Chapter - I

Introduction
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Introduction

1.1 Introduction:

History of agriculture dates back to remote past. Agriculture was already highly developed before writing was invented, but archaeology has revealed much of its early condition. There is no evidence that crops were grown for food in Paleolithic times, but the flint sickles of Mesolithic (Natufian) age found at Mr. Carmel, probably of a date earlier than 6000 B.C., may indicate cereal cultivation. There is evidence that this had begun at Jericho and elsewhere before the time of pottery. Wheat and barley dating back probably to c. 5000 B.C. have been found in Egypt: the barely two and six-rowed, the wheat emmer, not bread wheat (Triticum Vulgare). Triticum Vulgare, however, is found is Asia Minor. In both cultivation had presumably begun much earlier; the Egyptian was almost certainly an immigrant culture. No wild form of T. Vulgare is known; it is a hexaploid formerly supposed to have resulted from a natural cross between the emmer and einkorn groups, now regarded as more probably formed by spontaneous hybridization outside Triticum. The earliest plows portrayed are in Egyptian tombs and on Mesopotamian seals of c. 3000 B.C.; they were, however, probably in use mish earlier. The plows depicted, like the present-day Arab nail plow, could only make a groove, but nothing more is needed in semiarid
conditions. From very early times the plow carried a box to hold seed which could drop into the groove.¹

About the middle of the 3rd millennium, Neolithic people migrated through Europe and later on to Great Britain by land and sea routes, bringing seeds of wheat and barley and also of some of their accompanying weeds. Apparently they used only the hoe, and their fields is shown on Dartmoor and elsewhere are small and irregular in outline. The Bronze Age people who succeeded (c.r800 B.C. onward) had plows drawn by from two to six oxen. In those depicted in caves in France on the Alps Maritimes and in Sweden at Bohuslan (undated), one man is shown driving while another in front walks backward with arms outstretched; this practice long persisted in Britain, and in the laws of Hywel Dda (c. A.D.945) the 'caller' sings or chants and is enjoined to be gentle so that the oxen "shall not break their hearts at their work." No remains of these plows survive in Great Britain.²

A number of Iron Age (450 B.C.-A.D.450) plowshares have been found, however. The early ones (in A and B periods) very a good deal in length and width, suggesting considerable variation in the weight and the size of the plow. It is not certain that a coulter was used, though F.G. Payne thought that one found at Bigbury might be pre-Belgic. The later shares, the Belgic to Celtic, were wider, though variable in width; coulters were certainly used with them. A number
have been found; they vary from 24 to 36 in length, indicating large, heavy plows, especially in Romano British times. Another type of Iron Age share has been found, tanged, not socketed; from its shape it is clear that the plow frame differed from the other form and that there was no counter; it does not appear to have survived after roman times.\(^3\)

The above paragraphs at length describe as a general survey the historical background of global agriculture.

1.2 Agriculture in India:

India is a large continent spread over from the Himalaya's in the North to the Indian Ocean at the South, and from the Arbian Sea in the West to the Bay of Bengal in the East. The primary occupation of the people of India is agriculture. It is also traditional occupation in this country. The livelihood of majority of the masses comes from the profession of agriculture. The ancient Indians are the first in human civilization to discover the science of agriculture.

People in ancient India were agriculturist. References to agriculture are found in the Vedas. It includes hymns and prayers for good crop, cattle and rain. In Rig-veda & also in Yajur-veda there are references to agriculture.

The Arthashastra of Kautilya\(^4\), describes in detail how agriculture is the basic source of revenue for the state and what were the duties of the state for development of agriculture. He made a provision for the special officer at the
state level called ‘Superintendent of Agriculture’, ‘Revenue Collector’ and a
‘Superintendent of Agriculture Warehouses’ to look after the industry of
agriculture. Indian agricultural produces like cotton, jute, sugar, goor (jiggery),
etc. were exported to the western countries via the Silk Route through
Constantinopal⁵.

