CHAPTER – I
SELECT REVIEW OF LITERATURE AND METHODOLOGY

"Would you tell me, please, which way
I ought to walk from here? That
depends a good deal on where you want
to get to"

--- LEWIS CARROLL

1.0 Introduction: In a rather fundamental sense, agricultural progress is normally a prerequisite for industrial development. This is clearly the case in a closed economy, where one of the most important pre-conditions of industrial expansion is the achievement of a rate of increase in agricultural productivity which exceeds the concurrent rate of increase in the demand for food. Rising agricultural productivity supports and sustains industrial development in several important ways. First, it permits agriculture to release part of its labour force for industrial employment while meeting the increasing food needs of the non-agricultural sector. Second, it rises agricultural incomes there by creating the rural purchasing power needed to buy the new industrial goods and rural savings which may then be mobilised, by direct or indirect means, to finance industrial development. Finally, it enables agriculture to supply the major wage-good (food) of industrial workers at a price favourable to the profitability of new industry.

The first type of contribution of agriculture to economic growth of a nation is that constituted by growth of product within the sector itself. An increase in the net output of agriculture, in and of itself, represents a rise in the product of the country since the later is the sum of the increase in the net products of the several sectors. This may be called the product contribution.

The third type of contribution by a sector to economic growth occurs when there is a transfer or loan of resources from one sector to others. Thus, if agriculture itself grows it makes a product contribution; if it trades with others, it renders a market contribution; if it transfers resources to other sectors, these resources being productive factors, it makes a factor contribution.

According to Samuelson and Solow "If agriculture stagnates it will act as a break on industrial expansion and halt real growth". William Nicholls subscribes to this opinion of Samuelson and Solow and says "The existence of substantial agricultural surplus is a pre-condition for industrial development".

1.1 Studies on Agricultural Development in General: World Development Report deals with agriculture and economic growth in the context of developing countries. It explains government policies that affect the national economy as a whole – for example, policies on exchange rates, trade regimes or government spending – influence the

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performance of the agricultural sectors. Within a country and throughout the interdependent economies of the world, better policies are needed to improve the allocation of resources and raise real incomes. In agriculture, using resources more efficiently would involve removing both the policy induced bias that generally discriminate against production and trade in developing countries and excessive subsidies that generate over production in industrial ones. In the wider economy, better resource allocation policies are needed to help developing countries adjust to changing external circumstances - a process which is essential for growth and to correct certain deep seated problems that have constrained economic growth in industrial countries.

The Report explores the connection between Government policy and agriculture and emphasizes the interdependence of agricultural policies in different parts of the World public policies in both developing and industrial countries greatly influence the growth of agriculture and of rural incomes. This influence often extends far beyond national frontiers. What is perhaps most surprising is the fact that it is the developing world which, on the whole, discriminates against its farmers, even though they account for large shares of gross domestic product and export earnings. And it is the industrial countries which provide subsidies to agricultural production, even though, their farmers account for small shares of GDP and employment. The Report examines the potential gains to the world economy from removing these distortions and concludes with a discussion of the priorities for reform.
Agricultural Development in the Third world: Eicher and Staatz explore different views about what has been learned theoretically and empirically about the agricultural development processes since the early 1970s.

The overview by the editors of the volume on "Agricultural development ideas in historical perspectives" captures succinctly the evolution of thought leading to the recognition of primacy of agriculture in the early stages of development. A distinctive contribution of this text of readings is the inclusion of two articles, one of political economy of rural development and another on land reforms. Both these are written from the perspective of dependence theory and provide a meaningful and refreshing critique of the neo-classical and Schultzian models of agricultural development with considerable clarity.

The inclusion of articles on development experience of China and Africa in the concluding part of text is thoughtful since Africa's inability to feed itself and vast amount of unused land and record levels of foreign aid presents a contrast to the impressive achievements of the People's Republic of China in agriculture and overall development.

Asian Rice Irrigation: James K. Boyce has surveyed the technological and institutional alternatives in Asian Rice Irrigation with a view to explaining the wide variations in the pace and character of irrigation development in the region. In much of Asian Rice agriculture, irrigation acts as the 'leading input' or finding technological constraint.

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upon increases in land productivity. Yet the pace of irrigation development in the region has been very uneven, with the percentage of net sown area irrigated ranging from only 3 per cent in Kampuchea to 76 per cent in Japan. At the same time, the character of irrigation development varies in a number of dimensions, including scale, relative factor intensity, institutional arrangements and the degree of 'farmer controlledness' in addition to the usual hydrological and engineering criteria. Various factors which may help explain these variations.

First, much of Asian rice irrigation requires action above the level of the individual farm and thus lies in the large intermediate terrain between the extremes of pure private goods and pure public goods. This intermediate terrain is inhospitable to the elegant but fragile axioms of conventional economic theory. The pursuit of individual self interest cannot be assumed to promote the public interest, the invisible hand loses its grip. Conflicts between individual and collective rationality are a common feature of irrigation development and Asian societies differ considerably in the success with which they have resolved them.

