CHAPTER - II
THE CONCEPT OF
AGRICULTURAL MODERNIZATION

Introduction

The importance of agriculture and the role it has to play in the context of technological revolutions has carefully been discussed in the last chapter. It was concluded that modernizing the agriculture is the only answer to meet the growing requirements of food etc. as well as our aspirations. Against this background the present chapter endeavours to highlight the concept of agricultural modernisation. Viewed in the context, agricultural modernization is a wide ranging process embodying a variety of inputs that bring about agricultural transformation from traditional ways to modern techniques.

It is aimed at bringing out those changes which reduce the marginal cost of output. This change can occur either by altering existing input combinations or by introducing new factors of production either as additional inputs or replacing old ones. The reasons for doing so
are quite obvious. The fact of the matter is that in any plan of economic development the first and foremost emphasis has got to be essentially placed on the overall improvement and extension of agriculture. This is possible with the introduction of farm technology which may be reflected in a given mix of man and machines seeds and fertilizers, water, power credit etc.  

Modernisation and mechanisation are two faces of a coin, each one carrying a different idea and purpose. The two are not complementary but supplementary in their approaches as well as effects. Technology is just one component of the whole process of modernisation. Technology refers to knowledge used in production to improve the returns. It points out to the input mix and the consequent changes that take place in it from time to time with a view to enhancing the productivity at the same unit cost or maintaining current levels of productivity at a reduced cost. The use of new technology used in it has not been developed simultaneously and defused among the farmers. It can thus, safely be concluded that modernisation is a broader concept which according to scholar embraces farm technology, farm mechanisation and agrarian reforms.

besides institutional and socio-political changes. A change for the better is the essence of all those components. No technological change in itself will bring miracles unless it is followed by a change in the attitude of the farmers. A basic change in the attitude of the farmers is essential ingredient or otherwise the lack of it will throw the whole process of modernisation out of gear. Any technological innovation will fail to bring the desired results unless the adopters adopt a proper bent of mind towards it. Further the success, depends upon the availability of these measures as well as the capacity of adopter to own and use the same in their agricultural pursuits. Above all the value of human factor is not to be overlooked in taking a stock of the agricultural situation for communities and nations have remained poor in the midst of rich surroundings. They have fallen in decay or poverty despite their fertility of soil and abundance of natural resources. All this happened because the human factor was of a poor quality or was allowed to deteriorate or run to waste.--- Human factor is an important input in agricultural notwithstanding the fact that "the crops in the best areas or in the best farms in India are no worse than
those in best area and in best farms in China". 2

To sum up agricultural modernisation aims at bringing about proper combination of mechanisation chemicalisation, rationalisation of natural, technical, economic, social, structural, institutional and administrative obstacles in the way of optimal utilisation of the land resources. It has, therefore, been rightly said that the fundamental problem of agriculture is to transform the occupation for the benefit of the cultivating classes. 3

The justification as well as the urgency of modernising the agriculture crops up because of the fact that agriculture is to be transformed from a mode of living into a business proposition to enable the farmers in particular and the people in general to reap the good dividends. It has already been stated that agriculture is a primary sector and as such the development of industrial sector is thus dependent on its growth. "Agricultural Revolution" preceded the Industrial Revolution in great Britain. It was the


3. Reports of the Royal Commission on Agriculture Page 433, Govt. of India.
resulting growth in food production and in the productivity of labour engaged on land which provided both the food and the manpower for industrial expansion.

