CHAPTER - I

INTRODUCTION

Recent years have witnessed some spectacular changes on the Indian farm front. The controversy whether these changes have heralded a real 'green revolution' or merely a 'wheat revolution' is only an academic exercise. The fact remains that the introduction of new high yielding varieties of cereals has definitely raised the hopes for a green revolution in the country, if it has not actually ushered in the green revolution. But we appear to be still far away from achieving our goals as is clearly evident from the situation created by droughts in a large part of the country during 1972-73. We have still to reach a stage when agriculture will start playing a significant role in developing the overall economy. This state of affair is mainly because the so called green revolution is confined to small and limited pockets of the country. Unless we make concerted efforts to spread it over to a larger area, the problem of balanced regional economic development may remain unsolved. So far we have placed our hopes mainly on the IADP concept i.e. concentrating all efforts and resources in areas already developed to a considerable extent. There was and there still is the belief in many quarters that there are progressive farmers in certain geographic areas, and lazy and conservative farmers in other geographic regions of the country. Part of the policy of concentrating efforts in these so called progressive areas is founded on this belief. It seems likely, however, that there is also a great potential of
development in other areas devoid of natural hazards, which have been neglected only because the people farming them are considered conservative and backward. If the human factor in these areas is not the source of development constraint, such areas have been neglected to the detriment of national interest.

Eastern Uttar Pradesh is an example of an area excluded from intensive development efforts and resource allotments because of a prevailing belief that its people are unresponsive and backward. It was one of the neglected areas even before the British Rule, and during British times nearly all agricultural development in U.P. took place in the western part of the State. A major development was the construction of net work of canal systems which reduced the element of risk in agriculture and gave farmers incentives to experiment with new techniques and crops with new farm related industries. Eastern U.P. farmers on the other hand with their high density of population, resulting in heavy pressure on land and complete dependence on natural forces for agriculture, were not in a position to take risks or experiment in ways that, if they failed, could threaten their very existence. In eastern U.P. agriculture was a very low paying business and received a very low priority in both private and public investment allocations. Holdings were small and scattered and prevailing technology made large scale investments in agriculture both risky and uneconomic. This led to a neglect and to a capital starvation which depressed returns for agriculture still further. Over time, surplus population from East U.P. moved to cities in search of jobs to
maintain their families, and those who remained, invested whatever savings they made in things other than farming, mainly in education as a source of extra-regional employment.

The introduction of high yielding varieties accompanied by high foodgrain prices combined to raise the hopes of making agriculture profitable even on small eastern U.P. farms. The droughts of 1965-66 and 1966-67 brought changes in Government policy as well. Rules for provision of credit and supply of electricity for agricultural purposes - especially irrigation - were liberalised, and the 1967 general elections gave local politicians added motivations to help farmers in overcoming the official red tape wrapped around applications for wells and credit. The result was large investments in agriculture by large and medium size farmers in developing their own irrigation sources. Once the investment process started, other cultivators saw the economic benefits that accrued to the early innovators and added impetus to the process by taking their own initiative to make still further investments in farming. Remittances from incomes earned in cities by local emigrants became a major factor in providing resources for modernising agriculture.

With the availability of water, the demand for other inputs such as chemical fertilisers, plant protection material and improved

* Cultivators in this area have had a sad experience with Government irrigation sources as water from these was all too frequently not available when needed or in the quantities required.
implements increased and total productivity rose. In spite of prevailing beliefs in traditionally lazy and conservative farmers, many of these farmers have turned out to be active and progressive when given access to resources that could profitably be employed in their farming. And with the new posture of agriculture, social barriers are disappearing and the so-called "upper castes" are gradually assuming the direct performance of almost all the operations on their farms. In short, the rise in the resource base i.e. the creation of private irrigation sources, has started a chain of new activity on the farm embracing new aspects of economic decision making and involving new patterns of behaviour: indeed, it has worked to alter the entire matrix of activities of farmers. A resource base change with such wide consequences needs careful study as it is likely a major key to effecting agricultural development.