Second, the determinants of irrigation development considered population pressure, geography, agrarian structure, cultural factors, and the role of state are not independent variables, much less mutually exclusive ones. It is not the case that there are simply several casual factors at work, the relative strength of which could be assessed, if all variables were quantifiable and measurable via a multiple regression procedure. Rather, the various determinants are themselves interrelated; population pressure affects the agrarian structure, cultural factors affect the role of the State and vice versa, and so on. Moreover, the relationship between these determinants and irrigation is not
unlinear, since irrigation in turn may profoundly influence each of them.

Finally, the process of technological change is not always smooth or elastic with respect to population pressure as evidenced by the underdevelopment of irrigation in much of contemporary south and southeast Asia. The foregoing analysis suggests such underdevelopment is not accidental, but rather is the outcome of a particular constellation of factors. In such a situation, it may be tempting to search for a magic wand of government policy which can, at a stroke, surmount conflicts of individual interests and ensure efficient outcomes. Thus Wittfogel's vision of the oriental despotism of ancient times is reborn in the modern, technocratic version of irrigation development, in which rights and responsibilities are clearly demarcated by an impartial, efficiency-maximising State. The relative importance of bureaucratic versus market allocative mechanisms is here a secondary issue, what defines the technocratic approach is not its choice of instruments for social engineering, but rather its assumptions as to who will make such choices and direct the development process. A comparative analysis of Asian rice irrigation underscores the limitations of this version, and portents to the potential merits of alternative strategies based upon the democratisation of control over water resources.

The Political Economy of Agrarian Change: Keith Griffin analyses the story of the Green Revolution and new technology. His main theme is that the new technology has not revolutionized production but it has often helped to worsen the distribution of income. His major hypothesis is that economic and political power are

concentrated in a small group and, as a result factor markets are highly imperfect. He advances the view that factor and commodity markets are interlinked.

Agricultural innovation, however, has been encouraged by considerable subsidies, in the form of domestic price support programmes for wheat and rice and in the form of cheap credit and low prices for machinery and agro-chemicals. There is a danger that these subsidies to particular inputs will lead to the criterion of an inefficient and capital intensive agriculture which is incapable of producing an adequate livelihood for the mass of the rural population.

Many of the policies that governments have adopted have been not only inegalitarian, they have also reduced the level of output and its rate of growth. In effect, governments have been arbiters of a 'negative sum game'. That is, the gains of those who have benefited from public policy have been less than the losses of those discriminated against. This, of course, is an inevitable consequence of any policy which results in allocative inefficiency. An example of such a policy is the common practice of protecting industry and turning the terms of trade against agriculture. The losses suffered by the rural community may be substantial, whereas the additional profits reaped by industrialists may be rather small in comparison, particularly if the technical efficiency of the protected activities is rather low, as is often the case. Similarly, within agriculture, policies which subsidize labour displacing mechanisation may increase the profits of landowners much less than it reduces the income of the workers, this will occur whenever factor proportions fail to reflect opportunity costs.
Unfortunately, the policies that preceded and have accompanied the "Green Revolution" in many developing countries have aggravated several of the problems these countries face. Supply of some commodities has increased but the rate of growth of total agricultural production has shown little tendency to rise. In India, for example, wheat production has increased substantially, but agriculture as a whole has not prospered. At the same time inequality has become worse. Poverty sometimes has increased absolutely (e.g. in parts of Java) and employment opportunities have failed to keep up with population growth (e.g. in Sri Lanka), in some cases technical change has led to such sharp social conflict that the peasantry has had to try to defend itself with violence (e.g. in Philippines). The high yielding varieties of foodgrains that have been developed – and those which are still in the pipeline – could in principle be used to alleviate many of these problems.

**Technology and Agricultural Development**: Penelope Francks has brought together the macro-economic aspect of the development of Japanese agriculture and its relationship with industrialisation on the one hand and the main characteristics of Japanese agriculture conditioning its micro-economic development of the Japanese agriculture with industrialisation has been covered in chapters 1, 3 to 4.

It is often argued that Japanese experience is particularly useful for understanding and promoting growth in developing countries of Asia. The author questions the applicability of Japanese experience to agriculture of other developing countries of Asia. The Japanese model approach argues that until 1900 agriculture was the main source of

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resources used for mobilising savings for industry and transferring labour through small-scale rural industrialisation. Nakamura and Grace (1985) show that the contribution of land tax increased from 2 million yen in 1868 to 60 million yen in 1873. They further observe that it is only after the Sino-Japanese War of 1894-95 that the land tax as a proportion of overall tax revenue fell below 50 per cent. In view of estimates made by Nakamura and Grace the authors observe that it would be difficult to show empirically that there was a net flow of resources from agriculture to industry.

