Chapter- I

Introduction & Research Methodology
Chapter-1

Introduction & Research Methodology

From a historical perspective, it can be observed that till the late eighties agricultural sector in India was relatively closed as the export orientation was confined to only some commercial crops like spices, tea, coffee etc. and imports were largely restricted. However, during the period since then the degree of export orientation increased considerably with the removal of some of the restrictions on exports of commodities. The share of agricultural exports in GDP would indicate three major aspects, namely (1) the degree of openness or outward-orientation of the agricultural sector in regard to the export activity, (2) the name of agricultural trade strategies adopted in the country (3) supply capacity of the agricultural sector as regards exports. It can be noted that after a marginal rise in the shares of agricultural exports in total G.D.P. and G.D.P. originated through the agricultural sector during the seventies. However, since the beginning of the nineties there is perceptible rise in the shares, the share in total G.D.P. rose from 1.3 percent in 1990-91 to 2.0 percent in 1995-96. It can be inferred that the degree of oneness or outward orientation of the agricultural sector, with regard to exports, has increased on recent times. From the phase of gradual export orientation, the agricultural sector in India is likely to enter into a new phase of globalisation with the implementation of the various provisions of WTO.

India became a member of the W.T.O. in 1995 and consequently become obligated under Uruguay Agreement of Agriculture (URAA). India found its agricultural tarrifs at 100 percent for certain edible oils. The level of WTO bindings is far in access of the applied level. India did not have to WTO bindings is far in access of the applied level. India did not have to tariff its imports restrictions, because they were
maintained at that time for BoP reasons and such restrictions were exempted from the rarefication obligations. The URAA also imposed an obligation on members to reduce domestic support if it was above the stipulated levels. The threshold for developing countries was 10 percent. According to the latest WTO notification made by India for 1996-97 and 1997-98, the product specific support was negative for all supported crops and below the stipulated level for non-product specific support. At the time of its entry into the URAA, India did not have any export subsidy programmes listed for reduction in the agreement, and consequently it did not undertake any reduction commitments in this area. As a developing country it had the possibility of using subsidies to reduce the costs of international transport and freight, and also of giving more favourable terms for internal transport and freight charges of exports shipments since 2000, however, India has recourse to these export subsidies in seeking to sell its accumulated stocks of wheat and rice in the international markets. Doubts have been expressed in the WTO on the consistency of these measures because of the extent of subsidisation. Adherence to the URAA has not constrained India with respect to either the domestic support programmes or the external trade policies related to agriculture.

The role of capital formation is crucial in the context of agricultural development. It is particularly true of the Indian economy, where even submarginal land has been brought under cultivation and the labour is easily available. In such a situation modernisation of agriculture with the help of advanced technology and intensive utilization of available surplus resources calls for a constant growth of capital. The larger the portion of current output invested by the cultivating families the greater be the increase in the production and the rate of growth.
Although theoretically, it may be possible to get production from a combination of land and labour only in actual practice, even in its simplest form, agriculture does require some amount of capital. Leaving the simplest form of agricultural production behind, as we start out on the path of economic progress, the use of capital at once assumes importance, Adam Smith attached great significance to this factor since it was concerned primarily with the growth of wealth. A shift in the focus of attention of economists to the problem of underdevelopment, specially after the last world war, has given a new dimension to the problem of capital formation both in context of importance and urgency.

High levels of production and the resultant high income levels are a function of proper combination of production factors including management. When capital is limited as compared to other resources, its addition increases the efficiency of all these resources. In an underdeveloped and predominantly agricultural economy characterised by poor technology of production, low farm incomes, relatively small savings and social and economic stagnation, the problem of agricultural development directed towards a long run objective of self propelled growth can very largely be viewed as a problem of the growth of farm capital. One of the serious obstacles the agricultural development directed towards a long run objective of self propelled growth can very largely be viewed as a problem of the growth of farm capital. One of the serious obstacles the agricultural industry in this country faces today is, how to raise the agricultural productivity or level of farm returns per hectare. Inadequacy of capital and its inefficient use coupled with traditional technique of cultivation are same of the more important causes of low production on Indian farms and therefore, these problems
need immediate attention and solution for the development of agricultural industry.

