CHAPTER I

INTRODUCTION

Agricultural sector has been the cornerstone of Indian economy. Its growth and development across the regions and crops is of crucial importance in ensuring food security, achieving self-reliance, supplying raw materials to industries and generating effective demand in the economy through linkages. However, despite concerted efforts by the government at the centre through planned outlay, there has been little structural transformation of the Indian agricultural sector. Even today, about 55 percent workforce belongs to agricultural sector and contributes only about 17 percent to the Gross Domestic Product. Green Revolution during the mid sixties gave a significant breakthrough in terms of increased productivity of agricultural crops, though it did not have an immediate impact across all crops, regions and farm size. One of the important changes took place with the emergence of such a revolution is that the Indian agricultural sector shifted from a simple land-labour-bullock technology to improved seeds, fertilizers and new technology.

Nevertheless, the performance of agriculture in recent years has been far from satisfactory. The growth rate of agriculture decelerated from over 3.5 percent during the period 1981-82 to only 2 percent during the recent year i.e., 1997-98 to 2004-05. This deceleration although mostly marked in the rain fed areas, occurred in almost all states and almost all major sub-sectors including those such as horticulture, livestock and fisheries where growth was expected to be high. Mention to be made that given this scenario, the Indian agricultural sector has to face serious challenges in the coming years, especially in the wake of economic liberalization in making agricultural production cost effective both in the domestic market as well as in the international market.

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1 Govt. of India (2007)
The issue of interregional inequalities in the sphere of economic development has also been echoed in the country and poses a serious challenge in the coming years. While some parts, including the northern belts did well by virtue of early adoption of technology and gradually growth diffused to other sectors of economy, some parts, most notably the eastern belts, there are people still to attain basic minimum needs. These wide differences could be attributed to differences in agro climatic conditions, entrepreneurial ability and incentives provided to their agriculture and other economic activities. What is more concerning is the fact that despite Indian agriculture has achieved self sufficiency in food grain, the country still has more than 250 million underfed people and persist with high underemployment\(^2\).

Large chunk of farm policies in the past have been undertaken by the government in order to promote development of Indian agriculture. Subsidization of key inputs is one among such policy measures which might reduce farm efficiency in the long run. This is because provision of agricultural subsidy at a massive scale dampens resources that could otherwise have utilized for promoting investment in agriculture. The Eleventh Plan identified public investment in agriculture as one of the important determinants of agricultural growth in India. In other words, the government should play an important role in raising the level of public investment in agricultural sector through irrigation development, expansion of credit facilities, improving rural infrastructures, establishing market yards, research and extension services etc. This would not only benefit a large section of farming community, largely consisting of small and marginal farmers and the rural poor, but also give a fillip to overall growth of the economy through backward and forward linkages. The limited scope for increasing area under cultivation to augment agricultural production further provides a strong ground for innovation of new technology, bridging gap between agricultural research, knowledge and putting them into practice, which largely come from public initiative.

\(^2\) IFPRI (2007)
In recent years, however, public investment in agriculture as well as investment on rural infrastructures have shown a declining trend. The declining tendency of public investment, therefore, is a cause of concern for sustainable growth in Indian agriculture. The recent literatures\(^3\) on rural poverty and agricultural development heavily drawn the conclusion that reduction of rural poverty largely depends on growth in agricultural output. In a similar vein, agricultural growth largely depends on the improvement in rural infrastructures and other incentives provided to farm sector.

The development of Indian agricultural sector in the front of investment and growth has been presented below. The subsequent sections, thus, reviews some of the important literature in agricultural investment and growth in India.

1.1 The Initial Phase of Agricultural Development

In the initial phase of development, Indian agriculture was largely viewed as a traditional and subsistence sector. It was beset with many structural and technological bottlenecks viz., small size of land holding, poor institution, unscientific farm practices etc. Being the cornerstone of the economy, the backwardness in agricultural sector affected the industrial prosperity and the prospects of the whole economy. The nature of backwardness of the agricultural sector is well formulated in Schultz's\(^4\) well known “Transforming Traditional Agriculture”. Transforming traditional agriculture into a modern one requires huge investment, which, in tum constitute the source of economic growth. In his own words, economic backwardness is the result of the factors such as; the state- of- art remain constant and the motives and preferences for holding and acquiring sources of income remain constant for a long period of time. The consequences of this being, the marginal productivity of investment continues to decline. Then, there comes to a point, when the rate of return is so low that there are no incentives to save for additional investment. Commenting upon India's agricultural policy during early sixties Prof. T.W. Schultz puts; “The root cause of trouble is the policy preferences for industrialization,

\(^4\) Schultz, T.W. (1964)
agriculture’s contribution to its attainment being cheap food, as a source of cheap labour and public revenue”. In other words, low farm product price and cheap food, accompanied by high input price were integral part of economic policies, and consequently the disincentive to invest arose.