Jaunpur district in Eastern U.P. provides an example of the process/agricultural development mentioned above, where substantial changes have taken place during the last 5-6 years or so. It is one of the most densely populated areas of the country. Holdings are small and a sizeable portion of the land owners belong to "upper castes" who shunned the direct undertaking of some of the operations (to some extent still do) as taboo. But despite prevailing beliefs, the cultivators cannot entirely be blamed for this state of affairs. The opportunities for development were, until recently, almost negligible.
The consolidation of holdings in the early and mid-sixties started a process of change. With consolidated units, cultivators began thinking in terms of irrigation investment. This was the time when foodgrain prices underwent a sharp rise. In 1965-66 and 1966-67 the drought affected the entire area and as relief measure the State Government came in with liberal loan policies and provided electric connections to farmers purchased irrigation facilities on easy terms. New high yielding wheat and paddy varieties were introduced which, along with fertilisers and proper supplies of field water, raised yields upto nearly 300%.

The investment in agriculture began on a modest scale due both to risk discounts and capital limitations. Farmers started by placing small tube wells and pump sets to command land where they had their larger chaks, where two crops could be grown easily. The creation of irrigation facilities prompted an entirely different set of management decisions for chaks with own irrigation and chaks without irrigation or purchased irrigation. There was a change in the cropping pattern and in the use of other inputs such as manures and fertilisers and pesticides on the irrigated land. The cropping pattern and input use on unirrigated land and land irrigated by purchasing water from others remained almost unaltered. A significant feature of this change appears to be in the handling of family resources with a diversion of savings from earnings from other sources being alloted to agricultural investment.

* A chak is a consolidated plot of land.
The educated people of the area working in cities and local institutions acted as agents of change, being an important source of information and knowledge sparking these developments. These were the people who traditionally had little to do with the farming operations carried out by the family. An investigation into which castes have been most responsive to change, which farmers, their educational levels, economic and social position, etc., will provide a substantial test of the belief that certain castes in these areas are not interested in farming or in modernising their agricultural operations. Indeed, such an investigation would throw considerable light on an alternative hypothesis that views the eastern U. P. farmers as being backward and unresponsive to change in the past only because profitable technologies and/or the resources to apply them to local agriculture were not available, a circumstance that resulted in a stagnation that was misread as being caused by social and human factors unique to this area.

Further, studies of such backward areas have assumed added significance with new postures of planning and development for social justice, removal of poverty and regional economic imbalances in the country.

* As already mentioned above, people from this area migrated to cities in search of livelihood. But they maintained links with the family in the village and were expected to send back to the village their savings to support the family. When the new technology promised to make East U. P. farms self-sufficient, they not only disseminated this knowledge back home but also helped with finances and encouraged their families in the village to invest on the farms. By doing so they were freeing themselves to a great extent from the demands of their families all the time, which in many cases compelled them to lead miserable lives and also incur debt to support the family in the village.
Objectives:

In the light of the above observations the main objectives of this study may be stated as follows:

1. To assess the relative importance of Economic and Social factors in bringing about modernisation in agriculture.
2. To study the factors affecting the process and level of modernisation.
3. To study the impact of modernisation on farm organisation on the modernised farms vis-a-vis traditional farms.
4. To examine the impact of modernisation on the resource productivity and efficiency of resource use.

Conceptual Framework:

Agriculture in underdeveloped countries is characterised by its traditional nature. It is difficult to give any precise definition of traditional agriculture. However, traditional farming may be described as that stage of agriculture where productivity is low and the farmers use most of what they produce and the marketable surplus is negligible, if there is any. They think in terms of costs and returns. "But to them a cost may be arduous work, or leisure or ceremonial foregone".

The methods of farming are based on age old traditions, using only traditional factors of production such as land and labour. By long trial and error, farmers reach "a point after which they can make little or no contribution to economic growth because there are few inefficiencies in the allocation of factors, the removal of which would

---

increase current production, and because investment made to increase
the stock of traditional factors would be a costly source of economic
(1) growth".