However, there is some logic in the authors' argument that the Japanese model is irrelevant for the present day as the economic conditions in Japan differed conspicuously from those surrounding today's developing agricultural sector. The author quotes Hayami and Ruttan in support of her argument that USA and Japan selected the paths of development appropriate to the relative availability and prices of factors of production, land-saving in Japan and labour-saving in USA. Hayami and Ruttan also argue that the lessons from the Japanese agricultural development lie in the choice of an appropriate path of technical change to suit the peculiar endowments available rather than in the specification of a particular growth. The author rightly observes that the choice of technology should take into account the variations in existing investments in infrastructure, equipment and institutional factors conditioning access to inputs. Technical changes in agriculture are related to the development of the economy as a whole.

Agricultural Systems Research10: The editor of this volume outlines the issues and priority areas in farming systems research

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10Remenyi J.V., Agricultural Systems Research for Developing Countries, Australia Centre for International Agricultural Research, Richmond, 2004.
based on the proceedings of the workshop. The workshop identified the following seven priority areas for future farming systems research initiatives: (1) Study of potential land use patterns based on agro-ecological zone definition, (2) Crop-livestock-pasture interaction, (3) Farming systems research in a policy and methodology development context, especially as they relate to food policy studies, agricultural production incentives, prevention of post-harvest losses, rural labour market studies, technology adoption and the design of policies that support technical progress in agriculture, (4) Management of rainfed agriculture, (5) Animal health and production including utilisation of agricultural residues, (6) Forestry and tree crops as components of small holder agricultural systems and a source of systems stability and sustainability, and (7) Farming systems research training and communication research especially where this involves the development of training manuals, computer games and other research outputs that are not location-specific. The workshop noted that farming systems projects should not ignore the important issues of the role of women in agriculture, the problem of landless labourers, human nutrition and how the rural poor spend their meager cash income.

Dayal\textsuperscript{11} analyses the progress of agricultural output in different countries of the world over a decade or so. He calculate the growth rates of agricultural output during the period 52-53 and 62-63 for about 60 countries all over the world by fitting the semi-log least square trend. No attempt has, however, been made to give the reasons for inter-country differentials to growth rates. For a limited number of countries, the rates of growth of crops have been broken down into components, namely, those due to changes in farm land

surface, double cropping changes in crop yields and improvements in the cropping pattern of the 57 countries. Four countries (Israel, Sudan, Mexico and Yugoslavia) had exceptionally "high" growth rates of more than 5 per cent per annum, Israel topping the list. Nine countries had "high" growth rates between 3.5 and 5 percent. At the other end, nine countries had "very low" growth rates of below 1 per cent – three of them (Sweden, Algeria and Uruguay) show even negative growth rates and eight countries had "low" growth rates of between 1 and 2 per cent. The remaining seven countries having necessary data has an average growth rate varying between 2 to 3.5 per cent.

Khan\(^2\) examines the adoption of biological hydrological chemical technology and its income and employment effects found that the benefits from the Green Revolution have been unequally distributed between large and small farmers while testing the hypothesis of widening/narrowing of income disparities between the large and small farms and between the progressive and backward areas, he established that these benefits have been considerably greater in the progressive districts and the disparity between small and large farms is greater in the more backward areas.

1.2 Studies on Indian Agricultural Development: Dantwala\(^3\) with his incisive analytical insights and deeper understanding of the Indian agriculture, provides a balanced assessment of the strategy adopted since Independence and its consistency with the avowed objectives of the nation. He finds that "Agricultural strategy adopted by the policy

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makers was concerned more with growth of production and marketable surplus than with the equity aspect of development”.

On “Agrarian Structure and Agrarian Relations” Dantwala pleads for a more pragmatic approach to the problem. Analysing the NSS and Agricultural census data he concludes that since the available surplus (land) will be inadequate and its distribution cannot conceivably reduce inequality significantly, other ways and means should be explored for reducing inequality. The most sensible way is to make the meager assets (and skills) of the poor more productive. This would involve both positive and preventive action. The preventive action refers to plugging all openings through which the poor are exploited in security of tenure, moneylending, trade and bonded labour. But in the absence of alternatives available to the poor, such preventive action will not be very effective.

Giriappa et al4 analyse the value added in agriculture, the impact of new technology on agriculture and trends in crop pattern, area, production and field of principal crops, the pattern of distribution of land between 1970-71 and 1976-77. The study notes that agro-climate is a major factor in crop yield variation and modern inputs have had mixed impact on the latter. Among the crops, the value-added by sugarcane was one of the highest per hectare being Rs.4178 during 1962-65 and Rs.5142 during 1970-73, followed by tobacco, jute, rice, groundnut and wheat. The growth rate in foodgrains production which was estimated at 3 per cent per annum during 1950-52 to 1974-77 declined to 2.84 per cent during 1974-75 to 2002-03. Though the rate of growth in area has slowed down and production grew at more or

