hard, learn a little from year to year; seldom develop new methods: use methods of their fathers or their neighbors. hope for modest improvement: spared from hunger, illness, and the death of their children; some farmers are less than these; There are others who seem not able to keep up at all.

b) Most of farmers(like the rest of us) live far below their capacities
- They could learn much more than they do, if they had the opportunity and encouragement. They could try out more new methods than they do. Almost all of them live largely by habit. Keep on doing it that way, year after year.
-Three mental habits are particularly important to agricultural (and all other binds of) development.
-One is the habit of measuring; thinking in terms of amount of things. Here he asks, for example, how good is the harvest in terms of kilogram per ha.
-The second useful mental habits is that of always asking why? Example, why is this crop is better than that? etc
-The third is the habits of constantly looking for alternatives, for other ways of doing anything one has to do
-habits can also be a nuisance and an obstacle. They make it difficult to learn new ways of doing old tasks. Habits is like friction in the physical world. Whether it is an asset or liability depends on what is being attempted at the moment (friction is an asset in brakes of automobile bicycle; liability between the moving parts of a pump or engine.)

-In short farmers live far below their capacities as persons, and one of the tasks of agricultural development is to help them, and make it easier for them, to develop as persons so that they regularly use much more of each of the capacity they have.

-5.Influences

-5.1 The influence of the Family

-Although we said farmers make a decision what to crop and tend, it would be accurate to say that decisions are made by the farm family, since the various farming operation are carried on by different members of the family.

-5.2 Community influence

-Farmers' decisions are like wise greatly influenced by attitudes and relationships with in the local communities in which they live.

-To farmers, his community means many things. It is his chief sources of security. He relies upon his friends and neighbors to help him in emergency, or to aid his family if any thing happens to him.

-Members of rural community commonly cooperate to do things that would be difficult or impossible for individuals working alone- .

-Because of mutual dependence farmers are usually reluctant to do anything that would upset the community structure or break down traditions of mutual aid. Community tradition define what sorts of conduct are “proper” for each person.

-5.3 The “**Great Tradition**” **and religion.**

-Beyond the social values and traditions of local communities are called great tradition that affects them in varying degrees.

-These are the living philosophies formulated by the great thinkers, teachers, and prophets of society. They, too have an effect on the behaviors of farmers as persons.

-Basic belief about life and its meaning color the attitude and action of great numbers of people throughout wide regions.

Session 7th hr

Topic: Whole Farm VS Enterprise

Session learning objective
-Provides the scope and the insights of farm
-Discuss the government's role leading to more efficient farms
-Enables to distinguishes the concepts of farm business and farm enterprises
-It also helps to explain the difference between the size of farm and size of farm business and its implication to agricultural development
Reading Assignment discussion (10 min)
-Discuss government actions that may be necessary to assure effective control of their land and to enable them to farm more efficiently
-What does farm business mean
-Demonstrate as to how you distinguish farm enterprise and farm business

Reading Text
A.T Mosher, 1966, **Getting Agriculture moving, essentials for development and modernization**. New York: Frederick A. Praeger, Chapter 3 &4 . Page 39-62

-Ellis, F. (1988) **Peasant Economics: Farm Household and Agrarian Development,** 2nd Ed, Cambridge, University Press, chapter 2, page 17-43

Synopsis of lecture (bullet)

1. The farm.
-A farm is portion of the earths surface, land, on which a particular farmer, farm family, or other organization cultivates crops or tends livestock.
-Nature determined the basic character of the soil and its exposure to sun light, the amount and seasonal distribution of rain fall, the length, of days and night's, the air temperature , and other physical features, It is also affected by what men have done to it in the past .
-a farm may include structures erected on the land: wells, irrigation channels, fences to control livestock.
-***1.1 The farm and Agricultural development***
-the farms need to change, both in size and in arrangement, in order to make it possible to utilize changing methods of farming more efficiently.
-***1.2-Shifting cultivation*** - One primitive type of farm is that associated with shifting, or "slash-and- burn" cultivation: cutting the trees and burning them so that a crop can be planted, usually without plowing.

-Shifting cultivation is low in the scale of agricultural development. When man learns how to manage that particular soil so that continuous cropping become economically feasible, the shifting ceases and the agriculture becomes settled.

-***1.3-Settled agriculture*** - Here farms are settled permanently and the same fields cultivated year after year, perhaps with certain fields left fallow periodically to allow the land to rest and regain some to its former fertility.

-***1.4-Private field cultivation and*** "***common***" ***grazing lands.*** Domesticated livestock, whether for draft or for the meat, milk, wood or hides, can be grazed on land not yet under cultivation. As population increases and more and more land is wanted for cultivation many communities set aside certain areas for grazing.

-This gives rise to the combination of private field cultivation and "common grazing lands": grass lands available for grazing by all of the livestock owned by anyone in the community.

-But as the number of livestock increases, and as scientific methods of animal breeding and feeding and scientific methods of raising productivity of grass land become available, it stands in the way of further agricultural development.. Common grazing land has to change.

-***1.5 Scattered fields***- A farmer may claim to different plots in different places. This can give every one some of the better and some of the poorer land, and allow each family to come closes to producing the variety of crops it need and wants.Needs change, however, as new methods of farming become available.

-If new implements work better on larger fields, the farmer with all of his land in one place has more opportunity to change the size, irrigation, and pest and disease control, likewise, are made easier by having all of the land of each farm in one bloc.

-***1.6 legal right in land*** – when the population of settled agriculture increases to the point where the fertile land is all being used, a family without land but wanting some, or a farmer who wishes to enlarge his farm, must either buy the "ownership" or rent the temporary use of land to which some one else has had the right.

-Once land becomes valuable, complex customs and laws develop regarding its ownership, sale, and rental and inheritance.

-They vitally affect the freedom and willingness of farmers to adopt and use the most efficient methods of farming currently available

-2. Towards more efficient farms : Five kinds of government action may be necessary to assure farmers effective control of their land and to enable them to farm more efficiently; these are 1. survey of land and registration of ownership titles; 2. enclosure of land to eliminate indiscriminate grazing; 3. consolidation of scattered land holdings ; 4 redistribution of land to provide management units of efficient size ; 5 Change of the conditions of tenancy.

-***2.1 land survey and titles:*** The first need is the clear demarcation of farm boundaries and the registration of land titles. Farmers cannot invest unless they are sure of their rights either to keep the land or to be repaid for the efforts and expense that they put in to improving it.

-***2.2 Enclosure*** - farming in ones plot and grazing on common land may be a limitation-individuals can not improve their own animals, so long as their stock graze together with others. They cannot control diseases, nor can they control breeding to improve their herds.

-***Enclosure*** means putting an end to such indiscriminate grazing of common lands. This is to say if the land is suitable to crop, give it to farmer, if it is suitable for grazing sell it to individuals. If it is decided to remain in under common grazing, provide a restricted use-by fencing or bring to and the straying of livestock in to cultivated fields, or by limiting the number of animals to graze, charge the livestock owners on number of animals they have.

-***2.3 Consolidation of holdings*** Fragmented holdings can be inefficient to operate. It is hard for family to protect all its scattered plots from stray animals- or from pilfering neighbor. A farmer cannot install an irrigation well that will serve his whole farm. Gets little benefits from using insecticides and fungicides, unless neighbors use them. He is deterred from buying implements that would be burdensome to carry back and forth to his several fields.

-Where fragmentation is a serious problem, consolidation of holding can greatly facilitate development. Consolidation also may be difficult because some farmers may have an attachment to the land. Or may fear redistribution.

-***2.4 Land distribution*** -Some farms are so large that they are not used intensively by their owners. The pressure to break up large land holding and to transfer ownership to the operators of the smaller farms is usually more political than economic. Political as well as economic power goes with land ownership.

-Breaking up large estates in to many owner- operator farms thus redistributes political power as much as it changes economic opportunity. Redistribution accelerates development when it is augmented with support services.

-***2.5 Changing the conditions of tenancy*** -Although ownership of the land they cultivate is the goal of most farmers, tenancy can play a constructive role in agricultural development. It can be a way of making land available to skilful farmers who lack the money to buy enough land for efficient farming.

-It allows such a farmer to put his own money or the funds he can borrow, into implements, tools, draft animals, fertilizers, improved seeds and other supplies.

-For tenancy to be satisfactory, it must (1) involve a reasonable rented and (2) insure security of tenure.

-3. The farm Business- Each farm operator, on his farm, carries on a farm Business. It is a business because each *farmers purpose* is *economic*: to produce products either for sale or for use by his family.

- some say farming is not a business but it is a way of life. It is true that farming is a way of life that production is mixed up with consumption, that social satisfaction are built in to the way farmers of many society go about their daily tasks . At the same time, it is important to recognize that farming is a business in so far as production is concerned.

-Farming involves more and more buying and selling as agricultural development proceeds. But even in a largely subsistence agriculture the better farmers think like other business men and learning to think in this way is a part of development.

-***3.1 Inputs and outputs*** Farm production uses inputs (all the things put in to the production process: the use of the land, the labor of the farmers and his family and any workers he may hire, his mental effort in planning, the seed for his crops, fertilizer, insecticide, tractors, etc) to produce outputs (the crop and livestock products the farm produces)

-***3.2 Costs and Returns*** Inputs and outputs involve cost and returns. In primitive agriculture the chief cost is the effort- the hard work and the skill- of the farmer and his family. In a subsistence agriculture the chief return is the value of the products in providing the family's own living.
-As agriculture becomes more highly developed, more and more of the costs are cash cost and more and more of the returns are in money. Every farmer thinks about cost returns.
-His consideration of costs includes the efforts he must put forth-
-***cash costs*** of the equipment and supplies he uses;
-Non-cash costs -allowance for risks of crop failure, for the possibility of low market prices and at harvest time, and for uncertainty regarding the effectiveness of new methods he is considering adopting.
-Takes in to account the disapproval of family, friends, or neighbors for departing from established patterns of cultivation, or from social traditional of what it is "proper" for him to do.
-***Returns includes*** food and other farm product used by his family, the money received for products sold, and the value of goods and services that may be obtained by exchange with neighbors, also he takes in to account his family's or his neighbors" admiration for his skill
- **4. Farm Enterprise** Most farm produce a variety of products. In some areas the margin of returns over cost per one crop is greater than any other crop.
-In most places the soil and climate, efficient use of labor, family need, and market conditions make it advantageous to each farmer to grow several different crops and often also to keep one or more kinds of livestock. It is customary to speck these different kinds of production as a farm "enterprise".
-Thus a ***farm business*** , for example, that combines the cultivation of maize, sugar cane, wheat, and fruit with the tending of poultry and milk cattle is said to include ***six farm enterprises*** .

-5. **Cropping Patterns** Farmers select individual enterprise by considering their relation one to the other. Different crops have different growing seasons, make different demands on plant food nutrients from the soil, and require different amounts of attention at different times of the year.
- Enterprise combinations are full of "joint products" and "joint costs". Wheat grown for the grain produces straw used for feeding or bedding livestock. Fertilizer applied one year to a crop of wheat may remain in the soil to increase the yield of a sorghum crop is the following year. The manure from livestock may be used to fertilize crop land.
-the several enterprises included in a particular farm business are rarely separable in an accounting sense. Each farmer tries to work out the best combination of crop and livestock enterprise for his own farm business, considering the land, labor and other resources available to him.
-6. Complexity of Each farm Business.
-All farmers think is terms of costs and returns but some of this are in money terms while others are related to the position and responsibilities of each farmer in his community.
-If the farm family consumes most of the product of its farm, its need for the foods in its customary diets and for other products of the farm will be the major factor in its choices of farm enterprise.

-To the extent that products are grown for sale, the choice of enterprise will be influenced by the accessibility of markets for different products and by their relative market prices.

-6.1 Differences Between size of Farm and size of farm Business Factors that determine the size of the farm business it supports are (a) The ***size of a farm*** in hectares (b) the ***amount of labor applied*** to the various enterprises on the farm (c) ***amount of supplies and equipment purchased*** to be used in the farming operation

-6.2 "***Intensive***" crops are those like vegetables that require large amounts of labour, fertilizer, and frequently, irrigation.

-6.3 "***Extensive***" crops are those like pasture grass at some cereal crops that when not irrigated, require less labor per hectare.

-a large farm may support a relatively small farm business if it is devoted only to extensive crops and pasture, or if some of it is not used at all. . Likewise, a relatively large farm business can be developed on a small farm by combining several intensive crops and livestock enterprises on it.

-Suppose you have 4 rice farms, each one ha in size (**A,B,C,D**). On **A**, local seeds is broadcasted. No more. In **B-** improved variety is row planted accompanied with spacing, fertilizer, disease control etc. In **C**, in addition to rice growing like in **B**, fish pond for fish harvesting is established. In **D**. all is land put to rice like in **B**, but some plot used to built pens for growing chickens, and has a batch of broilers ready to market every two weeks.

-All four of these **farms** are of the same size (one ha.), but the farm business are all different in size. The farm business on farm **B** is larger than on farm **A**, farm **C** > **B**, and farm **D** is the largest of all.

-7. **Implication for Agricultural Development** The fact that farming is a business has important implications for agricultural development

-7.1. Cost and returns are important. While the production process of farming is biological-the growth process of plants and animals- the farmer is more interested in the relationship between ***costs and returns*** than he is in the physical size of the harvest alone.

-Any intervention recommended to farmer, he asks not only "will it be effective" but also "will it pay me to used it"

-7.2. farmers think in terms of cropping systems In considering whether or not to substitute one crop for another, each farmer considers how it will fit in with his other crops.

-7.3. Large farm business can be developed on small farms. It is possible to have relatively large farm business on relatively small farms by growing intensive crops or by raising poultry on swine or keeping dairy cattle. Considerable agricultural development can often be achieved by increasing the size of farm business without increasing the size of farm, praticulary in region of small farms, dense population, and limited industrial employment opportunities.

-7.4.Different types of farm business require different programs for development . -The wide variations in sizes of farms and types of cropping systems requires that the content of programs for developments vary from locally to locally if they are to be most effective.

Wrap-up discussion question/activities (10Min)

-Distinguish between farm and farm business

(please note that at the end of the week you will be given next weeks ;assigment)
(stop)

Session 8th 9th 10th hr

Topic: Farm Records

Session learning objective

-Enables to understand the concept, purpose and objectives of farm record and bookkeeping
-Gives the kinds of records known and methods of farm book keeping, especially cash records, the production, labor machinery live animals and supplies
-Provides and insight on the valuation of assets and allowance for deprecation
-Provides examples valuation of different corners of the world as an illustration
-Illustrates the various forms of farm records

Reading Assignment Discussion (10 min)

-Differentiate the type of depreciation methods and their relevance to agriculture
-What types of farm records or bookkeeping are required for a small irrigation projects
-Design a form for the following three enterprises.A. Poultry farm B. Wheat growing farms C. pine apple production farms ;

Reading Text

W.Y. yang, **Methods Of Farm Management Investigation For Improving Farm Productivity (revised edition**)" FAO, Agricultural Series no. 11, Fao Agricultural Development paper no.80, UN, Rome, Italy; 1980 ch.1 & 2-page 6-51

Synopsis of lecture (bullet

I-Farm bookkeeping/records

-Primary motive of ***farm bookkeeping*** is to record all transactions which might other wise be for gotten
-***Record and books*** have became an important source of information for compiling national statistics on agricultural productions, marketing, prices, costs, income, and expenses as a basis of formulating government polices, and also for proper decision to be made by farmers.
-The most important ***objectives of farm bookkeeping and financial accounting*** should be to appraise the financial positions of the farm business and to determine its gains and losses during a given period, thus providing the basis of farm diagnosis and planning for higher efficiency and greater profit.
-most comprehensive system of farm book keeping and accounting was developed by professor E.Laur, of the secretariat of the Swiss Farmers' Union, about 1900, after a successful trial with ten cooperative farmers.
-The Swiss system was later adopted by several other countries in Europe, and many people throughout the world consider it to be a model system for farm accounting.

-There are over 500 farm records handled by some institution. We will illustrate some of the farm records below.

1.Kinds of records and methods of farm bookkeeping

-The kind and comprehensiveness of the records and books to be kept depend on the size and organization of the farm, the intelligence, education and interest of the farmer, and the amount of assistance he can get from extension workers or officers responsible for the farm bookkeeping and accounting in the area.

-The records and books kept by farmers should at least provide as much information as is required in conventional farm business survey, including a) the ***quantities and values of various assets*** b) the ***inventory changes*** c)the ***source and amount of receipts*** d) the ***purpose and amount of payments***

-the first task in farm bookkeeping and account is the ***taking of an inventory and the preparation of a balance sheet*** which shows the financial conditions and structure of the farm business ***at the beginning of the accounting period*** .