The backwardness of economy is also well explained in “Vicious Circle of Poverty”

This implies the ‘circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in a state of poverty’. The circular forces operate both on the supply side and on the demand side. On the supply side, there is small capacity to save due to low level of income. The low level of income is a reflection of low productivity, which in turn is due to lack of capital. And, the lack of capital is a result of low level of saving, and so the circle is complete. On the other hand, on demand side, the inducement to invest may be low because of lack of purchasing power of the people, which is due to their small real income and low productivity. The operation of this vicious circle does not make to accelerate investment and growth in poor agrarian economy. Indian agricultural scenario at the time of independence was, thus, at the subsistence level and tradition oriented where land-labour-bullock remained to be only factors of production. Therefore, vicious circle was operating both at demand and supply side. Private farm investment in the agricultural sector did not receive much attention in view of the lack of investment incentives and low per capita income of the cultivator households.

Some economists, however, emphasize the traditional nature of Indian agriculture on "social and cultural" ground whereas, some attributes to "institutional factor”. The FAO (1965) concluded that “agricultural production is the variable factor determined by family needs which, in turn, depend on tradition and varying extent to the composition of the family.” The group further maintains that in these set up, “the methods of production are not only traditional but that tradition also determines what kind of crops have to be grown and how much to be produced of them”. The small farmers are assumed to be living in village societies in which various kinds of traditional and semi traditional social

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5 Nurkse Ragnar (1960)
organizations and corresponding attitudes and values are the main determinants of their behavior.\textsuperscript{6} It is, thus, fashionable to assume that peasants in backward agriculture lack the virtues of 'protestant ethics' that strongly encourage releasing the productive forces for rapid development. Another group of economists approaches the nature of backward agriculture in terms of the institutional factor. This group is of the opinion that the continuation of semi-feudal production relations operate as a drag on land productivity. The basic features of this mode of production operates in Eastern India country side include; an intensive non-legalized share cropping, perpetual indebtedness of the small tenants and overwhelming presence of usury\textsuperscript{7}. The system prevents capital investment in agriculture, which might raise the production potential of the small farmers and get out of bondage. In other words, to perpetuate this bondage, the land owning class does not allow any capital investment and intensive use of available means of production in the agricultural sector.

It is thus clear that agriculture in India followed the traditional pattern and depended heavily on human and bullock labour during the early phase of development. There were almost no investment taking place in the farm sector by the government causing no incentives and motivation for private investment. The use of tools, machinery and other agricultural implements were hardly been practiced by the farming community; irrigation was largely dependent on natural endowment of seasonal rain water.

The crux of the problem, therefore, lies in structural and institutional bottlenecks, which affect the growth of demand and supply of capital in the long run. The inability of the government to accelerate the pace of land reform programme, the inadequacy of institutional credit, and continued dependence on moneylenders were of great concern. Given this scenario, the problem of agricultural development towards a long run objective of self sustained growth was largely viewed as a problem of farm capital formation. As a consequence, the country faced huge deficits in food grains and there was not enough to feed the growing population.

\textsuperscript{6} Doland, Gordon (1976)  
\textsuperscript{7} Bhaduri A (1973)
1.2 Impact of New Technology on Agriculture

The technological breakthrough popularly called ‘Green Revolution’, came upon during the mid sixties brought significant changes in the food economy of India. One of the important aspects of the change relates to adoption of modern agricultural technology. Outdated and unscientific means of production were replaced by modern farm equipments, improved seeds, irrigation, fertilizers and many others scientific methods of production. It brought in its wake new opportunities for investment in Indian agriculture as the rate of return on these investments were higher. It ushered in rapid agricultural growth that made the country “reasonably self-sufficient” in food grains- a national objective that had always received a high priority. In the first phase of Green revolution, there witnessed a significant improvement in crop yield despite an accentuation of inter-regional and inter-crop imbalances. Concerns expressed by scholars that HYV (High Yielding Varieties) programme had been limited to wheat and rice, and that there was a tendency of growing inequalities among the cultivating households in the adoption of new technology, and that some institutional constraints prevented the small farmers from adopting the new technology. It has also been observed in some studies that per acre cost of adopter farmers was higher than that of the non-adopter farmers and therefore, output per acre was higher in the former. The availability of controlled irrigation facility is a necessary pre-condition for the adoption of new technology and thus, the new technology and capital formation in Indian agriculture have been reported as a closely related phenomenon. In its second phase, however, output growth was accompanied by reduction in interregional inequalities as it spread to eastern part of the country and there was emphasis on watershed programmes in dry areas.