less constant rate, the rate of growth in yield has shown a decline from 1.9 to 1.74 per cent per annum in the second period. The study concludes that owing to limited extension of modern inputs the growth of Indian agriculture is constrained. It suggests the need for speedily evolving and diffusing an alternative system of development so as to break the productivity bottlenecks and to modernise the production process. Hanumantha Rao (1975)\(^1\) has discussed the emerging pattern of income distribution in the process of technological growth in India which is characterized by technological changes, such as the use of HYV of seeds, tractorization the study reveals that technological changes as such, has contributed to the widening of income disparities between (i) different regions, (ii) small and large farmers, and (iii) landowners on the one hand and tenants and agricultural labourers on the other. In absolute terms, however the grains from technological change have been shared by all sections. He suggests that the biggest prospect for increasing output and generating employment in the next two or three decades (with wider application of known technology such as HYV of seeds and fertilizers) for improving the distribution of income horizontally as well as vertically lies in the public investment in irrigation and the exploitation of ground water.

Bandhudas Sen\(^2\) sheds light on several aspects of countryside distribution of benefits from the new technology. According to Sen, since the irrigated land operated by small farms is greater than that of large farms, the share of the benefits flowing to the small farms should be distinctly greater than that of occurring to the large farms. He states that the expectation of a staggering increase in disparities and


of polarization seems to have been based mainly on the currently iniquitous distribution of land. There is no denying the fact that the operated land is unequally distributed. However, in relation to the question of sharing benefits from green revolution, it is not the distribution of operated land but the distribution of irrigated land that is relevant. Since the percentage of irrigated land operated by the medium sized farms is the largest, the share of benefits flowing to these farms is likely to be the greatest. The doubt, but it is likely to be skewed neither in favour of the large nor against the small but in favour of the medium sized farms. Sen comments that widespread adoption by small and medium sized farms is predominating, which is not so much to the scale neutrality of the High Yielding Varieties, but partly to the inherited pattern of distribution of irrigated land and partly to the government initiated mass action programme under which all irrigated land and all irrigated farms sought to be covered. Regarding international disparities he agrees with Peter Von Blacknenburg\(^{17}\) that there is no evidence of any significant increase in polarization and agrarian unrest that could be attributed to the Green Revolution.

Dharm Narain's\(^{18}\) path-breaking impact of price movements or areas under selected crops in India, 1900 – 2001, was published in 1965. He investigates the empirical evidence for the 'perverse responses' of Indian farmers to economic stimuli and demolished widely held beliefs about the irrationality of the Indian farmer. In his later work he focussed on the response of marketed surpluses in agriculture to change in relative price, and to the related question of using the terms of trade between agricultural and non-agricultural


products as an instrument of resource mobilization from agriculture. The first evidence of this was a theoretical paper published in 1957 (Chapter 3), followed a few years later by a careful empirical investigation into the distribution of marketed surpluses (Chapter 3), his later papers (Chapter 5 - 6) draw on the empirical findings of this study.

In the 1970s Dharm Narain's attention turned to the study of agricultural growth and productivity. His analysis of the constraints faced by efforts to expand the production of rice (Chapter 7) is highly relevant even today. Chapters 8 to 10 focus on the response within Indian agriculture to advances in seed-cum-fertilizer technology.

In the last essay (Chapter III), he considered distributional factors on one investigation of growth, and stressed the need for encouraging labour intensive technique as well as the importance of improved access to resources by small and marginal farmers.

Hanumantha Rao19 explains the overall growth performance in the agricultural sector. The ratio of growth of foodgrains output as a whole has been around 2-7 per cent per annum since the beginning of planning in India and there is no evidence of an acceleration or deceleration in this growth rate between the pre and post Green Revolution periods.

The biochemical technology was introduced in India in the mid-1960s for stepping up the crop output growth rates. However, analyses of pre and post 1965 production data, popularly known as the pre and

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the post Green Revolution periods reveals that except for wheat, growth rates could not be maintained despite the adoption of biochemical technology. In some cases growth rates were considerably lower when compared to the pre green revolution period. This position is maintained even when the growth rates are estimated after adjusting for the impact of year to year variations in rain fall on output.

The impact of biochemical technology on wheat production is clearly established. Wheat Output growth rate has increased from around 4 per cent per annum in the pre Green Revolution period to over 5.5. per cent per annum in the post Green Revolution period. However, growth rate of rice production, which was over 3.3 per cent per annum during the pre 1965 period has declined significantly to 2.4 per cent. For coarse cereals, the decline in the growth rate was more dramatic. Its output growth rate has fallen by around 60 per cent. Pulses too have recorded a sharp decline, their pre 1965 output growth rate has been halved. In spite of these sharp declines, foodgrains output as a whole has maintained a growth rate well above 2.6 per cent in both the periods due to two compensating factors viz., a significant step up in wheat production growth rate, and in addition to wheat, an increasing contribution of other rabi food crops in total foodgrains production. The share of rabi food crops in total foodgrains production has steadily increased from around 34 per cent in 1965 to over 40 per cent in 1985. Even then, foodgrains production growth rate in post Green Revolution period has not shown any increase over the rate recorded in the previous period. Moreover, in the case of crops like oil seeds, which have not experienced any significant technological breakthrough, output growth (all crops) after the introduction of biochemical technology has failed to maintain its pre 1965 level, it has fallen from over 3.0 to around 2.6 per cent.
The characteristics of the growth performance during the two periods, however, differ in two important ways. First, pre-1965 production base levels for measuring growth were substantially lower than the post-1965 period. Secondly, while area expansion contributed significantly to the pre-1965 agricultural growth, the post-1965 output growth rates were realised primarily through gains in productivity.