-***Inventory taking*** involves such process as counting, measuring and evaluating all the tangible assets on the farm.

-Among these **tangible assets** are **a) land**; b***) land improvement, improving buildings, drainage and irrigation works, hedges, fences***; c) ***orchard trees*** ; d) ***draft and productive animals*** e) ***farm products and purchased supplies*** store; f) ***equipment and machinery*** g) also involves ascertaining all the intangible assets such as - ***accounts and notes receivable and prepaid expense*** (for example, ***debts owed*** by the farmer such as accounts and notes , payable loans and mortgages, farmers own share of capital investment in the farm business

-**Cash receipts and Payments**-Among all the records and books to be kept the first is the ***cash receipts and payment*** records.

-A ***cash record*** will a) Provide information on cash transactions and net cash balance for periodic checks against the actual cash –in-hand and in the bank. b) supply most of the information required for determining income and expenses c) Furnish the basis for making cash planning and budgeting in the future.

-A ***cash book or record*** may be made up of two separate columns: one for entries of cash receipts and the other for those of payment, in addition to the columns for entering date and explanations of the particulars of the transactions-

-The sum of the various columns in a cash receipts book show not only the total amount of cash received in the period but also the amount of cash received from each of the important sources.

-Like wise the sum in the cash payment book show separately the amount of cash paid for each particular purpose during the period.

2. The production and the use of disposal of farm products- they show

i. the amount and kinds of crops harvested, sold, used on farms as seeds and feeds, paid to the land lords as rents, paid to the labours as wages , and consumed by the house holds

ii.entries are also made for animals, animal products and processed products

3. labor records should be kept daily, or weekly , on the kind and amount of work performed by each labour and draft animals, and the payment of wages for hired labours

4. **Machinery**-if tractors and other expensive equipment are used, detailed records on their use, performance, consumption of fuel and oil , and repairs should be carefully kept
5. **Live animals**-On a poultry, dairy a pig farms, records of feeds and feeding should be kept in addition in to the production records.

-Illustration of forms of records may be shown here; however note that books and records used in various countries may differ so much from each other in size, form, structure, and system that it is hard to decide which set of record forms would have the widest applications.
-Forms of record must be designed based on the experience, and knowledge of local people. Similarly books may be kept by either the double entry or the single entry method.
-II. Valuation of assets and allowance for depreciation -The main difficulty in farm accounting is in valuing right the farm assets, and in determining the depreciation allowances for the appraisal of the farms financial condition and of ascertaining its financial success in the fiscal period.
-the method of valuation must be rationally chosen and uniformly followed every year, so that financial statement prepared in the different periods represent true conditions and can be accurately compared .inter-farm comparisons are invariably made by research and extension agencies, and thus it is desirable that all farmers in the area should follow the same standards of valuation.
-valuations may be made
1. Based on cost of the purchase- feeds, fertilizer and seed and other unused supplies which have been purchased can be evaluated accordingly to the cost of the purchase.
2 .market price-farm products in the store can be evaluated according to the market price less the cost of marketing.
3. cost of growing- the value of crops which are not for sale, or which are still growing and the field , is usually determined on the basis of the cost of growing them
4 .replacement value- meat animals for sale and feeder animals per fattening can be evaluated according to the market value less the marketing costs. However, breeding and other productive animals can be evaluated according to their current replacement value, or according to their replacement value or according to standard values determined by the accounting agencies.
5. current worth to the owner –land and buildings should be evaluated on the basis of their current worth to the farmer .The prices that the farmer is willing to pay for similar land and buildings should be taken as their value.
III. Depreciation: - Depreciation allowance must be made for farm asset which have as useful life of more than one year, but which loose their value from wear and tear or obsolescence or exposure to weather, so that the original costs are gradually written off within the course of their useful life.
-Farm assets for which depreciation allowance need to be determined include breeding and draft animals , perennial orchard trees, equipment and machinery, buildings, and land improvement, such as drainages and irrigation works, hedges and fences.
-There are several methods of calculating depreciation allowance. Although most Economists and accountant disagree, one method is ***to revalue all assets periodically according to the market and replacement values***. The conventional method of

calculating the depreciation charges is to write off a fixed proportion of the book value of the various assets according to the estimated length of their useful life.

-One method is ***straight line method***. Here the original cost of the asset (cost of purchase plus installments) less salvage, scrap or trade-in value is divided by its estimated useful life in years. The quotient thus obtained represents the annual depreciation cost.

Table 1- useful life and depreciation value for California farm assets.

Asset	Productive life Range	Usual	Rate of depreciation
Orchards (approximate age of commercial bearings)			
Apple trees (12 yrs)	20-40	30	3
Cherry trees (9 years)	20-35	30	3
Grape fruit trees (5 Years)	10-30	25	4
Irrigated pasture and lachino clover (1 Years)	5-20	10	10
Lemon trees (5 yrs)	25-35	30	3
Orange trees (7 years)	25-35	30	3
Peach trees (5 years)	15-25	20	5
Plum trees (8 years)	15-30	20	5
Prune trees (10 years)	15-30	25	4
Buildings and improvements			
Barns and other farm building	20-60	30	3
Dwellings	30-50	40	3
Fences	10-30	20	5
Wells	10-30	20	5
Irrigation pumps and motors	10-25	15	7
Irrigation pipe line, concrete	20-50	30	3
Farm machinery and equipment Tillage and similar	5-20	10	10
implements Harvesters, diggers,	10-30	15	7
et	5-15	10	10
Milking, machines, refrigerator			
Field power and transportation units	4-12	7	15
Automobile and trucks	8-12	10	10
Tractors, 6, 000, to 12,000 hr of use	10-20	15	7
Trailors			

❖ Source shultis, Arthur, records and accounts for California farmers. California Agricultural extension services, circu.124, august 1942, University of California, Berkely, p.8.

Table 2- useful life, depreciation rate and percentage of value recoverable at the end of useful life of farm animals in Japan.

Type of animals	**Period before Serviceable age**	**Useful life**	**Value recoverable at end of useful life in % full value**	**Rate of Depreciation percentage**
Cattle - farm use	**Years**	6	50	8.3
Bovine - hauling	2	5	40	12.0
- Reproduction- meat, draft	4	5	50	10.0
Dairy	2	6	20	13.3
- breeding – meat, draft	2	4	20	20.0
dairy	2	4	10	22.5
	2			
Horse				
- farm use		8	30	8.7
- hauling	3	6	20	13.3
- reproduction	4	7	20	11.4
- breeding	4	6	10	15.0
- racing	4	4	20	20.0
	2			
Sheep - general purpose		5	10	18.0
- breeding	2	3	20	26.0
	2			
Goat - General purpose		5	10	18.0
- breeding	2	3	20	26.7
	2			
Pig - breeding		3	10	30.0
	10 month			

Source: School of agriculture, K Yoto University, farm account books
(11) April 1954, keyoto, Japan,

Table 3 - Useful life and Rates of Depreciation of Punjab (Pakistan) farm assets.

Assets	**Useful life**	**Annual rate of depreciation(%)**
Bullocks	8 years	12
Buildings		
Brick	40	2.5
Mud	20	5
Cane crushers	10	10
Carts	8	12
Fodder cutters	5	20
improved plows	10	10
Wells	33	3

Some farm Records form

-I. Farm land

Here Included are operated land owned and land rented and mortgaged from others but exclude land rented and mortgaged to others

1. **Areas of major uses of farmland**

	Areas of farm land (unit)	
	Owned	Rented.
Uses of farm land		
Annual crops		

Pasture		
Orchard		
Productive water area (fish ponds)		
Land is farm stead (haves, barn, yard,)		
hand in roads, path, ditches, canals,		
wells, fences) etc		
Other		
Total land in farm ……	_	

II. Land and related capital investment

give the estimated value of each type of investment, excluding land and buildings rented to others (Count of value-)

	Beginning of the year			**End of the year**		
Kind of investment	**Omit of retain**		**Total**	**Omit of at the begin**		**Total**
Land	Farmers share	Land lords share		Farmers share	Land lords share	
Buildings						
Drainage works						
Irrigation works						
Fences, hedges, etc						
Trees (fruit, etc)						
Crops in field						
Others						
Total						

-*III. Crops*

Including field crops, vegetables, trees and bush products, such as fruits, tea and wood, rotated pasture and green manure crops) etc..

-IV. Livestock inventory

Including all draft and productive animals, enter young and adults separately excluding the landlords

Kinds of livestock	Total	
	no	value

-V. Livestock products

Including milks, eggs, hides and skins, feathers, honey, silk, cocoons, meat, fish, manure and all other livestock products the value of which is not included in the preceding table

Kinds of products	Production		Sold or to be sold			House Hold use		Quantity used on the farm	Quantity of wages paid in kind
	unit	quantity	quantity	price	value	quantity	value		

-VI. Farm machinery, equipments, tools

Including all implements, vehicles, harnesses, tractors, and other farm machinery having useful life's longer than a year

	Beginning of the year						**End of the year**					
Kind	**Farmers**		**Rented**		**Total**		**Farmers**		**Rented**		**Total**	
	No	Value	No	Value	No	Value	No	Value	No	Value	No	value
All others												
Total												

-Vii. Inventories And Purchases of Farm Supplies

Give the inventories at the beginning and end of the year on: seeds, tubers, feed, grains, hey, silage, fertilizers, manure, lime, insecticide, crops, ropes, wires, gasoline, oils, etc, whether produced or purchased and the amount of supplies purchased during the year. Do not include anything previously stated as sold or to be sold , or used by house hold or rent to land lords. Do not make a special effort to collect information on any item which does not materially affect annual income and expenses.

Kind	**Beginning of the year**			**Purchases: during the year**			**End of the year**		
	Quantity (indicate	Value	Rant share	Quantity	Value	Rent share (%)	Quantity	value	Rents share (%)

	unit)		(%)						
Total									

1. If during the year, any of the supplies were used other than on this farm state separately the kind, use (such as sold to neighbor, etc) and values involved.
2. if, during the year, any disasters occurred, state the kind and also the quality and value of seeds, feeds, and other supply destroyed

VIII. Farmer's miscellaneous income

Including all incomes in either cash or kind received by the farmer during the year other than those given under previous tables.

1. Work other than on his farm by the farmer and his households members:

Person	**Kinds of work**	**Place of work**	**Days and month of work**	**Net income**

2 .hire of work animals to other persons

Kind of animal	**No of animals**	**Kind of work**	**Days of work**	**Net income**
		Donkey-plus water		
		Camel –for salt		
		Oxen – plowing		
		Horse - for riding		

3 Hire of machinery, equipment, etc., to other persons

Kind of Equipment	No hired out	Places of work	Days of work	Net income

4.Rent from land and buildings rented to other persons:

Kinds of land or Buildings	Amount rented out (indicate unit)	Reason Rented out	Net income

IX. Farm labour

1. ***Unpaid family labor*** doing farm work on this farm during the year.

Family labor	age	Kind of form work performed	Actual number of days and months of work on the form	Estimated cost, including board, lodging and other personal supplies for some kind of amount of labor of hired
Farmer				
Total				

-2. **Hired labor for farm**

Kinds of labor	Age	Actual number of days or month of work on the farm	Wage paid in cash or kind	Estimated cost of board, lodging,and other items supplied to laborers	Total cost

Wrap-up discussion question/activities (10Min)

-Are there any differences in design agricultural record forms from country to country? Why? Explain

(Please note that at the end of the week you will be given next weeks ;assignment)

Module III Farm Management and Production Economics

Session 11th -13th hr

Topic-Production function in crops, livestock and business

Session learning objective
-to illustrate the application and use of microeconomics production theory in farm management
-to show the application of statistics and/or regression coefficient to estimate in optimum utilization of resources in agriculture
-to give insight on use of and need for production function estimate
-to realize the need for interdisciplinary cooperation in production function estimates
-to show physical production function, industry function, and firms function
-to look at contributors of the various of types of production function

Reading Assignment discussion (10 min)
-describe the importance of or use of production function
-Why is inter disciplinary cooperation in production function estmates is necessary
-Explain Von Liebigs' "law of the Minimum"
-Differentiate Cobb-Douglass production with that of Spillman

Reading Text
- Earl O-Heady- **Agricultural production Function,** Iowa State University Press, Ames, Iowa, Fifth Print, 1972 chapter 1 page 1-30
-Ellis, F. (1988) **Peasant Economics: Farm Household and Agrarian Development,** 2nd Ed, Cambridge, University Press, chapter 1, page 17-44

Synopsis of lecture (bullet)(30 min)

Production function

1.Use of production function concept
-The **production function** is a concept in physical and biological sciences. It was largely developed and until recently used mainly by economists. It has grown because of the following reason.
-A-is important in economic development and in determining the extent to which national products can be increased from given resources stocks,
-B-The magnitude of production coefficients serves as the base for determining optimum patterns of international or interregional trade.
-C-The concept is basic to certain theories in the functional distribution of income.

-D-The production function provides half or one of two general categories of the data needed in determining or specifying the use of resources and the patterns of output which maximize firm,s profits.
-In many cases research workers in biological fields have been concerned only with estimating with output from a specific quantity of new material which serves as an innovation. For example, fertilizer rates recommended to farmers, based on a few point estimates, have not always been as high as those which would maximize profits in the classical sense of a farm operating with unlimited capital under static condition.
-There are many biological and physical areas, where continuous relationships are involved and the data lend themselves to formal production function analysis. In many of those areas recommendation to farmers could be made with greater economic meaning if the experimental design and statistical analysis were a form to allow prediction of the production functions involved.

2.Need for production function research

-a nation such as Ethiopia may have limited facilities for producing or purchasing fertilizer materials. With a given amount of fertilizer for annual allocation to the agriculture, how much should be distributed to various soils, geographic and climatic areas?
-If the goal is to maximize the food product available from limited fertilizer resources, production function derived for major regions and crops with an indication of marginal coefficients, can provide a basis or guide for attaining the goal.
-Similarly, the same type of information can be used during wartime or during any other emergency period when material shortage exist.
-With a passage of time, a greater knowledge level of farmers, and an increased commercialization of agriculture, there is increased need for experimental deigns and research in biological field, which lend themselves to estimation of production function.
-Data can then be better adopted for economic interpretation and recommendation. An increasing numbers of farmers wish to use fertilizer, feed, and similar resources in a manner to approach formal agronomic optima.
-Formal estimation of production functions allows derivation of marginal products, physical maximal or minima, isoquants, isoclines, marginal rate of substitution, and other quantities which can not be computed from experiments which imply discrete data and which are designed only to provide point estimates.
-production function analysis has scientific as well as practical importance. Wherever biological or physical relationships of nature are of continuous functional form it would appear that the interest of even pure science would be that of estimating them in this manner.
-The amount of resources devoted to estimating farm and industry production functions is much smaller than that devoted to technical function. The method is only one of many for providing knowledge of agricultural structure and the foundation on which choices and decision can be based.
-Estimating physical quantities and relationships does have some uses in assessing resources productivity in agriculture and for decision making by individual farmers and policy administrators.

-3.**Interdisciplinary co-operation in production function estimates**

_Most of the formal production function research completed to date has resulted from-cooperative efforts among scientist in physical and economic fields.
-Cooperative work on production function among physical scientist and economists, in certain university /institution could be on an informal basis between individuals done based on mutual trust, or on the basis of detailed and formal inter-departmental agreements.
-An important element of the success has hinged on the ability and interests of the physical scientists involved.
-3.1The first requirement for the successful cooperative research is an understanding by the physical scientist of the analytical models which thus far have been emphasized in economics.
-3.2 The person involved need to be genuinely interested in the investigation. The real stimulus for scientific integration must come from the individual research workers. They must see the need for the prospective product.
-3.3 The people involved must not be of the "lone-wolf" type. Cooperative research requires that some people "run in packs"
-3.4 A fourth requirement is scientific objectivity. One scientist must not have a special interest in one kind of findings. Result; whether negative or positive to the causes of one scientist should be accepted objectively by both. If each wants to prove his predetermined notion, he may not be willing to accept out comes in terms of probabilities.
-3.5 A fifth requirements is to establish a satisfactory division of labour. the largest input of time and experimental funds is in conducting the experiment or\and the analysis of the data is more time consuming. So resources must be allocated properly.
-3.6 A final requirement for successful cooperative research is that the objective of the two research workers be sufficiently complementary to allow for an integrated approach.