India obtained freedom in 1947. The dawn of freedom not only brought
in its train new horizons of hopes but also a number of problems such as the
problem of poverty, of un-employment, of population, of nutrition, of schooling,
of habitations, of standard of living, and so on. These problems made it necessary
to take immediate steps through the process of planning and development. All
these problems were associated with the issues of growth and development in
areas both economic and non-economic. Agriculture being the primary
occupation of the masses all these problems were also directly and indirectly
related with agriculture. Mahatma Gandhi⁶ had rightly observed that the real
India lives in villages. Thus the process of socio-economic growth and
development relied to great extent on agricultural growth and development.

The process of economic growth is complex and creates problems of
adjustment in all sectors of the economy but especially so in agriculture.
Agriculture is usually the oldest sector in the economy, characterized by a
distinctive pattern of life and organization; life in attachment to land; in small
units combining property, management and labour; engaging all or most of the
family members in agricultural pursuits; and relatively isolated from the urban foci of modern economic growth. All these characteristics make for obstacles to an easy transfer of properly trained and educated labour to other growth in employment sectors; to an adjustment of production to changing demand; to changes in scale and structure of farm units and to movement of capital out of agriculture. At the same time, unlike many obsolescent older sectors, agriculture has benefited from vigorous technological innovations, particularly in the developed countries since World War-II. There is thus a distinctive contrast between the technologically feasible agricultural production processes and the persistent pattern of production and life among large groups of small-scale farmers responding but slowly to pressure of low incomes.

Improvement in agricultural productivity in India is of paramount importance today, not merely because it provides food and other wage-goods to the rising population, but also because it ensures a strong base for the future development of the industrial sector. It has been very rightly pointed out that country is not poor because it is agricultural in nature. Infact, it is so because its agriculture is backward. The Indian agriculture, as is well known, has been starved of capital investment, firstly, because of the poverty or low levels of income of the farming community, and secondly, because agriculture has traditionally been considered 'a way of life' and not 'a business proposition'. 
As India has celebrate 60 years of our Republic, it is necessary to travel back in history and see how issues of rural development have evolved over the years, and how some issues continue to be relevant even today.

Efforts to bring greater power to the Gram Panchayats were led by Dr. S. K. Dey, India's first Community Development Minister. This was the year in which the Government of India launched the first community development project. The Balvantrai Mehta Committee recommended the formation of a three-tier, Panchayati Raj system of rural local self-government, with the Gram Panchayat, Panchayat Samiti and Zilla Parishad as its components at the village, block and district levels respectively. The aim was to decentralize the process of decision making. The 73rd amendment of the Constitution has carried the process of devolution further, and today we see many panchayats in the country participating actively and very constructively in the development process. While it is true that the effects of empowerment have not reached every corner of the country uniformly, and many regions are still to stand firmly on their feet, there is no doubt about the fact that participatory development has established itself firmly in the Indian context at the different components of the rural economy, agriculture remains the mainstay of the rural sector. The compound growth rate in agricultural production has been 2.7 per cent per annum since independence. Since the first green revolution in the 1960's the food grain production has increased significantly from 82 million tonnes in 1960-61 to 129 million tonnes.
in 1980-81 and 233 million tonnes in 2008-09. However, the share of agriculture in the country's GDP has declined from 48.7 in 1950 to 24.4 per cent in 1996-97 and further down 18.7 per cent in 2007. Further, our agricultural productivity continues to be low at 1.7 tons/ha as against the world's average of 2.6 tons/ha, leave alone the world's best of 4 to 5 tons/ha. This is a matter of concern, and scientists and planners are now advocating the launch of a second Green Revolution which will increase the yield of our crops substantially. If we could do it the first time, we certainly can do it once again?

Another area of concern is the fact that economic growth has not generated the desired number of jobs in the rural areas. One of the most ambitious projects on rural development, National Rural Employment Guarantee Scheme (NREGS) launched in February 2006 hopes to provide employment to millions of people in the rural areas thereby fueling economic growth, as well.