Whereas there is no evidence of a significant change in the All India Growth Rate of Foodgrains output between the two periods, there is a marked change in growth rates experienced by different States over this period. For example, Andhra Pradesh, Madhya Pradesh, Maharashtra and Rajasthan experienced an acceleration in growth rate between the two periods, whether we consider the adjusted or unadjusted growth rates. Similarly a large number of States experienced a sharp deceleration in their growth rates. Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Punjab and West Bengal provide examples of such deceleration in growth rates. Thus unevenness in performance over a period of time for individual states seems to be a striking as unevenness in performance over a period. During 1970s and 1980s growth rates ranged from negative in the case of Kerala and Tamil Nadu to as high as around 6 per cent for Maharashtra and Punjab.

A large number of States e.g., Assam, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Orissa, Punjab and Uttar Pradesh experienced above average growth rates during 1960s. But the number of States experiencing above average growth rates came down drastically during seventies and eighties indicating regional concentration of output growth. Only 3 States
among them viz., Haryana, Punjab and Uttar Pradesh continued to experience above average growth rates in latter period, while the remaining seven states slid down to below average growth rates. Gujarat also continued to experience above average growth rate if unadjusted growth rate is considered. Maharashtra and Andhra Pradesh experience a jump from very low rates of growth in 1960s to above average rates of growth of around 6 per cent respectively during 1970s and 2002s.

Alagh highlights the long-term growth of output in agricultural sector$^{20}$ for the period of 1978 – 79 to 1984 – 85 and 2002-03.

There is no evidence to suggest that Indian agricultural growth is stagnating. In fact, the agricultural economy shows considerable inherent strength, but it needs continued support in its new phase of development. Since the earlier sources of growth in irrigated wheat and prime paddy lands have been covered already by new technologies more widespread growth is now a pressing requirement. Land is becoming a more intensive constraint in the India economy than perceived hitherto. Irrigation is playing the output and productivity role targeted for it but it is not playing the role it was expected to play to the extent targeted in releasing the land constraint by increasing cropping intensity. Land and water management policies will have to be the central focus of the planning strategies now. A number of interesting experiments in water shed development need quick replication. Marketing, commercial information infrastructure and modern agroprocessing techniques will have to be integrated into

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agricultural planning to maximise the income generating capacity of Indian agriculture.

M.V. George21 (1966) opines that technology that holds the key to the development of Indian agriculture and the introduction of which present innumerable problems. The analysis made on the basis of the data collected indicates that agricultural extension agencies are more effective at the awareness stage of adoption while the informal contacts of source at the later stages. He suggests that different methods of communication should be used in order to maximise the intensity of information among cultivators.

N.S. Shetty22 (1968) analyses the stages of adoption as a further step. According to him, the lag between awareness and the actual adoption would be explained by the amount of liquid resources, the age of the farmer and the level of the education. In regard to fertilizer and the Japanese method of cultivation, it was explained, besides education by tenancy and total value of assets. Shetty studied the problems of adoption of new techniques from several angles. His study included analysis of the characters of the innovator early adopters and laggards. He also studied the progressiveness as defined by the number of new techniques adopted and its relationship with the economic and social factors. He found that in the case of farmers, small or big, extension contact and availability of irrigation were two important factors but size of holding tenancy total value of assets, age or level of education did not have significant relationship with the degree of progressiveness. The same analysis carried out for owner


and tenants showed extension contact and size of holding to be important in both the cases, but in the case of tenants irrigation was an additional influencing factor.

V.S. Vyas et al.\(^3\) examines the problems of small farmers in greater depth in the context of the 'Green Revolution'. They investigated the problems of overcoming the non-availability of the unit of cultivation commanded by small farmers by exploiting the potentialities created by the new technology. Accepting Rs. 2250/- as the requirement of family of five members, they came to the conclusion that the production function as a result of the adoption of new technique would shift to the right to make a substantial number of small farmers units of cultivation viable. However, to help this process it would be necessary to make available to them the production requisites and finance.

David Hopper\(^4\) calculates growth rates, both linear and computed, for the fifteen year period ending with 64-65 for the fifteen year period ending with 64-65 for the country as a while. This study includes first three five-year plans excluding the final year of the Third Plan. The compound growth rate for the shorter period of 51-56, 56-61 and 61-65 of the study reveals the fact that the growth rate in food production had actually been declining in the latter years of the period, since 50-51. The production of all crops also shows the same trend. However, in contrast, there was an accelerating contribution from productivities over the succeeding periods.