The proposition that gains of new technology being adverse to small size holding has been contended by economists. Contrary to widely held view, a significant number of marginal and small farmers have been able to adopt the new technology, though the

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9 Bhalla, G.S. op. cit.
greater resource base of the large farmers favours the adoption of new technology\textsuperscript{11}. Irrigation base of the farmer emerged to be a positive and significant factor for the adoption of new technology. Obviously, then major part of the irrigation base of the farmers was provided by the government through public canal in the absence of inadequate private investment in the form of tube well.

The main thrust of new agricultural strategy was on changing the techniques of production in terms of creating a congenial condition for the application of new capital inputs with the expansion of irrigation facilities. Further, the advent of Green Revolution witnessed expansion of credit facilities to help gearing input use and adoption of farm mechanization. In fact, the allocation of resources for agriculture and irrigation in the first Five Year Plan remained at its highest ever since the planning development. The priorities laid to agricultural sector in terms of improving irrigation base as well as expansion of credit facilities had also its impact on private investment on new technology including HYV seeds, chemical fertilizers and further building farm assets like tube well, pumpsets, tractors and other modern implements.

1.3 Initial Phase of Research on Agricultural Investment

With the seminal work of Nurkse (1953), during early 1950s, there were a few studies conducted on capital formation in agricultural sector in India (Deshmukh and Bhargava, 1954), Shukla (1965), Shukla (1968), Panikkar (1969). Shukla's (1968) is one among the important studies carried out on the subject. In fact, the study of investment and capital formation in agriculture came into front when the Indian Society of Agricultural Economics took up the subject during 1960s. The prime interest was to develop the country's capability to feed the growing populations, continued dependence of PL 480 since mid fifties and food crisis during sixties. Shukla (1968) took this as a subject of study for the period 1920 to 1960 using the plan document as the main source of data. The study showed that there was a close relationship between investment and labour supply over a period of forty years in Indian agriculture. In other words, there was a

\textsuperscript{11} Sharma, Ramesh K. (1992).
constant relationship between capital and labour during the period under study. The findings also revealed that the level of investment is more influenced by the production requirement or by the need of income and consumption in future rather than by the capacity to save in the past. The total investment in Indian agriculture during 1950-51 to 1965-66 increased at an increasing rate with both public and private investments showing an increasing trend. But, it appeared that the rate of increase in public investment had accelerated faster than the rate of increase in private investment, though the later occupied a larger share during the same period.

The structure of capital formation during the study period revealed that traditional inputs like bullocks constituted a major proportion of total private capital formation. On the other hand, investment on irrigation projects, constituted a major share of public sector capital formation. There are evidences that private investment has been pushed up as a result of public investment in various irrigation projects. The construction of dams, soil conservation measures and proper drainage by the government have improved the level of sub-terranean water table and has encouraged well irrigations. Increasing investment on irrigation has also helped massive use of fertilizers and improved seeds.

1.4. Estimates of Investment Based on National Accounts Statistics, CSO

Subsequently, the estimation of capital formation in various sectors of the economy has been undertaken by Central Statistical Organisation, Govt. of India. The estimates of public and private investment at the country level are available from 1950-51 onwards, and the coverage and methodology used to prepare such estimates are available in CSO publication- National Accounts Statistics; Sources and Methods (1989).

Using the National Accounts Statistics, Shetty (1990) studied the trends in public and private investment in Indian agriculture from the period 1960-61 to 1987-88. It was shown that the gross capital formation in agriculture at 1980-81 prices increased steadily during 1960s and reached its peak level during the late eighties. But, since then, it has shown a declining trend in absolute term. Shetty’s explanations for the factors
responsible for the declining of public investment in agriculture during 1980s was due to a rapid increase in revenue account expenditure on agriculture. The proportion of expenditure on agriculture under revenue account was 44 percent during 1970s, which shot up to nearly 70 percent by 1988-89. Despite a rapid expansion of institutional credit to agriculture, private investment had stagnated during eighties. The reason put forwarded is that expansion of credit by the financial agencies has tended to be substituted for “own saving” and used for usurious non-institutional practices.

