Chapter-VIII

Summary and Conclusions

This study has focused principally on the trends in agricultural productivity and the impact of such productivity on the economy and employment in West Bengal for a distinctly defined period of time. The exercises undertaken in earlier Chapters of the thesis have validated the hypotheses initially framed in this study, albeit with certain modifications. The study has addressed the colonial tenancy systems as it evolved in different phases and the impact of such systems on the agrarian relations and agricultural productivity in Bengal. Coming to the post-colonial era, an attempt has been made to assess the rate of growth of agricultural production and productivity amidst changes in decadewise crop-mix especially from 1960-61 to 2007-08 in India in general and the states in particular under the aegis of land reform, the Green Revolution and economic reforms. The study has assessed primarily the impact of such changes on the growth rate in agricultural production, production area, productivity of foodgrains and non-foodgrains in West Bengal and her districts during a defined period viz. 1970-71 to 2008-09. Such assessment analysis has shown that West Bengal and her districts have experienced changes in crop-mix, crop diversification, and significant change in farm size due to land reforms followed by operation *barga*, introduction of Green Revolution technology, liberal economic reforms and such other economic and non-economic inputs. The study has attempted to present here, in the form of findings, the corresponding impact on agricultural employment, and the economy.

To adumbrate, the study has shown how colonial Bengal experienced infeudation and sub-infeudation in the agrarian sector causing hindrances to the ushering in of desired agricultural production and productivity. By bringing reforms in institutional, techno-biological and economic fields the postcolonial Indian state has shown the ability of enhancing both agricultural production and productivity and reducing disparity in regional growth rate in agricultural production and productivity. With respect to agrarian growth, West Bengal has done exceptionally well especially after 1970s. Agrarian growth, both in terms of production and productivity in West Bengal, has been consistent since the late 1970s, after a very long period of stagnation in the preceding period. It has been established in the study that crop diversification has increased over time both in the districts and West Bengal in general. Much of this growth was on account of factor productivity growth. Productivity growth in non-foodgrains has also increased over the period. Multicropping has not only generated higher

agrarian output, beneficial to the consumers as well as to the producers, but also induced higher and more sustained worker participation throughout the year. It has also been established that the growth of foodgrain productivity has helped the growth of income, employment and non-farm sector of the economy over time across the districts of West Bengal. A summary of the findings of the different sections of the study along with observations are presented herein.

At the outset, one of the basic tenets of the present study has been that the possible inverse relationship between farm size and productivity provided a logical basis and favoured a redistribution of lands to landless to bring in improvement in production and productivity in India and her states in the post-independence period. Further, providing access to land for a large number of landless agricultural workers, marginal farmers, and tenants either through redistribution or through a secured tenancy contract has proved to be effective in increasing the agricultural productivity. It has been identified that since 1991 the basis of the input supply system faced by the farmers has changed altogether. Most of the inputs were to be procured from market as market determines the prices. The poor tenants, small and marginal farmers do face difficulties not only in procuring the complementary inputs at affordable prices but also realizing the optimum value for the output produced. In the case of West Bengal, it has been found that studies measuring long term growth pattern of agricultural production and productivity, disaggregated at district level and long term changes in crop-mix have been insufficient and non-comprehensive. Sub-period growth in accordance with major institutional and policy changes has seldom received attention. Most of the trend analysis on agricultural production and productivity in West Bengal did not move beyond state level aggregated data with implicit assumptions that the turn-around has been caused by introduction of land reforms, operation *barga* and introduction of grass root level governance through *panachayati raj*. The present study has shown the simultaneous impact of institutional reforms, Green Revolution technologies and economic reforms on farm production and productivity both at the state and the districts.

Growth estimation along with estimation of sub-period growth rates, nature and direction of long term acceleration or deceleration of growth, extent of stability and instability in growth have been shown in the study. To ascertain the magnitude of the impact of decline in growth rate in foodgrain production and productivity in West Bengal, district-wise acceleration and deceleration of crop wise growth, district-wise status of instability and stability over a long time frame, estimation of sub-period growth in production, area and productivity in tune with

major institutional and policy changes have been attempted. The study also shows the fact that crop diversification does have a significant impact on agricultural production and productivity. The study argues for various economic and non-economic factors that influence growth in production and productivity of agriculture at the level of the districts. Precisely, factors namely, agro-climatic conditions including rainfall, institutional reforms especially operation *barga* and *panchayat*, Green Revolution technology (use of high-yielding varieties, irrigation, fertiliser etc.,), size of holdings, land distribution pattern, rural infrastructure, credit and cooperatives, population density, area under non agricultural use, wage and many more are seen to have considerable impact on agricultural productivity. Using econometric models and by standard pooled regression measurement of the impact of various economic, non-economic variables and changes in agricultural policies on foodgrain productivity in post land reform period in West Bengal and impact of changes in productivity on employment and economy has been shown.

