CHAPTER - 1
INTRODUCTION
CHAPTER - I

INTRODUCTION:

Agriculture occupies a place of pivotal importance in India’s economy as it provides employment and income to the bulk of the population. There are references in our *vedas*, *puranas* and epics with regard to agricultural activities and it has been practiced in India since time immemorial. It has remained mostly in the hands of illiterate people of the country. A vast country of sub-continental size like India, with marked regional diversities in agro-climatic environment, resource endowment and population density is likely to be characterised by uneven economic and agricultural development among various regions.

The immediate solution to the problem of agriculture is being sought in the context of a rapidly growing population and the changing consumption pattern of the rural inhabitants all over the country. The problem of agriculture production resolves itself into the basic problem of productivity. In an agro-based economy, with an old civilization, where land is cultivated by peasants on traditional methods over thousands of years, the question of agricultural productivity is crucial.

The question is how to change the traditional methods of agriculture? The engineering industry can play a vital role in bringing about the change. Agricultural production is basically the result of the factors like cultivable land, labour employed, material inputs and extension inputs. The setting up of industrialised agricultural
farms with modern and mechanised means is used to raise production, productivity levels and attain self-sufficiency in the sphere of production of food grains and raw materials.

The main features of India’s agricultural development since independence are well known and do not need a detailed description. It suffices to note that during the last 50 years the country has achieved the sustained, unprecedented growth of agricultural output. Agricultural output growth has been well ahead of population growth. This has happened despite the cultivated area has virtually stagnated in recent years. Increase in yield levels per hectare of cultivated area has become increasingly important and is now the predominant source to meet the growing population of the country.

The two successive severe droughts in 1965-66 and 1966-67, gave rise to international apprehensions about India’s capacity to feed her huge and growing population. Critics recommended the application of “triage” formula to countries like India which were considered beyond redemption. Fortunately, for the country, at this very time the HYVs of cereals became commercially viable. With this we can accept that technological changes ushered through the application of HYVs, as such, have contributed to the widening of the income disparities between;

i) Different regions

ii) Small and large farms
iii) Land owners on the one hand and tenants and agricultural labourers on the other.

However, the highest priority had to be assigned to augmenting food production by encouraging HYVs, as the HYVs opened up a process of modernisation of Indian agriculture and significantly raised India’s productive capacity.

Before Green Revolution, the year 1964-65 was the best year for food grains production. Even then the annual rate of growth of food grains production during the five years ending 1964-65 was just 1.8 per cent. The next two years ending 1965-66 and 1966-67 were years of disastrous crop failures. Food grains production declined from 89 million tonnes in 1964-65 to 72 million tonnes in 1965-66. It was only in 1970-71, that the food grains production revealed the impact of the Green Revolution. Between 1964-65 and 1970-71, food grains production registered a growth rate of 3.4 per cent per annum. In the six intervening years (after the Green Revolution) food grains production increased by 19.1 million tonnes, registering a compound growth rate of 3.3 per cent. This rate was 18 per cent higher than the growth rate shown by the same measures between the similar crop years 1949-50 to 1960-61. The weather in 1964-65 was slightly better than 1970-71. Food grains production declined once again in subsequent years, but the highest of this period (1972-73) at 97 million tonnes was substantially higher than the lowest of 1966-67 (72 million tonnes). The increase in wheat production was more spectacular between 1964-65 and 1970-71, where the wheat production increased by 90 per cent and the yield per hectare by 43 per cent.
The increase in agricultural production depends largely on the key inputs like fertilisers, irrigation and improved seeds. The application of farm machinery has many advantages
1) Greater output per man day and per acre
2) Maximum use of good weather
3) Widening the scope of cropping pattern
4) Raising more productive higher quality crops
5) Less toil and better conditions for workers.

The foundation of our economic progress lies in a self-sufficient and prosperous agriculture. World experience shows that through increased use of fertilisers we can make the land more bountiful. This is particularly important in our country where land for cultivation per family is limited and the pressure of population on the land is increasing at a rapid pace.