Kumar (1992) also reached the same conclusion as observed by Shetty that the investment in agriculture has shown a declining trend during 1980s. It was concluded that slowing down of investment in irrigation from the public account was the main contributory factor of declining trend in public investment. In subsequent periods, the addition to total gross irrigated area has been declining. For instance, the annual compound growth of gross irrigated area during 1961-71 was 2.87 percent which declined to 1.57 percent in 1981-91. The study also has shown that net irrigated area by surface water sources (canal and tanks) have been stagnating during 1980s, and was largely government controlled. But, the ground water sources (well and tube well etc.) have shown an increasing trends, which is largely due to investment made by the private sources. The study thus concluded that the source of problem was due to the fall in public investment in agriculture.

Similarly many scholars viz., Pattnaik (1987), Rath (1989), Mallik (1993), Rao (1994), Dhawan (1996), Gandhi (1996) empirically showed that agricultural investment, more specifically on government account had declined during the eighties compared to the previous two decades. Alagh (1991) though supported the declining trends of investment in Indian agriculture, argued if inventory formation or changes in stocks is netted out; there is no evidence of its decline though fluctuations can be estimated depending on the importance given to agriculture in macro and investment policies.

There were several reasons pointed out for such a decline in public investment in Indian agriculture. Gulati and Bhide (1993) pointed out that deceleration in capital formation in
Indian agriculture is because of declining profitability of investment vis-a-vis other sectors. Mishra and Chand (1995) pointed out the decline in public capital formation during 1980s was due to politics of state agricultural policies that encouraged subsidies to agriculture. (Rao 1994, Gulati and Sharma, 1997) also pointed out that rising input subsidies happened to be a major reason for declining trends of public investment in Indian agriculture. As the public investment is meant for creating agricultural infrastructure including the expansion of irrigation base and augmenting productive capacity, it is crucial for long term growth in output. Accordingly, it has been pointed out that declining public investment in agriculture during eighties would have adverse impact on the growth of output. Yadav and Dhawan (1996) held that borrowing and revenue surplus happened to be the major factors influencing public investment in agriculture. Rao (1994, 1997) concluded that steep rise in the cost of construction since mid-seventies, deceleration in per capital income in Indian agriculture and adverse terms of trade for agriculture during eighties led to decline in capital formation in agriculture. Gandhi (1990, 1996), observed that decline in private investment during first half of eighties might be associated with squeezing of rural saving as well as net commercial bank credit and cooperative credit to agriculture in real term. The Economic Survey (1997) outlined lower allocation of expenditure for irrigation, rural infrastructure, agricultural research and extension were the prime factors for decline in public investment during 1980s and thereafter.

1.5 Inducement Effect of Public Investment

Using the National Accounts Statistics, many scholars estimated the elasticity of private investment with respect to public investment. Further, there are several studies conducted on factors influencing private investment in Indian agriculture. A positive relation between public and private investment is generally termed as ‘complementarity’ or ‘inducement effect’ between the both which implies that public investment induces farmers to step up their own investment. The conclusion on complementarity hypothesis between public and private investment is drawn basically with the direction or movement of both the investment series or through their statistical relationship. Such inducement
effect is noted by (Krishnamurthy and Pandit 1985), Rath (1989), Shetty (1990), Rao (1994), Rao and Gulati (1994), Dhawan and Yadav (1995), Dhawan (1996). Krishnamurthy and Pandit (1985) found almost one to one correspondence between public and private investment in Indian agriculture. In other words, one rupee of additional investment in agriculture on public sector account was accompanied by almost one rupee of additional investment on private account. In view of this relationship it was concluded that the decline in private investment during 1980s was mainly because of the decline in public sector investment in Indian agriculture.

A study based on the long time series for the period 1960-61 to 1989-90, by National Council for Applied Economic Research (NCAER), estimated the elasticity value of 0.26. Rao and Gulati (1994) observed the high complementary between public and private investment and the adverse terms of trade in the 1980s may explain the decline in private investment. They concluded the observed decline in investment unless reversed may slow down the future growth of agricultural output and jeopardize food security as the pressures on the available infrastructures and the productivity of current inputs begin to decline. Dhawan and Yadav (1995) endorsed the complementarity hypothesis through a multivariate analysis of All India Debt and Investment Survey (AIDIS) data for 1981-82. It was again endorsed in Dhawan (1996) who studied the impact of government investment on canal irrigation and it's likely impact on private farm investment in Indian agriculture. Canal irrigation constituting a substantial portion of public investment can stimulate private investment through price route. It has been found that the institutional lending to agricultural development in India is more concentrated in irrigated than in dry land tract. Using the data published by AIDIS, RBI, for 17 states for the period of 1981-82, it is found that canal irrigation ratio (i.e. percentage of area under public canal) bears a significantly positive correlation (0.65) with total private fixed farm investment. The canal irrigation ratio and the institutional credit per cultivator household was also well correlated (0.58).
Mitra (1996) strongly subscribes to the hypothesis that total private farm investment are positively enhanced by public investment in irrigation works, though he disinclined to accept a generalized complementary hypothesis.