1.3 Statement & Significance of the Problem:

India obtained freedom in 1947. The dawn of freedom not only brought in its train new horizons of hopes but also a number of problems such as the problem of poverty, of un-employment, of population, of nutrition, of schooling, of habitations, of standard of living, and so on. These problems made it necessary to take immediate steps through the process of planning and development. All these problems were associated with the issues of growth and development in
areas both economic and non-economic. Agriculture being the primary occupation of the masses all these problems were also directly and indirectly related with agriculture. Mahatma Gandhi had rightly observed that the real India lives in villages. Thus the process of socio-economic growth and development relied to great extend on agricultural growth and development.

Mario Bandini, Arthur Hanau & others (1965) have rightly pointed out that the process of economic growth is complex and creates problems of adjustment in all sectors of the economy but especially so in agriculture. Agriculture is usually the oldest sector in the economy, characterized by a distinctive pattern of life and organization; life in attachment to land; in small units combining property, management and labour; engaging all or most of the family members in agricultural pursuits; and relatively isolated from the urban foci of modern economic growth. All these characteristics make for obstacles to an easy transfer of properly trained and educated labour to other growth in employment sectors; to an adjustment of production to changing demand; to changes in scale and structure of farm units and to movement of capital out of agriculture. At the same time, unlike many obsolescent older sectors, agriculture has benefited from vigorous technological innovations, particularly in the developed countries since World War-II. There is thus a distinctive contrast between the technologically feasible agricultural production processes and the persistent pattern of production and life among large groups of small-scale
farmers responding but slowly to pressure of low incomes.

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Kurulkar R.P.\(^9\) (1983) in his valuable study has observed the reasons of backwardness of Indian agricultural as follows:

“...Main reason for the backwardness of Indian agriculture may be attributed to neglect of long-term credit to the agricultural sector of the economy. To improve the productivity of our agriculture and to free the cultivators from the vicious circle of poverty, a breakthrough has to be achieved by supplying adequate amounts of long-term invisible funds to the cultivators in the country.”

Khusro A.M.\(^10\) (1968) has also noted the various reasons of backwardness of Indian agricultural. He writes:

1. A failure to understand the operation of the price mechanism and hence to price outputs and inputs appropriately.
2. A failure to direct investment in relatively more productive channels.
3. A failure to adopt relatively more profitable cropping patterns.
4. A failure to analyze the implications of land reforms under a free price system and follow up this implication and a failure to utilize (organize) agricultural labour surplus and other forms of agricultural savings for capital formation.

The economic development of most countries is unbalanced, in the sense that not all sectors come alive and show vigorous growth simultaneously. From the point of view of the role of agriculture in economic development we may distinguish three case. 11

1. Where development begins outside agriculture, or
2. Where development begins with agricultural exports, or
3. Where development begins with greater productivity in food for the home market.

India is by population the second, and economically perhaps the most important, of the emerging nations. The problems she faces in her agricultural development are similarly on an enormous scale sixty-two million farms, with more than 70 percent of the country’s population, are unable to produce enough food for India’s basic needs. Under-nourishment is common, and famine not rare. Since the beginning of our century, farsighted people (mostly English) have endeavored to introduce co-operation to the Indian farming community as
a remedy for this basic illness. What are the results of sixty years of this work and what is the outlook for co-operation? Can co-operation continue to assist in the solution of the urgent problems which economic reconstruction and development raise?

India covers an area of 806 million acres; her population (in 1961) totaled 439 millions. The agricultural area (Net sown area) of 130 million hectares or 322436000 acres is worked by 62 million families. The size distribution according to the sample survey indicates the huge number of the smallest operational holdings (families cultivating not more than a small allotment garden in the English sense). According to a rough estimate (and leaving aside intensive irrigated holdings) the minimum subsistence area for a family, under Indian conditions, is probably about 10 acres. Present methods of cultivation may justify this estimate. India at present uses 36.6 million wooden ploughs, 1.4 million iron plough and some 39000 tractors; 24 million holdings, for which not even a wooden plough is available, would not be considered as agricultural holdings by western standards.

The above observation of Theodor Bergmann rightly points out the situation with reference to agricultural development in India and is equally applicable to economically backward areas like Nanded.