From the theoretical analysis, as attempted in the initial Chapters of the study, it can well be observed that India's agricultural development effort has been widely discussed, debated and commonly lamented. The perspective of agricultural economic history suggests that the efforts to raise production and productivity are not a post-independence phenomenon. The Permanent Settlement Regulations of 1793 had left the cultivating *raiyats* entirely at the mercy of landlords. There were sub-infeudation, eviction, and re-settlement with the *raiyats* on payment of fresh premium or rent at enhanced rate. The need for new legislations to improve on the situation was widely felt. This led to the passing of the Rent Act of 1859. The Act sought to provide certain safeguards to some classes of cultivating tenants with regard to tenancy relations; however, the beneficial effect was usurped by the landlords. The inherent defects of the Rent Act gradually surfaced and it was replaced by The Bengal Tenancy Act of 1885. This Act was followed by a host of other Acts legislated in the subsequent period. All these Acts provided, *inter alia*, certain concessions like conferment of occupancy rights and protection against eviction in favour of certain classes of tenants. Despite all these measures, the Indian rural society continued to remain afflicted with low capacity of agricultural production and productivity. Precisely, agriculture-related reform measures in India during the British rule were prompted not by any serious consideration for improving production and productivity.

Considering the situation in colonial Bengal, it has been observed that despite bringing repeated amendments to Bengal Tenancy Act between 1928 -1940 to secure the rights of the

raiyats, not much benefit accrued to them. However, the Act resulted in broadening the ambit of the tenancy stratum. The wide range of intermediary hierarchy was engaged in making profits. Unfortunately however, agriculture, which sustained the system, was nobody's concern. The half-hearted administrative efforts were found to be inadequate to relieve the *raiyats* of their distress. The Government of Bengal appointed Floud Commission in 1939 to look into the matters of tenancy reform. The recommendations of the Commission could not be implemented due to partition. Thus, agriculture-related reform measures in colonial Bengal failed to bring about any perceptible change in Bengal's agrarian scenario, characterized by a skewed land holding pattern, exploitative land relations, a persecuted peasantry and languishing production and productivity.

Thus it was pertinent to the broad policy interventions undertaken in post-Independence period in India, the production and productivity of foodgrain and non-foodgrains that could neither move linearly nor uniformly over time. At the policy level till the 1960s, India remained preoccupied in attempting to bring institutional changes in the agrarian sector. It remained as an unfinished task for most of the states in India. During the fifties and sixties, the growth of foodgrain and non-foodgrains remained low and growth was primarily driven by growth in area. However, growth of non-foodgrains remained relatively higher than foodgrains. Sluggish spread of irrigation and increasing thrust on industrial expansion were the major causes of slow growth in agriculture. In the early-sixties, India encountered the problem of food scarcity and the scope to increase production through area expansion also reached the saturation point. This forced the country to introduce Green Revolution technology for wheat and rice. The period between 1967-68 and 1979-80 is identified as the early Green Revolution period. The agricultural growth scenario during this period remained less impressive in comparison to pre-Green Revolution period. Growth in area, production and productivity for rice, pulses, oilseeds and foodgrain remained lower than pre-Green Revolution period. A major turn-around in growth in production and productivity was observed for wheat during this period. This success remained confined to Punjab, Haryana and western Uttar Pradesh. However, stagnation in growth of other crops and slow growth in rest of the states failed to boost the overall growth in production and productivity. Unlike the rest of India, the North-West region consisting of Punjab, Haryana, and Uttar Pradesh was well endowed with irrigation facilities and that helped the Green Revolution technology to spread during the early Green Revolution period of the sixties.