By implication traditional farmers have reached an equilibrium
although at a lower level. Whatever inefficiencies are there, are
probably due to inherent bottlenecks such as lack of knowledge and
low level of technology. Agriculture in many developing countries
could not move ahead as desired by the respective governments;
because the research was stagnant and there was nothing worthwhile
(3) to be extended to the farmers.

In traditional agriculture output is mainly derived from land
and labour inputs. These inputs are considerably more important
than the capital inputs, which too are the direct embodiment of
labour in the form of land improvement such as bunding, levelling
(4)
and ownership of small tools.

On the contrary, modernised agriculture embodies the use of
a profitable new technology based on continuous and sustained
research leading to higher productivity and higher returns to
resources.

1) Schultz, T.W. "Transforming Traditional Agriculture", Yale
University, 1964.
2) Hopper, W.D., "Allocation Efficiency in Traditional Indian
3) Hopper, W.D., "Main Springs of Agricultural Growth in India",
4) Mellor, J.W. "The Economics of Agricultural Development", Vora
Mosher has described five essentials (transportation, marketing, new innovations, access to supplies and incentive to produce) for transforming traditional agriculture. But the process of transformation may start in chronic deficit nations with the availability of profitable technology and needed inputs alone. Once this process starts, the entire input structure and decision making on the farm is marked by substantial changes.

The main characteristics of modern agriculture is the application of more capital inputs, consequent to the introduction of technological changes such as new varieties of seeds, fertilisers, pesticides, machinery etc., which in their respective ways raise the productivity of resources. It also enhances the scope to substitute inputs of elastic supply with those having inelastic supply such as land. For instance, fertiliser use can substitute land in the sense that a particular level of output can be achieved by applying more fertiliser with lesser unit of land.

There is also the transitional stage, which lies in between traditional and modern agriculture. This phase is characterised by the large inequities in the returns of resources with their costs, resulting in disequilibrium. The introduction of new technology in agriculture has resulted in very high returns to resources as compared to costs. It can, therefore, be said that presently Indian agriculture is in the transitional phase.

1) Mosher, A. T. *op. cit.*
How does the new technology as it is being propagated in this country, i.e. high yielding varieties would change the combinations of input factors. The manner in which the relative importance of factors of production (land, labour and capital) will be affected through the modernisation, (mainly based on HYV) will depend upon the extent to which the new technology (which is the main source of modernisation) is labour/capital/land intensive or otherwise and the degree of elasticity of demand for the said factors.

Since modernisation implies the application of more capital inputs, it shifts the production surface upwards from the level achieved in the traditional agriculture. It increases either or both

* It may be mentioned that apart from modernisation, the other forces such as growing population and a declining market may also alter the relative share of factors of production. The forces in combination with modernisation often tend to conceal the effect of one another. However, in our case the other forces do not play any important role in concealing the effect of modernisation because the area of study is very small (i.e. only one block) under which the density of population has already reached at a very high level and given the share of market, which is insignificant, the above mentioned limitation does not apply.

the absolute and relative shares of products imputed to each factor of production. However, due to higher use of capital inputs, its absolute share in production would increase provided the elasticity of demand is more than unity.

Land being the scarce resource, the ultimate success of modernisation will be conditioned by the relative share of land in the production process. The changes which are responsible for modernisation, either increase or decrease the absolute return to land depending upon whether output is elastic or inelastic. If the demand is inelastic, it would result in lower absolute returns, unless the land has very close alternative use, whereas elastic demand would increase absolute returns. But it may or may not result in larger relative share imputed to land.