In the modern days, particularly after industrialization following the great industrial revolution that has taken place a few centuries ago, agriculture is
becoming more and more significant as it is the only source of food for the increasing population of the world. The views about agriculture are continuously changing. It may attain the status of an industry. India’s entry into GATT (General Agreement on Trade and Tariffs) and the WTO (World Trade Organization) and the new economic policy of globalization has widened the dimensions and horizon of Indian agriculture. The acquired knowledge of agriculture industry, its methods, and systems over thousands of years is now open for a severe test. The role of government has also increased. The era of planning, after attaining freedom in 1947, has witnessed radical changes in the Indian agriculture. The latter half of the last century, representing the 50 years of freedom, brought significant changes in the Indian agriculture. Use of new methods of farming, mechanization, use of chemical fertilizers, high yielding varieties of seeds, and controlled market rates of agricultural produce are some of the important dimensions of the changing agriculture patterns.¹³

The profession of agriculture, though not recognized as of equal status with that of an industry, yet it was included in the priority sector of the economy along with small-scale industries, small business, and export sectors, helped changing attitudes and approaches towards agriculture in the process of five-year plans. Subsidies were extended for various agricultural products on a mass scale. The whole banking system is geared up for extending credit to various agricultural and allied activities. Therefore, the issue of credit with
reference to agriculture in India attracts utmost importance while studying the
trends and progress of development of agriculture in the Indian economy.

Considering this significance, an attempt is made to study the issues
related with farm mechanization with particular reference to agriculture in the
Nanded district.

Though, the Indians knew the agriculture right from an ancient times and
it has remained the main profession of the masses of this continent yet it is not
free of problems. Agriculture in India, also referred to, as a gamble in the rains,
is full of a number of problems of these problems the problem of rural indebtedness
is one of the significant issues with which co-operative banking and agricultural
development is deeply related. It would not be out of place here to survey the
over all extent of rural indebtedness in India.

Considering this, researcher has selected a subject for research i.e.
"Agriculture Mechanization And Economic Development in India a Special
Reference to Nanded District". The main object of the above subject is to study
the effects of Agricultural mechanization in Nanded district.

1.4 Rationale of The Study :

It would not be out of place here to present a brief review of agricultural
mechanization in India at a glance.
Mechanization plays an important role in today's modern age. The development of Industry and Agriculture is not possible without the new technology. The Industrial revaluation took place in England and latter spread to other countries of the world. The present age is an area of large scale production. Many big factories have large number of workers during the last 60 years or so, tremendous and rapid development of science and technology has taken place. That is why the present area is known as atomic age, space and electronic age. In pre-machine age the methods of agriculture where traditional and the production was by manual labour on relatively small scale. But in machine age Agriculture and modern factories carry on large scale production to meet the demands of a large number of people. Production is carried on in anticipation of demand. The developments in the fields of science and technology have increased the degree of mechanization in the modern factory system. The efficiency of the factories has increased many times because of new innovations. Hugh power driven machinery and automatic processes of production have replaced the traditional manual methods of production. So mechanization we mean the replacement of animal and human power by machinery or replacement of manual power and animal power by mechanical power called is mechanization.

The first tractor to India was brought in 1914. In 1930’s pump-sets were introduced in the country. In the 1940’s high horsepower crawler tractors were imported under the aegis of Central Tractor Organization (CTO) mainly for land
development and to eradicate obnoxious weed Kans grass. At the time of independence, Indian farmers used mostly bullock-drawn ploughs and wooden planks for pulverization, compaction and smoothening. Hand tools like spades, pick axe, crowbars, hoe, sickle and chopper were in use. For irrigation, watering buckets and for transportation bullock carts were in use. In late 1950's, manufacturing of irrigation pump-sets started. There were only about 8000 tractors in 1950 and these increased to 39000 units in 1960. Engines (petrol, kerosene, and diesel) were being used for post harvest processing like floor making, rice milling, grinding, etc.\(^{14}\)

India passed through severe food crisis during sixties and the situation was called “ship to mouth”. During later half of this decade, important policy decisions were taken by the Government of India for bringing in transformation. The Government of India assured procurement of main crops from farmers at minimum support price (MSP). There were only about 75000 units of tractors (one tractor/1800ha) in India in 1967.