Between the eighties and nineties, the growth in production in both foodgrains and non-foodgrains increased. It was primarily driven by growth of yield. Wider dissemination of Green Revolution technology boosted the growth of yield. Turn-around in growth of rice production in Eastern region, especially in West Bengal and rise in oilseed production in Central India helped the country in achieving the highest ever growth rates of foodgrain and non-foodgrain production. Price support, credit support, input subsidy support and marketing support contributed positively towards achieving higher growth in production and productivity in several foodgrains and non-foodgrains. Increase in crop-diversification and cropping intensity also helped to increase agricultural output. The period between 1990-91 and 1999-2000 or the first ten years of economic reforms shows a sharp decline in the growth in production, yield and area for most of the crops. The states of North-West India are considered to be the foodgrain basket of India and Uttar Pradesh contributes highest amount of foodgrains. However, since, 1991, this region has experienced deceleration in growth of foodgrain productivity. This scenario made the country fragile in managing self-sufficiency in foodgrain production. Sustenance of the success of Green Revolution technology has also seriously been challenged. Growth scenario of foodgrain production and productivity however, improved between 2000-2001 and 2008-09.

The Eastern region which experienced a turn-around in growth in production and productivity of foodgrain and rice in the eighties has substantially propelled the growth in production and productivity of foodgrain at the national level. In particular, rice failed to maintain the same from 2000-01 to 2008-09. However, increase in crop diversification or for that matter, moving towards high-value crop may be an option for farmers in a situation where production and productivity of foodgrains are falling. A change in crop-mix is gradually taking place. Onion occupied considerable area in many states of North-West, Central and Southern region of India. Potato and mustard and rapeseeds in West Bengal, coconut in Tamil Nadu have achieved considerable growth in area under cultivation.

Fall in growth in production and productivity implicitly and explicitly affected agrarian community across the states of India. The increasing threat of loss of food security, rise in incidences of rural poverty and indebtedness, increase in gap of income between the farm and non-farm sector, fall in per-capita agricultural income and rise in agricultural labourers and marginal workers have been identified as the natural outcomes of slump in foodgrain production and productivity both at the national and regional level.

The statistical findings lead us to certain inferences:

(a) Rice is the catalyst to augment or diminish the growth in production of foodgrains in West Bengal. During the 1970s, growth in production, productivity and area under cultivation of aman and boro grew at abysmally low rates, while aus achieved negative growth in production, area under cultivation and productivity. As a cumulative impact, the growth rate for rice remained low during the 1970s resulting in low rate of growth in foodgrain production causing stagnation in agriculture in West Bengal;

(b) From the 1980s, a break in the trend was observed in foodgrain production in West Bengal alleviating the long spell of agricultural stagnation. This turn around was caused by the spectacular rise in growth in production of aman, aus and boro. Importantly, in the post-1980s, growth in production of aman and aus was primarily driven by the growth in productivity while growth in production of boro was achieved through growth of cultivable area. Notwithstanding the fact that boro is a high productivity crop and its absolute productivity is much higher than aman and aus, the growth in productivity remained negative during the decade of 1980s;

(c) During the 1990s and in the post 1990s, aman experienced decline in growth in production and productivity; for aus a decline in growth in production and productivity and area was observed, and in the case of boro, though a very high growth rate in production was maintained, a sharp decline in growth in area was also observed. Moreover, growth in productivity for boro remained low. As a result the spurt in growth in production and productivity of rice and foodgrain observed during 1980s could not be sustained in the decade of 1990s and in subsequent years;

(d) As the decline in growth becomes discernible, the pace of change in growth rate enables us to judge the long term impact on agrarian scenario in West Bengal and her districts. It has been found that districts of Birbhum, Midnapore, Hoogly, Murshidabad, West Dinajpur, Jalpaiguri, Cooch Behar and Purulia have experienced acceleration of growth of foodgrains, while the rest of the districts such as Burdwan, Bankura, Howrah, 24 Parganas, Nadia, Malda and Darjeeling, experienced deceleration in growth rates over time;

(e) Despite the acceleration of growth in production for the districts of Birbhum, Hoogly, West Dinajpur, Jalpaiguri, Cooch Behar and Purulia, the worrying factor has been that the major rice producing districts of Burdwan, Bankura and Midnapore, Murshidabad and 24 Parganas have been faced deceleration in growth of foodgrain production;