4.Physical production function
-We first review studies relating to physical production function of technical units in agriculture.
-Just as Von Liebig's "***law of the minimum***" was the first attempt to define the ***fundamental relationship between fertilizer or nutrients input and crop yields***.
-He believed that crop yield were proportional to the amount of nutrients supplied to or provided from the soil , and that when all soil nutrients are present in sufficient supply addition of one or more would not increase yield . Each nutrient would serve as a limitational factors to the others. In general, this type of crop production function has been disproved.
-However, as data presented later, most crop production functions probably have a "Von Liebig point" where all nutrients are limitational and addition of anyone will not increase yield.
-Baule suggested that Von Liebigs, ***law of the minimum*** supposed that plants took up nutrients only in a given ratio and that yield would vary directly with the quantity of nutrients available in smallest supply.
-Bon dorff and Plessing interpreted his law as represented by the algebraic form.
-4.1.Y = ax Where **Y** is yield response, **x** is the quantity of nutrients, and **a** is the constant or coefficients defining the transformation ratio. Boresch proposed Von Liebig,s law like represented as:

-4.2.Y = C + ax Where **Y** is a total yield **C** is a yield level in absence of application of **x**, the nutrient added. Extension of these concepts to more than one nutrients would provide, in the case of equalities 4.1, the function $\mathbf{Y= ax_1 x_2 x_3}$ for three nutrients and yields would be proportional to input of anyone fertilizer resources. Yield would be zero in absence of any one.

-The first attempt to define the algebraic nature of the fertilizer crop production function was that of Mitscherlich in 1909. He perhaps was the first agriculturalist to suggest a non linear production function relating nutrient input and crops output. With the aid of Baule, a mathematician he proposed the equation.

-4.3.Log A - Log (A-Y) = CX To explain fertilizer response allowing diminishing marginal productivity.

-In this equation .**A** is total yield when the nutrient, **X**, is not deficient (i.e, **A** is the maximum yield attainable from addition of **X**) and **C** is a proportionality constant, defining the rate at which marginal yield decline.

-Mitscherlich proposed the coefficient **C** was a constant for all crops, unaffected by type of crop, climate or other environment factors.

-Mitscherlich made adaptation to allow negative marginal products, or diminishing total yields. This equation can be stated as

-4.4 $\mathbf{Y= (1-10^{-cx})(10^{-kx}{}_2)(10^{C})}$ Where **k** is a "damage factor" due to excessive magnitude of **x.**

-Working independently, Spillman developed an exponential yield equation similar to that of Mitscherlich. In main form, Spillman's total yield equation is

-4.5 $\mathbf{Y= M-AR^{x}}$ Where **M** is the maximum total yield attainable by increasing the nutrient input **x**, **A** is a constant defining the maximum response (the sum of marginal yield) attainable from use of **x**, and **R** is the coefficient defining the ratio by which marginal productivity of **x** declines.

-It was believed that the constants in the production function varied with environmental condition. In the above equation, total attainable output can be defined as **M= yo +y** where **yo** is total yield when **x**= 0 and **y** is the addition to yield corresponding to various non zero values of **x**.

-Hence we can define the out put forth coming in the absence of the variable nutrients as **yo= M-A** while the addition to yield or response is

-4.6 $\mathbf{Y= A(1-R^{x})}$

Total yield is $\mathbf{Y= yo+y = M-A+A(1-R^{x}) = M-AR^{x}}$,

The quantity indicated in the equation 1.5. The term $\mathbf{1-R^{x}}$ can be defined as a "percentage sufficiency" quantity. If **x** is zero, response also will be zero. As **x** increases in magnitude, the fraction **1-Rx,** or the percentage represented by it declines and the response approaches the mathematical limit, **A**.

-4.7 $\mathbf{Y= A(1-R^{x})(1-R^{z}}$ }(**-spillman**, based on previous person work, developed this)

-Where **y** is output from variable inputs, **A** is the maximum increase from use of variable resources, **R** is the ratio defining marginal products, with the unit of variables defined to make **R=0.8**, and **x** and **z** are quantities of two variable input.

-For this equation, the variable inputs serve as limitational factors at zero magnitude either, since $\mathbf{1-R^{o} = 0}$. Again, the function allows for diminishing marginal productivity of any resources but does not allow for negative marginal product; the resulting surface approaching a height asymptotic to **A**.

-4.8 Briggs suggested the use of the hyperbola function of the general form

$$Y = \frac{(x+b)E}{x+b+h}$$

-Where **E** is the maximum yield, **b** is the quantity of **x** initially in the soil, and **h** is the optimal supply of the input.

-Some what similar hyperbolic –type equation were suggested by **Boresch, Balmukand**, **Baule and Bunderf**.

- the above represent the main early concepts of the algebraic nature of crop response to fertilizer.

-Final conclusion on fertilizer response must be based on a series of experiments conducted in different years, on different crops, and under varying farm and soil situation.

-The function used for certain of the estimates was $y = yo+d(1-10^{-kx})$, a modification of the Mitscherlick form, where **yo** is yield with out fertilizer, **d** is the limit in response, **x** is the amount of nutrient applied, and **k** is a constant value for each nutrient.

-4.9 $W = 588\ (.0097)^{.9923A}$ Where **W** is hog weight in pounds and **A** is age in days from birth.

-The estimates derived in this study also were useful for war time guides and policies relative to optimum marketing weights for hogs, and hence, for structuring of administered price differential for hogs of varying weights.

-The single- variable function derived, adoption of the Spillman function, were

-4.10 Calves: $W = 1.446\text{-}1{,}049e^{-.00026f}$

-4.11 yearlings: $W = 1{,}446\text{-}805e^{-.00028f}$

-4.12 2 year $W = 1{,}446\text{-}610e^{-.00037f}$

-Where **W** is live weights in pounds after the start of the feeding period, **e** is the base of the natural system of logarithms, and **f** is feed intake per animal measured as pounds of total digestible nutrients.

-5. Industry Function

-Wicksell indicated that agricultural output was clearly a mathematical function of the quantities of labor, land, and capital used and if these are expressed respectively as **a, b**, and **c**, with production per annum indicated as **p**, the production function can be expressed as

-5.1 $P = f(a,b,c)$

- he noted that this function is homogenous of first degree, denoting constant returns to scale. Hence, if input of all factors is doubled, it becomes $f(2a,2b,2c| =2p\}$ and output also is doubled.

- the equation which has came to be known as the Cobb-Douglass functions traces to Wicksell. He stated, in a footnote, the function as

-5.2 $P = a^{\sigma}b^{\beta}C^{r}$ and as in the earlier attempts of Douglass, said that σ, β, and r should sum to 1.0.

While the first general hypothesis about the algebraic nature of an industry production function was proposed for agriculture, the first empirical attempt was for non-farm

industries. Cobb- Donglass applied a function similar to Wicksell's to data for American manufacturing industries over the period 1899-1922. Evidently, this was the first formal empirical production function fitted to time series data. The function fitted was of the form

-5.3 $\mathbf{P^1 = bL^kC^{1-k}}$

-Where $\mathbf{P^1}$ was the predicted index of manufacturing output over the period, **L** was the index of employment in manufacturing industries, and **C** was the index of fixed capital in industry.

-The function derived from the time series data was

-5.4 $\mathbf{P^1 = 1.01L^{.75}\ C^{.25}}$ Cobb and Douglass computed the marginal productivity of capital and labor which are respectively $\mathbf{.25\ PC^{-1}}$ and $\mathbf{.75PL^{-11}}$. They used these quantities to impute the share of the actual total product to labor and capital during the period studied.

-On the basis of these quantities, they imputed the total product to capital and labour in the proportion of **0.25 p and 0.75p** ,respectively , where **p** is the actual index of production in any one year.

-The annual quantities so imputed from the empirical production function then were compared with estimated shares of the total manufacturing product actually distributed to labor and capital over the period.

-The value of **R**, the multiple correlation coefficient, for the function with these elasticity's was **0.97**.

-Douglass and his associates used time series data to estimate several industry production function of the form of equation **5.3** where the sum of the exponents are forced to unity. --they were interested in the condition of equation **5.5** where the marginal products of labour and capital, $\frac{dp}{dL}$ and $\frac{dp}{dc}$ respectively,

5.5 $P = \frac{dp}{dL} .L + \frac{dp}{dc} . C$

-Multiplied by the quantities of labor and capital, L and C, would allow a sum equal to the total product, P. The following values were obtained for other sets of time series data.

Country and period	b	k	1-k
Massachusetts (1890-1926)	1.007	.74	.26
Victoria (1902-1929)	-	.71	.29
New South Wales	1.018	.65	.25
New Zealand	-	.52	.48

-In the above findings the data for New south Wales was for the period 1901-1971, where as for New Zealand it was for the years 1915-35.

-In an article published in 1936, Edelberg concerned himself with a some what similar type of function in relation to time series data for industry. The function he discussed was

5.6 $\mathbf{P = cs^{\sigma} X^b L^r}$

-Where L and X were respectively the rate at which land and labor are applied in production, **s** was the time or period of production and **P** was the rate of production.

-Capital letters were used to denote quantities for the economy although he indicated that firm condition might be represented by some algebraic form and the same variables denoted by **p, s,** and **1**.
-He obtained the following empirical functions over the period 1850-1910 for great Britain and the United States where, like Cobb and Douglas, he assumed the function to have constant returns to scale in respect

5.7 U.K $\mathbf{P = cs^{.33}L^{.07}\ X^{.93}}$
5.8 U.S $\mathbf{P = cs^{.32}L^{.09}\ X^{.91}}$
To L and X but not in respective **s**
-Douglas and associates then relaxed the restraint that the sum of the elasticity's in the production function should sum to unity and employed, at the suggestion of Dur and, the function.

5.9 $\mathbf{P = bL^kC^j}$
-Where **k** and **j** could take any value. The resulting power function, which is linear in logs, has commonly come to be known as the Cobb- Douglass function. It has been applied in numerous production function studies for technical units and firms of agriculture

6.Firms Function
-Perhaps the earliest production function study representative of estimates for farm firms was published by K. Kamiya of Tokyo University in 1941.
-He analyzed data from a 1939 survey of paddy farms in the Toboku and Seinan districts of Japan. The respective Cobb-Douglas functions fitted to these data are
-6.1 $\mathbf{P = 924T^{.73}\ L^{-.07}}$
-6.2 $\mathbf{P = 1.101T^{1.3}\ L^{-.53}}$
-Where **P** is receipts from rice production measured in yen (after deduction of expenses for fertilizers, seed and other material), **T** is land area measure in Choi and **L** is labor in days.
-Data of both districts resulted in coefficients for labor which denote negative marginal productivities.
-Heady derived production functions for 1939 random samples of 738 lowa farms.
-Functions were derived both for types of farms and areas of the state. In all cases the inputs were land, labor, power, and equipment, livestock, and feed, and operating expanses, all measured in dolars. Output was measured in dollar value of product.

-A Cobb-Donglass function with out the restraints of constant returns to scale was employed. The computed elasticity are shown below.

Farm group	land	labor	equipment	livestock and feed	miscellaneous operating	sum of elasticity
North east dairy	.2081	-.0449	.0871	.6136	.0223	.8862
Cash grain	.3425	.1131	.0757	.4115	.0174	.9502
Crop	.2412	-.0748	.0761	.5294	.0166	.9381
Hog	.0691	.0209	.0965	.7449	.0343	.9657

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-
-

All farms	.2316	.0282	.0844	.4767	.0317	.8526

-Tinter conducted an industry study for American agriculture for the period 1920-41. In contrast to the farm functions based on time series data cited above, his was on industry studies.
-It was based on time serious data and paralleled the non-farm industry studies of Douglas. The derived function was

6.3 $\mathbf{X_1 = -.187 + 1.698X_2 + .813X_3 + .007X_4}$

-Where the variables are measured in logarithms with $\mathbf{X_1}$ being the volume of agriculture and production, X_2 the employment of agriculture X_3 the operating capital of agriculture, and X_4 being time with original 1930-31.
-Tinters obtained an elasticity for labor over twice as great as that for capital. His exponential time trend represents a yearly increase of **1.6** percent due to innovation and related factors

Wrap-up discussion question/activities
Discuss the use and application of production function in Ethiopia

(please note that at the end of the week you will be given next weeks assignment)

Session 14th -16th hr

Topic : Average, marginal, Equi-marginal and optimal condition of resource use and production

Session learning objective

-enables to distinguish farm resources between variable and fixed inputs underling much economic analysis of farm production

-enlighten the principle of diminishing physical and economic returns to agricultural production economics.

-giving the understanding of farm production model yielding three conditions of economic efficiency:

Reading Assignment discussion (10 min)

-Explain and show graphically the least cost combination of inputs.

Reading Text

-Ellis, F. (1988) **Peasant Economics: Farm Household and Agrarian Development,** 2nd Ed, Cambridge, University Press, chapter 10 & 11 , page 199-245

Christopher Ritson, **Agricultural Economics, Principles and Policy**, 1977, Grandad Publishing Limited, chapter 2 the supply of agricultural product page54-115, chapter 4-agirlcural Resource use page 177-222

Martin Upton, **Agricultural Production economics** and resource use, Oxford University Press, 1976, Chapter 1 and chapter 3 page 3-35 and73-129

Synopsis of lecture (bullet)

-1 The Concept of Production Function-revisit : production is the process of conversion of certain inputs in to a consumable form.

-Here we are concerned with ***the factors of production*** or resources. There are four factors of production: :i) ***Land***, ii) ***labour***, iii) ***Capital***, iv) ***Managemen***t or ***Entrepreneurship*** : This is a factor of production that is distinguished from land, labour and capital.

-Factors of production can also be classified as Variable factors of production & Fixed factors of production

-The above distinction refers to the time period with which a decision to alter the quantity used of an input can become effective.

-There are two reasons why an input may be regarded as a fixed factor. First, it is sometimes physically impossible to pursue all the stages required for an input to become involved in the production process in less than a period of years. Second, where the productive life of an input lasts for several years, there may well also be a period of years before a new decision regarding its use is implemented.

-the distinction between the two with agricultural production, the crop year (or for animal production, the life cycle) help us to distinguish a short run for which certain factors of production can be regarded as fixed.

-For example, if at the beginning of a crop year, a farmer decides he wishes to increase output he can increase the quantities used of seed, fertilizer, fuel and certain categories of labour, and thus these can be regarded as variable factors of production. He will probably find it impossible to increase his land area or buildings significantly for the coming

season (this might well involve moving to another farm); nor will he find it easy to increase large capital items.
-Even where it is feasible to obtain a large item or equipment in time for the coming season his decision on whether or not to do so will be affected by the fact that its productive life will continue in to future crop years.
-Thus items such as land, buildings and machinery are usually regarded as fixed factors of production, and decision affecting the quantity of them used taken with respect to a time period known as the *long run.*
-The fact that agricultural output is to some degree measurable in physical terms means that results observed from experimental data can be used to throw light up on some aspects of the organization of agricultural production function.
-Here we will see the physical relationships between inputs and products in the production process. Assume that a particular agricultural product (A) is produced using only two inputs, X and Y. Both the inputs and the product are perfectly divisible in to very small amounts.
-In symbolic form we can represent the relationship between the maximum obtainable quantities of the products and given quantities of the two inputs as follows:

$$\mathbf{A}=f\mathbf{(X,Y)}$$

Where, **A** is the quantity of product **A** produced per time. X and Y are quantities used respectively of input Y per time period
-This is called the production function of product A. That is the amount produced of A is some function (or is dependent up on) the quantities used of X and Y (which are the independent variables).
For example, a very simple functional relation ship between one product and two inputs could be

$$\mathbf{A=1/2X^{1/2}\ Y^{1/2}}$$

-Which says that out put of products A per time period is equal to one-half of the square root of the amount of input X used multiplied by the square root of the amount of input Y used.
Example: If the **X**=9 units and **Y**=16 units, out put would be ½.3.4=6 units of **A**
-The above type of function is known as Cobb-Douglas production function. we have also many other types such as polynomial functions, quadratic functions, square root functions etc.
Graphically the production function can be expressed as shown below.

Figure 1 The production function
-If the production function starts from the origin we expects no output without input. But in the case of fig.(b) above you can get some output without input (fertilizer)
-The production function can be affected by the type of technology. If you have a better technology then the production function will shift. That is we are producing the same output with less input or we are producing more out put with the same input.
-The relationship between inputs and outputs can also be presented in a tabular form.

Example: Number of workers	Output (in kilogram)
1	a_1
2	a_2
3	a_3
4	a_4
-	-
-	-
n	a_n

-2.The law of diminishing Return: This law states that if input of one factor are increased by successive equal amounts per unit of time while input of other resources are held constant total output increases but beyond some point the resulting output will be smaller and smaller and finally declines.

-This law is important for the selection of methods of production. More generally economic problem are related to this law of diminishing return.

-3. Optimal Conditions for Resource Use and Profitability : We can divide the main input/output characteristics in to three kinds: i) Factor-product relationship ii) Factor-factor relationship, iii) Product-product relationship

-4 Factor-product relationship : This is the relationship between one input and output, with the other input held constant. We can have different relationships like total physical product (**TPP**), average physical product (**APP**), marginal physical product (**MPP**) and elasticity of response.