In 1970s in North India, with extensive irrigation canal network, actual command area of canals decreased significantly due to increased water requirement of HYV crops. Farmers using traditional methods of lifting ground water, like Persian wheels of irrigation were not able to grow these HYV crops as they were not able to provide sufficient water (5-6 irrigations) to exploit the yield potential of these HYV crops. Most “better-off” farmers invested in tube-
well pumps powered mainly by diesel engines of 5-10 hp. The Government of India also expanded its rural electrification program significantly and farmers installed 3-10 hp electric motors driven pumps for pumping ground water from bored wells. To grow HYV crops farmers not owning tube-wells pumps purchased water from neighbor farmers and normally payment was made after the sale of harvested crop. This was the beginning of custom hiring of farm equipment. Thus the first and most important mechanization in India was ground water pumping using engine and electric motor driven irrigation pumps. As the volume of crop harvested increased manifold on irrigated farms using HYV seeds these farmers also invested in purchasing threshers, mainly for wheat crop, powered by the same engine or motor used for water pumping. Interestingly, initially many of the threshers were fabricated by local black-smiths in small towns using locally available materials, especially from discarded Persian wheels. Farmers not owning threshers hired these from neighboring farmers mostly on share of produce basis.\textsuperscript{15}

In fact, the mechanization in India was driven by assured price to farmers for their produce (wheat and rice initially). The intensification of agriculture was assisted by higher inputs of farm power, but also because the greater profitability of farming-generated surpluses that could be spent on capital equipment. With adoption of HYV seeds the number of tractors doubled by 1971 and 96% of the tractors were privately owned on farms of over 10 ha in size. By 1980, the
number of tractors was more than 500000 (1 tractor/260 ha) which in 200 reached about 4.0 million units (1 tractor/35 ha). At present, India is the largest producer of tractors in the world at annual production of 500000 units with export of over 50000 tractors.16

All these above years, the economics of ownership of most tractors had been justified by custom hiring for on-farm works as well as for off-farm transport and construction activities. The use of tractors in transport activities accounted for about 60% of average annual use of 600 hours. Many small farmers also started owning tractors due to opportunity of custom hiring. Custom hiring of combine harvesters has been another remarkable success in mechanization. Some custom operators hiring covering almost five states (600 km.) in one crop season and earning on an average Rupees 300000 per annum on each combine.

In Northern India, most farmers replaced bullocks by she-buffaloes and sold their milk and used the cash for daily necessities and custom hiring of farm machines. The rising wage of labour and bullock costs also contributed to the higher viability of tractors and created the conditions for diversification into high value crops and the provision of mechanization services at competitive rates, to their more numerous small-scale farmers. The benefits to smallholders could also be increased through tractor hiring services. As a result, In Northern India most of the wheat crop now is threshed by custom-hired threshers mounted on trailers and powered by tractors of 45 and higher hp.
Over the years, due to rural electrification majority of the irrigation pumps are powered by electric motors and their size has increased due to lowering of water table in many areas. As the electricity to rural areas for agricultural purposes in India are subsidized most farmers either individually or jointly have installed tube-wells wherever ground water is available. The number of electric motor operated pumps increased from four million in 1981 to 20 million in 2010. The number of diesel operated irrigation pumps has also increased from 3.3 million in 1981 to 6.7 million in 2010. There was a phenomenal growth of farm equipment due to favorable government policies for promoting machinery manufacturing in private sector.