Due to continuous cropping over the years, the fertility of our soil has been lowered. In any system of intensive agriculture, the harvesting of the crops takes place in succession, often several times a year. This involves a recurring drain of nutrients from the soil and sustained agricultural production of high level will be impossible unless the nutrient elements removed from the soil are regularly returned to it. If our agricultural production has to be stepped up to achieve self-sufficiency a massive programme of fertilizer production and its application has to be undertaken.
The best results in agricultural production are achieved by using fertilisers and HYVs of seeds in Intensive Programme Areas (IPAs). These are the areas with favourable conditions in relation to assured irrigation and better rainfall having extension staff in position. The farmers are relatively more conscious of improved methods of agriculture. Government had evolved the “New Strategy” based on introduction of science and technology in the field of agriculture. But one of the major problems in communicating the new methods was convincing millions of farmers who were illiterate and ignorant. There are many ways in which information about the new methods could be transmitted. One of them was the price incentive to the products produced by using new inputs.

The Government’s new approach towards agriculture was part of the programmes for raising overall economic resources. Because of the difficulty in communicating the new methods to farmers it had been decided to concentrate on the approach in the better-endowed areas, which offer great potential for development.

The planning commission had accepted in principle, the setting up of industrialized agricultural farms. It brings us to the heart of the solution namely, industrialized agricultural farms with modern and mechanized means in use to raise productivity, increase production of food grains and raw materials. This will open up the gate of agricultural engineering growth of these farms would also lead to the
expansion of new branches of agro-based industries like poultry, dairy-farming, piggeries, horticultural farms canning and food processing units.

There are many advantages of the application of farm machinery. Mention should be made, particularly, of the following major benefits that result from the use of machinery.

a) Greater output per man and per acre.
b) Maximum use of favourable weather and a reduction in the negative effects of unfavourable weather.
c) Widening the scope of cropping pattern through deeper ploughing and cultivation of unused land in the hillsides.
d) Raising more productive types of crops in greater quantities of higher quality.
e) Less toil and better conditions for workers. In other words Mechanisation is paid for by saving the cost per unit for production or increased output.

Experience confirms that the production goes almost without exception with an increase of tractor population and decrease of workers in agriculture. These are good reasons to believe that it is impossible to raise India’s agricultural productivity without the use of modern machinery in large number. During many months in the year soil conditions in large parts of India are too severe for cultivation other than machinery. Timely operations during short rainy season can be secured only by the use of modern machinery. Experts who have examined the problem of shifted population from farms to industries have expressed the opinion that it is more expensive for the nation as a whole to provide a farmer with a job in any industry and
to train him in production methods than to provide him with tools, facilities and technical know-how to broaden the valuable knowledge he already possesses and to increase the agricultural production. It is most welcome that there is a growing realization in the country that modern machinery should be made available to farmers in adequate quantities.

For a programme of improving the farm productivity, we will have to take into account the area under different holding groups. The large holding group will find it beneficial to take to tractor farming and on the smaller holdings, bullocks will continue to be the primary source. Modern production tools must be made available to our farmers. Today's modern technology must be brought up to the peasant's doorsteps. To accelerate tractor farming it is necessary to prevent further fragmentation to present holdings and to consolidate holdings effectively however possible using a tractor will enable farmers to carry out proper tillage faster. It will ensure completion of farm operations in time.

Because of power limitations, we have not been able to cultivate on land effectively, wide use of tractors and effective mechanisation of our farms will generate employment in the country on activities of manufacture and marketing of not only farm equipment but a wide range of ancillaries. High yield of less cost of production will increase the farmers buying power. This itself will generate wide employment opportunities.
The spectacular growth of Indian agriculture during last two decades has won international acclaim. It is, in fact, a riddle to many observers as to know how a food deficit economy has been transformed into food surplus economy in a short span of about two decades. The agricultural production in the country increased at a compound growth rate of 2.4 per cent per annum during 1960-80. However, the progress made is not of the same level in all the states. Punjab with a compound growth rate of 5.4 per cent leads all other states.