On micro level it would be desirable to know the productivity of durable physical capital used in agriculture. The items which give the highest returns to an additional rupee invested would be his obvious choice for further investment. It is only after this information is available highest returns to an additional rupee invested would be his obvious choice for further investment. It is only after this information is available that the farmers can make further investment profitably. In this context the ultimate success or failure is determined by the national dictions of the farmers concerning the use of specific resource and their levels of application. A concrete knowledge of the productivity of the durable capital structure would substantially improve the basis for these decisions.

India is vast country comprising of numerous regions with diverse agro-climate and market conditions. The production techniques, crops, assets and resource structures show considerable variation between these regions, and resource structures show considerable variation between these regions, and so have region-wise information on this vital aspect. In the present study, an attempt has been made to measure the formation of capital in agriculture in Four districts in U.P.

Capital formation is "not an automatic process but a response to investment of money, effort and time in resources or facilities of production. "Capital formation involves investment whether public or private, investment involving the purchase of factors of production and their utilization for the creation of non-consumption output." "The growth of inputs not merely to maintain, in the future, the previous rate of outputs and inputs, but in order to make it possible to produce larger
outputs."

"The amount which a community adds to its capital during a period is known as the amount of its investment or capital formation during the period."

"Society does not apply the whole of its current productive activity to the needs and desires of immediate consumptions; a part of it goes to the making of capital goods: tools and investments, machines and transport facilities, plant and equipment—all the various forms of real capital that can go greatly to increase the efficiency of productive efforts."

Strictly speaking capital formation denotes addition to the stock of productive equipment. Capital formation can be viewed either as gross or net. Baum says though all capital is product saved from consumption and used in further production, an important portion of it replaces each time the previously existing capital that has been used 'up', has depreciated, or that has otherwise lost its value as a productive agent. Thus all savings actually being transferred into productive use are considered gross capital formation. Net capital formation, on the other hand, measured after allowances are made for depreciation, obsolescence and accidental damage to fixed capital. Conceptually net capital formation represents the addition to fixed capital (building, other constructions and works, equipment and machinery) available for further production.

**Selected Area—**

Uttar Pradesh (UP) is situated in northern part of India and is surrounded by Bihar in the east, Madhya Pradesh in the south, Rajasthan, Delhi, Himachal Pradesh and Haryana in the west and Uttaranchal in the north. The state has a population of 166 million. The state has the longest network of rivers and canals at 28,500 km fostering the agriculture sector. The mineral resources in the state are mainly limestone, dolomite, glass-sand, marble, bauxite, non-plastic
fireclay and uranium. Endowed with fertile land, salubrious-climate and perennial river systems, the state have long been the granary of India. Agriculture is the major source of income for about 72 per cent of the population. The state is one of the leading producers of food grains and other commercial crops in the country. The state has a well-developed traditional industry besides mineral based industry. UP is now flexing its status as the leading agricultural state in the country to emerge as a preferred destination for the food-processing industry in the country. The state has some of the oldest powerhouses and currently is one of the largest power producers in the country. The state has good communication network including one of the longest rail and road lengths. The state is keen to improve the industrial infrastructure and has developed integrated industrial townships like Noida with state-of-the-art facilities. Noida export zone enjoyed a good inflow of investment from many domestic and international players. The state has established four agro export zones and three Special Economic Zones (SEZs) are under implementation. Centre for Monitoring Indian Economy (CMIE) index of Relative Development of Infrastructure of the state (2002-03) is at 103.3 against an all India figure of 100. The state has a well-developed agro-based industry. Being one of the largest producers of sugar cane, the state is India's sugar bowl. UP accounts for 28.03 per cent of India's sugar production. The affluence of agriculture spurred the growth of allied industries like cold storages and warehousing. In addition to industrial areas, many centres like Kanpur, Ghaziabad and Lucknow have an established traditional industry. The large livestock population allowed the leather industry to flourish in the state. Kanpur and Agra emerged as the hubs for leather goods in the country. Textile industry is the other promising sector in the state. Uttar Pradesh is the largest producer of electronic goods and
is the fourth largest exporter of software products from the country. UP accounted for close to 10 per cent of IT & BPO exports from the country in 2003-04 with a productive and cost effective manpower, the state has attracted some of the largest MNCs to set-up their manufacturing facilities – Coca-Cola, Pepsi, Glaxo, Daewoo, Honda, and Piaggio to name a few. The state with its human resource potential, proactive policies and commitment to ensure encouraging climate to the investors is poised to emerge as a manufacturing hub in the country. The state has become a hub for corporate R&D with many domestic players and MNCs establishing their facilities. Uttar Pradesh is the second biggest state economy in the country; with a share of 10.7 per cent in aggregate domestic product. Area-wise it is the fourth largest state in the country. The state recorded a growth of 4.5 per cent during 1993-94 to 2003-04. Among the major states, Uttar Pradesh ranks fourteenth in per capita income. Uttar Pradesh is the most populous state in India, with more than 16 per cent of India's total population. The western region is more urbanised than the rest of the state and has 622 industrial workers per thousand in registered factories, against 443 in the state. The density of population in the western region is 762 per thousand against 689 in the state. Agriculture is the primary sector of the state’s economy, employing about 72 per cent of the total work force. The share of agriculture in the total income of the state is 33 per cent. Uttar Pradesh produces 38 per cent of India’s wheat, 20 per cent of paddy and 21 per cent of sugarcane. The state boasts of the highest irrigation intensity at 66 per cent. It is the largest producer of wheat, pulses, sugarcane, tobacco, potato and milk in the country.