PRESENT POSITION

The saga of agricultural development in India since the advent of independence in 1947 is an inspiring one. Before independence this sector suffered from deep rooted institutional, structural, economic and social constraints, leading to low productivity trap. As a result of the determined and planned efforts for socio-economic development, combination of factors like priority to agriculture in the planning strategy, emphasis on building up an infra-structure of irrigation, power, scientific research and extension services, tenancy reforms which gave land to the millions of tillers of the soil and a network of credit and marketing have contributed to the near trebling of foodgrain output over the last thirty years. India can legitimately claim that in spite of severe droughts that have gripped the country several times in the past, starvation could be prevented by bridging the gap between production and demand initially with imported grain and subsequently with the foodgrain produced internally. The mid sixtees

witnessed a break through in productivity on the agriculture front and the phenomenon came to be termed as "Green Revolution". In the early seventies India became not merely self sufficient in food grains, but also began to help some of her neighbours with food supplies.

The growing strength and resilience of the Indian agriculture was put to severe test in 1979-80 which was the century's worst drought affecting 38.6 million hectares of farm land and more than 220 million people in 11 (out of 22) major states. The fall in production was of the order of 22 million tonnes. Not a single starvation death was allowed to take place without any imports. It was tested again in 1982-83 when the cropped area affected was of an even larger dimension viz. 42.8 million hectares. However, the performance in the year 1982-83 was more impressive than in 1979-80 a fall of less than 5 million tonnes was registered in that year compared to the preceding year.

India is the seventh largest in area and the second most popular country in the world having a total area of 329 million hectares. Out of this the net and the gross cropped area in nearly 145, and 173 million hectares

5. The Hindustan Times Nov. 28, 1983.
hectares respectively. Nearly 75 percent of India's total population of over 700 million is dependent on agriculture which contributes about 42 percent of the gross national product. It also contributes about 60 percent of the total exports directly and indirectly. It makes a sad commentary of facts that about 70 percent of land holders in India fall in the category of small and marginal farmers. To ameliorate the lot of this particular category, Government has launched a massive programme involving an outlay of Rs. 2500 thousand million during the year 1983-84 to increase their agricultural production. The programme provides subsidies for the development of minor irrigation, land development, plantation of fuel and fruit trees and fuel supply of mini-kits of seeds and fertilizers for oilseeds and pulses.

The excellent performance in 1983-84 reflects the success of the agricultural strategy in achieving high and growing levels of production. This strategy relies upon raising yields in agriculture through expansion or irrigation, remunerative prices for the producer provision of high yielding varieties of seeds and other inputs besides the provision of credit. With

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a view strengthening and streamlining these measures, a special campaign was launched in 1983-84 to provide necessary inputs for the Kharief season at the right time and in adequate quantities. Of all these inputs, seed occupies a distinct place.

a) **SEED**

Seed is the basic input for agricultural production. Hence, the distribution of the quality seeds, has therefore, received the highest importance.

The National Seed Corporation of India are engaged in the production and multiplication of seeds. Besides the Agricultural Universities and the Indian Council of Agricultural Research (ICAR) together with some other institutions are also involved for the production of breeder seeds during 1982-83 increased to 17067 quintals as against 3915 quintals in 1982-83.

Cropwise details of breeder seed production are given below:

Table No. 2.1

<table>
<thead>
<tr>
<th>Crop</th>
<th>1981-82</th>
<th>1982-83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>1944</td>
<td>11,067</td>
</tr>
<tr>
<td>Pulses</td>
<td>574</td>
<td>2,886</td>
</tr>
<tr>
<td>Oil seeds</td>
<td>1373</td>
<td>2,652</td>
</tr>
<tr>
<td>Fibres</td>
<td>24</td>
<td>462</td>
</tr>
<tr>
<td></td>
<td>3915</td>
<td>17,067</td>
</tr>
</tbody>
</table>

Source: Economic Survey Report Govt. of India Page 7 1983-84.
The distribution of quality seeds has also been stepped up substantially. It increased by 41 percent from 29 (1981-82) to 42.06 lakh quintals in 1982-83 and further by 36 percent to 57 lakh quintals in 1983-84. An innovative programme of distribution of minikits of improved varieties of seeds has been introduced under different central and centrally sponsored programmes. The objective is to popularise improved varieties of seeds of pulses, oilseeds and cereals. The minikits are distributed free to demonstrate the potential productivity of the new technology on a limited area. During 1983-84, 42.32 lakh minikits were distributed including 11.83 lakh minikits of pulses and 14.83 lakh minikits of oil seeds. A major proportion of these minikits was distributed among the small and marginal farmers. The quantum of improved certified seeds distributed in the country has increased by 23 times over the last three decades as would be evident from the following table.