Rath\textsuperscript{25} examines the performance of agricultural production in India for a period of two and half decades i.e., from 55 to 78. He opined that his study will help to know the underlying factors responsible for such performance, and might permit broad judgement about the overall performance possibilities in the near future. The exponential trends are worked out for the index numbers (with ending 69-70 as the base) of overall yield and output of major crops in India for the period 49-50 to 77-78. Attention was paid to infer growth rates in detail for the period 55-56 to 77-78 excluding the years 49-50 to 54-55. The entire period of 23 years from 55-56 to 77-78 has been divided into two from 55-56 to 64-65, and from 64-65 to 77-78 and treated the former and latter periods as pre and post Green Revolution periods respectively. According to him, the total agricultural production of India grew at an average rate of 2.48 per cent per annum during 55-56 to 77-78, if only peak years are considered, it is 2.59 per cent. The rate of growth was 2.95 per cent during the ten years ending with 64-65 against 2.42 per cent of the period 64-65 to 77-78 (after dropping a few abnormal years).

Saini\textsuperscript{26} in his study based on farm management studies finds that after the setting in of the Green Revolution, the income gap between the small and large farms has widened. The emergence of capital intensive technology in Saini's view seems to have shifted the production possibility frontier hitherto enjoyed by small farmers, in favour of the big farmers. This he attributes to the unlimited and


relatively easy access to capital on the part of large farmers who also can make more rational use of it due to the favourable farm size. Again, the greater risk bearing capacity of the big farmers puts them in a more advantageous position to exploit the new opportunities. He concludes that compared with small farmers, the big farmers stand to gain more from new technology consequently the inequalities among farm families in terms of farm incomes are bound to grow under the impact of the Green Revolution.

1.3 Area Specific Studies: Sharma (1973) reports that the pattern of savings and investments in the Punjab. Irrigation structure formed the major investments in small holdings during the period 1966-67 to 1969-70 because they give high priority for increasing the intensity of cropping and better water management to increase the output. On the medium holding, the emphasis shifted to the purchase and improvement of lands, and on large proportion of farm investment. It was pointed out that in other areas also, the first preference of the farmers was to reinvest the additional income in agriculture for production purposes. The second preference was for education. The third preference was for repairs to buildings. The fourth preference was investment for financial assets. The bank deposits were given a very low priority by the farmers.

K.Desai and D.A.Patel (1968) examine the procedure through which future demand can be estimated quickly and precisely. This research suggests that a quick survey of a sample of village level

workers and individual farmers to ascertain the demand for improved seeds for the coming season would give a fairly reliable estimate of the demand of the region. An equally important observation made by them was that the price elasticity of demand for improved seeds was fairly high, particularly in the case of late adopters.

Kathuria and Rao examine growth rates of some important oil seeds in India at the state level for the period 60-79. They compare the performance of the whole period 60-79. They compare the performance of the whole period under review, 60-61 to 78-79 with the performance of the Green Revolution period 67-68 to 78-79. This study concludes that the main reason for low productivity of oil seeds was the instability in production resulting from this entire dependence on rainfall.

Parthasarathi examines the trends in the Agrarian Economy of Andhra Pradesh and shows that despite the declining contribution of agriculture and altered sectors to the state income, the agrarian sector continues to be dominant. There has been hardly any decline in the dependence on agriculture in percentage terms. In absolute terms, in the two decades between 1961 and 2001, agriculture has to support an addition of 57 lakh workers. With a declining share of agriculture in the total state income together with a constant share in the total population, per capita income from agriculture tended to show a decline relative to per capita income in the non-agricultural sector. The ratio of per capita income in the agricultural sector to the corresponding income in the non-agricultural sector at constant prices

in 1970-71 showed a continuous decline over the decade from 0.76 in 1960-61 to 0.42. A comparison of the ratios at constant and current prices shows that the relative decline of the per capita incomes within the agricultural sector is more due to growing dependence on agriculture in the context of poor rates of growth rather than due to deterioration in terms of agriculture. What is disturbing is that in absolute terms per capita income from agriculture shows a decline in 1980-81 as compared to 1960-61 at 1970-71 prices. Even taking the best year in the early 1980s, i.e., 2000-01 per capita income within the agrarian sector showed hardly an increase of six per cent as compared to 1960-61. It is against such a background that issues of growth, stability and equity in the agrarian sector will be the dominant concerns of research and policy for years to come.

Ramana et al.\(^{31}\) analyse two factors influencing the levels of yields of different crops and show that differences in yields among the villages in Zone I and Zone II. Thus the analysis underlines the importance of the strong infrastructural support for the spread of HYV’s and adoption of the dry farming techniques in agriculture.