It also has the highest yield in the country of pulses and tobacco. The state has a well-developed agro-based and food processing
industry. The total investment in the food processing industry is expected to be more than US$ 42.55 million in 2004-05. The state is one of the leading producers of dairy and horticulture. The state, better known as the sugar bowl of the country is one of the largest producers of sugar cane. The state recorded total production of 5.4 million tonnes of sugar in 2001-02. The state ranks second in total number of sugar factories in the country at 101 in 2002-03.

The availability of good natural resources and abundant manpower spurred the growth of the industry in the state. About 389,000 Small Scale Industries like hand-knitted woollen carpets, woodcarving, brass metal industries, terracotta, etc. provide large employment opportunities.

Three most important industries in the state are sugar, cotton fabrics and diversified food preparations. The state has fifth highest share in the country in manufacturing value added of nearly 7 per cent. The state witnessed a growth of 42 per cent in cement output in 2003-04. At 13,645, UP is in the top quartile in the total number of factories in the country. The electronics, leather, textiles and mineral-based industries have shown a promising growth over the years. The services sector is the key emerging sector in the state. Uttar Pradesh emerged as a hub for IT companies and ranks fourth in terms of software exports. Several MNCs have established their facilities in Noida industrial area, which is in close proximity to the national capital. Tourism is one of the promising sectors in the state. With a range of pilgrimages, the state is the favourite destination for the domestic tourists. The state enjoys the highest domestic tourist visits in the country.
Review of Literature-

A number of studies\(^1\) have indicated that the items of capital formation consist purchase of land and its improvements, purchase of livestock, purchase of implements, machinery and transport equipments, construction of farm buildings and development of irrigation resource etc. Though many of these studies have accepted that the purchase of land does not increase the amount of capital formation, as it simply refers to the transfer of capital from one hand to another. As such in these studies the major items of investment were purchase of land and livestock. But Hate\(^2\) (1951) carried an enquiry covering 227 families in Kodinar taluka to know the extent of net capital formation. He observed that net capital formation was highest in machinery and implementations followed by digging of well, i.e. 37.4 and 28.1 percent of the total investment. The National Sample Survey’s\(^3\) (1965) in its, fifteenth round estimates of capital formation per reporting house hold stood at about Rs. 250.00. Expenditure on land and building was about 48 percent of the total investment. The next most important item was livestock (39 percent).