**TABLE 2.2**

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (in million quintals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953-54</td>
<td>0.18</td>
</tr>
<tr>
<td>1978-79</td>
<td>0.90</td>
</tr>
<tr>
<td>1979-80</td>
<td>1.40</td>
</tr>
<tr>
<td>1980-81</td>
<td>2.50</td>
</tr>
<tr>
<td>1981-82</td>
<td>2.98</td>
</tr>
<tr>
<td>1982-83</td>
<td>4.21</td>
</tr>
<tr>
<td>1983-84</td>
<td>7.50</td>
</tr>
</tbody>
</table>

Source: The Hindustan Times Nov. 28, 1983.
b) **HIGH YIELDING VARIETIES**

The area under High Yielding Varieties Programme for cereal crops increased from 46.5 million hectares in 1981-82 to around 48 million hectares in 1982-83. The target for coverage of area under this programme has been fixed at 52 million hectares for 1983-84. On the basis of the 1983-84 target it is estimated that about 80 percent of the target total area under wheat will be covered by H.Y.V. Programme. The coverage in respect of paddy will be only about 56 percent in the case of coarse cereals it will be much less.

The execution of H.Y.V Programme needs to be accelerated, particularly in the case of paddy which is normally grown only in areas with assured rainfall or where irrigation facilities are available. Table 2.4 given below depicts the progress of high yielding varieties programme in the country during the last five years.

**TABLE NO. 2.3**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High Yielding Varieties programme</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paddy</td>
<td>-</td>
<td>15.99</td>
<td>18.23</td>
<td>19.69</td>
<td>18.67</td>
<td>22.50</td>
</tr>
<tr>
<td>Wheat</td>
<td>-</td>
<td>15.03</td>
<td>16.10</td>
<td>16.75</td>
<td>18.07</td>
<td>18.20</td>
</tr>
<tr>
<td>Maize</td>
<td>-</td>
<td>1.35</td>
<td>1.58</td>
<td>1.60</td>
<td>1.74</td>
<td>1.80</td>
</tr>
<tr>
<td>Jowar</td>
<td>-</td>
<td>3.05</td>
<td>3.50</td>
<td>3.88</td>
<td>4.75</td>
<td>4.80</td>
</tr>
<tr>
<td>Bajra</td>
<td>-</td>
<td>2.96</td>
<td>3.64</td>
<td>4.38</td>
<td>4.45</td>
<td>4.70</td>
</tr>
<tr>
<td>Total HYP</td>
<td>-</td>
<td>36.38</td>
<td>43.05</td>
<td>46.50</td>
<td>47.68</td>
<td>52.00</td>
</tr>
</tbody>
</table>

Source: Economic Survey Govt. of India Page 92, 1983-84
It is gratifying to note that the gains from H.Y.P. were not enjoyed by large farmers alone. In fact all farmers belonging to all size groups were its beneficiaries.\(^{10}\)

However, T. Byros holds a different view. According to him the benefits of H.Y Varieties have not been shared equally between different regions or amongst groups of holdings in the same area.\(^{11}\)

The conflicting opinions lead us to conclude that H.Y.P. is a problem of policy options on the part of the Government. After seeds, another important input is Assured Irrigation.

d) **IRRIGATION**

The introduction of new agricultural technology particularly the high yielding variety seeds, and the use of fertilizers is dependent on the availability of irrigational facilities. The importance attached to irrigation at national level can well be understood from

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the fact that the sixth Five Year Plan (1980-85) envisages an outlay of Rs. 10,970 crores for major and medium irrigation programmes. This amount is about 48 percent more than the total amount of 7450 crores which has been spent in this sector during the last thirty years.