Since demand elasticities of agricultural commodities generally show

1) In this connection Heady has mentioned that "Hicks has provided some analytical tools which are useful in this respect. A technological change can affect the income imputed to a given factor of production in various ways: (i) Both the absolute and relative shares of the product imputed to a given factor may be decreased, (ii) Both absolute and relative shares may be increased, (iii) The absolute share may increase while the relative share is decreased. The final outcome depends on how the marginal productivity of the given factor is affected. The discussion of general principles may be simplified by assuming that only two factors, labour and capital for example, are used in producing a given commodity. Accordingly, improved techniques which affect both absolute and relative shares of total product imputed to two factors may be classified as labour saving, capital saving or neutral. Labour saving devices are those which increase the marginal product of labour. Conversely, capital saving inventions increase marginal product of capital by less than that of labour. A neutral invention means that the marginal productivity of the two factors increased in the same ratio". See Heady, E. O. "Changes in Income Distribution in Agriculture with Special reference to Technological Progress", Journal of Farm Economics, Vol. XXVI. 1944.
predominance of inelastic demand, it would lead to lower share of income
imputed to land.

A particular component of modernisation may push the absolute
or relative shares of land in either direction, but the total effect of
modernisation as a whole would be in the downward direction. Growth
in population may increase the absolute and relative shares of land.
The fact that relative share of land in most of the developed countries
has not increased, but instead has shown a decreasing tendency indicates
that the total effect of the forces, of which modernisation is certainly a
very important component has contributed to the decline in the relative
share of land in the production process. The classical explanation of
rent also supports the decline in relative share of land due to modernisa-
tion of agriculture. An increase in productivity of land would make land
relatively less scarce.

To sum up "the process of change involves the re-establishment
of new economic equilibrium and it is necessary for people to experiment
for a substantial period of time before they can find the new points of
optimality. Indeed, a definition of non-progressiveness might be a
high correlation between traditional input and outputs".

1) Heady, E.O., "Economics of Agricultural Production and Resource Use",
2) Heady, E.O., op. cit.
4) Hopper, W.D., Comments made in a private communication.
The conceptual propositions supported by empirical verifications indicate that the relative importance of land would decline, but the absolute share would increase as a consequence of modernisation of agriculture. Further, it would increase both the relative and absolute share of new inputs such as fertilisers, new seeds etc. particularly at the initial stages of modernisation. The derivative hypotheses of these propositions given at the end of this chapter will be tested in the chapter-V.

Review of Literature:

Having briefly stated the propositions regarding modernisation in terms of factors embodying modern technology and also changing relative and absolute share of factors of production, it would be interesting to know empirical findings of the studies in this context. Unfortunately, the studies referred to subsequently do not have specific theoretical framework. Besides, these studies have concentrated on particular individual components of modernisation i.e. fertiliser use, pesticides, new seeds etc. Their orientation, again has been mainly in identifying the factors responsible for adoption of the particular components of modernisation. The impact of adoption of the individual component of modernisation on resource productivity and efficiency of resource use has also been studied. These studies throw useful light on the factors affecting the adoption of new technology, which has direct relevance to this study.
These studies have examined different aspects of the problem and cover a number of disciplines. In a review of this type, it is difficult to cover all of them. Attempt has, therefore, been made to limit this review to major problem areas, which are more relevant to this study. These problem areas relate to economic, social and personal factors determining the acceptance of improved farm practices. The following review of these studies is, however, very brief and is intended to present only a broad survey of research work done on this aspects.

**Economic Factors in Modernisation:**

As usual the rate of modernisation in agriculture is determined by its demand and supply. The supply here refers to the availability of these inputs which lead to modernisation. Assuming the availability of the inputs to be approximately uniform to all the cultivators, the rate of modernisation becomes largely a demand variable, which is a matter of 'willingness' and 'ability' of the cultivators to apply the modern inputs on their farms. The willingness to accept is related mainly to personal factors like education, age etc., whereas the ability to modernise the farming depends upon the economic factors, like creation of necessary infrastructure, capacity to invest, risk bearing capacity, etc. Thus, the factors, which affect the propensity to adopt are, irrigation facilities, size of holding, additional returns due to modernisation i.e. profitability, increased income etc. An attempt has, therefore, been made to present the direction of relationship of these factors with the modernisation as
has emerged from different studies. For the sake of clear exposition the relationship has been examined separately in the following pages.