Patel\(^4\) (1965) from the study of 21 cultivators of Sijhora village (Manda) in Madhya Pradesh has concluded that nearly 50 percent of capital is invested on land improvement alone.

Certain Studies\(^5\), however, have excluded the purchase of land as an item of capital formation. These studies reveal that a major portion of the capital was spent on purchase of livestock, implements and

---

3. The National Sample Survey.

machinery and irrigation sources. Sancheti\textsuperscript{6} (1965) in his study of 140 cultivators of 24 villages of Rajasthan has excluded land but included residential buildings. In certain studies both purchase of land and livestock have been excluded as items of capital formation. According to the All India Rural Credit Survey\textsuperscript{7} (1956) estimation, the capital formation is 294.6 crores of rupees which composed of 7.91 per cent invested on reclamation of land, 14.05 percent on bunding and other land improvements, 18.50 percent on digging and repair of wells, 5.80 per cent on development of other irrigation resources, 8.83 percent on laying of new orchards and plantations, 19.18 percent on purchase of implements and machinery and transport equipments, 8.72 percent on construction of farm houses, cattle shed etc. and 17.01 percent on miscellaneous capital expenditure in agriculture.

The NCAER\textsuperscript{8} (1963) survey indicates that gross capital formation for rural sector was of the order of Rs. 699 crores in 1962 for the nation as a whole. Out of which 218 crores was in farm investment, constituting 26.15 percent on land improvement, 27.98 percent on irrigation sources, 25.69 percent on farm equipments, 11.47 percent on bullock carts and 8.71 percent on farm structures. They also made a separate estimation of Rs. 88 crores for the change in livestock (net births and net purchases). All India Rural Debt and Investment Survey\textsuperscript{9} (1965) sponsored by the Reserve Bank of India estimated 166.8 crores of rupees capital formation in farm business for the whole country. Purchase of farm equipments was the most important item

\textsuperscript{7} Reserve Bank of India (1956), All India Rural Credit Survey Vol-I, Part I, (Rural Families) Reserve Bank of India, 727.
accounting for 28.4 percent of the total capital formed in farm business. Well and other irrigation resources were the next in importance accounting for 26.5 percent of the total, followed by reclamation of land 16.7 percent, building and other land improvements 15.5 percent, farm houses 9.3 percent and other items of fixed capital formation 0.9 percent respectively.

**Relationship between of size of farm and capital formation**

Almost all the studies\(^\text{10}\) have established the fact that as the size of farm increases, total investment per farm increases where as on per acre basis the same decrease. However, Sen\(^\text{11}\) (1965) in this connection has observed that 78.2 percent of the farmers in Bihar marginal surplus of farm receipts left for further investment towards capital formation. Shastri\(^\text{12}\) (1965) in a study of 108 holdings of Bihar found that in case of gross capital formation the small farmers claim higher amount but in net capital formation there is no definite trend.

**Income and Capital formation**

Few studies conducted on micro as well as macro level on income and investment pattern showed that the percenting of investment of the total income varied from 7.20 to 14.77.

Pain\(^\text{13}\) (1950) found Haringhata, (West Bengal) “Only a portion of 13.9 percent of the total amount available for capital formation was being utilised for net agricultural investment during the period”.

---


Rangnekar\textsuperscript{14} (1958) viewed that the rate of investment as a percentage of the national income was an average about 9.5 percent per annum during the period 1950-51.

Khatkhate and Deshpande\textsuperscript{15} (1965) worked out investment-income ratio for the plan period of India. The average investment-income ratio which was 7.2 percent during the First Plan, increased to 11.7 percent in the first two years of the Third Plan.

Misra \textit{et al}\textsuperscript{16} (1965) observed in a study of 87 families in three villages of Cuttack district (Orissa) that 10.11 percent of average income was being further invested.

Shukla\textsuperscript{17} (1965) has calculated that the net capital formation as percentage to net agricultural income in India was 2.83 per cent between 1935-36 to 1940-41, 0.93 percent from 1940-41 to 1945-46, 5.36 percent from 1950-51 to 1955-56 as well as 1955-56 to 1960-61.