Thus irrigation is a key factor not only in raising agricultural production but also in minimising the instability attributable to uncertain and irregular rainfall. During 1982-83, 2.34 million hectares of additional irrigation potential was created as against 2.25 million hectares created during 1981-82. Of the total addition to irrigation potential in 1982-83, 0.90 million hectares was covered by major irrigation schemes. A cultivative potential of 63.32 million hectares was created by the end of June 1983 compared with 60.98 million hectares a year ago. The cumulative utilisation of the irrigation potential also improved from 92.1 percent in 1981-82 to 92.5 percent in 1982-83. In absolute terms utilisation increased from 56.17 million


hectares in 1981-82 to 58.55 million hectares in 1982-83. The target set for 1983-84 is 61.07 million hectares.\(^*\)

Table 2.4 indicates the irrigation cumulative potential and its utilisation.

**Table 2.4**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Potential up to 1982</th>
<th>Utilisation Potential up to 1982</th>
<th>Potential up to 1983</th>
<th>Utilisation up to 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Medium Irrigation</td>
<td>28.206</td>
<td>23.401</td>
<td>29.110</td>
<td>24.732</td>
</tr>
<tr>
<td>Additional</td>
<td>(0.873)</td>
<td>(0.563)</td>
<td>(0.902)</td>
<td>(10.931)</td>
</tr>
<tr>
<td>Minor Irrigation</td>
<td>32.773</td>
<td>32.773</td>
<td>34.214</td>
<td>34.214</td>
</tr>
<tr>
<td>Additional</td>
<td>(1.373)</td>
<td>(1.373)</td>
<td>(1.441)</td>
<td>(1.441)</td>
</tr>
<tr>
<td>Total</td>
<td>60.981</td>
<td>56.174</td>
<td>63.324</td>
<td>58.546</td>
</tr>
<tr>
<td>Additional</td>
<td>(2.246)</td>
<td>(1.936)</td>
<td>(2.343)</td>
<td>(2.372)</td>
</tr>
</tbody>
</table>

Source: Economic Survey, Govt. of India 1983-84 Page 9

**c) FERTILIZERS**

Introduction of chemical fertilisers is partly an offshoot of the progress of science and agro-research and partly the result of the research for an alternative to organic and natural fertilizers which enjoy higher rate
of adoptability. In order to stimulate the use of fertilizers which had solved down in recent years, its price was reduced by 7.5 percent in June 1983 with a further discount of 10 percent on old stocks. Effective steps to improve and expand the network for distribution of fertilizers were also taken. As a result of these measures, consumption of chemical fertilizer increased remarkably as is revealed by the following table No.2.5.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>Million Tonnes</td>
<td>3.50</td>
<td>3.68</td>
<td>4.07</td>
<td>4.22</td>
<td>4.80</td>
</tr>
<tr>
<td>Phosphate</td>
<td>--</td>
<td>1.15</td>
<td>1.21</td>
<td>1.32</td>
<td>1.44</td>
<td>1.60</td>
</tr>
<tr>
<td>Potassic</td>
<td>--</td>
<td>0.62</td>
<td>0.67</td>
<td>0.73</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>Total MPK</td>
<td>--</td>
<td>5.26</td>
<td>5.52</td>
<td>6.06</td>
<td>6.39</td>
<td>7.20</td>
</tr>
</tbody>
</table>

Source: Economic Survey, Govt. of India Page 92.