-*Total physical product (TPP):* the total output at a given level of output. *Averageg physical product (APP):* is the output at a given level of output. If the variable input is $\mathbf{X_1}$ then **APP=TPP/ $\mathbf{X_1}$**

-*Marginal physical product (**MPP**):* this is the additional physical output by one more unit of input. MPP=ΔTPP/ΔInput = ΔTPP/Δ X_1

Elasticity of response: this is the degree of responsiveness of production to a change in input. E_p=ΔTPP/TPP Δ X_1/ X_1 = ΔTPP/TPP * Δ X_1/ X_1 = ΔTPP/ Δ X_1 *X_1/TPP

-E_p=MPP/APP measures the percentage change in output due to a one percent change in the input.

Table 1

Level of input(x1)	Wheat yield (kg) TPP	APP	MPP
0	0	-	-
1	8	8	8
2	20	10	12
3	36	12	16
4	48	12	12
5	55	11	7
6	60	10	5
7	60	8.6	0
8	56	7	-4

We can consider two important points that are used to classify the production in to steps

-Maximum average physical product and Maximum total physical product

Figure 2 The stages of production

-stage i: this extends up on the maximum value of APP. In this stage, MPP>APP. Therefore $E_p>1$. The efficiency of using the variable resource is increasing. The TPP is increasing at an increasing rate. It means it is recommendable to expand the use of the variable resources so as to increase this production.
-Therefore it is not the rational area of production because you have plenty of fixed resources as compared to the volume of the variable resources.
-stage ii: this is the area between the maximum value of APP to the maximum value of TPP. Both the average and marginal physical product are declining. The MPP<APP. Elasticity of production (Ep) and one ($0< E_p<1$). This stage is the rational area of production
-stage iii: This is the area beyond the point of maximum TPP. Here the Mpp<0. Elasticity of production (E_p) is less than zero, $E_p <0$. This is another irrational area of production.
-The variable input is increased to the extent where the fixed resources will be limiting.

-Production function is important to assess the level of inputs to be used. Given the objective of maximizing profit the manager has to select the levels of inputs to be used. If land and other fixed inputs can be obtained free of cost and if the target is to increase the output per labour used the level of input used will be at a point where average physical product (APP) is maximized. This indicates the greatest efficiency. But in practice land and other fixed inputs require money.
-5. **Cost of Inputs**-we have to consider also the cost of inputs. That is in addition to information on production function we need price of both inputs and outputs in order to determine the level of inputs to be used. Let $\mathbf{P_x}$= unit factor cost, $\mathbf{P_y}$= product price per unit, $\mathbf{MVP_x}$= marginal value product of using the variable input, $\mathbf{MVP_y = MPP_x.P_y}$
-6.**Economic Optimum**-If we have got the above information we can determine the economic optimum. This can be determined by one of the following procedures. 1)At the economic optimum level extra return must be equal to extra cost. That is $MVP_x = P_x$ This implies $MVP_x/P_x = 1$, The value of the marginal product per unit of money spent is unity
2)By definition $MVP_x = MPP. P_y$, $MPP. P_y = P_x$ $MPP = P_x / P_y$
3)$MPP = \Delta Y/\Delta X$. This implies that $\Delta Y/\Delta X = P_x / P_y$
4)If you multiply the equation in number 3 by $P_y * \Delta Y/\Delta X$ then we will get
$P_y = \Delta X/\Delta Y * P_x$
-In a free market individual producers receive constant amount. They cannot affect the market individually. So Py is the marginal revenue (MR). The producer purchases the variable input. At a certain constant price. $\Delta X/\Delta Y * P_x$ is the marginal cost (MC). At the economic optimum level the MR=MC

Table 2 MVP, Factor cost optimum Input level, (P_x=12, P_y=2)

Input level	TPP	MPP	MVP_x	MIC
1	12	-	-	-
2	30	18	36	12
3	44	14	28	12
4	54	10	20	12
5	62	8	16	12
6	68	6	12	12
7	72	4	8	12
8	74	2	4	12

9	72	-2	-4	12
10	68	-4	-8	12

Now the question is to determine the economic optimum level of using the resource.
1) We have said $MVP_x = P_x$ at the optimum, Marginal value product = (MVP) (ΔTotal value product /Δinput level), Where Δtotal value product = ΔTPP. P_y , Marginal input cost = Δinput cost/ Δinput level , Where Δinput cost = Δ P_x . Input level
2) MPP= P_x /P_y = 12/2=6, From (1) and (2) the economic level of input is 6 units.

-7.Change in Variables on **Economic Optimum**: Change in price of inputs, change in price of output and the level of technology can change this economic optimum level
- If the factor price (P_x) increase relative to the product price then the economic optimum will occur at lesser price.
- If P_x falls (gets cheaper) relative to the product price then the economic optimum level will occur at a higher level.
- If the product price increases relative to the factor price then the economic optimum level will occur at a higher level.
- If the product price falls relative to the factor price then economic optimum level will occur at a lower level
- If we have a technologic change with in a given price then MPP will be affectd.

-8. Factor-Factor Relationship (substitution between Inputs)
-This refers to the physical interaction between inputs. Even though the idea of out put response to varying levels of inputs yields some powerful conclusions about resource use in farm production, it does not adequately describe the interaction between inputs for the case of more than one input.
-Any production function relation output to two or more inputs contains the possibility that a given level of out put could be produced with more than one combination of inputs. For example 20 units of wheat might be produced by using 0.5 hectare of land and 5 workers or 1 hectare of land and 3 workers.
-The idea that two or more variable inputs may be combined in different quantities to produce the same output is called the principle of substitution (or the law of variable facto proportions)
-Isoquant: is a locus of all possible combinations of a given pair of alternative inputs, which will produce a given level of output. They are sometimes called ***iso product*** curves. Several such isoquant curves are shown below.

Figure 3 Variable factor proportions-isoquants

-The varying quantities of labour (X_1) and land (X_2) used to produce these given outputs are shown on the horizontal and vertical axis of the graph. Along an isoquant curve the level of output is constant.
-Isoquants have certain general characteristics: :1) They are negatively sloped
2) As they are moving away from the origin, they represent higher level of output
3) They do not intersect each other, 4) They are convex to the origin

-9.The optimum combination of inputs : This refers to the problem of finding the least combination of inputs for a given level of output. So the optimization problem here deals with cost minimization.

-Iso-cost: refers to the different combinations of two inputs having the same total cost. Suppose the price of labour is 10 birr per day and the price of land is 1000 birr per hectare. If the total amount of money to be spent on the two inputs is 10000 birr then the isocost line shows all the different combinations of land and labour which could be purchased for 10000 birr.

Figure 4 Optimum factor proportions

-If all the money is spent on land then it will obtain 10 hectares. If all the money is spent labour then it will purchase 1000 days of labour. The different ***iso-cost*** lines represent different levels of costs.

-The ***slope*** of an isocost line is equal to the ***inverse ratio of input prices*** and it is negative. The slope measures the amount of X_2 (land) that can be sacrificed for a unit increase in X_1 (labour).

-Now the least cost combination of inputs, for a given level of output, occurs at the point of tangency between the isoquant and the isocost line. Any other points to the left or right of this point on the isoquant would clearly lie on a higher isocost line than the one which makes the tangent, and would therefore incur a higher total cost for the same output. At the point of tangency the marginal rate of substitution (slopes of the isoquant) and the inverse ratio of input prices (slope of the isocost) are equal.

-Let us discuss the above concept mathematically. If the production function is given as follows: $\mathbf{Y=f(X_1. X_2)}$, Where Y is the level of outputs , $\mathbf{X_1}$ and $\mathbf{X_2}$ are the level of inputs , Then the marginal physical products can be calculated as follows: $\mathbf{MPP_1=dY/d\ X_1}$ and $\mathbf{MPP_2 =dY/d\ X_2}$ It works out that theinverse ratio of marginal physical products equals the marginal rate of substitution. $\mathbf{MPP_1 /MPP_2=(\ dY/d\ X_1).\ (d\ X_2\ /\ dy)= (d\ X_2\ /\ d\ X_1\ )= MRS_{12}}$

-Therefore the optimum, the least cost, combination of inputs occurs when ***the ratios of marginal physical products to unit costs are the same for all inputs.***

-The least combination of inputs changes either if there is a change in the technology of production or if there is a change in the ratio factor prices.

- Enterprise Choice (The Physical Interaction between Outputs)

-10.Product-product relationship : Here we will consider the combinations of alternative outputs, which can be produced for a given set of resources. The main consideration here is that farm enterprises are likely to compete with each other for a given availability of inputs.

-For example, different annual or perennial crops are grown in pure stands compete with each other for a fixed resource of a given quantity of land. Two crops which ripen in the same month of the year would compete at harvest time for a fixed labour resource, and so on. How ever, not all inputs are necessarily competing for all resources.

-Consider the simplest possible case of two outputs competing for one fixed resources. Let the two crops be **Y1 and Y2**. The variable resource in limited supply is labour (2 people with 300 days of labour available for farm work between them)

-The production possibility frontier (PPF) is a curve that shows all the different combination of outputs $\mathbf{Y_1}$ **and** $\mathbf{Y_2}$ that can be produced with the available resource. It represents the maximum product combinations for a given input level, which is why it is called a frontier.

Figure .5 The production possibility frontier

Note

-The points at which the PPF hits each axis are the maximum quantity of each output, which can be produced with the given amount of labour.

- The slope of the PPF measures the rate at which one output can be substituted for the other given the fixed level of the resource. It is the amount of Y1 on the vertical axis (d Y_1), which can be obtained by giving up unit of Y_2 on the horizontal axis (dY_2). The slope of the PPF is negative since more of Y1 can only be produced at the expense of less Y_2. The slope is called **marginal rate of transformation (MRT**). It measures the increase in Y_1, which results from a small decrease in Y_2.

-The shape of the PPF is concave to the origin. The MRT is expected to increase as more of the input is transferred from one output to the other. As successive units of a single variable input are removed from Y_2 to Y_1, the sacrifice of Y_2 for each individual unit of Y_1 gets larger and larger.

- ***Technical efficiency*** in production requires operation at some pint on PPF. Any point inside this is inefficient in technical terms, either because it represents, less than full employment of the available resource or because it implies a lower efficiency of resource use than could be obtained given the production technology confronting the farmer.

-11.The economic choice of enterprise :The economically optimum choice of enterprises is determined by the ratio of output prices. Figure 6 shows a number of parallel straight lines, which describes the different combinations of Y_1 and Y_2, which yield given levels of total revenue.

-The lines are called ***iso-revenue*** lines. For example the iso-revenue line of birr 1000 represents the different combinations of Y_1 and Y_2 , at a price birr 10 and birr 20 respectively, which will yield a gross income of birr 1000. The ***slope of the iso-revenue*** lines ***equals the inverse ratio of output prices***. It is the number of units of Y_1, which must be sold to earn the same revenue as one unit of Y_1 .

-The ***slope is negative*** because for total revenue to remain constant, increased income from one output is associated with decreased income from the other.

-The ***optimum combination of enterprises*** must lie on the PPF and should represent the maximum total revenue consistent with location on the PPF. This occurs at the point of tangency of an ***iso revenue line*** with the PPF. In the above figure the Optimum combination of Y_1 and Y_2 occurs at point **A**. At the ***point of tangency*** the ***marginal rate of transformation*** dY_1/dY_2 equals the ***inverse price ratio*** of the ***two outputs*** $P(Y_1)/P(Y_2)$.

Figure 6 Optimum choice of enterprise

-We have two production functions :$\mathbf{Y_1=f(X_1)}$ **and** $\mathbf{Y_2=f(X_1)}$, The single variable input $\mathbf{X_1}$ has two marginal physical products. $\mathbf{MPP(Y_1) = dY_1/dX_1}$ and $\mathbf{MPP\ (Y_2)= d\ Y_1/d\ X_1}$,The marginal rate of transformation of output Y_1 in to output Y_2 has already been defined as $\mathbf{MRT_{12} = dY_1/dY_2 = MPP(Y_1)/MPP(Y_2)}$

-This is by substitution from the MPP definitions. Thus the ***marginal rate of transformation*** equals the ***ratio of marginal physical products*** for a given resource between the ***two enterprises*** . Profit is maximized when: $\mathbf{MRT_{12} = P(Y_2)/P(Y_1)}$

Therefore at the optimum point: $\mathbf{MPP(Y_1)/MPP(Y_2)= P(Y_2)/P(Y_1)}$

$\mathbf{MPP(Y_1).\ P(Y_1) = MPP(Y_2).\ P(Y_2)}$

Therefore: $\mathbf{MVP(Y_1)=MVP(Y_2)}$

-The above result says that the optimum choice of enterprise occurs when the marginal value product per unit of a variable resource is equal in both enterprises. This is called the ***principle of equal-marginal returns*** . It says that a variable input should be transferred from one enterprise to another up to the point where the MVP of each unit of the input is equal for both enterprises.

Wrap-up discussion question/activities (10Min)

Show that the production elasticity E_p=MPP/APP

(please note that at the end of the week you will be given next weeks ;assignment)

Module IV Budgeting and Cost analysis

Module V Farm Planning and Enterprise Analysis

Session 25th hr
Topic: Planning and Enterprise analysis
Session learning objective
-Discuss the dimension of planning and budgeting
-gives an insight to approaches to planning
-it elucidates the importance of farm planning and budgeting and the role of farm planning and budgeting

Reading Assignment discussion (10 min)
-Design a format for preparing budget for dairy farm and explain the problems you have confronted

Reading Text
-Abbott J.C and Makeham, J.P (979) **Agricultural Economics**, **and Marketing in the Tropics,** Longman group Ltd., chapter 4, page 67-129

W.Y Yang, **Methods of Farm Management Investigations For improving Farm Productivity** (Revised edition) FAO agriculture Series, no 11, and FAO Agricultural Development paper No 80, FAO, 1980,Rome Italy, chapter 6,page 120-162

Keith B. Griffin and John L. Enos, **Planning Development**, Addison-Esley Publishing Company, Lonndon, 1970, Chapter 3, page 20-29

Please post chapter from text book

Synopsis of lecture (bullet)

-1.Planning: - its Dimensions
-Human wants are unlimited. As a matter of necessity, growth of population increases the demand for limited resources. Technological forces also aggravated the intensity of the competition over limited resources to meet additional wants.
-In general the available resources whether replenish-able or not are limited. Therefore planning has continued to be an instrument to effective utilization of the limited resource to meet the need or the unlimited wants of a society.
-Planning rests upon also on the inability of the price mechanism to ensure growth, efficiency and equity. The monopolistic character of many sectors of the economy and the consequent distortion of commodity and factor price, makes free market economy

perform poorly in underdeveloped countries These distortions are caused by institutional arrangement which interfere with market signals. (i.e. interest rate, prices, exchange rate, etc) as a consequence, private and social benefit-cost calculations diverge.
-The art of planning in underdeveloped countries is to intervene in the economy with sufficient vigor to overcome the major problems without at the same time exceeding the capacity of the civil service and causing a breakdown of public administration.
-The coverage of planning can vary over time, over space, over types of activity, and over individuals.
-To plan it is necessary to consider the institutions under which the growth is to occur, the distribution of income and wealth that will result, the concentration of activities in certain areas and the strains that this will produce. Plan will be judged only when it states what is to be accomplished and who will share in the benefits and in the burdens.

2. approaches to planning

-Given the political and social environment, try to predict future event, and then decide to what extent these future events are in conflict with or harmony with the realities.
-Secondly, take similar experiences in the past and assume that the future will be much the same. Most plans do not contain completely new projects or focus on novel activities; rather they are collection or systematizations or extension of old.

-3. Planning And Budgeting

-A ***farm plan*** is a scheme for the operation and organization of the business farm. In its broad sense, it may mean any contemplated change in the method or practice followed in the farm operation, or it may mean the complete reorganization of the farm business.
-Any attempt to estimate the future outcome of a plan in quantitative terms is called ***budgeting*** .
-It is prepared merely to compare the ***cost and returns*** resulting from the adoption of a new method or the use of new equipment, and the improvement of soil productivity by the application of lime or the installation of a drainage system;
-but it may also be prepared to determine the ***prospective expenses*** and ***income*** resulting from a complete change in the choice and combination of farm enterprises and a completer reallocation of farm resources.