\textbf{Objectives of the Study-}

The new economic policy being implemented since mid 1991 has progressively started possessing new challenges in all sectors of the economy and is also opening up new vistas in the global markets. Agriculture cannot remain insulted from the ongoing economic reform process as the indirect impact of globalization measures directly affecting this sector. The specific objectives of the study are as follows-

1. To determine the existing resources available with the cultivators in the area.

2. To estimate land farming pattern of families during the period under study.
3. To study the level of farm income, consumption and saving pattern of cultivating families in the area.
4. To suggest measures for accelerating rate of growth in the direction of increased farm the earnings.

**Nature & Scope of the Study**

High level of production and the resultant high income levels are a function of proper combination of production factors including management. When capital is limited as compared to other resources, its addition increases the efficiency of all these resources. In an underdeveloped and predominantly agricultural economy characterised by poor technology of production, low farm incomes, relatively small savings and social and economic stagnation, the problem of agricultural development directed towards a long run objective of self propelled growth can very largely be viewed as a problem of the growth of farm capital. One of the serious obstacles the agricultural industry in this country faces to-day is, how to raise the agricultural productivity or level of farm returns per hectare. Inadequacy of capital and its inefficient use coupled with traditional technique of cultivation are some of the more important causes of low production on Indian farms and therefore, these problems need immediate attention and solution for the development of agricultural industry.

On micro level it would be desirable to know the productivity of durable physical capital used in agriculture. The items which give the highest returns to an additional rupee invested would be his obvious choice for further investment. It is only after this information is available that the farmers can make further investment profitably. In
this context the ultimate success or failure is determined by the rational
decisions of the farmers concerning the use of specific resource and
their levels of application. A concrete knowledge of the productivity of
the durable capital structure would substantially improve the basis for
these decisions.

India is a vast country comprising of numerous regions with
diverse agro-climatic and market conditions. The production
techniques, crops, assets and resource structures show considerable
variation between regions, and so would the use and productivity of
capital. It is, therefore, necessary to have region-wise information on
this vital aspect. In the present study, an attempt has been made to
measure the formation of capital in agriculture is the four selected
districts of U.P. Auraiya, Etawah, Meerut and Bulandshahr.

**Hypothesis of the Study-**

In order to enable the empirical evolution of the above objective,
it is necessary to formulate hypothesis which may be tested. The
hypotheses pertinent to the above objectives of this study are follows-

1. There has been addition in the stock of durable physical assets
   on farms.
2. Growth of farm capital has altered the share of various categories
   of farm assets in the total capital stock.
3. There exists positive relationship between capital formation and
   size of farm.

**Research Methodology-**

**Estimation of Capital Formation-**

Generally, the following two methods re used to estimate the
capital formation in the agricultural sector.
Money Expenditure Approach- in thesis method on estimate of savings, after deducting current expenditure from the total income devoted to investment or addition to capital assets is made symbolically $S = Y - C$, where $S$ stands for savings, $Y$ for income and $C$ for Current expenditure.

Net Worth Change- In net worth change approach estimate of the value of capital assets at the beginning and at the end of the year, are taken into account. The difference between the two estimates after providing for depreciation and obsolescence gives an estimate of net capital formation during the year.

\[ S = \Delta A - \Delta L \] where $S$ refers to saving $\Delta A$ refers to change in assets and $\Delta L$ refers to change in liabilities i.e. depreciation etc.

In Indian conditions, both the methods are beset with several difficulties. Money expenditure approach would involve an enquiry into receipts, expenses and savings and their disposal seems to be involved with certain difficulties mainly because the farm and non-farm business accounts and family budgets are inter mixed and cultivators do not have any record of their economic transaction.