(f) West Bengal, in general, has shown acceleration in growth in production from 1970-71 to 2008-09. It thus may be argued that though the growth rates have fallen over time, it does not necessarily mean that there is deceleration of growth in the strictest sense. In order to arrive at such results, coefficients of time (t) as well as time square (t^2) both have to be negative, which is not the case for foodgrain, and rice in particular;

(g) The impact of rainfall on growth in production is significant only for the districts of Darjeeling, 24 Parganas and Midnapore. The rest of the districts as well as the state seem to be insulated from the vagaries of rainfall;

(h) Coming to the issue of long term stability or instability in foodgrain and rice production in the state and the districts, it has been identified that instability of foodgrain and rice production from 1970-71 to 2008-09 has declined for Burdwan, Birbhum, Bankura, Midnapore, Hoogly, 24 Parganas, Nadia, West Dinajpur, Darjeeling, Cooch Behar, Purulia, Howrah, Jalpaiguri and for the whole state as well. Only in the district of Malda, instability has increased over time;

(i) In the matter of non-foodgrains, it has been found that the area under major non-foodgrains in West Bengal has almost doubled and reached close to 20 percent of total cropped area in last thirty eight years. Consequently, non-foodgrains have gained ground among the farmers of West Bengal.

(j) Among the various non-foodgrains grown in West Bengal, majority of the area under cultivation has been used for jute, oilseeds, rapeseeds and mustard and potato. With the passage of time, jute started losing its relevance and especially from 1985-86, the area under jute cultivation has consistently fallen. A similar trend has also been observed for sugarcane. Potato has proved to be more attractive option for the farmers in West Bengal and area under potato cultivation increased considerably in the period 1970-71 to 2008-09. Area under rapeseed and mustard cultivation – despite fluctuations in some years – has registered an increase over time. Though the area under linseed cultivation declined steadily, the area under other oilseeds consistently increased and added to the total area under oilseed cultivation. Potato has also registered an impressive growth in production; however, this growth became more pronounced during the 1990s. The growth in productivity for potato though remained low, the growth in production of potato was primarily driven by the growth in area under potato cultivation in West Bengal;

(k) Jute, one of the major cash crops of West Bengal grew at a modest rate of above 3 percent per annum the period 1970-71 to 2008-09, but it remained the highest in the decade of 1970s and was primarily driven by growth in productivity, however, it became susceptible to fluctuation and failed to attain the growth rate in 1970s in the subsequent years as per the data. It is seen that the growth of sugarcane production continued to remain bleak in West Bengal. Conversely, rapeseed and mustard have shown spectacular growth in production and a massive increase was achieved during the decade of eighties and growth in productivity together with increase in area under cultivation, the latter having played a dominant role in this. Linseed and other oilseeds also grew at an impressive rate during the period 1970-71 to 2008-09 and the highest growth rate in production was experienced during the decade of 1970s, but it started declining thereafter. Especially after 1980s, growth in productivity became so strong that the influence of increase of area under cultivation was dissipated for linseed and other oilseeds. However, the statistical results have established that during the period i.e., 1970-71 to 2008-09, potato, jute, mustard and rapeseed experienced deceleration of growth in production, area and yield while sugarcane experienced acceleration. On the issue of stability vis-à-vis instability of production it has been found that production instability has increased over time for potato, sugarcane and linseeds and other oilseeds while for jute, rapeseeds and mustard, instability has registered a decline.

The aforementioned observations need further elaboration and corroboration with the findings of the study which have been presented herein.

The study identifies that in West Bengal, since the seventies, more than half of the total foodgrain production has come from Burdwan, Midnapore, Birbhum, 24 Parganas and Murshidabad. Except in Nadia, Murshidabad, Malda and Jalpaiguri, foodgrain production is completely dominated by rice and predominance of rice has increased over time. An important aspect that emerges out of this research is that Birbhum, Bankura and West Midnapore, though falling under Red Lateritic sub-region contribute more to rice production of the state in comparison to the more fertile strips of Nadia and Hoogly which fall under new the alluvial zone of lower Gangetic region. In terms of yield of rice, Birbhum, Midnapore and Bankura either maintained higher or same level of yield compared to Hoogly and Nadia. The yield of foodgrain and rice has substantially improved for most of the districts since the eighties, and this upward movement has been maintained till date. In the seventies, Burdwan, Hoogly and Birbhum were the only districts which achieved yield level between 1500-2000 kg/ha, rest of the districts were had productivity of 1000-1500 kg/ha. For Malda and 24