-4. The Importance of Farm Planning and Budgeting

- helps the individual farmers to improve the organizations and operations of their farms.
-It enables to reconcile the different diversified, and often-contradictory issues suggested by the different specialists in the different fields.
-Apart from determining the change needed in the choice and combination of enterprises and in the organization and use of farm resources, farm planning and budgeting also provides the basis for evaluating their impact on the development of the total economy of the region. Thus, it facilitates regional economic planning.
-To encourage production, safeguard security and promote rural welfare, agricultural credit must be given on such terms that it meets the definite requirements of the farmers.
-When ***farm plans*** have been made, ***budgets prepared*** for all the farmer borrowers, and the most promising plans for yielding the maximum returns have been selected need tobe offered with credit.
-It is possible to determine the proper type and amount of credit needed and the amount of cash available for loan repayment by each farmer, for his budget will show the most

probable cash receipts and cash expenses in each of the years for which it has been constructed.
-Another reason for the popularity of the technique of farm planning and budgeting is the general awareness of the government's role in undertaking large scale development projects such as land reclamation, irrigation, drainage, flood control, land settlement and soil conservation- and the recognition of the part which farm planning and budgeting can play in their formulation and appraisal.

-5.Roles

-Farm planning and budgeting in connection with the planning of development project has four major roles to play:
-5.1. To reveal the ***prospective needs of farmers*** so that a suitable scheme will be designed
-5.2. To ***determine the best alternative for the reorganization of the farm*** units so as to use to the full the services and facilities made available after the completion of the development projects.
-5.3. To ***anticipate farmers' requirements*** in the services and material other than those provided directly by the project in order to ensure the success of the project.
-5.4. To ***furnish basic information for the appraisal of its cost/benefit relationship***.
There are also other uses of the technique of farm budgeting. For the developing countries, agriculture is the main enterprise and farm planning should be of paramount importance in providing a basis for national economic planning and development.

Wrap-up discussion question/activities (10Min)

-discuss the importance of planning and budgeting

(Please note that at the end of the week you will be given next weeks; assignment)

Session 26th Performance Indicator

Topic: Performance Indicator

Session learning objective

-enable to specify the performance indicators including the discounted and the undiscounted project worth

-Give a broad understanding of project operation performance and monitoring of impact

-give the insight on the class of indicators including the indicators of external conditions

Reading Assignment discussion (10 min)

-Discuss rigorously on the performance impact indicators for irrigated farm **project**

Reading Text

-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 1 page 3 to 43

Synopsis of lecture (bullet) (30 min)

-1.Performance Indicators -Once all the financial cost elements with appropriate prices are tabulated, and discounted with realistic rates, then the farm projects performance indictors would be estimated. There are several performance indicators to choose from. Only a few measures are itemized below(much will be elaborated in session 34th).

-2. Undiscounted Measures of Project Worth: This includes among others , Pay -back period, Proceeds per unit of outlay, Average annual proceed per unit of outlays, Average income on book value of the investment and Many financial ratios each for specific performance can be used.

-3. Discounted Measure of Project Worth: - To use discounted measures of project worth, a calculating discount rate is required. For financial analysis, the discount rate is usually the marginal cost of money to the project or enterprise for which the analysis is being done.

-In Ethiopia the average rate of interest since the economic reform program could be used. The major discounted measures of projects and the criteria commonly used for project viability are the following

3.1The net present value (NPV) or Net Present Worth(NPW)

3.2Internal Rate of Return (IRR)

3.3Benefit-cost ratio (BCR)

4.Net Present Value (NPV): NPV is one of the discounted measures of project worth. It is the present value of the incremental net benefit or incremental cash flow realized annually during the life of the project, i.e. the present worth of benefits less the present worth of costs of a project.

-The formal selection criteria are to accept all independent projects with positive net present value when discounted at the opportunity cost of capital. This measure is absolute and is not suitable for ranking projects.

Mathematically:

$$NPV \equiv \sum_{t=0}^{T} \frac{Bt - Ct}{(1+i)^t} \quad or \quad NPV = \sum_{t=0}^{T} \frac{Bt}{(1+i)^t} - \sum_{t=0}^{T} \frac{Ct}{(1+i)^t}$$

Where:

Ct = Cost at year t
Bt ≡ Benefit at year t
t ≡ 1,2,3 ..... T
i = discount rate

-5.Internal Rate Of Return (IRR) IRR is a discount rate, which just makes the net present value equal to zero. The selection criterion is to accept all projects with an IRR above the opportunity cost of capital.

-6. Benefit Cost Ratio (BCR) The benefit-cost ratio is simply the present value of total benefits divided by the present value of total costs. The larger the ratio the more attractive a project is.

Mathematically:

$$B/c\ Ratio = \frac{\sum_{t=0}^{BC} \frac{Bt}{(1+i)^t}}{\sum_{t=0}^{T} \frac{Ct}{(1+i)^t}}$$

-7. Monitoring Project Operation, Performance and impact

-A distinction must be made between two monitoring activities. On the one hand, monitoring systems concerned with the recording of project operation and performance and on the other hand, those, which specifically deal with the measurement of, project impact.

-***Monitoring of project operation and performance*** mainly involves the continuous, even if intermittent, measurement and recording of scheduled tasks, time tabled activities and expected outcomes.

-The purpose of these monitoring activities is to provide information for on-going evaluation and often day-to-day management response.

-The ***monitoring of project impact***, being mainly concerned with the effects and impact of project operation on its beneficiaries, in some cases, those people outside a project whole, nevertheless, experience its positive or negative influences.

-The ***impact monitoring system*** usually focuses on data acquisition. Its function is to measure and record indicators, such as farm costs, net farm incomes and their distribution; composition and levels of family nutrition; domestic water use and hygiene in the farm family; availability of and access to the various social services by rural families, the role and status of women; the environmental effects, etc.

8.Classes of Indicators A complete monitoring system include three broad classes of indicators:

-8.**1** **Operation And Performance Indicators,** for the control of inputs, activities and achievements in terms of time, quality and cost;

-8.**2** **Impact Indicators,** for longer-term control of direct and indirect expected or unexpected, effects of the project on all aspects of the socio-economic and physical environment.

-8.3 **Indicators Of External Conditions,** for the control of these external factors whose variation may need immediate correction to the project plan (activities, inputs, or budget); and

-9.**Operation and Performance indicators** can further be divided in to several classes.

-***Input indicators*** **:** project inputs consist mainly of staff, equipment, and recurrent funds/cost for operation; they may also include credit facilities, institutional arrangements, etc.

-**Input costs** are usually recorded in account books;

-**Timely delivery** of inputs is essential for most activities. It can be checked against activity calendars , as determined by a Gantt Chart or network schedule of the project plan;

-***Quality control*** check may be necessary for some specific elements of equipments.

-Operation indicators. measure or record the execution, timeliness, and quality and possibly cost of project tasks and activities.etc

-Performance indicators compare activity results with set targets. They are usually measured in physical terms, for example, kms of road or canal built, number of hectares planted, number of farmers visited, number of animals vaccinated, quantity of fertilizer distributed, project yields and production levels, loans allocated, health services provided, food aid distributed, etc.

-10. **Indicators of External Conditions**, by contrast, relate to factors that project management cannot control, but which may nevertheless require changes in the project objectives. The most important of these for example in agricultural project are: Input and farm product prices; Market condition for farm products; Availability of key inputs like fertilizers; Cost of credit to farmers (wherever applicable), if subsidies don't stabilize it for the project area; Climatic conditions(lack of rain may require a change of rotation plan, or irrigation regulations, etc.), Incidence of pests and diseases.(see the matrix below)

1. Input and out put indicators

type	Elements to be monitored	Data collection methods	Data analysis
Inputs	Staff -arrival date -work plan -cost	-records -staff meetings -records	-recording -network analysis -accounting
	Equipment-arrival date -quality -cost -stocks held -maintenance	records technical check accounts book-keeping "	network analysis recording accounting stock management
	agric. inputs-arrival date -quality -cost -stock held	ibid	ibid
	recurrent budget -receipts -expenses	accounts accounts	accounting &audit accounting &audit
	credit facilities obtained	records	recordings
Activities operation	activities achieved-%	internal reports	aggregation and network analysis
	activities { infrastructure quality { services	-technical checks -beneficiaries interviews	comparison with standards
	activities cost	cost accounting	cost accounting
Achievements (in % of objective	infrastructure construction	internal reports	aggregation and comparison with plan

and in physical terms)			
	distribution of fertilizer, pesticides, seeds, etc.	book-keeping	aggregation and comparison with plan
	agricultural services provided (by type and type of farm	book keeping	aggregation and comparison with plan
	loan allocated	book-keeping	aggregation and comparison with plan

2 . Performance and impact indicators

Type	Elements to be monitored	Data collection methods	Data analysis
Agricultural production system	rotation	survey and /or aerial photography	statistical analysis
	input use	surveys disbursing book	statistical analysis
	farm equipment	survey	statistical analysis
	labor and work calendar	calculation based on standard coefficients	statistical analysis
	production practices	extension workers reports, surveys and observations on selected plots	statistical analysis
	agricultural production	surveys, and crop-cutting experiments, harvest records	statistical analysis
	marketing of farm products	surveys records	statistical analysis
Farmers and agrarian structure	farm income	surveys and farm budget calculations	statistical analysis
	household income	surveys	statistical analysis
	consumption	household surveys and shops data	statistical analysis
	nutrition	measurement, calculation based on standard coefficient surveys	statistical analysis
	assets	interviews or direct counting	statistical analysis
	health status	officials record and surveys	statistical analysis
	farmers attitude towards innovation	officials record and surveys	statistical analysis's
	farmers association	officials record and surveys	sociological study statistical analysis
	land tenure, etc.	officials record and surveys	statistical analysis
	social structure	officials record and surveys	sociological study
Ecology	soil fertility	sample	laboratory test
	erosion	punctual measurement aerial photography	cartography statistical analysis
	hydrological balance	punctual measurement	statistical analysis
	ecological systems	bibliography and measurements	simulations and statistical analysis
Economic environment	effects on agro industry	survey and registered data	accounts study
	effects on state budget	registered data	accounts study
	effects on balance of trade and balance of payment	registered data	accounts study
	effects on other agents	registered data	accounts study
	effects on population	census and surveys	statistical analysis

3. Indicators of External conditions

Elements to be monitored	Data collection	data analysis
Input prices	records from sellers and internal markets	recording and projections
input availability	records from sellers and internal markets	recording and projections
farm produce prices	government services record and markets	recording and projections
Demand for farm produce	markets	recording and projections
cost of credit	bank records	recording and projections
climate-rain -temperature	measurement on plots and meteorological records	statistical analysis
pests and diseases	measurements and extension agents	statistical analysis

-crops -livestock	reports measurements and veterinary services	

Wrap-up discussion question/activities (10Min)

-discuss how data have to be analyzed for world prices of you exportable agricultural products

(please note that at the end of the week you will be given next weeks ;assigment)

Session 27th & 28th
Topic*:* Partial budget , whole farm planning and uncertainities

Session learning objective
-enables to understand the guiding principles of farm planning and budgeting as well as the fundamental points in farm planning and budgeting such as comparative advantage , proper combination of production factors etc
-gives insight to procedures in farm planning and budgeting
-enable to highlight on making farm plans and budgets
-Enlightens the type of points to be considered in crop plans and budgets as well as livestock plans and budgets
-highlights on uncertainties.

Reading Assignment discussion (10 min)
-What are the factors affecting farm income

Reading Text
W.Y Yang, **Methods of Farm Management Investigations For improving Farm Productivity** (Revised edition) FAO agriculture Series, no 11, and FAO Agricultural Development paper No 80, FAO, 1980,Rome Italy, chapter 3,page 53-79, chapter 6,page 120-162, chapter 8,page 194-208
-Abbott J.C and Makeham, J.P **Agricultural Economics, and Marketing in the Tropic**s, Longman group Ltd., chapter 467-129

Synopsis of lecture (bullet)

-1 Guiding Principles In Farm Planning And Budgeting
-Let us assume that farming is undertaken to obtain the highest possible income so long as it is compatible with,
- the practices of good husbandry for the conservation of soil, land and water resources
- the social standards of the area and,
- the physical and mental capabilities of the farmers.
-2. Important points in farm planning and budgeting:
-2.1 Rule of comparative economic advantage : Because the area differences in the adaptation and requirements of various kinds of crops as well as differences in the physical, natural, economic and social, or family characteristics, a particular farm or farming area may have an absolute advantage over other farms or areas for the growing of certain kinds of crops.
-A farm planner must appraise and make full use of these advantages or favorable conditions when he selects the crops to be grown.
-2.2 Proper combination of production factors : At the prevailing level of technological development and for each type of farming system, there is normally an optimum proportional combination of production factors.

-The conventional combination of production resources is the result of many years of trial and adjustments, and it provides a guide post enabling farm planners to start in the right direction, while taking in to consideration the differences in a farmer and his family, in the quality of land, and the available capital.
-Farm planning must began, therefore with the rational combination of farm resources. If the farm area is too small, or the labour force too large, for the particular type and system of farming in the region, plans must be made either to expand the land area or to reduce the labour force on the farm, or else to do both.

-2.3 Proper combination of farm enterprises : In line with the rule of comparative advantage, all farm resources, land, labour and capital, should be used entirely for the one or the few enterprises which yield the highest total net returns.
-Because of the hazards involved in farming, such as crop failures due to weather, pests, and a drop in the price of a farm product, it is usually advisable to include more than one major income yielding enterprise in the farm plan of a particular farm.
-Exception to this is when the farmers are well protected against such hazards by crop insurance or government compensations.

-2.4 Forward looking approach :-The budgeting approach of farm business analysis is forward looking as opposed to the conventional factors-affecting-profit method or the method of establishing norms and standards for direct comparisons, which are both back ward looking.
-In farm planning and budgeting it is absolutely essential to estimate what is most likely to happen, and not to assume that everything will remain unchanged.
-Costs and price levels of different farm products and farm requisites, for example, have never been stable and they continue to fluctuate. Farming techniques and practices of the future will most likely differ from those of today owing to technological progress. As a consequence, far, plans must be made on the basis of the most accurate estimates on the future price and cost levels of farm products and farm supplies, the probable and suitable farm methods and practices to use and the input and output ratio.
-That is, the amount of labour, fertilizer, seeds, etc., per acre of crop and the quantity of feed and labour required per livestock unit.

-3. Procedures in Farm Planning and Budgeting

-3.1 Preliminary survey of local farm conditions : Farm management specialists should compile all relevant information from secondary sources, such as census reports, meteorological records, land registers and taxation records.
-Reliable statistics and authoritative socioeconomic studies should be consulted to understand the local tenure systems and the land lord/tenant relationship, the price and cost situation and prospect, the farmers organizations, the marketing facilities and outlook, the means of transportation and costs, the supply and skill of temporary labour, the availability of non farm employment and wage rates.
-If data are not available, the farm planner should conduct a farm management survey, for this will enable him to obtain a close up view of the organization and operation of the individual farms, the suitable farm sizes and the important factors which influence farm earnings.

-3.2 Diagnosis of handicaps and shortcomings of the individual farm : The next step is to diagnose the handicap, shortcomings and weak points in the present organization

and operation of the particular farm, or the particular type of farms, for which a new plan is to be made.
-some of the following questions have to be answered. Is the land area on the farm adequate to provide a decent living for the farmer? are the land improvements, buildings, equipment and other capital resources sufficient and of the desired types?
-Are the present choice and combination of farm enterprises ensures the optimum use of the farm resources (land, labour and capital)?
-whether the present combination of enterprises makes full use of complementary and supplementary relationships; and whether adjustments are necessary to meet changed conditions.
The third group of questions deals with the rates of production, that is, crop yields per acre and livestock production per animal unit.
-This group includes: whether the present crop yield and animal production conform with prevailing an prospective technological standardsetc.;
-The fourth group of questions concerns factors which affect the efficiency of labour, such as the work method, the type and the cost of equipment and power, the size and the layout of the fields
-The fifth group of questions involves the evaluation of current marketing policies and schemes for financing the farm.
-4. Making farm plans and budgets : Farm planning and budgeting involves the setting out of the desirable changes in the organization and operation of the entire farm, the formulation of schemes for carrying them out and the estimating of receipts, expenses and net farm income, for each of the alternative farm plans, according to principles and procedures already outlined.
-4.1 There are two types of budgeting : Partial budgeting and whole farm budgeting.
-4.2 Partial budgeting: is used to compute the expected change in profit due to a proposed change in the farm business. Sometimes partial budgeting can be viewed as marginal analysis.
-In most cases this partial budgeting is used when there is a small change in the farm business. It contains income and expense that are associated with the proposed change or modifications.
-4.3 Whole farm budgeting:- Unlike the partial budgeting, it is concerned with the complete reorganization of the farm business or complete reallocation of the resources.
-Every aspect of the farm business is affected. We have to assess the overall impact of the change and estimate the cost and the expected income from the allocation of the whole farm.
-5.Making cropping plans and budgets : The first step in farm planning is the making of crop plans, that is the choice and combination of cops in accordance with the principles previously set out.
-Important considerations in making a crop plan are:
-a.. Food requirement of the farm household, especially in areas where subsistence farming prevails
-b. Feed requirement of farm animals, including productive and working animals
-c. Maximum total net value of crop production to be determined by deducting total variable or operating crop expenses from the total estimated gross value of production
-d. Soil conservation and the maintenance of soil fertility

-e. land, Labour and capital potentials of the farm and household
-f. Government policies, including restrictions, regulations, taxation, as well as subsidization, crop insurance, price support, etc.
-**6.Making livestock plans and budgets :**Livestock production plans are made on the basis of : a. Farm need for draft power and home need for animal products. b. Prospective cost and income situation of livestock enterprises. c. Availability, skill and aptitude of arm labour in feeding and caring for animal. d. Complementary relationships between crop and livestock production for most advantageous utilization of by-products and the maintenance of soil fertility. e. Types of buildings and equipments that are available or can readily made available. f. Government policies and regulations pertaining to livestock production and the accessibility of the various breeding, feeding and veterinarian services.
-The first step in making a livestock plan is the selection of the particular kinds or kinds of livestock to raise and the determination of the ultimate number of the various kinds of animals in the herd or flock.
-The programs for building up the herd or flock of the desired kind and size should be worked out. The intensities and methods of feeding and caring for these animals should be systematically ascertained, and the kinds to equipment, buildings and other supplies required in different seasons and years must be determined for timely provision.
-Finally, a budget should be prepared to summarize the operational and the financial results to be expected in different years from the livestock enterprise.
-7.**Summary of estimated income and expenses**
-Estimated income and expenses must now be summarized in order to determine the total cash balance and net farm earning to be expected form the envisaged plans.
-If a long-range development program is involved, such an estimate should be made for a serious of years until the program becomes fully developed.
-**8.Selection of the optimum plan for implementation :**It's desirable to make several alternative plans which may appear to be most desirable and practical. The particular plan, which is expected to yield the highest average total net farm earnings and the highest average earnings per hectare and per labour day should be chosen for implementation.
9.**Risks and Uncertainty :**The uncertainties of a particular project arise from many unpredictable influences. One cannot perfectly predict future technology or tastes or the actions of the government: and of these can quite easily falsify the assumptions upon which the project design and appraisal is based. And of course the projects itself may not perform in the way expected.