The method of valuation of capital assets at two points of time is subject of difficulties arising from the necessity to list all fixed and make proper allowances for depreciation, obsolescence, fluctuations in values as well as for individual idiosyncrasies of valuations. This is particularly so, because important assets like land and buildings in rural areas have only limited market and do not change hands frequently. In most of the cases, these are handed over from father to son. Therefore, valuation is subject to wide margin of variation based on ideas of individual evaluators and about certain types of assets like wells, it is
difficult to know even the original cost and life. It will also be a hinderance in marketing the adequate provision for depreciation.

Both the methods have certain limitations under the circumstances it was considered desirable to combine the two approaches in a well designed schedule and the savings estimated through the two different methods be reconciled for internal consistency.

To use the money expenditure approach, net savings after deducting current expenditure from the total income were worked out. The savings incurred leading to the investment or addition to the assets were enquired from the farmers.

The expenditure made by the farmers on major repairs which alter the shape of the assets or make the assets more serviceable or increases the potentialities of its utilization, is included in the capital formation. In the development and constructional work the non-monetary investment viz. family labour used or the resources used, for which the cash expenses are not made, is also included. Fluctuations in the market prices of assets did not count in capital formation. In other words, the prices of various categories of farm assets have been treated as constant at the base level period. But the appreciation on live stock and depreciation on all capital assets have been taken into account.

Disinvestment like-wise has been studies. It includes sale of assets or mortality of cattles or any loss to capital assets.

**Items of Capital Formation**

In the present study, concerned as it is with the capital in farming, the following items have been considered for the measurement of capital formation.
Land improvements:

Land improvements include reclamation of land expenditure on bunding, fencing and on any other land improvement. Though the repair and maintenance of old bunds, do not create any addition to capital assets, however, this operation increases the productivity of land or brings fallow land under cultivation or is done for the prevention of soil erosion. This kind of investment incurred has been treated as capital formation.

Purchase of Livestock:

The purchase of sale of livestock will not add or diminish to the community’s wealth, but probably it is a major item by the Indian farmers. The purchase of livestock may be for (i) Expending the size of farming business (ii) replacement of lost cattle by old age, sickness and mortality (iii) periodic purchases in accordance of custom of selling of cattle after the busy or carting season and buying again at the beginning of the next season or disposing milch cattle when dry and buying them in milk immediately or later and (iv) purchasing when funds are available to recover the cattle sold due to financial needs. Here purchases to increase the size of farming and for replacement due to old age, sickness and mortality are included in the capital investment except where cattle breeding is practised for sale.

Purchase of Implement, Machines and Transport Equipment’s-

With regard to the purchase of implements, machines and transport equipment, there is a likelihood of a considerable extent of replacement except in the case of costly implements, machinery and transport equipments about which the position is more clear and their purchase is addition to the capital assets. But in the case of ordinary
and simple implements, the position is not so clear. Thus, the expenditure pertaining to increase of size of business or change in the technique, has been considered in the capital formation.

**Digging and Repairs of Wells:**

Construction of new wells is definitely an item of capital formation. But in respect of wells in use, expenditure on repairs which is more or less for maintaining the assets, does not constitute investment. On the contrary, the amount incurred on deepening, boardening or on strengthening the old wells which will increase their utilization, leads of capital formation and has been so considered.

**Purchase of Irrigation Appliances:**

It includes the expenditure on Persian wheels, pumping sets, installation of tubewell and the construction of irrigation channels which either did not exist before or were not fully developed or expenditure were made to increase the efficiency of assets. Therefore, the expenditure incurred under this head constitutes the capital formation.

**Construction of Repair of Farm Buildings:**

Expenditure on the construction and on major repairs of cattle shed, godowns and farm houses are included in capital formation.

Should the farm residence be included in an inventory of capital? The question is raised because of its use. There is a good reason to include farm residence as an item of capital formation. Although it undoubtedly can also be classified as consumer’s goods, it would be difficult to show that the investment in housing for a farmer, his family and hired help is less essential to farm operations than the investment in stables for live stock or sheds for the production of machinery.
Laying of Orchards:

It is also an item of capital formation. Replanting, hedging and bunding etc. have also been considered along with laying of (new) orchards under this head.