1. Size of Farm:

Most of the studies have revealed that the size of the farm was positively associated with the acceptance of improved agricultural practices. Lionberger and Coughenour have reported that large farms encouraged the use of improved farm practices, among medium and


large farms. According to the authors a 'critical minimum' size of farm was necessary for the successful adoption of improved farm practices. However, no significant relationship between the size of farm and acceptance of improved farm practices was found in few studies. On the other hand, Singh and Reddy have observed that in the presence of other factors such as, socio-economic status and social participation, the size of farm was negatively associated with the adoption of improved farm practices in a significant manner. Similarly some other studies also revealed that as the size of farm increased there was a tendency to decrease the application of fertiliser per acre.

2. **Gross Farm Income:**

Gross farm income is another important factor which is related to the adoption of improved farm practices. It has been observed that a reciprocal cause and effect relationship is likely


4) Chaudhury, K. M. and Maharaja, M., op. cit.
to exist between income and the acceptance of improved farm practices. The higher and quicker adoption of farm practices leads to higher income, which in turn, makes more capital available for the adoption of improved practices. However, Desai and Sharma did not find any significant difference in gross income between users and non-users of fertilisers.

3. Cash Income:

Gross farm income and cash income are highly correlated, and the latter appears to have more relevant relationship with the acceptance of improved farm practices. Cash income is measured in terms of products sold and it is found to be associated with the acceptance of improved farm practices in some foreign studies. However, in an Indian study it was found that there was no definite relationship between the value of marketed produce and fertiliser use per acre.

4. Liquidity Position:

Shetty examined the liquidity position of the farmers in relation to the rate of diffusion of improved farm practices. In the liquidity position only cash income other than farm business income was included. The study revealed that farmers with higher liquidity adopted improved technology more quickly.

2) Misra, V. N., op. cit.
3) Shetty, N. S., "Inter Farm Rates of Technological Diffusion in Indian Agriculture", Indian Journal of Agricultural Economics, Vol. 21, 1966.
5. Profitability of Improved Practices:

In the context of hybrid corn Griliches has defined profitability as the per acre increase in yield due to use of hybrid seed, times the price of corn, and minus the difference between the cost of hybrid seed and open pollinated seed. He found that the profitability was very important in the acceptance of innovations; other factors tend to disappear in the long run. He states that..."difference in both the long run equilibrium use of hybrids and in the rate of approach to that equilibrium level are explainable at least in part by difference in the profitability of the shift from open pollinated to hybrid varieties".

In another study conducted by P.E.O. also it has been observed that the non-adoption of improved farm practices reflected the failure to produce a return, which justifies cost and effort.

6. Irrigation Facilities:

A number of studies indicated that the cultivators having irrigation facilities tend to adopt improved farm practices more than the cultivators without irrigation facilities. Whereas, Desai and Sharma found no

significant difference in the irrigation facilities available to users and non-users of fertiliser. However, Misra\(^{(1)}\) has found that the per acre use of fertiliser was higher on farms having their own pumping sets than those depending on canal irrigation. Hence, the conclusion was drawn that only the substantive type of irrigation created by own irrigation facilities would influence the adoption of improved practices as compared to state owned sources such as canals, which provide only a protective type of irrigation.

**Personal Factors in Modernisation:**

The above presentation shows that the economic factors are the major determinants of the rate of adoption of improved farm practices. However, this does not imply that personal factors are not important. As stated earlier 'willingness' to adopt the improved farm practices depends to a great extent upon a number of personal factors. Keeping this in view, an attempt has been made to present the relationship of personal factors such as age, education, with the acceptance of improved agricultural practices as has been observed in the studies oriented to this problem.

1. **Education:**

   Most of the studies indicated that the education and the adoption of improved farm practices were positively associated in a significant manner.\(^{(2)}\)

---

1) Misra, V. N., *op. cit.*

However, a few studies revealed that education had less influence on the adoption of improved farm practices.

### 2. Age:

A number of studies conducted to examine the relationship between age of the operator of the farm and the adoption of improved agricultural practices did not reveal any significant association between the two. On the other hand, Shetty has found that the effect of age on the farmers' speed of response towards technological change has shown influence on the elasticity of delay in case of improved seeds, but it has no effect on the fertiliser use.