The strategy, which made this achievement possible is the priority accorded to agriculture in the developmental efforts and appropriate policies adopted by the Government. Emphasis was laid on creation of infrastructure for irrigation, power, research and extension service land reforms, credit, marketing and transport networks along with the facilities for procurement and distribution of farm inputs. The lessons learnt from this experiment are vital for the developing countries and also for the agriculturally backward regions of India for modernization of their agriculture.

Since from Green Revolution Era, Net Sown Area remained at about 142 million hectares. Food grains production has increased due to introduction of modern scientific agricultural practices and increased cropping intensity. The consumption of fertilizer, electricity and diesel in agriculture increased steadily. Compared to 51 million tonnes of food grain production in 1951-52, the country achieved food grain production of more than 195 million tonnes in 1998-99. The annual growth rate of food grain production has been about 3.38 per cent during last ten years compared to
population growth of about two per cent. The country has attained not only self-sufficiency in food grain production but also have sufficient buffer stock to meet any eventuality. But even then, certain sections of the society, particularly in the rural areas, still do not have adequate food due to poor economic conditions. The productivity of agriculture has to be increased to feed the growing population besides, measures for alleviation of poverty and generation of employment opportunities.

The process of Mechanisation of agriculture has to be viewed in the context of the overall objective of increased agricultural production. The extensive irrigation system, more particularly the developing network of tube-wells, has made large-scale adoption of high-yielding varieties feasible in Punjab. It has simultaneously made multi-cropping a practical proposal. In the next decade, a substantial increase in agricultural production in Punjab is expected with at least two crops being raised on irrigated land. With tube-well irrigation, the intensity of cropping could even be more than 200 per cent. However, a serious limitation has set in because of reduced time gaps between harvesting and threshing of one crop and the sowing of the next. Cultivation of two or more crops in a year will be practical only through Mechanisation of these operations and further development of tube-well irrigation.

Mechanisation has also led to the proper utilization of inputs, like fertilizers, pesticides and water. This aspect is however, not fully appreciated. It is well established that with the use of modern equipment, the utilization efficiency of these inputs is substantially increased. For instance, a farmer having a tractor and a blade
tracers manages to grade his land to a much better level in course of time, as compared to the farmer not having similar sources of power and equipment at his disposal. Proper grading helps in reducing water losses during irrigation. Among many other useful aids are the seed-cum-fertilisers drillers and well-designed plant-protection equipment.

Irrigation is the most important factor, which has vastly helped in extending the area under high-yielding varieties of different crops and application of fertilisers. Irrigation facilities are being extended at the rate of nearly two million hectare per annum. The irrigated area in India increased from 17 per cent of total cropped area in 1950-51 to 19.9 per cent in 1965-66 and to 32 per cent in 1983-84. This is the result of major and medium irrigation projects undertaken by the government and also private investments made by the farmers in sinking wells and tube-wells. There has been dramatic increase in the number of tube-wells from 8.86 lakhs in 1965-66 to 60.9 lakhs in 1980-81. The area irrigated by tube-wells including dug wells increased from 20.7 per cent in 1950-51 to 60 per cent in 1983-84 in India.

Irrigation may be noted as the single major factor responsible for transformation of agriculture in India, more particularly in the state of Punjab. The net area irrigated to net area sown in Punjab has been increased from 59 per cent in 1965-66 to 85 per cent in 1983-84. Punjab had hardly any significant area irrigated by tube-wells in 1950. The share of tube-well irrigation increased to 41 per cent in 1960-61 and further rose to 59 per cent of net irrigated area in 1983-84. The
importance of tube-wells lies in the fact that is flexible and reliable source of irrigation as compared with canal irrigation. The modernization of Indian agriculture is closely identified with the growth of irrigation.