-It is important to bear in mind this distinction between uncertainties about the project itself and uncertainties about the environment in which it operates-that is , about the rest of the economy and the rest of the world.
-These two sources of uncertainty will often act independently of one another. The price of the output, for instance, may depend on that is happening to the demand for that commodity in the industrialized countries, whereas the quantity of output that can be produced depends upon the success with which the project is being operated

-Risk analysis is essentially a method of dealing with the problem of uncertainty usually affects most of the variables which we combine to obtain a cost estimate, an economic rate of return or net present value, a financial return, or any of the other indicators which may be used to evaluate a project.
-The purpose of risk analysis is to eliminate the need for restricting one's judgment to a single optimistic, or ‘"best" evaluation, by caring throughout the analysis a complete judgment on the possible range of each variable and on the likelihood of each value within this range.

Wrap-up discussion question/activities (10Min)

In farm planning and budgeting, it is essential to estimate what is most likely to happen, and not to assume that everything will remain unchanged. Explain.

(Please note that at the end of the week you will be given next weeks; assignment)

Module VI Agricultural Project analysis

Session 29th hr
Topic-concept and aspect of project preparation
Session learning objective
-defines projects
-enables to understand the technical, social, commercial, financial and economic aspects of project preparation
-It also enlighten the organizational, institutional, and managerial aspects of project analysis
-differentiates between the economic and financial analysis of a project
Reading Assignment discussion (10 min)
-How do you treat tax, subsidies in financial analysis?
-why is market price is different from shadow prices
Reading Text
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 1 and 2 page 3 to 61
-Development Project Study Project Agency, **guidelines to Project planning in Ethiopia**, Addis Ababa, 1982, Page 7-32

Synopsis of lecture (bullet)(30 min)

1 Introduction
-A **project** is a discrete package of investments, policies, an institutional and other actions designed to achieve a specific development objective or set of objectives within a designated period.
-To design and analyze effective projects, those responsible must consider many aspects that together determine how remunerative a proposed investment will be.
-Here we will divide project preparation and analysis into six aspects: technical, institutional-organizational-managerial, social, commercial, financial, and economic.

-2 Technical aspects
-The technical analysis concerns the project's inputs (supplies) and outputs (production) of real goods and services. It is extremely important, and the project framework must be defined clearly enough to permit the technical analysis to be thorough and precise.
-The technical analysis will examine the possible technical relations in a proposed project: for example in agricultural project the soils in the region of the project and their potential for agricultural development; the availability of water, both natural (rainfall, and its distribution) and supplied (the possibilities for developing irrigation, with its associated drainage works); the crop varieties and livestock species suited to the area; the production supplies and their availability; the potential and desirability of mechanization; and pests endemic in the area and similar considerations.

-the technical analysis will determine the potential yields in the project area, the coefficients of production, potential cropping patterns, and the possibilities for multiple cropping.
-The technical analysis will also examine the marketing and storage facilities required for the successful operation of the project, and the processing systems that will be needed.
-The technical analysis may identify gaps in information that must be filled either before project planning or in the early stages of implementation (if allowance is made for the project to be modified as more information becomes available).

-3 **Institutional-organizational-managerial aspects**
-A whole range of issues in project preparation revolves around the overlapping institutional, organizational, and managerial aspects of projects, which clearly have an important effect on project implementation.
-One group of questions asks whether the institutional setting of the project is appropriate.
-Does the project design take into account the customs and culture of the farmers who will participate? Will the project involve disruption of the ways in which farmers are accustomed to working? If it does, what provisions are made to help them shift to new patterns? What communication systems exit to bring farmers new information and teach them new skills? Has enough time been allowed for farmers to accept the new procedures, or is the project plan overly optimistic about rates of acceptance?
-To have a chance of being carried out, a project must relate properly to the institutional structure of the country and region. What will be the arrangements for land tenure? What size holding will be encouraged? Does the project incorporate local institutions and use them to further the project?
-The organizational proposals should be examined to see that the project is manageable. Is the organization such that lines of authority will be clear? Are authority and responsibility properly linked? Does the organizational design encourage delegation of authority, or do too many people report directly to the project director?
-Managerial issues are crucial to good project design and implementation. The analyst must examine the ability of available staff to judge whether they can administer such large-scale public sector activities as a complex water project, an extension service, or a credit agency.

4. Social aspects
-You have to note that proposals to include weights for ***income distribution*** in the formal analytical framework so that projects benefiting lower-income groups will be fevered.
-Consider to determine if a proposed project is as responsive to national objectives as it can be. Such question as creating employment opportunities that is closely linked to, though not quite the same as, the question of income distribution.
-consider carefully the adverse effects a project may have on particular groups in particular regions such as an adverse effect on the income of working women and their families?
- consider concerning the quality of life that should be as a part of any project design. A rural development project may well include provisions for improved rural health services,

for better domestic water supplies, or for increased educational opportunities for rural children.
-Those designing or reviewing projects will also want to consider the issue of adverse environmental impact. Irrigation development may reduce fish catches or increase the incidence of schistosomiasis in regions where this snail-transmitted disease is endemic, and waste from industrial plants may pollute water. Project sites may be selected with an eye to preserving notable scenic attractions or to preserving unique wildlife habitats.

-5. Commercial aspects

-The commercial aspects of a project include the arrangements for marketing the output produced by the project and the arrangements for the supply of inputs needed to build and operate the project.
-On the output side, careful analysis of the proposed market for the project's production is essential to ensure that there will be an effective demand at a remunerative price.
-Perhaps provision should be included in the project for processing, or maybe a separate marketing project for processing and distribution is in order. Is the product for domestic consumption or for export? Does the proposed project produce the grade or quality that the market demands?
-On the input side, appropriate arrangements must be made for farmers to secure the supplies of fertilizers, pesticides, and high-yielding seeds they need to adopt new technology or cropping patterns. Do market channels for inputs exist, and do they have enough capacity to supply new inputs on time?

-Commercial aspects of a project also include arrangements for the procurement of equipment and supplies. Are the procurement procedures such that undue delays can be avoided?

-6. Financial aspects

- encompass the financial effects of a proposed project on each of its various participant.
-In agricultural projects the participants include farmers, private sector firm, public corporations, project agencies, and perhaps the national treasury.
-On the basis of these budgets, judgments are formed about the project's financial efficiency, incentives, creditworthiness, and liquidity.
-A major objective of the financial analysis of farms is to judge how much for example the farm families participating in the project will have to live on.
-The analyst will need budget projections that estimate year future gross receipts and expenditures, including the costs associated with production and the credit repayments farm families must make, to determine what skills, and capital.
-Part of the income the family will receive may be in food that is consumed directly in the household, so a judgment must be made about this quantity and its value.
-The farm budget becomes the basis for shaping the credit terms to be made available. The analyst must judge whether farmers will need loans to finance on-farm investment (and if so, what proportion the farmers should invest from their own resources) or to meet some production costs, and whether seasonal short-term credit should be provided for working capital to finance inputs and pay for hired labor.

-The analysis of farm income will permit assessment of the incentives for farmers to participate in the project. What will be the probable change in farm income?
-A similar group of considerations applies to the financial analysis of private firms involved in the project. Will they have capital for expanding facilities? Will they have the working capital needed to carry inventories of farm supplies or stocks of processed goods awaiting sale?
-An analysis of the financial aspects of the project's administration will also be needed. What investment funds will the project need and when? What will be the operating expenses when the project is under way?
-Finally, the fiscal impact of some projects will need to be considered. Will the increased output yield significant new tax revenues, perhaps from and export tax? Will new subsides be needed to encourage farmers to participate, and how much will subsidies have to grow as project implementation proceeds?

-7.Economic aspects

-The economic aspects of project preparation and analysis require a determination of the likelihood that a proposed project will contribute significantly to the development of the total economy and that its contribution will be great enough to justify using the scarce resources it will need.
-The point of view taken in the economic analysis is that of the society as a whole.
-There are three very important distinctions between the two that must be kept in mind.

-These qualifications are summarized here and are taken up in greater detail later.First, in economic analysis taxes and subsidies are treated as transfer payments. The new income generated by a project includes any taxes the project can bear during production and any sales taxes, which are part of the total project benefit, are transferred to the government, which acts on behalf of the society as a whole, and are not treated as costs.
-Conversely, a government subsidy to the project is a cost to the society, since the subsidy is an expenditure of resources that the economy incurs to operate the project.
-In financial analysis such adjustments are normally unnecessary; taxes are usually treated as a cost and subsidies as a return.
-Second, in financial analysis marker prices are normally used. These take into account taxes and subsidies. From these prices come the data used in the economic analysis.
-In economic analysis, however, some market prices may be changed so that they more accurately reflect social or economic values. These adjusted prices are called “shadow” or “accounting” prices and in the analytical system recommended here are efficiency prices, as noted earlier.
-In both financial and economic analysis projected prices are used, so both rely to a substantial extent on what are, in effect, hypothetical prices.
-Third, in economic analysis interest on capital is never separated and deducted from the gross return because it is part of the total return to the capital available to the society as a whole and because it is that total return, including interest, that economic analysis is designed to estimate.
-In financial analysis, interests paid to external suppliers of money may be deducted to derive the benefit streams available to the owners of capital. But interest imputed or “paid” to the entity from whose point of view the financial analysis is being done is not

treated as a cost because the interest is part of the total return to the equity capital contributed by the entity.

Wrap-up discussion question/activities (10Min)
-Explain the difference between social and technical aspects of project preparation
Please post here
(please note that at the end of the week you will be given next weeks ;assigment)

Session 30th hr

Topic- Distinction between Economic and financial analysis

Session learning objective

-Provides the insight on the purpose of economic and financial analysis
-outlines the distinguishing factors between financial and Economic analysis
-Enable what types of projects require economic analysis and which ones do not
-outlines also the process of carrying out economic analysis by showing the stages
-also gives introduction to resource pricing

Reading Assignment discussion (10 min)

-There are three important modification to the approach followed in the financial analysis, to arrive to economic analysis, what are they

Reading Text

-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 5,page189-214, chapter 6 ,page 215-234, chapter 7 page 243-286

Synopsis of lecture (bullet)(30 min)

-**1. Purpose of Economic Analysis** Economic analysis is an appraisal of the project in terms of its contribution to the general objectives of economic development policy for the country as a whole i.e. sustained economic growth, equitable income distribution among national, balanced government budget, creation of new jobs, both skilled and unskilled, achievement of self-reliance in certain activities.

-The economic analysis of a project seeks to examine and estimate the impact of the project on the society or the nation as a whole. The impacts are generally examined in terms of contribution to the national income, employment of labor, distribution of income and other resources and achieving other specific social objectives such as regional balance, poverty alleviation, meeting of basic needs, etc. This is necessitated by the need to allocate limited resources for carefully selected development projects.

-2. Differences between Economic Analysis and Financial Analysis

The differences between financial and economic analysis are as discussed below

-i. Financial analysis evaluates the problem from the point of view of individual entity while economic analysis evaluates this from the point of view of the nation as a whole.

-ii. Financial analysis evaluates input and output using market prices while in economic analysis shadow prices are used.

-iii. In financial analysis, externalities, i.e. costs and benefits that arise outside the project are excluded while in economic analysis such externalities are included.

-iv. Transfer payments such as taxes, duties, subsidies, interests, etc. are included in financial analysis but excluded in economic analysis.

-3. Projects Requiring Economic Analysis

-Economic analysis should be conducted where there is a good chance that the cost of doing the analysis will not exceed the likely benefit obtained from the information generated.

-Economic analysis should therefore be conducted where:

-The size of the project justifies the expense of doing the analysis

-There is a strong possibility for a project where the output is sold, that the result of the economic analysis might be significantly different from the analysis conducted at market prices

-The costs of the project are borne by people or organizations who are not the same as the project beneficiaries

-The nature of the project is such that economic analysis can be undertaken in a reasonably meaningful way. This implies either that both cost and benefits can be measured in value terms or that there are alternative ways of achieving the same objective whose costs and benefit can be measured and compared.

-4. On the basis of the above criteria, economic analysis is less likely to be needed where:

-The project is small- unless it is a pilot project likely to be replicated.

-The project is financially viable and is producing mainly for export with no significant negative externalities and no significant use of undervalued local resources.

-The project is financially viable and, although producing primarily for the local market, is receiving no significant protection and involves no significant negative externalities and no significant use of undervalued local resources.

-The project is in a sector where valuation of the benefits is not practical and where there is no issue of cost effectiveness in determining the project design.

-occur in the case of social sector projects where benefits may be difficult to value and alternative ways of achieving the same objectives cannot be identified

-5.The Processes of Economic Analysis

-Stage 1. Annual statement of Costs and Benefits at Constant market Prices

-Benefits minus investment Costs minus Working capital minus operating costs equals Net Internal Benefits at constant market Prices

-Stage 2- Externalities and Linkages

-External Benefits minus External costs plus linkage effects equals Net Benefits at constant market Prices adjusted for Externalities and linkages

-Stage 3 - applying Shadow Prices

-Estimate Conversion Factors for important Cost and Benefit items and/or use MEDaC Estimate →Multiply Market price values of costs and Benefits by Conversion Factors →Net Benefits at Shadow Prices

-6. Resource Pricing and Economic Analysis

-The determination of the economic viability of a project is dependent on the use of accurate estimates and methodologies for carrying out an economic analysis.

-The profitability of the proposed project can be assessed in terms of its capacity to make efficient uses of the nations resources in producing national income.

-There are two basic approaches to economic analysis in project formulation: the 'shadow pricing' method and the 'effects ' method.