Mishra and Hazell (1996) observed that the terms of trade (i.e. the price received by the agricultural sector vis-a-vis the rest of the economy) and technology (measured by area under HYV) have significant positive impact on private investment. Similarly, institutional credit, land and tenancy reforms, which belongs to the realm of institutions, also positively influence private sector investment in Indian agriculture.

Gandhi (1996) showed that for the period 1952-53 to 1992-93, rural savings and cooperative credit to agriculture is the strongest determinants of private investment in Indian agriculture followed by area under High Yielding Varieties seeds, agricultural wages and commercial bank credit.

Commenting upon the complementary hypothesis, Mishra and Chand (1995) regarded complementarity as a relationship of being together to form a unity and not simply a causal relationship. It has been asserted that “inducement effect is causal, where as complementary is not, it arises due to the technical externalities of public investment”. The “inducement effect hypothesis” is still spurious during 1980s. The elasticity of private investment in respect of public sector is found to be negative (-0.50) during 1980s, thus falsifying the supposed complementary hypothesis. Though it seemed to be present in earlier decades, the private investment in Indian agriculture may be partly induced by public investment and may be partly autonomous, and the issue should be posed accordingly. However, Chand (2000), pointed out that importance and role of public investment to create infrastructure and to promote long term agricultural growth should not be undermined by lack of complementarity between public and private investment. Using a simultaneous equation model, Chand and Kumar (2004) found that terms of trade and institutional credit as strong determinant of private sector capital formation. The impact of agricultural subsidies on private investment was also positive. It was however, concluded that long term returns from public capital formation are more
than double the returns from subsidies. As there is a trade off in resources going into subsidies versus resources available for public investment, diverting resources from subsidies to public sector capital formation is highly desirable to ensure growth in agriculture.

1.6 Disagreement over the Coverage of CSO Data

Nevertheless, there has been a growing discontent among the researchers over the nature and coverage of data published by CSO on capital formation in Indian agriculture. The researchers looked into the definitional aspects of public investment estimates of CSO to understand the implication of falling public investment in agriculture. The discussion centered around on the restrictive nature of CSO series on public investment in agriculture, which was found to be largely consisting of investment in irrigation. It has been reported that 90 percent of public investment in Indian agriculture in the CSO series comprises of investment in irrigation (Rao, 1997). Public investments on important infrastructure like marketing, storage, rural roads, rural electrification etc., are not included in CSO series. This invites the famous statement of Dantwala (1986), “what is relevant is not simply investment in agriculture but for agriculture”. Rao (1997) concluded that controversy over the complementarity between public and private investment had arisen due to limitations of CSO data, which basically cover major and medium works. If public investment in agriculture are properly accounted for by including investment in rural electrification, rural roads, storage etc, then complementarity between public and private investment stands out prominently.

Based on the above, Chand (2000) and Gulati and Bathla (2001) have attempted to construct a broad series of investment in Indian agriculture by including investment on various items that are essential for agricultural growth and development. This broad series is based on data on budget head wise government expenditure reported in “Finance Account” of the union and state governments. Chand's study reveals that public investment reported by CSO covers only 48 percent of the total public investment channeled into agriculture. Conversely, the CSO series excludes 52 percent of public

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sector investment for capital investment in agriculture. It also found that the broad series showed declining trends, which started earlier than the decline in CSO series. Moreover, no positive association between public and private investment is found during the period 1981-82 to 1996-97, private investment was rather influenced positively by institutional advance for term loans for agriculture and the terms of trade for agriculture.

Gulati and Bathla (2001) re-estimated public capital formation in agriculture defining three alternative concepts. While the first concept is the conventional concept of public sector capital formation as defined by CSO, the second concept is the first concept plus investment in power relevant for agricultural sector. The third concept includes the second concept plus public investment in agriculture as defined in the government budget. The analysis showed that public sector capital formation even after including the other major relevant items meant for agricultural sector has registered a negative growth during the period 1974 to 1998. On the basis of OLS estimation, they found a positive relationship between public and private investment in agriculture given the lag effect. Other variables such as terms of trade and institutional finance also significantly explained the behavior of private investment in agriculture.