The growth of the mechanization in India has followed the same general pattern found worldwide. Farm operations requiring high power inputs and low control are mechanized first (tillage, transport, water pumping, milling, threshing, etc.). Farm operations requiring medium levels of power and control are mechanized next (seeding, spraying, intercultural operations, etc.). Farm operations requiring high degree of control and low power inputs are mechanized last (transplanting, planting of vegetables, harvesting of fruits and vegetables etc.). This is because any power intensive work can be done faster mechanically and at a lower cost. Whereas converting human knowledge into machine knowledge is difficult and costly.¹⁷
In India ground water and water from ponds and small reservoirs in rural areas for irrigation should be the highest priority to increase agricultural productivity. This can be done by farmers mainly; provided supporting infrastructure is made available by the government and necessary equipment, spare parts and maintenance are provided by the private sector. Due to implementation of Mahatma Gandhi National Rural Employment Guarantee Scheme, wages for labor throughout India have gone up leading to scarcity of farm laborers. This has provided tremendous boost to mechanization. Especially through opportunities for custom hire work. The President of India in her address to the Nation on the eve of Republic Day on 25th January 2011 said, “Small farmers are leaving farming, because of poor returns and scarcity of agricultural labour. In such situation, it would be advantageous to think of modernization and mechanized farming…”

At present in India, tractors are being used for tillage of 22.78% of total area and sowing 21.30% of total area. Although utility of manually and bullock operated equipment has been established but the response of the farmers has been selective. The bullock drawn see-cum-fertilizer drill and manual paddy transplanter have not been universally accepted in spite of financial incentive from the Government. Due to limited use in a year and economic advantage of many items, some improved implements could not replace the local alternatives. The land levelers, seed-cum-fertilizer drills have also been accepted by the
farmers but on limited scale. Major adoption of agricultural machinery in addition to irrigation equipment and tractor, was thresher for wheat crop. Due to various application of paddy straw, preference has been limited for paddy threshers. Self propelled/tractor operated combines, reaper harvester, potato and groundnut mechanization machinery are also commercially available and accepted by the farmers in states where tractors were introduced. Now combine harvesters are commonly used in different parts of the country, on custom hire basis, for wheat, soybean and paddy harvesting.

Therefore the researcher has decided to study the Agriculture Mechanization and Economic Development in India: A Study with Special Reference to Nanded District.

1.5 **Objective of the Study:**

The following are the objects of the present study –

1. To define & explain the concept of farm mechanisation and review the significance of the same with special reference to Nanded district.

2. To present a profile of Nanded district.

3. To study the effects of agricultural mechanization on farm employment.

4. To find the agricultural productivity after agricultural mechanization.

5. To study the impact of agricultural mechanization on cost of agricultural production.
6. To study the effect of agricultural mechanization on traditionally operated farms.
7. To study the relation between irrigation and agricultural mechanization.
8. To study the need of agricultural mechanization.

1.6 Limitations of the Study:

The limitations of the present study are as follows:

1. The study geographically limited to Nanded district.
2. The study covers a period of last decade.

These are the limitations of the study.

1.7 Hypothesis of the Study:

The hypothesis of the present study are as follows:

1. There is no significant difference between the Socio-economic impact of Mechanization on Small, Medium and Large Farmers.
2. There is no significant difference between the Expenses impact of Mechanization on Small, Medium and Large Farmers.
3. There is no significant difference between the Cost Saving as a impact of Mechanization on Small, Medium and Large Farmers.
4. There is no significant difference between the impact on time lag of Mechanization on Small, Medium and Large Farmers.

5. There is no significant difference between the Yield & Other Aspects impact of Mechanization on Small, Medium and Large Farmers.

1.8 Methodology of Research:

The present research work is a study of Agriculture Mechanization and Economic Development in India: A Study with Reference to Nanded District. This is also an empirical study. Therefore the research model selected is that which is suitable for such type of study. The research methodology adopted is as follows:

Analysis study of Agricultural mechanization in Nanded District is based on primary and secondary data. Five main villages were selected for the present study from Nanded District because they represented the progressive and leading area in adoption of agricultural machines in Nanded District. The list of selected 100 human samples of each selected villages was prepared along with the operational holdings with the help of ‘Talathi’ (a villages level revenue official). The farms of these villages were classified into three different size groups (i.e. small, medium and large).
Primary Data:

This study is based upon primary data. Primary data is the foundation of this study. The researcher has collected primary data by means of personal visits and questionnaires. Following questionnaires were prepared.