Popularisation and dissemination of knowledge about water management techniques which are area specific and culture specific is urgently needed. Many of the farmers have expressed agencies is inadequate and unsatisfactory, Government has to take up effective steps in this regard both qualitatively and quantitatively.

There is an urgent need of tapping ground water resources by the Government and making it a responsibility of the Government to

provide water to fields just like municipalities are made responsible for providing water facilities to the urban population and urban enterprises. Government has to sponsor agro-based industries and make the enterprises relating to dairy, piggery, poultry as economically viable for the farm households.

The institutional aspects of the study viz., credit that suggests the need for orienting rural institutions to the specific requirements of small, marginal farmers even in situations where technical and environmental condition favour the adoption of new techniques of agricultural production to improve the yield levels. The role of Grameena Bank (Rural) is commended by the cultivators.

The requirements of growth with equity demand orientation of institutional credit agencies to the needs of small and marginal farmers to make the potential linkages between agricultural growth and non-agricultural growth more effective through policies promoting overall rural development.

Epstein's is a pioneering undertaking employing an interdisciplinary approach to investigate the relationship between economic development and social change in an agrarian economy. She had chosen a wet village, Wangala, and a dry village Delena, in the vicinity of Mandhya town of Mysore (now Karnataka). The development in Wangala, started with the advent of canal water from Krishna Raja Sagar Project and Sugar and Paddy became the principal crops. Due to assured irrigation, intensity of cultivation increased leading to more employment and income generation in agriculture itself. The social

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roles and relations were strengthened. She concludes that unilinear development leads to commenting of traditional social relations.

However, in the case of Delena, the process of development was more diversified. Young men of Delena found non-farm employment in the Mandhya town due to the establishment of sugar factory. Women also began selling vegetables and fruits at Mandhya (now-a-days described as urban informal sector activity for women). Thus, diversified pattern of development had led to social roles and relations being altered. Hence, it is nor the development as such that initiates social changes but the nature and type of economic development as revealed by Epstein study.

The study by Bliss and Stern is an ambitious and systematic attempt to put to test theories of under development and of the motives and behaviour of poor farmers in the village of Palanpur, situated in Moradabad district in U.P. As well as reporting on this village, its population and institutions, the authors include a review of the development models on which they have drawn, modifying them where appropriate. They arrange their discussion around the various 'markets' for inputs, using that term in broad sense to encompass whatever arrangements predominants for the allocation of land, labour, bullocks, water and capital. They discuss tenancy, the explanation of the area land leased in or leased out by a household the inefficiency of share-cropping and now and to what extent it is overcome in Palanpur. They investigate the relation between farm size and output, specifying the production function for the farm in different ways, and relate the

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ownership of various assets by a household, including its labour power, to its income. The distribution of income is estimated.

Before presenting their own results the authors provide a thorough survey of the technical and economic properties. From a cross section study of wheat plots, supported by interview with the cultivators, they are able to throw some light on how farmers arrive at decisions concerning their inputs.

Finally, the implications of the research findings for development theory, for policy and for the future of Palanpur are discussed.

Mahender Reddy analyzes district-wise and region-wise growth rates of area, yield and output of foodgrains and one commercial crop namely, groundnut in Andhra Pradesh. The main objective is to see whether the growth rate during post Green Revolution period 65-81 is significantly different from the pre Green Revolution period 56-64.

Secondly, the study estimated whether the extent of fluctuations had increased or decreased after Green Revolution in Andhra Pradesh and in its three regions.

Thirdly, the study also attempts to find out whether there has been any reduction in the yield since the formation of the state. According to his study food production has increased from an average annual output of 6.35 million tonnes during 56-61 to 9.32 million tonnes during five year period covering 76-81. During this period the share of Andhra Pradesh in All India Production of Foodgrains has

declined from 8.58 per cent to 7.65 per cent. Growth of output of foodgrains and total agricultural output in Andhra Pradesh was not commensurate with the growth of inputs. Fertilizer consumption in Andhra Pradesh is near the top in All India fertilizer consumption accounting for about twelve per cent of All India fertilizer consumption. The wells energized, power consumption tractors and credit disbursed have also increased more than ten fold during the quarter century.

The volume35 points out that agricultural development of a region depends largely on the maximum utilisation of its land and water resources. Coastal Andhra Region lacks adequate irrigation sources. The rainfall is mostly undulating and the rainwater is easily lost through runoff. These facts are mainly responsible for the frequent failure of crops and recurring famines. Therefore, it was felt that the main emphasis for development of agriculture in this region, should be on soil and water conservation programme besides adopting such dry farming practices as would enable the maximum utilisation of moisture in the soil for crop production. Whenever irrigation facilities exist emphasis should be on the optimum utilisation of irrigation water by raising varieties of crops that would require the maximum water and give the maximum return. It was also felt that the land resources should be utilised to the best advantage by encouraging farm forestry and pastures whenever annual crops cannot be profitably grown.