Parganas the yield of foodgrain was even less than 1000kg/ha. However, in 2008-09, Birbhum, Hoogly, Burdwan, Murshidabad, Bankura, Nadia, West Dinajpur and Malda, yield rate of foodgrains crossed 2500kg/ha, which is indeed a success story. Trends in production and productivity of foodgrain and rice calculated during the period 1970-71 to 2008-09 and for four sub-periods did not deviate much in comparison to the studies either in West Bengal in general or at the district level in particular for a shorter time span. For the trend estimation of production and productivity this study has considered a time series from 1970-71 to 2008-09. This has allowed to validate or invalidate the sustainability of high growth achieved during the decade of eighties. During the decade of 1990s, Birbhum, Bankura, Midnapore, Howrah, Nadia, Darjeeling, Purulia and the state as a whole experienced a break in trend, but unlike the eighties, the values of break in trend turned out to be negative. Burdwan, Hoogly, Murshidabad, West Dinajpur made marginal progress and were successful in holding the gain. In respect of productivity, all the districts and the state as a whole experienced a negative break in trend in the nineties except Murshidabad, Malda and Darjeeling. Growth scenario became gloomier between 2000-01 and 2008-09. All the districts and the state experienced further fall in growth rate in foodgrain production and productivity except Jalpaiguri and Cooch Behar. Districtwise growth scenario of production and productivity of rice replicated the growth trajectory experienced by the districts for foodgrain during the nineties and the period between 2000-01 and 2008-09. Among the major gainers in growth rates of foodgrain and rice production and productivity, Howrah, Purulia and Nadia turned out to be major losers in the post-nineties. It may thus well be observed that the trends in production and productivity in West Bengal and in the districts indicate that a downward trend from 1990-91 and this downward movement became sharp from 2000-01. The impressive gain achieved in the eighties thus could not be sustained.

Moreover, agriculturally progressive districts started losing their stronghold and as a result this affected the overall agrarian condition of the state. The positive aspect that emerged from trend analysis is that though agriculturally progressive districts like Burdwan, Birbhum, Hoogly, Midnapore, Murshidabad, Malda or major part the of Gangetic plains were facing retardation in growth rates, this did not off-set the gain achieved by these districts in the eighties. In addition, districts which lagged behind like Cooch Behar, Jalpaiguri, are rather experiencing marginal improvements. Murshidabad and Malda have also performed marginally better. This has allowed West Bengal to remain better off in terms of growth in production and productivity in comparison to agriculturally progressive states like Punjab,

Haryana, Uttar Pradesh or the southern states like Andhra Pradesh, and other states of Eastern region which have been facing serious deceleration in growth since the nineties.

The research findings demonstrate that the changes in foodgrain production and productivity of the state and districts in various time periods are closely linked with the changes in production and productivity of rice. During the period of agricultural stagnation which continued till 1980s, very low or negative growth rate in production, area and productivity of aman, aus and boro caused low growth of foodgrain production in the state and created the 'impasse' in agriculture. The turn-around in agriculture in the eighties was driven by growth in production and productivity of aman and growth in production of area under boro. Finally, in the nineties and in the post-nineties, the fall in growth in production and productivity in aman, fall in growth in production, productivity and area under aus and fall in growth in area under boro collectively pull down the growth rate in production and productivity. A high growth rate that was achieved earlier was partially neutralised during the nineties and in post-nineties.

Analysis of long term acceleration and deceleration has enabled us to make more definite comments on the direction of growth. This study empirically verifies that while the state of West Bengal is still experiencing long term acceleration in foodgrain production, major rice producing districts like Burdwan, Birbhum, Midnapore and 24 Parganas are experiencing deceleration. Since expansion of area in the lower Gangetic region is not virtually possible; therefore, yield expansion is the only alternative to augment production. Failure to do so would make the state vulnerable not only in foodgrain production, but also the economic status of half of the population would be adversely affected. Another important aspect that has been explored in this study is that the agrarian sector can add long term benefits if instability of production and productivity decrease over time. Frequent fluctuations in growth productivity and production add to instability. This implicitly indicates inconsistency of the impact factors that affect production and productivity. Most of the districts in West Bengal achieved a decline in instability over time in foodgrain and rice. However, statistical significance was achieved only for West Dinajpur in rice. This research also found that rainfall has impact on foodgrain production in the districts of Darjeeling, 24 Parganas and Midnapore. It implies that spread of irrigation over time has substantially stabilised the fluctuation in foodgrain production in most of the districts as well as for the state.