The report of the Committee on capital formation in agriculture, GOI (2003) also brought exclusive finding on some aspects of broadening the concept of investment in agriculture. It attempted to regroup the CSO estimates and obtain composite figure of capital formation in agriculture. The report concluded that even after broadening the concept, the gross capital formation in agriculture as a percent to GDP declined from 4.3 percent in 1980-81 to 2.3 percent in 2001-02.

1.7 Rural Infrastructure, Agricultural Investment and Output.

Several scholars pointed out investment on rural infrastructure directly or indirectly meant for agricultural sector have an important role to play for enhancing agricultural investment and output. Binswanger et al (1993) with the help of district level time series data from India found that education infrastructure and rural banks play an overwhelming
role in determining investment, input and output decision. The expansion of commercial banks into rural areas had a large effect on fertilizer consumption and on fixed private farm investment. Canal irrigation and rural electrifications have also significant impact on agricultural investment and output. The authors asserted clearly that commercial banks prefer to locate in well-watered areas where agricultural risks are relatively low and avoid areas characterized by high risks of droughts and floods.

Fan et al (1999) analyzing the state level data in India showed that government spending on productivity enhancement investment such as agricultural research and development, irrigation, rural infrastructures including road and electricity have all contributed to the growth in agricultural productivity and reduction in rural poverty. Government expenditure on rural roads is found to have largest impact on poverty reduction and significant impact on productivity growth. On the other hand, additional government spending on agricultural research and extension has largest impact on agricultural productivity growth followed by investment on irrigation. They reached to the conclusion that in order to reduce poverty the government must give priority to increase its spending on rural roads and agricultural research and extension. In a similar study, Fan et al. (2002) worked out the effects of public expenditure agricultural productivity and rural poverty reduction across Chinese provinces. Government spending on agricultural research and development substantially improved agricultural production followed by investment on rural education. On the other hand, government spending on rural infrastructures such as roads, electricity, telecommunication had substantial impact on poverty reduction via improved non-farm employment and increased rural wages.

Bhatia (1999) established a strong relationship between rural infrastructure development and the value of output from agriculture. The study identified the states like Rajasthan, Bihar, Madhya Pradesh, Orissa etc, which have poor infrastructures and low level of yield of food grains. Therefore large scale investment in these states is required to improve infrastructural facilities and raise the productivity level.
Roy and Pal (2002) with the state wise analysis of agricultural investment and productivity concluded that agricultural productivity is central to rural poverty alleviation and infrastructural and technological changes in turn central to this process. The process, thus requires not only changes in institutional policies but also to enhance public investment in research and rural infrastructure.

Kumar et al. (2006) established a strong relationship between rural infrastructural development and the level of net state domestic product in agriculture in the Indo-Gangatic Plain of India. It was concluded from the study that there is significant scope for increasing the value of output from agriculture in backward states by improving the rural infrastructures.

1.8 Farm Level Studies on Capital Formation in Agriculture

There were, however, a few studies conducted on the pattern of investment and factors influencing investment at the farm level. It was only during the sixties that a few studies were carried out on agricultural investment at the farm level.

Mishra et al., (1965) based on the study of 20 households from two villages of the Cuttack district of Orissa found that farmers in irrigated villages fared better in making farm investment in terms of acquisitions of new capital assets and farm improvement. It is also found that the proportion of capital expenditure as a percentage of total income rises with increase in size of holding. Nevertheless, the total income of households in irrigated and unirrigated village remains same due to greater reliance of the latter on supplementary incomes.

Singh and Bokil's (1965) study was based on investment pattern in agriculture in villages selected from twenty cotton and oilseeds producing districts of Punjab, Gujarat, Maharashtra and Mysore. The study found significant regional variations in investment level, which is found to be highest in Punjab compared to other three states. It is also found that investment per holding increases with the size of holding.
Patel (1965) deals with the problem in relation to tribal economy of a village in Madhya Pradesh. It was found that the pattern of farm investment is income-oriented in big and medium farms while it is subsistence and quick return-oriented in small farms. The volume of investment per household varies directly with the size of holding. Shastri (1965), taking the data of six villages in Bihar found that size of farm bears a direct relationship with the agricultural investment. He observed that past savings and current income accounted for major proportion of investment in all groups.

Singh (1965) adopted inventory approach and measure capital formation while most of the studies quoted above used expenditure approach. In this approach, the differences in value of stock held at two points of time is measured. The study is based on 30 farms located in Rampur district of U.P. from the period 1951-52 to 1962-63. The growth rate of capital formation was 2.5 percent per annum with large variations across the farm size group. Irrigation equipment formed the largest item of investment followed by farm housing and cattle shed and new equipment. It is also found that small farms and their fragmentation are the main obstacles to capital formation.