The problems of agricultural holdings in India are two-fold. Not only the holdings are small but they are also fragmented and scattered in tiny bits. This is a major handicap, which restricts the use of improved agricultural practices. There is a wastage of land in boundaries and fencing. Moreover, quarrels over boundaries lead to litigation for a long time. Therefore, it has been realized that answer to this problem lies in the consolidation of holdings. The initiation of the consolidation of holdings in India was started during the British period in 1920s with the Enactment of Baroda Act of 1920, then Bombay holding Act, 1927. Primarily to start with, it was a co-operative joint effort made for the farmers for their mutual benefit. Later after independence (1947) special legislations have been enacted for consolidation of holdings in different states. As a result, 4.5 million hectares of land was consolidated by 1956, which increased to 12 million hectares in 1961 to 32.6 million hectares in 1972 and to 45 million hectares in 1985. Moreover, the implementation has been patchy and sporadic. Only Punjab and Haryana have completed the work of consolidation of land holdings and these are also the states, which have made spectacular headway in respect of agriculture production and productivity. In Punjab, the work was completed by 1968 as the state took the lead in consolidation of holdings. This situation made it possible for the farmers of Punjab to sink wells and
tube-wells and to make other improvements in farm organization that triggered rapid adoption of new technology and helped in modernization of agriculture in Punjab.

Land reforms constitute another important instrument for modernization of agriculture. Immediately after independence, various legislative and other measures were taken to initiate land reforms. These had twin objectives of increasing agricultural production and ensuring social justice. Land reform legislations were enacted in different states to suit local conditions and requirements. Steps in this direction resulted in the abolition of intermediary’s tenures like Zamindari and Jagirdari etc., which covered more than 40 per cent of the total area in the country. About 20 million cultivators were benefited by the abolition of these two systems. Legislative measures were also taken for providing security of tenures to the tenants and regulating rent payable by them. Laws for conferment of ownership rights on tenants were implemented in majority of the states. Similarly several states enacted land ceiling laws and nearly 4.33 million hectares of land was declared surplus. Out of this 2.9 million hectares had already been distributed till 1983. The State of Punjab historically has been a land of peasant-proprietors who had a deep interest in farming. Thus an equitable tenurial system and a stable and restructured base paved the way for modernization of agriculture.

A prerequisite for Mechanisation is the availability of sufficient power, which is the nucleus of all technological developments. The State of progress in industry or agriculture is fairly and accurately represented by power use index. Immense increase
in the supply of electric power to the agricultural sector has been still another factor contributing to the modernisation of agriculture. Rapid growth of tube-well irrigation has been largely because of availability of this important factor. The consumption of electricity increased from the low level of 5.5 Kwh per thousand hectares of gross cropped area in 1961 to 17 Kwh in 1980. The percentage of consumption of electricity in agricultural sector to total consumption in India has increased from six per cent in 1965-66 to 19 per cent in 1983-84. The supply of electricity to agriculture at subsidised rate is a very important factor responsible for modernization of agriculture in Punjab.