In the present study, the amount spent on purchase of land is not included in capital formation. Buying of land leads to another the other hand the same transaction affects a reduction in the capital structure of the seller. Thus it involves simply the transfer of assets from one hand to another. Therefore, from the point of view of the community, such transfers do not indicate any addition to capital. As this study relates to region, the amount spent on purchase of land is not included as an item of capital formation.

Calculation of Net Capital Formation:

In order calculate the net capital formation depreciation and other allowances were made. But to calculate the depreciation, two major points must be clarified (i) the average expected life of assets and (ii) the manner in which the assets are likely to be depreciation was calculated accordingly. Most of the cases were as given below:
<table>
<thead>
<tr>
<th>Name of Assets</th>
<th>Expected Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Improvements (including building, levelling etc.)</td>
<td>4 years</td>
</tr>
<tr>
<td>Improved implements</td>
<td>10 years</td>
</tr>
<tr>
<td>Improved implements (only hard hoe)</td>
<td>4-5 years</td>
</tr>
<tr>
<td>Major traditional implements (Plough, Pata, leveller etc.)</td>
<td>4-5 years</td>
</tr>
<tr>
<td>Minor traditional implements (Kurpi, Sickle etc.)</td>
<td>2 years</td>
</tr>
<tr>
<td>Well Pucca</td>
<td>50 years</td>
</tr>
<tr>
<td>Well Kucha</td>
<td>25 years</td>
</tr>
<tr>
<td>Irrigation Appliances (Pumping sets, Rahat, Irrigation Channels)</td>
<td>10 years</td>
</tr>
<tr>
<td>Tube Well electric</td>
<td>50 years</td>
</tr>
<tr>
<td>Tractors</td>
<td>10 years</td>
</tr>
<tr>
<td>Chaff cuttur (Bullock-drivences well hand operated)</td>
<td>10 years</td>
</tr>
<tr>
<td>Dunlop cart</td>
<td>14-16 years</td>
</tr>
<tr>
<td>Bullock cart</td>
<td>10 years</td>
</tr>
<tr>
<td>Building Pucca</td>
<td>50 years</td>
</tr>
<tr>
<td>Building Kucha</td>
<td>25 years</td>
</tr>
<tr>
<td>Live stock</td>
<td>10 years</td>
</tr>
</tbody>
</table>
After knowing the average expected life of the assets, another problem arises as to how the depreciation on assets should be calculated. There are several methods viz., (i) Straight line method, (ii) Diminishing value method, Evaluation method, (iv) Sinking fund method and (v) Insurance fund. One can argue in favour of and against these methods. But in all, it seems that the diminishing value method is appropriate as in the last when the assets have no practical use, they have some scrape value. Therefore in this study, this method has been used.

**Analytical procedure:**

**Regression Analysis:** Regression analysis was used as one of the analytical approach to determine the effect of different economic factors on capital formation on different on different sizes of farms under study. Both linear and Cobb-Douglas types of functions were tried for the regression analysis and the variation included in these of function were as follows:

**Linear:**

\[ Y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 x_6 + b_7 x_7 \]

**Cobb-Douglas:**

\[ Y = a x_1 x_2 x_3 x_4 x_5 x_6 \]

Where \( Y \) = capital formation in rupees.

\( x_1 \) = Size of holding in hectares.
\n\( x_2 \) = Size of family in adult units

\( x_3 \) = Intensity of cropping in percentage

\( x_4 \) = Irrigated area expressed as percentage of total holding.

\( x_5 \) = Value of annual income in rupees.

\( x_6' \) = Value of borrowing in rupees.
\( x_7 \) = Value of savings in rupees.

**Processing of Data and Elimination of Variables**

The data were processed by Electronic Computer I.B.M. 1620. Two to three runs of regression analysis with varying number of variables were made for each relationship (for linear as well as for Cobb-Douglas) to eliminate the non-significant variables from the equations.

The following steps were used to eliminate the statistically non-significant variables from the equations:

1. The standard error of the regression Co-efficient were examined and only those variables whose Co-efficient were greater than standard errors were selected for second run.
2. The equations were further scrutinized for a final run in which only those variables were retained in the equation whose Co-efficient were significant at 10 per cent level.