Bhanja (1965) studied the pattern of capital formation in three villages, one each in Orissa, West Bengal and in Bihar. The study found that capital formation in these three villages was characterized by predominance of either house construction or purchase of land. Saving out of income constituted the biggest sources of capital formation, but in the absence of proper credit facilities the capital formation remained low in these villages. The author however took the liberty to widen the definition of capital formation to include expenditure on durable consumer goods, gold and ornaments, which clearly deviates from the conventional definition of capital formation.

Singh et.al, (1978) studied capital formation at the micro level in the Punjab agriculture. The main objectives of the study were to examine the factors affecting capital formation in Punjab and changes in the relative significance of different variables affecting capital formation over time. It was found that the base year capital, farm size, lagged net income
and the family size were the important variables that affected capital formation. The base year capital had a negative impact on capital formation, which meant that the higher the base year capital, the lower would be the capital formation. This was indicative of the phenomenon that the farmers in the higher income group did not make substantial capital investment.

Mander and Grewal (1988) used a production function to examine the rationale of farm investment in Punjab agriculture. The study found the existence of excess capacity of labour in agriculture due to the lack of employment opportunity in other sector of the economy. Though tractarisation increased the productivity of some crucial resources like labour, irrigation, manures and fertilizers, there was an indication of under utilization of tractors. The use of other resources other than tractors was found to be rational.

Sharma et.al.(1994) studied the inequality in the distributions of farm assets and the relative contribution of these assets towards inequality in Himachal Pradesh. They found that land and farm buildings were the largest contributors to total assets distributions in all four zones as well as in all categories of farms. On per hectare basis, the value of farm assets was found to be higher on small farms. The study concluded that land, followed by other farm assets is found to be the most contributory factors as well as to inequalities in the total assets of the farmers.

1.9 Summing up Review of Literature and Rationale of the Present Study

Most of the literatures available on capital formation in Indian agriculture, revealed above relate to the country level. There were only a few studies conducted at the farm level during sixties and a countable few thereafter. In fact, the research interest on capital formation in agriculture starts with Shukla’s pioneering work on the subject. Thereafter, during eighties and early nineties, based on the data given in National Accounts Statistics brought out the issue of declining public investment in agriculture. Most of the scholars agreeing with the complementary hypothesis or inducement impact of public investment, concluded that decline in public investment have adverse impact on private investment.
and agricultural growth in the country. In the subsequent phase, however, there were discontentment over the nature and coverage on the source of data, from where, such conclusion was drawn. Since the data provided in the National Accounts Statistics on capital formation in agriculture cover mostly on investment in irrigation, concerns were raised regarding the other aspects of investment on rural infrastructures such as rural roads, electricity, investment on developing market yards, research and extension services, soil and water conservation etc., which are meant for agricultural sector. Therefore, attempts were made to regroup and re-estimate public sector investment in Indian agriculture. Nevertheless, even after broadening the concept of public investment in Indian agriculture which includes investment in agriculture as well as for agriculture (includes expenditures that are meant for agricultural sector), it showed a declining trends.

The ‘complementary hypothesis’ synonymous to inducement impact of public investment is also widely discussed among the scholars. With broad series of public investment the inducement impact continued to exist. In view of this relationship, it was concluded that the decline in private investment was mainly because of the decline in public investment in Indian agriculture. This overall decline has been the focus of major debate in the country because many scholars assume it to be the main cause behind the slow down in agricultural growth and, thereby, in the reduction of rural poverty. Several scholars also discussed the other factors that influence private investment in Indian agriculture, importantly; the terms of trade index and institutional credit flow to agriculture.

Most of the literatures available on capital formation in Indian agriculture, however, relates to the country level. And there are only a few studies conducted at the state level and at the farm level on the subject. Therefore, it is important to study in detail about the magnitude and variations in private investment at the state level as well as at the farm level. In fact, the data provided by All India Debt and Investment Survey (AIDIS, a rich source of information on private investment among the cultivator households as well as the non-cultivator households at the state level) has been grossly ignored by the available literature on investment in agriculture. The present study utilized this source of data in
order to understand the trends and pattern of private investment across the states. One of the important parameters in the AIDIS is the proportion of households reporting capital formation in farm business and that in the non-farm business. It is important to see how the rural households overtime have been shifting their resource to either of these two sources of investment and what are such factors responsible for that changes. The study further analyse this issue at the farm level.