Among many non foodgrains grown in West Bengal, the dominance of jute has been eroded over the years. The partition of Bengal had a strong negative impact on jute. Jute that had

global demand was primarily grown in East Bengal or present day Bangladesh and shipped to Calcutta where the jute industries were located. The Partition of Bengal was partly responsible for the decline of the jute industry in West Bengal. The jute providing area situated in the alluvial tract of the upper active delta created by the river Ganges and Brahamaputra now form a part of present day Bangladesh. Therefore, West Bengal has been denied the most fertile jute producing zone. In subsequent years, replacement of jute-based products by synthetic fibre further reduced the demand for jute. Less remunerative price for jute in comparison to other crops have discouraged farmers from cultivating jute in West Bengal. Impressive expansion of area under potato, mustard and rapeseed, linseed and other oilseeds was observed in West Bengal and in terms of area allocation; a shift from foodgrains to non-foodgrains has taken place. This shows that the farmers of West Bengal – though primarily cultivating rice – are gradually moving towards crop diversification to create a buffer against crop failure.

The study reveals that a sizeable area has been allocated to cultivation of non-foodgrains replacing area under cultivation of foodgrains. This validates that there has been a change in crop-mix in West Bengal over time. It has been further revealed that during the 39 years of the span of study, changes in cropping pattern remained rather slow and varied across the districts. In a broader frame, area under rice and wheat as percentage of gross cropped area (GCA) almost remained static, however, area under other cereals and pulses declined and area under jute and potato increased. A change has been observed in case of shifts in area under competing crops and alternating crops. For certain crops additional area has also been brought under cultivation. A considerable area has been diverted from the cultivation of aus and aman to boro. From the late eighties, the expansion of minor irrigation and credit aided the high yielding boro to expand its area under cultivation. Since the eighties, potato, and from the nineties, wheat, rapeseed and mustard, linseed and other oilseeds have absorbed considerable area under cultivation. In the post nineties, area under jute has also increased.

In the larger contour, it has been observed that fall in area under aus and aman in foodgrain was compensated by the increase of area under, boro, wheat, potato, rapeseed and mustard and jute. Crop diversification varied considerably across districts over time. In the districts of Burdwan, Midnapore, Purulia, Bankura and 24 Parganas crop concentration assumed more importance than crop diversification, i.e., these districts are moving more and more towards producing one or two crops. Crop diversification however increased in Nadia, Murshidabad, Malda, Darjeeling, Cooch Behar and Jalpaiguri over the period. Birbhum and Hoogly are

gradually moving from producing diverse crops to producing one or two crops. Crop-wise segregation suggests that rice is the most sought after crop in districts like Burdwan, Birbhum, Midanpore, Howrah, 24 Parganas and Purulia. The most diversified crop basket has been found in the districts of Nadia, Malda, Murshidabad, West Dinajpur, Darjeeling, Cooch Behar and Jalpaiguri. Along with rice, farmers in these districts have engaged considerable area under cultivation of wheat, other cereals, jute, rapeseed and mustard. A significant area in Hoogly has come under potato cultivation; it has increased in rice dominated districts of Burdwan, Bankura, Midnapore, Howrah and in districts of Northern Bengal, especially in Darjeeling, Jalpaiguri and Cooch Behar.

Another important finding which has emerged from this study is that districts that are more and more agro-economically backward have adopted crop-diversification to a great extent because the small and marginal farmers of economically backward districts like, West Dinajpur, Malda, Murshidabad, Jalpaiguri, Cooch Behar, and Darjeeling prefer to grow cereals to meet their consumption requirements. The backward districts have experienced diversification of crops or shift from low value crop to high value crop which has helped the districts to avoid the problem of seasonal unemployment and limited income opportunities outside agriculture. The study also revealed that the districtwise or district-based groupwise variations in crop diversification do not necessarily depend on the preference of the farmers, rather, the agroclimatic differentials between the districts induce the farmers to produce diversified crops. However, districts with high irrigation support facility are mostly moving towards producing fertilizer intensive high yielding varieties of rice and potato. It has also been observed that improvement of infrastructure, marketing facilities, institutional credit and strong labour force contributes positively towards prudent diversification of crops, and have the potential to raise the income of the farmers. Crop diversification can be considered as a more viable option when growth of foodgrains is slowly decreasing.