The table shows that all types of chemical fertilizers have been registering an increase though at a slow pace. The total MPK of 5.26 million tonnes in 1979-80 has gone up to 7.20 million tonnes in 1983-84. The Nitrogen type of fertilizer seems to be the most popular sought chemical as it recorded relatively an
appreciable increase during the period under study. However, the other two types seem to be contended with their slow pace.

e) **PLANT PROTECTION**

To prevent crop losses due to pest and disease, plant protection measures have been considerably intensified. Government has evolved a strategy for integrated plant protection service involving surveillance for timely detection of the emergence of pests and diseases setting up of plant protection squads for fighting pest epidemics aerial spraying, enlarging the delivery system for pesticides and plant protection equipment and strengthening of the quality control machinery.

A large number of tubewells and pumping sets are being installed in the countryside and mechanization in irrigation devices has been perceptible change a tractor is a costly machine. Its effect upon farmers and labour is conditioned by rather a wide set of policies and structural variables.

These inputs no doubt perform miracles, but their availability is a big quest in mark while the large farmers may well be in a position to use them.

because of their capacity, the small and marginal farmers may find it hard to use these inputs for improving the yield per unit. To overcome this situation easy availability of supply of credit is all the more imperative. Without this facility many a farmers will be deprived from making use of these inputs.

f) CREDIT

This credit is a key input for diffusion of benefits from new farm technologies among the small and marginal farmers and the landless and rural artisans constituting 70 percent of the rural population. Government has adopted a multi-agency approach for delivery of agricultural credit. Apart from the co-operative it is also being supplied through Commercial Banks and Regional Rural Banks. In the Co-operative sector there is a three tier structure with 94,600 primary Agricultural Credit Societies, 37 Central Cooperative Banks and 27 State Apex Cooperative Banks for supply of short term credit long term investment credit is arranged through 19 State Land Development Banks with 17 primary land development banks and commercial banks. This is further supplemented by other banks which supply agricultural credit through their 26,028 rural and semi urban branches. There are 123 Regional Rural Banks with
5393 branches playing a crucial role in the supply of agricultural credit.  

The setting up of the National Bank for agriculture and Rural Development in 1982 was a major event in the field of agricultural credit.

A major feature of the new strategy is its package approach embodying new high yielding seeds, fertilizers, pesticides, controlled water supply and mechanical equipment from seed drills to tractors and combined harvesters, institutional and structural changes like credit and land reforms. All these agricultural inputs, together form a package and help accelerate the process of modernization. However, the core of this package is the miracle seed which has been devolved through selective breeding to be highly responsive to fertilizer input. Through organisational and institutional arrangements for the production, import and distribution of entire package of inputs is emphasized. To examine all these aspects of new strategy the scholar thought it rather too un-yielding. Accordingly therefore, the present study focusses only some of the main components of this package deal. This, however, does not

imply that those aspects whose effect has not been discussed here are less important in any way. In fact they are vital links in the whole chain. The very process of modernisation will remain lopsided should their role be allowed to recede in any manner whatsoever. However, in the pages that follow now an attempt will be made to examine the effects of modernisation in agriculture in the district Pulwama.

Despite the evidence on the implications of technological changes in agriculture appears to be mixed. This contradiction of opinions is the result of the differences in the methodologies used as also the regional variations. While the debate continues, the weight of the available evidence seems to be on the side of those who argue a positive effect of modernisation in agriculture on production, productivity, income and employment.

**AGRICULTURAL MODERNISATION IN DISTRICT PULWAMA**

While like any other part of the country agriculture development in the State as a whole, in the post independent period has been characterised by institutional and technological changes, the fact remains that the State of J&K was the pioneer State in giving land
to the tillers. In this way the process of modernisation started with the process of land reforms. The State was second to none in providing incentives to the land tillers by abolishing the Zamindari system and landlordism. Thus it clearly demonstrates that institutional changes and reforms have however, proceeded technological changes. Accordingly therefore, Pulwama a newly created district could not afford to escape from this revolutionary change.