The availability of high yielding varieties of seeds along with assured sources of irrigation increased the demand for fertilisers. It was therefore, imperative that special measures should be taken by the Government for the production and distribution of fertilisers. The production of fertilisers went up from 0.334 million tonnes of nutrients in 1965-66 to 4.53 million tones of nutrients by 1984-85. The consumption of fertilisers too has been growing rapidly. It has increased from 0.8 million tonnes of nutrients to nearly 8.0 million tonnes during the same period. Due to the increased production of fertilisers, the share of imports in the total consumption of fertilizer declined from 71 per cent in 1967-68 to 40 per cent in 1983-84. The consumption per hectare of cropped area increased from 5.05 Kg to 41 Kg during the period 1965-66 to 1983-84. The credit co-operative societies account for about 47 per cent of the total fertilizer distributed in the country.
The extensive irrigation system, more particularly the developing network of tube-wells has resulted in large-scale adoption of HYVs in India. It has simultaneously made multi-cropping a feasible proposition. However, with the multi-cropping, the time gap between harvesting of one crop and the sowing of the next crop is reduced. To make multi-cropping possible, efforts were made to mechanize these operations. As a result of high priority given to the indigenous production of tractors to suit Indian condition, the number of tractors which was barely 54,000 (0.35 tractor per thousand hectares) in 1965-66 increased to 0.1 million in 1970. But during the next decade it jumped to 0.473 million (2.7 tractors per thousand hectares) in 1980-81. The tractorisation along with growth of oil engines and electric motors used in agriculture resulted in partially mechanizing major operations, such as water pumping, threshing, ploughing and sowing. This has led to proper utilization of inputs like seed, fertilisers and water. Punjab leads in farm Mechanisation. The number of tractors increased from 10,646 (2.17 per thousand hectares) in 1965-66 to 1,85,000 (43.9 per thousand hectares) in 1983-84. It accounts for 27 per cent of the total number of tractors in the country. The major operations, such as water pumping, threshing, ploughing and sowing have been mostly mechanized in Punjab. Besides, the tractors, tube-wells, threshers etc., there is a great improvements in hand tools, drills and other implements made by local artisans and agro-industries which too helped a great deal in increasing the productivity of agricultural workers.

Mechanisation of agriculture requires appropriate machinery for ensuring timely field operations and effective application of various crop production inputs utilising human, animal and mechanical power sources. It also requires machinery for
reducing drudgery in agriculture, besides, being cost effective and eco-friendly. The traditional tools and implements relayed mostly on human and animal power. Draught animals continue to be a major source of farm power. Human power is equally used for sowing or transplanting, weeding, harvesting and threshing field operations in hill regions. Diara land and Tal land, can be performed by human and animal power only. Even today, it is estimated that more than 57 per cent of the area is commanded by draught animals, with 2.5 hectare command area per animal pair. The cost of cultivation by using animal and labour power is economical when the wages are low. Improved hand tools and bullock drawn implements, although help in reducing drudgery in farm operations, they do not necessarily help in completing the operations in time. Due to the economic advantage of rearing animals primarily for milk, the relative importance attached to draught animal power is gradually declining. Many farmers limit reliance on District Area Programmes (DAP) and avail tractor services for tillage and other operations.

Today, more than 2.53 lakh tractors are being introduced every year compared to 880 tractors per year in 1960-61. The population of tractor in the country is estimated to be more than 2.04 millions in 1996-97. The growth of tractors has been more than 10 per cent per annum. Along with tractors, farmers have also adapted other farm equipment to facilitate farming. But average availability of tractors is less than two per cent of the total farm holders. The use of irrigation pumps has increased to more than 9.8 million electric pumps and 4.9 million diesel engine operated pumps to provide assured irrigation. Farmers preferred to get first ploughing done by tractors.
and other operations are performed by animal power. Average availability of per unit farm power is one of the indicators of modernisation. The average potential availability is estimated 1 Kw/ha from animal and mechanical sources, which is very low compared to average power used in Punjab of more than 4 Kw/ha. The average availability of diesel in agricultural sector is estimated as 18.61 Kg/ha or 56.87 Kg/Kw per year in 1996-97.

The animal drawn Dufan (two row), Tifan (three row) Enatigoru and 7ESPO plough (all local-sowing devices) are used as these cover more area and cost less. These however, require skilled operator to regulate the seed rate. For precise application of seed and fertilisers, mechanically metered seed drill and seed-cum-fertilizer drill operated by animal and tractor have been developed and are being manufactured to suit specific crops and regions. Number of till drill and strip till drill have also been developed to reduce energy consumption. Inclined plate planter and pneumatic planter is precise machinery for sowing potato planter, groundnut planter, mechanical rice planter and sugarcane set cutter cum planter have also been introduced. Traditionally, earthling operation in potato, sugarcane and other crops, are performed using shurpi, spade or country plough. Now bullock and tractor operated cultivator, furrower, bund former and ridge former are available which are effective and cover more area.