Questionnaires – ‘A’ – For Farmers.

The researcher visited the farmers at various villages along with the questionnaire. The data was collected, classified, tabulated and presented in graphic form. It was subjected to analysis & interpretation techniques by use of statistical methods.

Primary data were collected by the interview method, using questionnaire for various institutions, social and political leaders. Relevant data such as the size of holding, cropped pattern, area irrigated, agricultural mechanization were collected through personal interview. The reference period of survey was March 2009 to march 2010.

Secondary Data:

This study also uses secondary data. Secondary data is also one of the main source of this study. The researcher has collected secondary data from the published sources. The researcher has used following sources.

1. Annual reports of commercial & co-operative banks.
2. Annual reports of Lead Bank of Nanded district.

4. Various journals, periodicals, newspapers, Internet.

The secondary data was also analyzed and used for presentation of conclusions.

**Statistical Methods Used:**

The study has used various statistical methods such as Collection and classification of data, Tabulation of data, Graphic presentation of data, Use of percentages, averages, etc. Statistical inference and logic for testing of hypothesis, The test of significance where ever necessary are used.

Thus the researcher has used various statistical methods for analysis and interpretation of data.

1.9 **Size of Sample:**

This study is an empirical study. It is based upon sample survey. The researcher has used strategic convenience sample randomly selected. The following method has been adopted.

**Area sample:**

There are 16 talukas in Nanded district. The researcher has selected approximately 25% sample of the talukas i.e. 5 talukas were selected, they are
Nanded, Ardhapur, Mudkhed, Naigaon (Bazar) and Loha. The survey was conducted in the above selected villages regarding machines used by the farmers, land utilization, irrigated land, non-irrigated land, wells and effects of agricultural mechanization on agricultural employment.

Farmer Sample:

The present study depends upon data collected, survey and official records. For that purpose the researcher has taken 100 samples of farmers including bullocks operated, tractors operated and other machinery operated farmers from the selected area. These 100 samples of farmers were selected from five talukas selecting main villages as well as taluka places, of Nanded District. It means 20 farmers were selected from each taluka taken as sample. Out of these, 20 farmers, 12 farmers are irrigated land holders and 8 farmers are non irrigated land holders farm each village. The total sample was further divided to three categories, Small & Marginal, Medium and Large farmers selected as small and marginal 40, medium 30 and large 30.

1.10 Chapter Scheme:

The thesis has been divided into Seven chapters outlined as follows;

Chapter I - Introduction

This chapter gives a brief back ground and outlines the objectives, limitations, hypothesis and methodology of the present study. The chapter also includes statement & significance of the problems.
Chapter II – Review of Literature

This second chapter gives a detailed review of literature related with Small Scale Industrial units.

Chapter III- Profile of Nanded District

This third chapter is meant to give a detailed analysis of the socio-economic and geographical profile of Nanded district. Emphasis is given on Agricultural Mechanization and economic development and the infrastructural facilities available.

Chapter IV – Agricultural Mechanization in India

This fourth chapter presents an overview of the development and performance of agricultural mechanization in India. It also discusses the concepts and theories of mechanization and economic development.

Chapter V – Impact of Mechanization And Economic Growth of Farmers in Nanded District

This fifth chapter presents the impact of agricultural mechanization on growth and development of farmers in India in general and Nanded district in Maharashtra in particular.
Chapter VI - Problems of Agricultural Mechanization

This sixth chapter analyses the various problems related with agricultural mechanization. This chapter is based upon primary data.

Chapter VII Conclusions & Suggestions

This last chapter presents conclusions and gives recommendations. It covers the fulfillment of objectives and testing of hypothesis in the light of discussions and analysis presented in the preceding chapters.

Notes & References:


7. Bandini M., Arthur Hanau & Others (1965) Agriculture & Economic Growth-


13. Internet Source, www.http\agroindia.in


18. The Economic Times.