The economy of this district like its sister districts in the valley is dependent on agriculture. Right up to late forties conventional practices were followed and yield per unit acre was very low. Following the introduction of land reforms in early fifites the ownership was transformed to landless tillers and vigorous drive started under grow more d food campaign to make the State self sufficient in food. With the passage of time the net sown area increased by corresponding reduction in the area under forests, wastelands and fallows of different types. It is indeed a matter of satisfaction that with the introduction of improved technology and development in irrigation system, that the gross cropped area also registered a significant increase. Some studies made earlier have indicated the impact of modernisation in the district, though in
a partial manner. According to one such study, 24,000 hectares out of 29,974 hectares of paddy land has already been covered under improved seeds. According to only estimate the annual requirements of improved seeds has been put at 3000 quintals. As against this only normal quantity of 184 quintals of seeds of different improved varieties was distributed among the farmers during 1980-81. For the last two decades the department of Agriculture has been supplying seeds of China 1039. However, the farmers continue to cultivate other strains of China supplied to them earlier. According to experts China 1039 matures early but, the farmers prefer other strains for cultivation up to an altitude of 1656 meters, because of high yield and better quality of grains. Continuous research is going on to evolve suitable types of seeds for this region. In this context seeds of new crosses like K-39 (Non-shedding) for lower altitudes and R-322 (cold tolerant) for hilly areas and under large scale field trials. The scholar feels that only those types of seeds acceptable to the farmers need be multiplied and distributed. Nevertheless, these studies do reflect significant changes achieved in the following spheres.
Signs of modernisation can also be seen from the fact that out of an area of 11,399 hectares 3,470 hectares are covered under improved seeds in the maize cultivation. This forms about 30.44 percent of the land under this crop. Similarly 28.4 quintals of improved maize seeds were distributed among the farmers during 1980-81. Since the crop is generally cultivated under rain fed conditions an area of 1442 hectare were irrigated in 1978-79.

In respect of wheat the position is not a happy one. In fact wheat cultivation is going down annually. This is due to the fact that this cereal is less preferred as compared to paddy.

Another indicator of modernising the agriculture is that the number of tractors has increased in the private sector. Presently about 40 tractors are working in the district in the private sector. A full fledged workshop is already established in the private sector at Awantipora.

a) Area under all food grains has risen by 7.5 percent from 1965-66 to 1983-74 taking the average of 1962-63 and 1964 as the base.
b) During the same period the total cropped area of the State has risen by 7 percent.

c) Area under paddy increased only by 2.46 percent in comparison to wheat (15.22%) and maize (11.6%). However, it was too small an increase.

d) Wheat production registered an overall change of 20 percent during the said period, while paddy maize and all food grains registered 18.1 and 23.2 percent change in their production respectively. Despite these positive gains it is sad to note that the State of J&K as a whole has not been able to reap the fruits of green revolution in the real sense of the term.

In respect of cropping pattern and crop relative the district follows the same calender as is followed by the other districts in the valley. However, a notable feature is that an area of 3163 hectares out of the rainfed cultivable land is under saffron cultivation in this district, whereas 94 hectares only are covered by this crop in other parts of the State. Paddy and maize are the two principal crops cultivated in the district. It is a matter of

great concern to note that there has been no change in the area under their cultivation during the last two decades. Area under paddy crop stood at 29896 hectares while in the case of maize it stood at 11587 hectares since 1968-69. This shows that no effective measures were taken to increase area of cultivation under these two principal crops. Similarly it is distressing to find that area under wheat has considerably decreased. Another disgusting feature is that cultivation of wheat as 'Rabi Crop' in rotation with paddy does not find favour with the farmers as the operations namely harvesting of wheat and transplantation of paddy invariably overlap. However, it is gratifying to note that the area of oilseeds, saffron and orchards has increased in the District with the introduction of high yielding variety seeds, use of fertilizers, extension of irrigational facilities etc. The cereal production both in the State as well as in the District has registered a phenomenal increase. Out of 29974 hectares under paddy as much as 24000 hectares have already been brought under improved seeds, while in respect of maize 3470 hectares are covered out of a total of 11399 hectare. During 1980-81, 134 quintals of seeds of different improved varieties were
distributed among the farmers, in respect of paddy, and 28.4 quintals in respect of maize.