The adoption of technological inputs, such as tube-well irrigation, fertilizer and Mechanisation is dependent on the availability of cheap agricultural credit. The Government of India adopted multi-agency approach in order to increase the flow of
institutional credit to agriculture and also to minimise the dependence of the rural poor on non-institutional sources of credit, such as, moneylenders. The share of institutional agencies in total agricultural credit increased from seven per cent in 1950-51 to 19 per cent in 1961-62 and further to 40 per cent in 1983-84. Co-operative credit institutions have a major share in the institutional credit to agriculture. The Government of India nationalized 14 major commercial banks in July 1969. Before this, co-operatives were the only institutional agencies to provide agricultural credit. The short-term and long-term co-operative credit increased from Rs.3,920 million in 1965-66 to Rs. 28,820 million in 1983-84. This forms about 60 per cent of the total institutional credit. The share of nationalized banks and regional rural banks increased considerably after their nationalization from 1.3 per cent in 1969 to 40 per cent in 1983-84. The co-operative credit structure has played a very important role in providing agricultural credit for short-term production needs and long-term investments in Punjab. The co-operative credit increased 15 folds from Rs. 3.36 million in 1965-66 to Rs.3,420 million in 1983-84.

The Governmental programmes have been oriented to promote the farm Mechanisation and make the improved and modern agricultural machines available to the farmers throughout the country with a view to increasing the agricultural production, minimising the drudgery associated with the farm operations and removing socio-economic disparity among the farmers. Farmers have been provided assistance for owning agricultural machinery tractors. The infrastructure for human resource development on farm machinery has been expanded with a view to imparting
training in the proper selection, operation, repair/maintenance and management of farm machinery. Besides this, farm machines are tested with a view to evaluating performance characteristics and upgrading their quality. To begin with five state agricultural universities are being assisted financially for supplementing the efforts of the department’s farm machinery training and testing institutes, farm machinery centers towards human resource development in farm Mechanisation by way of imparting training on the various aspects of farm machinery.

Although animal and human power continue to be the main power sources in agriculture, yet the power driven machines, namely tractors, power-tillers and combine harvesters continue to be in the frontline of farm Mechanisation. Fuel-efficient tractors and better quality farm machines are now available in the country. The Governmental efforts have found expression in a substantial increase in the use of agricultural machines by the farmers. The sale of tractors and power-tillers touched an all time high mark during 1996-97 constituting about 2.21 lakh tractors and 11 thousand power-tillers. The same holds good for the other agricultural equipments as well. As a result the power now available at the farms is estimated at 1.10 hp/ha during 1996 as against about only 0.35 ph/ha in the early 70s.

During the ninth plan, thrust has been given to popularise the improved animal power driven implements and small tractors. Water management has also been given specific attention and the water saving devices such as sprinklers and drip irrigation systems would be promoted through oil seeds, pulses and horticulture development
programmes. Industrial designs of prototypes and their jigs and fixtures will be developed for arranging manufacture of new and improved agricultural implements. These schemes would give a fillip to the promotion of agricultural Mechanisation in the country.

Draught animals will continue to have relevance in Indian agriculture especially on small farms and hilly areas. About 67 per cent of the rural population, even today, depends on agriculture. But labour wages are increasing and their availability during peak seasons is getting scarce. Cost of maintenance of animals is also increasing. Though the investment in farm equipment is comparatively high, the farmers have accepted it as an important input for increasing the production to ensure timeliness and to reduce drudgery. Agro-ecological diversity and socio-economic disparity therefore will be guiding force for future Mechanisation strategy. The future Mechanisation perspectives include;

a) Efficient use of Inputs by use of Improved Machinery:

The Indian agriculture is characterised by small and scattered farm holding, poor investing capacities of the farmers and non-availability of good quality of implements/machinery in the vicinity of the farmers. Equipment will be required for an efficient utilization of natural resources keeping the constraints/limitations of land resource, natural precipitation, social and economic disparity of the farmer. The increased mechanical power to be supplemented by tractors, electric motors and self propelled machinery.
b) Modernised Irrigation System:

The total irrigated gross cropped area is about 42 per cent (80.5 million hectare) with traditional methods of irrigation, this is likely to increase to about 50 per cent by 2000 AD. Precision controlled irrigation through micro and drip system, especially in horticulture and high value crops may save water and thereby more area can be brought under irrigation.

c) Rapid Mechanisation Through Group, Contract and Franchise Farming:

The level of Mechanisation in the country, as a whole, is still at a very low as seen from potential unit farm power available. The investment in agricultural machinery vis-à-vis their utilization on small farms is quite high. However, in the present circumstances when labour wages are increasing and their availability to peak time of sowing, harvesting and threshing is decreasing, the farmers are now getting more inclined towards use of agricultural machinery, customs hiring of tractors for tillage, transport, irrigation and combine harvesting is already in vogue in many parts of the country. Mechanisation of agriculture through group farming, contract farming and franchise cultivation will ensure modernization of agriculture and quality farm produce.

d) Commercial Agriculture:

India is blessed with climatological diversity and this coupled with modern environment controlled green house, can provide a steady regular supply of agro produce for export and domestic market. This will further increase productivity and
farmers will be able to invest more for modernizing agriculture especially high value and industrial crops such as sugarcane, cotton, tobacco, exotic fruits, vegetables, cut flower, etc. Post harvest technology helps in reducing crop losses and improving quality of produce. The Government is committed to provide more thrust to food processing and agro-based industries in an endeavour to promote agri-business, increase in the income of the farmers, create employment opportunities, and foster rural industrialization.

Besides, assured irrigation, integrated nutrient and pest management, higher energy to ensure timely operations are important to increase sustainable productivity. The efficacy of agricultural inputs and natural resources, seeds, fertilisers, chemicals, land and water has further been increased through adoption of appropriate agricultural equipment. It is misconceived that benefits of Mechanisation could be reaped only by farmers having large acreage. The Indian farmers, however orthodox he or she may be easily convinced regarding the relevance of techniques and machinery. Equipment for tillage, sowing, irrigation, plant protection and threshing have widely been accepted by them. Even farmers with small holdings utilize selected improved farm equipment through custom hiring to increase productivity and reduce cost of production. The future Mechanisation strategy, therefore, may have to be based on agro-ecological diversity and economic disparity of the farmers. Drought animal and human power in India will continue to be used, but these are inadequate to ensure timeliness. Use of mechanical power on custom hire basis or contract service/franchise cultivation especially commercial agriculture need to be promoted to
provide modern technology to those who may not afford to use them on ownership basis due to high cost of equipment and limited use.

Agriculture is the base for economic development of the country with more than 25 per cent contribution to annual gross domestic products and with more than 67 per cent of the people dependent on it. Farmers and industries mutually depend on each other for inputs and raw materials for processing. Modernization of agriculture will promote higher productivity and better quality agro-produce for domestic and export. This will also provide higher economic return and employment to people.

Thus the introductory chapter gives a broad framework on Farm Mechanisation in agriculture. There are many issues as described above, need to be carefully examined both at micro and macro level for a clear understanding on this complex subject. Though there is a lot of literature available relating to the subject, it is essential to understand the economics of Mechanisation across various size classes as there is a greater diversification in the agriculture sector. The agriculture sector in the liberalization regime is heading towards more Mechanisation and small and marginal farms and farmers are disappearing as consolidation is going on due to corporate sector getting into the agricultural business. Therefore, the present study assume greater significance in the present-day context. Next chapter is devoted to critically review the research studies on Farm Mechanisation in the Indian context.