Wrap-up discussion question/activities (10Min)
-differentiate between financial and economic analysis

(please note that at the end of the week you will be given next weeks assignment)

Session 31st hr

Topic The Project cycle-designing and analyzing Problems

Session learning objective
-The paper demonstrates the project cycle in the course of preparation
-distinguishes between and among identification, preparation and analysis, appraisal, implementation, monitoring and evaluation
-enlightens the phasing of project preparation
-shows and illustrates diagrammatically the interrelationship of cycles and phasing in project preparation

Reading Assignment discussion (10 min)
-If you are assigned as a team leader in project preparation, draw a program from the start to the end as to how you will go about preparing and submitting you report

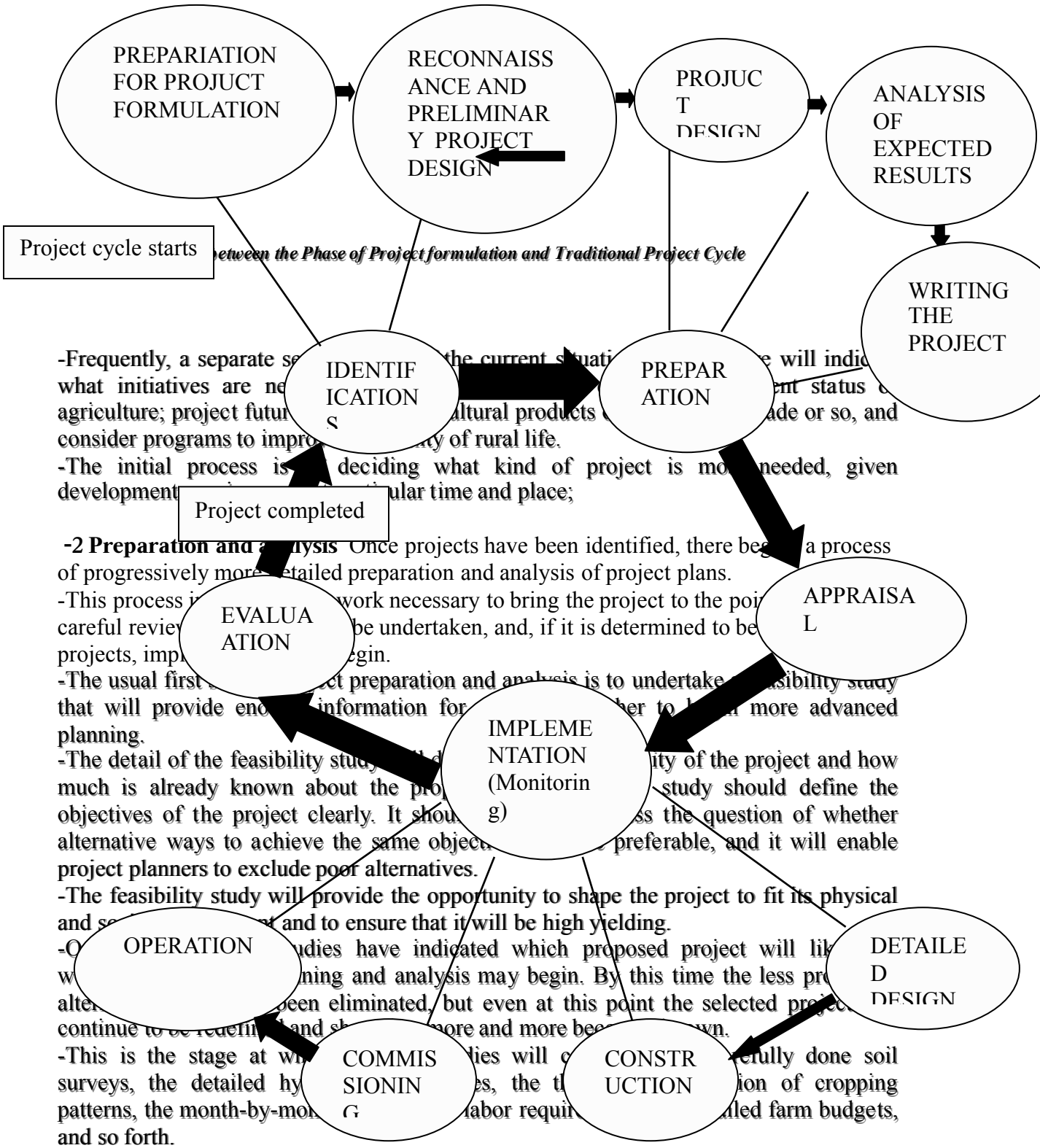
Reading Text
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 1,page 3-42

Synopsis of lecture (bullet)(30 min)

The Project Cycle

-There tends to be a natural sequence in the way projects are planned and carried out, and this sequence is often called the "project cycle." This cycle may be divided into identification, preparation and analysis, appraisal, implementation, and evaluation..

1 ***Identification***
-The first in the cycle is to find potential projects. The most common sources will be well -informed technical specialists and local leaders, from proposals to extend existing programs, suggestions for new projects usually arise because some agricultural products are in short supply-or will be in a few years if production is not expanded or imports increased.
-Most developing countries have an economic development plan of some formality that identifies sectors to be given priority and areas where investment is needed.



etween the Phase of Project formulation and Traditional Project Cycle

-Frequently, a separate se the current situati e will indic what initiatives are ne nt status o agriculture; project futur ltural products ade or so, and consider programs to impro ty of rural life.

-The initial process is deciding what kind of project is mo needed, given development ular time and place;

-2 Preparation and a lysis Once projects have been identified, there be a process of progressively mor tailed preparation and analysis of project plans.

-This process i work necessary to bring the project to the poi careful revie be undertaken, and, if it is determined to be projects, impl gin.

-The usual first ct preparation and analysis is to undertake sibility study that will provide eno information for her to l more advanced planning.

-The detail of the feasibility stud ity of the project and how much is already known about the pro study should define the objectives of the project clearly. It shou ss the question of whether alternative ways to achieve the same object preferable, and it will enable project planners to exclude poor alternatives.

-The feasibility study will provide the opportunity to shape the project to fit its physical and so t and to ensure that it will be high yielding.

-O udies have indicated which proposed project will lik w ning and analysis may begin. By this time the less pr alte been eliminated, but even at this point the selected proj continue to be redefin and sh more and more bec wn.

-This is the stage at wh dies will c efully done soil surveys, the detailed hy es, the t ion of cropping patterns, the month-by-mo labor requir led farm budgets, and so forth.

-3 Appraisal After a project has been prepared, it is generally appropriate for a critical review or an independent appraisal to be conducted. This provides an opportunity to reexamine every aspect of the project plan to assess whether the proposal is appropriate and sound before large sums are committed.

-The appraisal process builds on the project plan, but it may involve new information if the specialists on the appraisal team feel that some of the data are questionable or some of the assumptions faulty.
-If the appraisal team finds serious flaws, it may be necessary for the analyst to alter the project plan or to develop a new plan altogether.

-4 Implementation The objective of any effort in project planning and analysis clearly is to have a project that can be implemented to the benefit of the society.
-Thus, implementation is perhaps the most important part of the project cycle. Implementation is the physical putting into effect of the project plan as appraised. The better and more realistic a project plan is the more likely it is that the plan can be carried out and the expected benefit realized..
-Project implementation must be flexible. Circumstances will change, and project managers must be able to respond intelligently to these changes. Even as project implementation is under way, project managers will need to reshape and re-plan parts of the project, or perhaps the entire project.
-Technical changes are almost inevitable as the project progresses and more is known about soils, their response to nitrogen application, susceptibility to waterlogged, and the like. Price changes may necessitate different cropping patterns or adjustments in inputs. Or political changes may occur, and you need to respond to this.
-Project analysts generally divide the implementation phase into three different time periods.

-5 Monitoring and Evaluation The final phase in the project cycle is evaluation. The analyst looks systematically at the elements of success and failure in the project experience to learn how better to plan for the future.
-Evaluation is not limited only to completed projects. It is a most important managerial tool in ongoing projects, and rather formalized evaluation may take place at several times in the life of a project. Evaluation may be undertaken when the project is in trouble, as the first step in a re-planning effort. It may be appropriate when a major capital investment such as a dam is in place and operating, even though the full implementation of the plan to utilize the water and power is still under way.
-Careful evaluation should precede any effort to plan follow-up projects. And, finally, evaluation should be undertaken when a project is terminated or is well into routine operation.
-Many different people may do evaluation. Project management will be continuously evaluating its experience as implementation proceeds. The sponsoring agency-perhaps the operating ministry, the planning agency, or an external assistance agency-may undertake evaluation.
-From the evaluation should come carefully considered recommendations about how to improve the appropriateness of each aspect of the project design so that plans for project implementation can be revised if the project is ongoing and so that future projects can be better planned if the project evaluated has been completed.
-Monitoring is the tracking of progress made with project implementation and evaluation is the assessment of the impact of the project.

-6. Phasing of project preparation Agricultural and rural investment project formulation may be divided into five phases, covering the main fields of activity from the initial briefing about an idea for a project to submission of a complete plan for its implementation.

-These are preparation for project formulation, reconnaissance and preliminary design, project design, analysis of expected results, and writing the project document. Each phase is briefly explained below.

-*Phase 1. :* **Preparation for Project Formulation:** The phase is concerned with all the activities necessary to prepare the ground for sound formulation. Here team members, coordinators are appointed, term of reference are prepared, administrative arrangement are finalized, and a preliminary specification of the general objectives of the proposed project and a provisional definitions of the projects boundaries in terms of geographical areas, sectors, institutions and target groups are set.

-Phase 2. Reconnaissance and Preliminary Project Design: This phase comprises a diagnostic analysis of the situation in the project area or sub sector or relating to the target group, which it has already been agreed, is the desired focus of the project. The aim is to asses development potentials and constraints, define possible courses of action and draw up an outline specification of a suitable project.

-The finals task in phase 2 is to propose a preliminary project design indicating the main features of the project such as the location, type of participant, main activities, size, time, organizational structure and management system with rough estimates of cost and a tentative assessment of viability and risk.

-Phase 3: Project Design The third phase begins by defining in greater detail the project's specific objectives. This is followed by the design of the various component parts of the project (i.e. its main separable activities) using agreed planning criteria to help select the best among alternative feasible designs.

-Bringing together the estimates of component costs and consolidating them in to a complete schedule of overall project costs complete this phase.

-If required, a financing plan is proposed explaining how the various project expenditures will be met.

-Phase 4: Analysis of Expected Results A thorough assessment of the anticipated outcome of the project, as designed in phase 3, is an essential part of formulation.

-Typically, the criteria used to judge the extent to which a proposed project is likely to be generally beneficial or generally detrimental reflect financial, economic, social and environmental concerns.

-First, the profitability of the project from the point of view of both the agents directly concerned with it (i.e. individual, groups, organizations) and the nation as a whole is estimated,

-Then, the expected impact on the environment, on social conditions is assessed through an analysis of changes in social relations and economic organization and by using criteria relating to relative welfare such as income distribution, employment access to services, and so on.

-Phase 5: Writing the Project Formulation Document The product of the final phases of formulation is a project document, which enables government and funding agencies to consider the projects eligibility for loaning , approval and assistance.

-The project document should provide a sound basis for bringing up the implementation plan and for arranging finance. It often has to comply with a particular format required by the financing agency.

Wrap-up discussion question/activities (10Min)
-discuss the phase of project preparation very thoroughly

(please note that at the end of the week you will be given next weeks ;assigment)

Session 32nd hr
Topic: Agricultural project costs and Benefits

Session learning objective
-enables to illustrate project costs that include physical goods, labor, land, contingency allowance transfer payments and sunk costs
-it also clearly elaborate and enlightens the tangible benefits of projects including increased production , quality improvement, , change in time of sale, change in location of sale, changes in product form, cost reduction through mechanization, and reduced transport cost

Reading Assignment discussion (10 min)
-Discuss the in tangible benefits and intangible costs

Reading Text
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 2 page 43 to 64

Synopsis of lecture
-1.Identifying Project Costs and Benefits We undertake economic analyses of agricultural projects to compare costs with benefits and determine which among alternative projects have an acceptable return. The costs and benefits of a proposed project therefore must be identified. A **cost** is anything that reduces an objective, and a **benefit** is anything that contributes to an objective.
/Costs in production oriented irrigation project may be divided into three broad categories Costs required for ***construction***, ***operation*** and ***maintenance*** of project facilities. These include all project cost components: Dam and associated structures, Irrigation development, Cost of catchments treatment, Office and other buildings ,Vehicles, Tools and equipment, Study and design, Infrastructure development
-Annual operation and maintenance costs: Operation and maintenance cost of vehicles, Personnel management (salary, perdiem and incentives , Office supplies , Operation and maintenance of dam and associated structures , Operation and maintenance of irrigation structures and system , Operation and maintenance of catchments , Operation and

maintenance of infrastructures such as roads, telecommunication lines, etc. , Cost required for crop production, Fertilizer, seeds, draft oxen, taxes, interests, on farm investment, etc.

-**Benefits** may be direct or indirect. Direct benefits may be tangible or intangible

- ***Tangible benefits*** may result from increased production, improvement in quality of product, increase of value of product, reduction in cost, etc.
- ***Intangible benefits*** are real and reflect true values. They do not however lend themselves to valuation. Examples of intangible benefits are better nutrition, creation of employment, national integration, etc.

-**2.Costs of Projects** In almost all project analyses, costs are easier to identify (and value**)** than benefits**.**

-***2.1 Physical* goods** -Rarely will physical goods used in an agricultural project be difficult to identify. For such goods as concrete for irrigation canals, fertilizer and pesticides for increasing production, or materials for the construction of homes in land settlement projects.

-***2.2 Labor*** Neither will the labor component of agricultural projects be difficult to identify. From the highly skilled project manager to the farmer maintaining his orchard while it is coming into production, the labor inputs raise less a question of what than of how much and when.

-2.***3 Land*** the land to be used for an agricultural project will not be difficult to identify. It generally is not difficult to determine where the land necessary for the project will be located and how much will be used.

-2.***4 Contingency allowances*** Sound project planning requires that provision be made in advance for possible adverse changes in physical conditions or prices that would add to the baseline costs. Contingency allowances are thus included as a regular part of the project cost estimates.

-Contingency allowances may be divided into those that provide for physical contingencies and those for price contingencies.

-***2.5 Transfer Payments*** In financial analysis a tax payment is clearly a cost. Subsidies are simply direct transfer payments that flow in the opposite direction from taxes. If a farmer is able to purchase fertilizer at a subsidized price, that will reduce his costs and thereby increase his net benefit. Credit transactions are the other major form of direct transfer payment. From the standpoint of the farmer, receipt of a loan increases the production resources he has available; payment of interest and repayment of principal reduce them.

-***2.6 Sunk costs*** Suck costs are those costs incurred in the past upon which a proposed new investment will be based. When we analyze a proposed investment, we consider only future returns to future costs; expenditures in the past, or sunk costs, do not appear in our accounts.

-**3. Tangible Benefits of Projects** Tangible benefits of agricultural projects can arise either from an increased value of production or from reduced costs.

-***3.1 Increased production*** Increased physical production is the most common benefit of agricultural projects. An irrigation project permits better water control so that farmers can obtain higher yields. Young trees are planted on cleared jungle land to increase the area devoted to growing oil palm etc.

-In many agricultural projects, however, the benefits may well include increased production consumed by the farm family itself. Exclusion means underestimating the return to agricultural investments relative to investments in other sectors of the economy.

-3.*2 Quality improvement* For example, the analysis for the Livestock Development Project in Ecuador, which was to extend loans to producers of beef cattle production but also to improve the quality of their animals so that the average live price of steers per Kilogram would rise from S/5.20 to S/6.40 in constant value terms over the twelve-year development period.

-3.*3 Change in time of sale* benefits may arise from improved marketing facilities that allow the product to be sold at a time when prices are more favorable. A grain storage project may make it possible to hold grain from the harvest period, when the price is at its seasonal low, until later in the year when the price has risen.

-*3.4 Change in location of sale* investment in trucks and other transport equipment to carry products from the local area where prices are low to distant markets where prices are higher.

-*3.5 Changes in product form (grading and processing)* Projects involving agricultural processing industries expect benefits to arise from a change in the form of the agricultural product. Farmers sell paddy rice to millers who, in turn, sell polished rice. The benefit to the millers arises from the change in form.

-*3.6 Cost reduction through mechanization* The classic example of a benefit arising from cost reduction in agricultural projects in that gained by investment in agricultural machinery to reduce labor costs. Examples are tube wells substituting for hand-drawn or animal-drawn water, etc.

-*3.7 Reduced transport costs* In some projects the benefit may arise not from increased production but from a loss avoided. In Jamaica, lethal yellowing is attacking the Jamaica Tall variety of coconut to plant Malayan Dwarf coconuts, which are resistant to the disease.

-*3.8 Other kind of tangible benefits* Transport projects are often very important for agricultural development. Benefits may arise not only from cost reduction, as noted earlier, but also from time timesaving, accident reduction, or development activities in areas newly accessible to markets.

-**4. Secondary Costs and Benefits** Projects can lead to benefits created or costs incurred outside project itself.

-Another group of secondary costs and benefits has been called ”technological spillover” or “technological externalities.” Adverse ecological effects are a common example, and the side effects of irrigation development are often cited as an illustration. A dam may reduce river flow and lead to increased costs for dredging downstream. New tube well development may have adverse effects in the flow of existing wells.

-Irrigation development may reduce the catch of fish or may lead to the spread of schistosomiasis.

-costs and benefits that are intangible may include creation of new job opportunities, better health. and reduced infant mortality as a result of more rural clinics, better nutrition, reduced incidence of waterborne disease as a result of improved rural water supplies, national integration, or even national defense.