In the above presentation, the relationship of adoption of improved agricultural practices with individual factors has been examined. However, when all the factors were studied together, it was found that many factors influence the adoption of improved farm practices. It is, therefore, important to know how these factors in a group affect the adoption of improved agricultural practices. Though, the comparison of these studies is not possible due to the differences in the measurement of the variables and dissimilarities in the measures used for estimating the variation in the adoption of improved farm practices, still the basic approach is more or less the same. The summary of the findings of some

---


3) Shetty, N. S., *op. cit.*
of the studies where groups of factors studied together explain the variations in the adoption of improved practices, is given below:

**Summary of the Findings to Predict Adoption of Improved Farm Practices by a Group of Factors.**

<table>
<thead>
<tr>
<th>Name of the investigator</th>
<th>Main Independent Variables used</th>
<th>Percent variation explained in adoption of improved farm practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shetty, N.S. (1966)</td>
<td>Size of farm, Extent of tenancy, Value of fixed capital excluding land, Liquidity, Age, Education, Rate of returns of innovation</td>
<td>52.33*</td>
</tr>
<tr>
<td>Roy, P.D. and et.al (1968)</td>
<td>Education of respondent, Caste rank, Level of living, Social Participation (holding office), Value of agricultural products raised, Mass Media contact, Urban contact, Extension contact, Political Knowledge, Secular Orientation, Educational aspiration, Urban Pull, Empathy, Credit Orientation, Deferred Gratification</td>
<td>52.00</td>
</tr>
<tr>
<td>Name of the investigator</td>
<td>Main Independent Variables used</td>
<td>Percent of variation explained in adoption of improved farm practices</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Misra, V. N. (1968)</td>
<td>Size of farm in acres&lt;br&gt;Value of marketed produce in Rs.&lt;br&gt;Value of non-land fixed investment in Rs.&lt;br&gt;Percent of irrigated area&lt;br&gt;Adjusted intensity of cropping.</td>
<td>69.14*</td>
</tr>
</tbody>
</table>

*Only fertiliser use has been studied.

**Impact of Modernisation on Resource Productivity and Efficiency of Resource Use:**

A few studies have attempted to measure the impact of modernisation on resource productivity. Among the modernised practices, impact of only fertiliser use on resource productivity and efficiency of resource use has been examined in detail by Misra. It was found that output ratio, productivity of human labour and productivity of capital spent on fertiliser increased with the increase in the per acre fertiliser use. Further, in order to compare resource productivity and efficiency of resource use, production function analysis was made for users and non-users separately. The differences between marginal returns and acquisition costs of the resources have more or less similar pattern for users and non-users. Thus, it is concluded that there is no significant difference in the efficiency of resource use between users and non-users of fertilisers probably due to low quantum of the use of this input.

1) Misra, V. N. *op. cit.*
To sum up, it may be stated that with a few exceptions, size of farm, gross income, cash income, profitability of practices, irrigation facilities, and education have been found positively related to the adoption of improved farm practices. As regards the impact of improved practices on resource productivity, it has been found that the productivity of resources has increased due to the adoption of improved farm practices. Regarding the efficiency of resource use among modernised farms, it is difficult to draw any definite conclusion due to a limited number of studies.

In the light of the foregoing theoretical propositions and review of the literature, the following hypotheses are proposed to be tested in this study.

Hypotheses:

1. Economic factors such as size of farm, outside (off-farm) income play a predominant role in bringing about modernisation in agriculture.

2. Socio-cultural factors are of minor significance in the process of modernisation.

3. The process of modernisation leads to or involves:
   a) stepping up of cropping intensity, use of modern inputs and yields.
   b) stepping up of the volume of marketed surplus.

4. In traditional agriculture, cultivators have achieved higher level of efficiency in resource allocation.

5. The process of modernisation diminishes the relative importance of land in production due to changes in factor proportion; but the absolute share indicated by marginal value productivity increases with the increase in modernisation.