One of the major contributing factors towards agriculture production is proper and timely preparation of land for sowing of seeds and transplantation of seedlings. This is dependent on the use of improved implements and machinery. The farmers are still following conventional methods of cultivation but of late most of them have taken to the use of such tools and implements sold to the farmers in the district during the year 1979-80 is as under:

<table>
<thead>
<tr>
<th>Name of the implement</th>
<th>No. sold during 1979-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shalimar Ploughs</td>
<td>29</td>
</tr>
<tr>
<td>Shalimar Puddiers</td>
<td>35</td>
</tr>
<tr>
<td>Seed Storage Bins</td>
<td>231</td>
</tr>
<tr>
<td>Spraying Tubs</td>
<td>3</td>
</tr>
<tr>
<td>Orchard Tube</td>
<td>10</td>
</tr>
<tr>
<td>Hand Tools and Misc. items</td>
<td>17</td>
</tr>
</tbody>
</table>


The result of the investigation carried on the macro level do indicate that the district has

adopted new strategy for modernising the agriculture. But unfortunately, the process has been slow and staggering. Naturally, therefore, it has not kept pace with the growing challenges. The earlier studies also fail to reveal as to how the process of modernisation has proved effective in increasing productivity, income employment. With a view to find out this position the scholar has selected one block namely Pulwama. Out of the six blocks comprising District Pulwama. Out of this block 120 households were selected in all comprising 90 modern farmers and 30 traditional farmers. For purpose of the study, modern farmers are termed as those farmers who use all or some of modern agricultural inputs such as high yielding variety seeds, pesticides, fertilizers, small mechanical tools etc. On the other hand those of the farmers who do not make any use of these inputs are categorised as traditional.

DESIGN OF THE STUDY

Pulwama district has been carved in 1979. Till then it was a part of the erstwhile district Anantnag. This situation proved a stumbling block in obtaining the correct statistical information. However, paucity of the matter was not allowed to effect the study in any adverse manner, working against these odds, information from
various sources was collected. These sources of information comprised of statistical bulletins issued by the Directorate of Statistics & Evaluation, J&K Government and HAFEC Consultants reports. These sources provided accurate and adequate information required for this type of study. With the help of these sources, the design of the study was framed as under:

1. Introduction: The role of agriculture.
2. Concept of Agricultural Modernisation.
3. Impact of modernisation on income.
4. Impact of modernisation on employment.
5. Implications, conclusions and suggestions.

Some of the concepts and definitions used in the present study are as follows:

1. **Operational Holding:**

   Operational holding includes area actually cultivated by the cultivator and his family irrespective of its location and title.

2. **Cropping Intensity**

   \[
   \text{Cropping intensity} = \frac{\text{Gross cropped area}}{\text{Net cultivated area}} \times 100
   \]
3. **Human Labour Intensity**

   It has been defined as total labour inputs in mandays divided by total cropped area.

4. **Bullock Labour**

   It has been defined as total bullock labour input divided by gross area.

5. **Irrigated Intensity**

\[
\text{Irrigated Intensity} = \frac{\text{Gross Irrigated area}}{\text{Net irrigated area}} \times 100
\]

6. **Fertilizer Intensity**

\[
\text{Fertilizer Intensity} = \frac{\text{Total Fertilized area}}{\text{Gross cropped area}} \times 100
\]

7. **Gross Income**

   Gross income of the farmers includes value of output evaluated at harvest prices.

8. **Farm Business Income**

   Farm business is the gross income value of output evaluated at harvest prices.

9. **Returns Family Labour**

   Returns to family labour are calculated by subtracting cost B from gross value of output.
10. **Net returns**

Net returns have been estimated by subtracting cost $C$ from the gross value of output.