Wrap-up discussion question/activities (10Min)

-Discuss the technological spillover and technological externalities

Nest days assignment
Please post here
(please note that at the end of the week you will be given next weeks ;assigment)

Session 33rd hr
Topic: Valuing costs and Benefits
Session learning objective
-Enables to understand as to how finding market prices for agricultural projects inputs and output
- indicates how to treat and handle change in relative prices and inflation
- gives an insight on how to price for internationally traded commodities especially financial export and import parity prices
-it enlightens how to use base year for price estimate
-very importantly, indicates how resource pricing is done in economic analysis, in particular, shadow pricing

Reading Assignment discussion (10 min)
-Explains the difference between conversion factor and shadow exchange rate

Reading Text
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 3 page 65-85

Synopsis of lecture (bullet)

Pricing Project Costs and Benefits - Once costs and benefits have been identified, if they are to be compared they must be valued. Since the only practical way to compare differing goods and services directly is to give each a money value,

-1 Prices Reflect Value Underlying all financial and economic analysis is an assumption that prices reflect value-or can be adjusted to do so.

-2.Finding Market Prices the first step in valuing costs and benefits is finding the market prices for the inputs and outputs. finally by adjusting the final prices so they better reflect economic values.

-2.1 Point of first sale and farm-gate price : a good rule for determining a market price for agricultural commodities produced in the project is to seek the price at the "point of first sale." If the point of first sale is in a relatively competitive market, then the price at which the commodity is sold in this market is probably a relatively good estimate of its value in economic as well as financial terms.

-If the market is not reasonably competitive, in economic analysis the financial price may have to be adjusted better to reflect the opportunity cost or value in use of the commodity.
-The increased value added of the product as it is processed and delivered to a market arises as a payment for marketing services. This value added arises from the labor and capital engaged in the marketing service.
-***2.2Pricing intermediate goods:*** An intermediate good is an item produced primarily as an input in the production of another good. The analyst may treat the whole farm as a unit and value the milk produced at its point of first sale or value the calves sold as feeder cattle.
-Treatment of intermediate products will vary from project to project depending on the particular marketing structures. A frequently encountered intermediate good in agricultural projects is irrigation water. The "product" of an irrigation system-water-is, of course, intended to produce agricultural commodities. The price farmers are charged for the water is generally determined administratively, not by any play of competitive market forces.
-***2.3Other problems in finding market prices*** : Considerable confusion often arises in determining the values for land and labor. This happens primarily when the analysis moves from the financial project accounts to the economic analysis.
-In the accounts prepared for the financial analysis, the treatment of prices for land and labor is quite straightforward: the price used is the price actually paid.
-Prices for agricultural commodities generally are subject to substantial seasonal fluctuation. A good starting point is the farm-gate price at the peak of the harvest season. This is probably close to the lowest price in the cycle.
-2.4***Project boundary price*** : The concept of a farm-gate price may be expanded to a "project boundary" price if a project has a marketing component or if it is a purely marketing project.
-***3.Changes in relative prices:*** In financial analysis, a change in a relative price means a change in the market price structure that producers face either for inputs or outputs. A change in a relative price, then, is reflected directly in the project's financial accounts. A rise in the relative price of fertilizer reduces the incremental net benefit-the amount the farm family has to live on. It is thus clearly a cost in the farm account.
-Thus, changes in relative prices have a real effect on the project objective and must be reflected in project accounts in the years when such changes are expected.
-***3.1Inflation*** : The approach most often taken is to work the project analysis in constant prices. That is, the analyst assumes that the current price level (or some future price level -say, for the first year of project implementation) will continue to apply. It is assumed that inflation will affect most prices to the same extent so that prices retain their same general relations. The analyst then need only adjust future price estimate for anticipated relative changes, not for any change in the general price level.
-It is quite possible, however, to work the whole project analysis in current prices. This has the advantage that all costs and benefits shown would be estimates of what the real prices will be in each year of the project.

-4. Prices for Internationally Traded Commodities

-There are several international organizations and trade groups to which the analyst may turn. Example The World Bank, for instance, publishes its projections under the title *Price Prospects for Major Primary Commodities.*

-4.1Financial export and Import Parity Prices : In projects that produce a commodity significant in international trade, the price estimates are often based on projections of prices at some distant foreign point. The analyst must then calculate the appropriate price to use in the project accounts, either at the farm gate or at the project boundary.

-If the farm-gate or project boundary prices for the internationally traded commodities in the project are already known, and the prices in the particular country tend to follow world market prices, the farm-gate prices may be adjusted by the same relative amount as indicated, say, by the medium trend projected in the future relative prices supplied by one or another international organization.

- in financial analysis, if the form-gate price is set administratively and is not allowed to adjust freely to world prices, the relevant price to use is the administratively set price.

-There are many instances in estimating the economic value of a traded commodity that involve deriving a shadow price based on international prices.

-In such instances it is necessary to calculate export or import parity prices. These are the estimated price at the farm gate or project boundary, which are derived by adjusting the cost , insurance and freight (c.i.f.) or free on board (f.o.b.) price is quoted.

-4.2Financial Export Parity Price can be calculated in the following manner.

CIF at point of import **deduct** unloading at point of import **deduct** freight to point of import **deduct** insurance **equals** FOB at point of export. **Convert** foreign currency to domestic currency at official exchange rate **deduct** tariffs **add** subsidies **deduct** local port charges **deduct** local transport and marketing costs from project to point of export (if not part of project cost) **equals** export parity prices at project boundary. Conversion allowance is made if necessary, **deduct** local storage , transport , and marketing costs(if not part of project cost**) equals** export parity price at farm gate

Financial Import Parity Price can be computed in the following manner: F.o.b. at point of export ***Add*** freight to point of import ***Add*** unloading at point of import ***Add*** insurance ***Equals*** c.i.f. at point of import ***Convert*** foreign currency to domestic currency at official exchange rate ***Add*** tariffs ***Deduct*** subsidies ***Add*** local port charges ***Add*** local transport and marketing costs to relevant market ***Equals*** price at market *Conversion allowance* if necessary ***Deduct*** transport and marketing costs to relevant market ***Deduct*** local storage, transport, and marketing costs (if not part of project cost) ***Equals*** import parity price at farm gate

- 5.1 Market and Prices Market and price analysis forms an integral part of the financial analysis .

- 5.2 Seasonal Price Fluctuation of Outputs Determine during which months the producers are likely to sell their produce and what prices are likely to prevail during those months.

- 5.3 Farm Gate Prices Since the prices that farmers receive for their product at the farm or the nearest market is a good estimate of market prices, these farm gate prices

should be used for financial analysis. If farmers have to transport their produce to distant markets to get higher prices the cost of transport should be deducted to arrive at farm gate price.

-6.**Base Year for Price Estimate** Assume prices that prevailed either during the year the project is prepared or the year the project is expected to be implemented. If those years are not considered normal, the average of several previous normal years will be taken.

-7.**Market Structure for Outputs and Inputs: For Outputs:** take market structure and the existence of imperfections into consideration in order to make an estimate of the prices which are likely to prevail in the market under the prevailing conditions., **For Inputs:** In case of government determined prices, take prices, which farmers have to pay. This is likely to be the case with fertilizers whose prices might be controlled by the government.

-8. Resource Pricing and Economic Analysis

-The determination of the economic viability of a project is dependent on the use of accurate estimates and methodologies for carrying out an economic analysis.

-The profitability of the proposed project can be assessed in terms of its capacity to make efficient uses of the nations resources in producing national income.

-There are two basic approaches to economic analysis in project formulation: the 'shadow pricing' method and the 'effects ' method.

-While these methods can sometimes produce different results for the same set of project data, they are both aimed at answering the same basic questions and are equally valid.

-Here we are only concerned on shadow pricing method. -***The shadow pricing method***-

The principle is to define the project's costs and benefits in terms of their value to society as a whole.

-This requires ***three important modifications to the approach followed in the financial*** analysis.

a) Putting a value on the use of resources which, though not priced in any market, nevertheless have real production value, e.g. the labor a farm household devotes to working on its own farm or the grazing land it uses;
b) For those commodities and services representing project inputs and outputs which do have identifiable market prices, adjusting these prices where necessary if they are not considered to reflect the true values to the economy of the items in question;
c) Eliminating from the analysis all 'transfer payment ' i.e. payments made for which no goods or services are received in return.

-The procedure is that then

-1}All project inputs and outputs are classified in to:

(i) Internationally **traded** items (e.g. wheat, fuel oil, machinery, skilled personnel)
(ii) Items which are **not internationally traded** (e.g. civil works constructions, electricity, land, transportation);
(iii) **Unskilled labor**.

-2}All **transfer payments** (e.g. taxes, subsidies, duties, loans and debt services, social security charges) are omitted from the prices or unit costs of these items.

-3}In the case of **traded items** the residual price (i.e. after eliminating any element of taxes, subsidies, et. from it) is broken down into its **border price component**, i.e. the

price at which it enters or leaves the country (CIF-cost, insurance and freight- for imports, or FOB -free on board-for exports) and its internal price component, i.e. the price of handling, transporting, storing, processing, etc the item from point of supply to port (for exports) or from port to point of demand (for import)

-Then, either (i) the border price component is converted to its equivalent value in domestic currency or (ii) the internal price component is converted to its equivalent value in foreign currency.

Wrap-up discussion question/activities
-Explain and discuss how you price exportable coffe products in ethiopia

(please note that at the end of the week you will be given next weeks ;assignment)

Session 34th hr
Topic : Choosing a Feasible Project
Session learning objective
-attempts to explain the criteria for selection of viable projects
-Emphasis both undiscounted a discounted project worth selection criteria

Reading Assignment discussion (10 min)
-what is the major difference between discounted project worth and undiscounted project worth selection criteria
-if you were to select project between two technologies in project analysis what selection criteria would you use

Reading Text
-J.Price Gittinger, **economic analysis of agricultural Project** Second Edition, completely revised and Expanded, EDI Series in Economic Development, the Johns Hopkins University Press, Baltimore and London, 1982, Chapter 9 page 299-362

Synopsis of lecture (bullet)

-1. Measures of Financial Viability
-The analysis should check the basic reasoning behind the design option i.e. how well these designs enable the specific project objectives to be met in terms of production, increase in income, provision of specific services, etc.?
-Do the project would actually reduce poverty? would it really improve levels of nutrition; would it result in a sustained , rather than a temporary, improvement ; would it lead to higher total level of employment.

-The performance tests are basically concerned with the projects expected financial, economic, social and environmental impact.

-**2.Social Viability & Benefits** : Depending on the kind of project and its circumstances, the following areas of change should receive attention:

-***Production organization*** -cultivated area per household, size of plots per type of tenure, size of plots per type of land, size of crops per crop, proportion of farmers by size of holding, distribution of irrigated land among farmers etc

-***Population movements and settlement patterns*** Spatial redistribution of the population; temporary migration and permanent migration

-***Standard of living.*** expected income distribution impact; project contribution to employment; Nutritional effect; improvement of domestic water supply; the likely impact of the project on health; and housing improvements may be among project objects

-Are the incentives sufficient to induce the responses required? you may examine more in detail by seeing i.e. cost per beneficiary or per unit of service provided; Cost recovery from project beneficiaries (Rule of thumb- cover at least 75% of project operation and maintenance cost at full development); Cash incentives to participating agents (earnings by laborers, farm household incomes, return on private equity capital, traders marketing margins, etc) Rule.

-**3.Performance Indicators :** Once all the financial cost and benefits elements with appropriate prices are tabulated, and discounted with realistic rates, then the projects performance indictors would be estimated. There are several performance indicators (both undiscounted and discounted measures of project worth) to choose from. Only a few from both measures are itemized below;

-**3.1*Undiscounted measures of project worth*:**

-Pay -back period

-Proceeds per unit of outlay

-Average annual proceed per unit of outlays

-Average income on book value of the investment and

-Many financial ratios each for specific performance can be used.

-***3.2Discounted measure of project worth***: - To use discounted measures of project worth, a calculating discount rate is required. For financial analysis, the discount rate is usually the marginal cost of money to the project or enterprise for which the analysis is being done.

-In Ethiopia the average rate of interest since the economic reform program could be used. The major discounted measures of projects and the criteria commonly used for project viability are the following:

A. The net present value (NPV) or Net Present Worth(NPW)
B. Internal Rate of Return (IRR)
C. Benefit-cost ratio (BCR)

-**4.Net Present Value (NPV)** : NPV is one of the discounted measures of project worth.

-It is the present value of the incremental net benefit or incremental cash flow realized annually during the life of the project, i.e. the present worth of benefits less the present worth of costs of a project.

-The formal selection criteria are to accept all independent projects with positive net present value when discounted at the opportunity cost of capital. This measure is absolute and is not suitable for ranking projects.

-Mathematically:

$$NPV = \sum_{t=0}^{T} \frac{Bt - Ct}{(1+i)^t} \quad or \quad NPV = \sum_{t=0}^{T} \frac{Bt}{(1+i)^t} - \sum_{t=0}^{T} \frac{Ct}{(1+i)^t}$$

Where:

Ct = Cost at year t
Bt ≡ Benefit at year t
t ≡ 1,2,3 ..... T
i = discount rate

-5.Internal Rate Of Return (IRR): IRR is a discount rate, which just makes the net present value equal to zero. The selection criterion is to accept all projects with an IRR above the opportunity cost of capital.

-Projects are ranked in order of the value of their internal rates of return. To make the task of computing IRR and NPV easier, it is possible to use a computer software (Microsoft Excel under Windows) or Lotus 1-2-3.

-6.Benefit Cost Ratio (BCR) The benefit-cost ratio is simply the present value of total benefits divided by the present value of total costs. The larger the ratio the more attractive a project is. The BCR is affected by the interest rate chosen.

-Higher interest rates means lower BCR. The BCR discriminates against projects with relatively high gross returns and operating costs even though these may be shown to have greater wealth generating capacity than those alternative projects that have higher benefit cost ratio.Mathematically:

$$B/c\ Ratio = \frac{\sum_{t=0}^{Bt} \frac{Bt}{(1+i)^t}}{\sum_{t=0}^{T} \frac{Ct}{(1+i)^t}}$$

-7. The capital-turnover criteria's : Its various names are the rate of turnover criteria's, maximizing of out put per unit of capital criteria or the ratio of out put to capital criteria (minimum capital intensity or minimum capital-output ratio criteria).

-The logic behind is that since capital is scarce in LDC that techniques should be chosen which yields the maximum out put per unit of capital employed. Or for maximizing out put, investment projects with a high rate of capital turnover (i.e. of a low capital output ratio) should be selected.

-Quick yielding projects with low capital intensity make it possible for scarce capital resources to be realized soon enough for reinvestment in to other projects. Such projects also provide maximum employment per resources in LDC.

-8. The social marginal productivity criteria's It is based on the conventional marginal productivity approaches. As more and more capital is employed in any project in combination with given amount of other input, its marginal products will after a time start falling till the marginal productivity of capital in different uses is equalized.

-The aim is to allocate limited investment resources in such a way as to maximize the national output. In other words they should be utilized in the most productive projects. It

is applicable in general to the economy as a whole and not to individual investment project.

-9. The Reinvestment criteria's : Also known as the rate of surplus criteria's or the marginal per capital investment quotient. The later is defined as the "net productivity per worker minus consumption per worker."

-This emphasizes the maximization of per capital output in the future rather than in the preset. This is possible when the rate of saving is maximized leading to the reinvestment of income. Assuming that national income is divided in wages and profit the former is spent on consumption and the latter are saved for the purpose of the investment.

-The larger the volume of profits, the higher will be rate of savings, as a result the larger will be the amount of capital per head and the higher will be the growth rate of output which will lead to increased output per head in the future.

-Galenson and Leibenstein use the following formula to determine the rate of investible surplus (r)

$$R = \frac{P - e.w}{C}$$

Where p is the product per machine, e the number of men per machines, W real wage rate, and C the cost of machine; can be increased by raising P and decreasing e.w can increase r. in proportion to C.

-In order to raise the proportion of capital to labor, the per capital out put potential and the per capital investible surplus, Galenson and Leibenstein favor capital intensive techniques even in those countries were capital is scarce and labor abundant.

-Production processes having a high rate of capital to labor result in a large share of income going in to profits and a small share in to wages. Thus a large proportion of the initial income is available for investment through profit. The larger the profits, the higher will be the savings. As a result, more capital will be available for investment and the greater will be the increase in output.

-10 The time series criterion :The criterion seeks to maximize out put with in a given period of time. Given the capital-output ratio and the rate of savings, the time-path of (say) two techniques (capital-intensives and labour-intensive) can be drawn and it can be found out which of the techniques yields the highest returns over the time-horizon.

Wrap-up discussion question/activities (10Min)

-Discuss which of the project selection criteria are more useful to be applied to macro or national level instead of to a very specific project

(Please note that at the end of the week you will be given next weeks; assignment)

Module 7 -Dr.RAO

Module 8 –Dr.RAO