Though these studies investigate some aspects of growth and development of agriculture in Coastal Andhra region they are not comprehensive in their approach. Either one aspect or the other was left out by almost all the investigators. As such a complete picture of

growth and development of agriculture is not available. Against this background an attempt is made in the present inquiry to investigate the trends in the area, production and productivity of major crops grown in Nellore district of Coastal Andhra in Andhra Pradesh.

1.4 Objectives: The specific objectives are:

1. To analyse the agricultural development in terms of area, production and productivity in the district as well as in India.
2. To examine the nature and character of agricultural development in a canal irrigated village and a non-canal irrigated village.
3. To describe the factors influencing agricultural production and distribution of agricultural production among different categories of farmers in sample villages.
4. To ascertain the supply and cost of credit to different size groups of farmers in sample villages.

1.5 Hypotheses:

1. There is no significant difference in the rate of growth of foodgrains production before and after the Green Revolution.
2. Agricultural development of canal irrigated village is not significantly different from that of the non-canal irrigated village.
3. There is no significant variation in agricultural productivity among different categories of farmers and villages.
4. There is no significant difference in the supply of credit, cost of credit and overdues between categories of farmers and villages.
1.6 Sample Design: Nellore district is in the Coastal Andhra Region of Andhra Pradesh. The rural economy of Nellore district like that of the country is characterized by regional disparities. Canal irrigated segment of the district, mostly Western part, is supposed to be prosperous and advance. The remaining segment of the district i.e., non-canal irrigated part is backward though there are a few prosperous villages. Therefore, with a view to presenting a realistic picture of the agriculture development a village from the canal irrigated area Kotapolur and another village from the non-canal irrigated area Mannarpolur have been purposively chosen. The district itself is purposively selected because of considerations of familiarity and convenience.

Considering the varied characteristics of different villages of the district under investigation and the availability of statistical data, the method of purposive selection can give more precise and accurate result than the method of random supplying. Therefore, the villages were deliberately selected, utmost caution being exercised in the selection. An intensive travel across the villages of the district was undertaken before the villages were purposively selected. The study is planned to cover agricultural households excluding agricultural labour and non-agricultural households. Agricultural households are classified into five categories:

1. Marginal farmers (0 – 1 Hectares)
2. Small farmers (1 – 2 Hectares)
3. Semi – medium farmers (2 – 4 Hectares)
4. Medium farmers (4 – 10 Hectares)
5. Large farmers (10 Hectares and above)
In the second stage stratified random sampling was employed for the selection of the final statistical units. The sample was restricted to 10 per cent from each strata of the agricultural households. The number arrived through this process was 128 for both the villages.

1.7 Data Base: As the present study requires both primary and secondary data for evaluating the objectives envisaged in the study, the required primary data on asset structure, cropping pattern, production, sales were collected for the agricultural year 2002 – 03 directly from the selected farmers through personal interviews supported by a pre-tested schedule.

Secondary data were collected from the published reports of the Central and State Government, District Planning Office, and the Syndicate bank, which is the lead bank of the district. Visits to the district and Mandal level offices enabled us to fill the gaps in the time series data relating to the district and villages.

1.8 Tools and Techniques of Analysis: Data drawn from different sources were statistically treated and analysed. Measures of variation, correlation, regression, time-series analysis, and test of significance are calculated and observed. ANOVA and the like were employed besides elementary descriptive statistics. Cobb-Douglas production function, linear and compound growth rates are also computed. Charts and diagrams are used to illustrate the data.

1.9 Scope and Limitations: The present study is essentially based on primary data relating to the agricultural year 2002-03. Nellore district is situated in the Coastal Andhra and for non-canal villages; there is a standing threat of crop failure due to drought. Since the study is
confined to a single year, it may not appear to be typical. In agricultural economic analysis, a single year is also considered to be inadequate due to fluctuations in monsoons and therefore, agricultural conditions. The researcher has been constrained by time and money and being unfunded by any agency he had to meet the entire cost and therefore had to restrict his field data to a period of one year only. Agricultural economic analysis is too sophisticated that advanced econometric and statistical techniques are widely employed. In the present undertaking only a few of such techniques are employed. The conclusions arrived and the inferences drawn are location specific and cannot be generalized.

1.10 Chapter Scheme: A Selective review of literature and methodology are given in the present chapter. Some empirical studies on the subject were reviewed to provide the necessary background. A brief outline of the objectives, hypotheses, sample design, data base, scope and limitations and organisation of the study are outlined in it. The second chapter analyses the agricultural development in India before Green Revolution and after Green Revolution and also presents the impact of new agricultural strategy on total foodgrains production. Recent trends in the agricultural economy in terms of area, production and yield of principal crops in Nellore district are presented in the third chapter. The fourth chapter is devoted to a description of canal and non-canal irrigated villages, farm size and efficiency in terms of input use and output. The access to credit, cost of credit and overdues by size groups of farmers are examined in the sixth chapter. The last chapter incorporates the main findings and conclusions of the present study.