**Importance of Study**

Looking into the work done in regard to capital formation in India, it is revealed that the different workers have adopted different methodologies which makes cross interpretations of the findings impossible. Thus, it becomes difficult to infer the real problems pertaining to capital formation, though they provide a guideline for more scientific studies. There are significant omissions, The most important being the failure to take into account the income-investment relationships. Since farm income is a function of land, labour and capital used in agriculture, a feature which is wanting in many of the earlier studies. My thesis has covered this significant aspect also into consideration.
Further, it is vital to find out the influence of factors viz. size of farm, size of family, intensity of cropping, irrigation, saving on the rate of capital formation in Indian agriculture. Unfortunately none of the earlier workers has tried to measure the effect of these factors on capital formation. One also finds that wear and tear of the assets of the farmers has not been taken into account in most of the studies. Ignoring the depreciation and obsolescence one can not have a correct picture of the extent of investment. The proposed study aims at filling the gap in available information.

**Sampling Technique**

The design adopted for the selection of cultivators was a multi-stage-stratified random sampling with Community Development Block a primary unit and the farmer’s family as the ultimate unit.

From U.P. four districts are selected on the basis of levels of economic development. The research design for the selection of cultivators is multi stage stratified random sampling with community development blocks as primary unit and the farmer’s as the ultimate units. Details about sampling procedure are given below-

1- **Selection of Districts**- Four districts have been selected on the basis of their level of development for this purpose we have divided the economy of U.P. into twenty regions. Two districts from two regions have been selected randomly, The districts selected were Meerut, Bulandshahar from Meerut region and Auraiya, Etwah for Kanpur regions.

2- **Selection of Community Development Blocks**- All the Community Blocks of four sample districts of U.P. were listed, Two blocks from one district were selected for survey purpose randomly. The Blocks selected were-

4- **Selection of Cultivators**- From each village cultivators were selected according to their size of land holdings. The cultivators were classified into four groups:

i. Cultivators having up to 2 hectares of land.

ii. Cultivators having more than 2 and up to 4 hectares of land.

iii. Cultivators having more than 4 and up to 6 hectares of land.

iv. Cultivators having above 6 hectares of land. The study covers 200 hundred cultivators, 50 each from Meerut, Bulandshahar, Auraiya and Etawah. The details of selected cultivators is given in following table-
<table>
<thead>
<tr>
<th>District</th>
<th>Block</th>
<th>Village</th>
<th>Size groups (in hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Upto</td>
</tr>
<tr>
<td>Auraiya</td>
<td>Ajitmal</td>
<td>Atsu</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ballapur</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bhagyanagar</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ampur</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ratua</td>
<td>4</td>
</tr>
<tr>
<td>Etawah</td>
<td>Chakarnagar</td>
<td>Dadara</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bhoya</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mahewa</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aheripur</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bijauli</td>
<td>4</td>
</tr>
<tr>
<td>Meerut</td>
<td>Binauli</td>
<td>Fajalpur</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tera</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Baraut</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barwala</td>
<td>5</td>
</tr>
<tr>
<td>Bulandshahar</td>
<td>Lakhaothi</td>
<td>Pasauli</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ramgarh</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Siyanagar</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Khadmothonagar</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>76</td>
</tr>
</tbody>
</table>
Period of Study –

This present thesis relates to three years viz. 2008-09, 2009-10 and 2010-11. Each cultivator was interviewed in each year and the schedules were filled up. The study of globalisation of agriculture in India has been done from year 1991. We have compared it to past data from time to time,

Limitation of the Study-

The main limitation of the study is that the cultivators do not have any record of their transactions as a result of which reliance has to be made on their memory. Moreover, the farmers hesitate in giving correct information regarding income and saving as such our study suffer from this limitation.

The study has been conducted by survey method and data for three years have been collected. A period of three years for such a study is also not very long. However, at micro level it would not be possible to obtain information for a longer period due to limited resources and time at the disposal of investigator.