The study has established that the rate of crop diversification in the districts of West Bengal in terms of area under coverage has not gained expected momentum due to inadequacy in certain important economic and non-economic factors essentially related to crop diversification. It has been found that the degree of diversification is not evenly distributed over the districts. While certain districts have been swift in adopting the technology of diversification, others are lagging behind. This may be because of the fact that even though the state has achieved self-sufficiency in production of staple food, i.e., rice, the emphasis is still on increasing the production of rice. While crop productivity is associated with the

intensive use of inputs, yield can be increased through better land management and farming practices, and weed and pest controlling. Inappropriate ways of applying tools and modern inputs, lack of knowledge regarding chemical inputs and how to obtain a good price, also constrain farmers from earning profit. It is therefore necessary to provide financial assistance and training by the government, to spread knowledge of land management and best farm practices. This will not only help the farmers to earn higher income, it will also open up opportunities of marketability and widen the export market creating more income and employment.

It has been observed, the overwhelming growth in production and productivity in foodgrain achieved by West Bengal during the eighties, witnessed a slow-down in the nineties and since 2000-01 the decline became more pronounced. From the econometric analysis, it has been observed that the effects of operation *barga*, use of chemical fertiliser, labour use in agriculture in per-hectare net cropped area, presence of grass root level governance or *panchayati raj*, average land holding size and economic reforms, have considerable influence on the varying degree of foodgrain productivity in West Bengal. The results obtained from econometric analysis provide a clear indication that the turn-around in West Bengal can not be attributed to institutional reforms alone, rather, institutional reform, adoption and spread of Green Revolution technology and functioning of *panchayats* together brought about positive changes in agricultural production and productivity. The role of institutional reforms cannot be alone credited for this; rather, unless the number of *bargadars* as a percentage of operating household reached the critical level of 25 percent the fruits of Green Revolution would not have been fully be realised. As a matter of fact, in the districts of Birbhum, Bankura, Burdwan, Hoogly, Malda and Midnapore which achieved high average productivity, the number of *bargadar* registered as percentage of total number of operating households in those districts also remained relatively high in comparison to other districts in West Bengal. Among the districts of West Bengal, Burdwan, Midnapore, 24 Parganas, Hoogly, Murshidabad, West Dinajpur, Nadia and Birbhum achieved high average productivity of foodgrain and in these districts the average use of fertilizer (kg/ha) also remained relatively higher. The study has identified that while the small farmers engaged in cultivation of their small holdings may sometimes be included as registered *barga*. This random mix at different periods may be held responsible for forming higher percentage of registered *bargadars*.

The role of fertilizers in enhancing productivity has been reaffirmed in the regression results which go to implicitly prove the greater spread of HYV seeds and irrigation. Area under

HYV aman and boro as percentage of gross cropped area (GCA) registered more than three-fold increase from 1980-81 to 2008-09. The cumulative impact has also brought more than three fold increase in area under HYV rice during the same period. Expansion of tube-well irrigation in large scale allowed gain in productivity and output of HYV varieties of rice in West Bengal.

The study further confirmed that the inverse relationship between farm size and productivity does not hold good universally. After the introduction of Green Revolution, inputs like seeds, fertilizers, water and even labour were no longer procured from family resources or from nature, rather, they were purchased from the market. As a consequence, the poor tenants, small and marginal farmers were increasingly facing a difficulties not only in procuring the complementary inputs at affordable prices but also in realizing optimum value for the output produced. This possibly allowed the efficiency gain that was achieved through redistribution of land, to be gradually eroded. The study further observed that the impact of economic reform – which is captured by using a dummy variable – achieved positive relationship with agricultural productivity, though it was found that since late-nineties productivity has started declining in most of the districts of West Bengal. In addition, the spread of transport infrastructure in the form of expanding *zilla parishad* roads and credit society per thousand square kilometres were yet to reach a level at which it may strongly influence the agricultural productivity to large extent. On the income-employment front, the huge productivity gain in agriculture also helped in raising the over-all agricultural income in the state and it also contributed the most - in comparison to the secondary and tertiary sectors of the economy - to sluggish growth rate in the eighties. However, growth performance of secondary sector and tertiary sectors has remarkably improved during the period 1990 to 2009.