Further, interregional inequalities in growth and development and inter-farm differences in agricultural productivity has been a widely discussed issue and pose a big challenge among the policy makers in the country. Keeping this in view, the present study examines the level of agricultural productivity and the pattern of farm investment in two diverse regions of the country viz. Orissa and Haryana. These two regions are diverse in the sense that agricultural development and related infrastructure in both states are quite uneven. Comparative study of agricultural investment and productivity in these regions would certainly provide some fruitful policy decisions to improve the income of the farming community, especially in Orissa.

With better development of infrastructural facilities in a region such as irrigations, institutional credit, extension services, roads and communications, one would expect better agricultural productivity with continuing farm investment and increasing ownership of farm assets among the farming community in that region. This fulfills the supposed inducement impact of public investment. It may also happen that somewhat a lower incidence of farm investment and productivity specifically in the backward regions is attributed to lack proper inclination and attitudes for productive investment in agriculture. Farmers reveal their non-commercial attitudes in terms of spending more on ornaments and social ceremonies and thereby attach more on social values rather than look for long term economic benefits. There is also lack of proper environment for farm investment in villages arisen by lack of rural infrastructure, absence of awareness, dominance of professional moneylenders that hinder the progress of agricultural development.
The enhancement of farm investment as well as farm output is justified in the meaningful sense of ensuring food security for all. Though recently, the country has been able to overcome from food deficit economy to a food surplus economy, still in many parts, the grains so produced are not able to reach the needy. In fact, the lack of access to food in the backward regions especially in the eastern parts is accompanied by huge stock of food grains, primarily due to the lack of enough purchasing power with the large sections of population. The concern of food security in the backward regions can be addressed by increasing food supply locally through improving agricultural productivity. The long term increase in agricultural productivity depends lots on investment in agricultural research, extension services, education, and human capital which is in the domain of public authority.

The present study, thus, attempts to address issues relating to agricultural investment in India using both available primary and secondary data. More specifically, the pattern of farm investment and yield in farm business of the cultivating households have been analysed based on primary data in two diverse regions of the country viz. Orissa and Haryana. The specific objectives of the present study are as follows:

1.10 Objectives of the Study

1. To analyse the trends of public investment in Indian agriculture based on the data published in the National Account Statistics of the CSO.

2. To study the state level trends and composition of private farm investment based on the data given in the All India Debt and Investment Survey conducted by National Sample Survey Organisation.

3. To study the cost of agricultural production and yield level in the proposed study regions and across farm size categories.

4. To examine the proportion of farm and non-farm income in the proposed study
regions among the cultivating households of different size categories.

5. To analyse the pattern of farm investment among the cultivator households and the level of inequalities of agricultural assets in the study regions.

6. To examine the factors influencing private investment and agricultural production both at state level and at the farm level.

7. To analyse the problem of farm investment and suggest policy measures for agricultural growth and development in the study region, especially in the contest of Orissa, agriculture, being a backward region.

1.11 Hypotheses

1. Public investment positively induces private investment in Indian agriculture.

2. There are wide variations in agricultural investment across the states and the study regions.

3. States with better agricultural infrastructure have higher investment and output in their agriculture.

4. Farm investment per acre is directly related to farm size in both study regions.

5. Farmer's reliance on informal lenders for sources of financing farm investment is higher in a backward agriculture such as Orissa compared to that of a developed region such as Haryana.

6. Farm size and productivity are inversely related in both study regions.

7. The proportion of non-farm income to total household income is higher among small sized farm households compared to large sized farm households.

[22]
8. The use of farm capital i.e. agricultural implements and machineries enhances productivity in both the study regions.

1.12 Chapterisation Plan

After the introductory chapter, Chapter II analyses characteristics of agricultural economy of Haryana and Orissa in order to understand and compare the level of agricultural development in both the states.

Chapter III provides details of data base and methodology used in the present study.

Chapter IV discusses the trends and pattern of agricultural investment in Indian agriculture. It analyses the trends in both public and private investment utilizing various secondary sources.

Chapter V examines the cost structures as well as productivity levels in the respective study regions. It also highlights the relative proportion of both farm and non-farm income by different farm size groups in both the study regions.

Chapter VI discusses the asset holding position of households in both the study regions. One being an agriculturally backward region i.e. Orissa and the other a developed region i.e. Haryana. It also brings out the pattern of investment on several farm assets by different farm size categories and inequalities therein.

Chapter VII examines the various factors influencing private farm investment. The analysis has been carried out both at the state level as well as at the farm level.

Chapter VIII presents a summary of important conclusions emerging from the study and suggests policy options for increasing farm investment and productivity growth in the lagged regions, especially Orissa.