11. **Evaluation of Inputs**

Both family labour and hired labour have been estimated in terms of labour days involving eight hours of work. The female and child labour have been converted into standard mandays by adopting the following criteria:

1.5 female labour = 2 child labour = 1 Man

The cost of family labour was imputed on the basis of wage rate prevalent at the time of operation. For the hired labour the actual cost was taken into account whether the payment was made in kind or cash. The former was evaluated at the harvest prices.

12. **Bullock labour**

Hired bullock labour was estimated on the basis of actual amount paid in cash or kind, the latter payment were evaluated on the basis of actual market rates.
13. **Seeds**

The cost of seed was evaluated on the basis of existing market rates whether these were purchased from the market domestically produced or stored.

14. **Depreciation**

Depreciation of farm buildings were calculated at the rate of 5 percent for Kuchhe buildings and 2 percent for Tucca buildings. Depreciation of implements and machinery was estimated on the basis of the life of these implements and machinery.

15. **Manures and Fertilizers**

Domestically produced manures were evaluated on the basis of prevalent market rates. In case of purchased manures and fertilizers calculations were based on their actual cost.

16. **Direct Taxes on Agriculture**

These types of taxes constitute the land revenue plus the surcharges.

17. **Rental value of Land**

Rental value of land was taken as equal to
one fourth of the value of gross output produced.

18. **Tractor Charges**

Tractor charges were estimated on the basis of amount actually paid by the cultivator.

Thus, widely used and accepted concepts and their method of measurement have been used in the present study to estimate the help of Lorenz Curve and Gini concentration Ratio.

**HYPOTHESIS**

The study was completed with the following hypothesis:

1. It was believed that modernisation of agriculture has led to the increase in agricultural output and income per unit of input. As such a change in the agricultural scenario was envisaged.

2. The popular belief that modernisation in agriculture has been a labour substituting phenomena, it has been postulated that modernisation in fact has been rather labour intensive.
Finally, it has been again, presumed that the impact of agricultural modernisation on income of different categories of farm holdings, has tended to create more income inequalities rather than its being more egalitarian.

For testing the above hypothesis, various statistical techniques were employed to verify them. Test of significance popularly known as test has been frequently used to accept or reject the null hypothesis for existence of inequalities in farm output and income. Test has been derived by the formula: \( t = \frac{(x-u)}{s} \). For the determination of gaps in income inequalities, Lorenz Curve and Gini concentration ratio has been and to determine, its extent Lorenz curve have been used by using cumulated values in terms of percentages so as to plot them on a graphic for observing has close or far the line thus depicted is from line of egalitarian i.e. line bisecting two exies at 45° Gini concentration ratio has been derived by dividing the area under the drawn curve by the area under the drawn cum-of egalitarian.

**RESEARCH METHODOLOGY**

The present study is based on study conducted in Block Pulwama in District Pulwama in Kashmir division
of Jammu and Kashmir state. 20 villages of the block selected for the survey purpose on stratified random sample basis and amongst these villages 120 agricultural households were surveyed again on stratified random sampling basis. Different categories of agricultural households were made subject of study i.e. large, medium and small farm holdings. Within different categories of agricultural holdings modern and traditional farmers were surveyed in the ratio of 1:3. A total of 90 modern farmers and 30 traditional farmers were surveyed for collection of the relevant data. Size of the agriculture was determined on the basis of net operational farm holdings. Among each size of agricultural holding 10 traditional and 30 modern holdings were surveyed. Purpose and objectives of carrying out present study was to assess the impact of agricultural modernisation in District Pulwama for selecting their region as the universe of study was after well thought and through discussions with the concerned official and other agencies. It was unanimously agreed upon that District Pulwama was the only district in Kashmir region which benefitted most by agricultural modernisation. This view was also supported by the various departmental statistics. As such for making a study of agricultural modernisation. District Pulwama was chosen for the present study.