Manufacturing, being the backbone of the secondary sector, experienced an impressive growth rate and within the secondary sector, growth of unregistered industries remained higher than the growth of the registered industries during the period 1980-81 to 2009-10. Hence, the strong role of small-scale industries in propelling the economy gets pronounced alternatively. This also implies less penetration of large-scale manufacturing units. During the nineties and in subsequent periods, the growth rate in agricultural SDP declined, despite the fact that growth rate in GSDP for the state as a whole improving substantially during these periods. It has been found that rise in agricultural production and productivity during the eighties allowed a gradual increase in agricultural GSDP till the late-nineties. Thereafter, it started declining and such decline became sharper since 2000-01. However, the fall in

contribution of agriculture to GSDP was not compensated by the proportionate increase in the share of secondary sector. Since 1980-81, a secular fall in share of contribution to GSDP of both registered and unregistered manufacturing sectors became a matter of concern. Absence of large-scale manufacturing sector has also precipitated industrial backwardness in the state.

Looking at the employment scenario for three successive census years, i.e., 1981, 1991 and 2001, the cultivators as percentage of total workers has been consistently falling, and the fall became even more pronounced between 1991 and 2001. In the districts, viz., Midnapore, Murshidabad, Malda, West Dinajpur, Darjeeling, Cooch Behar, Purulia, Birbhum and Burdwan, the fall in percentage of cultivators to total workers was either close to 10 per cent or more than 10 per cent. At the same time, large increase took place in the percentage of marginal workers to total workers across the districts in West Bengal. A substantial rise in percentage of marginal workers has been observed in the districts of Purulia, Bankura, Burdwan, Birbhum, Midnapore, West Dinajpur, Malda, Jalpaiguri and Cooch Behar. Increase of incidence of land alienation of *pattadars* and increasing eviction of *bagadars* have been found in the state. A considerable increase in percentage of households belonging to marginal category has been observed for the state as well as for most of the districts in West Bengal. The decreasing size of average land holdings coupled with increasing percentage of household in marginal category resulted in the gradual marginalisation of the rural workforce. Consequently, the huge growth and gain in agricultural production and productivity in West Bengal that was ushered in during the eighties could not become sustainable. The inadequacies in providing alternative employment avenues had been discernible in the following decades, which to a large extent crippled the economic status of the agrarian community of Bengal. Another auxiliary negative trend noticed during the late nineties has been the rapid slow-down in industrial activities, especially small and cottage industries, causing tremendous economic stress in the overall economy of Bengal.

It has been observed that enhancement in agricultural growth is essential for achieving the objective of inclusive growth. Unfortunately, the multi-dimensional problems encountered by the farmers have put impediments in achieving such an objective. It has been revealed that non-application or low application of technology is one of the principal reasons for the low or differential rate of growth of agricultural crops. Thus, availability of and access to technology along with viability issues need to be addressed. Sometimes, price-related reasons have a direct bearing on production or productivity of agricultural crops. Stagnation in productivity of certain crops in certain districts has been due to economic or different agro-climatic

reasons and certainly not due to technological failure. The increased dependence on groundwater irrigation increases the cost of cultivation. It also depletes the ground-water level and increases the rate of well failures.

It has been recognized that fixed capital formation is essential for sustaining growth of agriculture as it reduces the transaction cost for farmers besides reducing the operational cost of cultivation. Unfortunately, fixed capital formation by the government in agriculture has declined. The findings suggest that both the government and the policy makers should make concerted efforts to step up public investment in agriculture. Another issue related to production and productivity has been agricultural credit. It has been found that institutional credit is essential for agricultural development, particularly for farmers belonging to the marginal and small categories, since there has always been a lack of simultaneity between the realisation of income and expenditure in agriculture. A well organized public institutional credit system may save the farmers from the clutches of money lenders. It is suggested that easily accessible, cheap and development oriented credit and meaningful crop insurance system can well achieve sustainability in agricultural productivity.