Chapter-VII

Driving Factors of Agricultural Productivity in West Bengal: Agriculture, Employment and Economy Interrelationship

7.1 Introduction

A considerable number of scholarly works has extensively highlighted the trends in agricultural production and productivity. For example, West Bengal in general and majority of the districts achieved vey high growth rates of production and productivity in agriculture since the 1980s (Saggar,*et al.*, 1989; Harris, 1993; Saha and Swaminathan, 1994; Sen and Sengupta, 1995; Rogaly *et al.*,1995; Raychaudhuri and Sen, 1996; Gazdar and Sengupta, 1996; Banerjee and Ghatak, 1996; Sanyal, Biswas and Bardhan, 1998; Rawal and Swaminathan, 1998; Chakraborty, 2002, Banerjee *et al.*, 2002, Bardhan and Mookherjee 2004, Raychaudhuri, 2004; Chattopadhyay, 2005) after a long spate of stagnation in agriculture (Shah, 1975; Islam, 1978; RBI, 1984; Planning Commission, 1985: GoI,1985; Vaidyanathan, 1987; Boyce, 1987). Growth in production and productivity of foodgrain was primarily driven by rice and increase in yield contributed most to the growth in productivity and production.

It is noticed, however, the overwhelming growth in production and productivity in foodgrain achieved by West Bengal and her districts during eighties, was arrested in the nineties and since 2000-01 the decline became sharp. In other words, if positive trend break was observed in the eighties then a negative trend break became a reality since 2000-01 (see chapter-IV). In addition, major rice producing districts Burdwan, Birbhum, Bankura and Midnapore, Murshidabad and 24 Parganas are facing deceleration in growth of foodgrain production. The estimates of growth did not change substantially when adjustments for weather were made. In other words, the growth performance of the last four decades in foodgrain production cannot be explained in terms of unusually good or bad weather conditions. Instability in foodgrain production for majority of the districts as well as for the state has declined between 1970-71 and 2008-09 (see chapter-V).

There has been a wide range of economic and non economic factors that may influence growth in production and productivity of agriculture. To be specific, agro-climatic condition including rainfall, institutional reforms especially, land and tenancy reforms, introduction of local level governance or *panchayati raj*, expansion and diffusion of Green Revolution technology combining high-yielding varieties, irrigation, fertiliser etc., size of holdings,

agrarian structure, land distribution pattern, cropping intensity, farm mechanisation, rural infrastructure, credit and cooperatives, population density, area under non agricultural use and urbanisation, relative prices, wages, sense of security of tenants, smooth communications of bureaucrats and technocrats to farmers etc., have considerable impact on agricultural productivity.

As the knowledge on interaction between economic and non economic factors is limited and therefore, to keep the analysis within manageable proportions, non-economic factors are generally treated as exogenous. Inputs are also classified as essential and non-essential inputs. Land, seed, minimum labour for sowing and harvesting are treated as essential inputs because output becomes zero if any one of the inputs assumes zero value. Fertilisers, pesticides, tractor services are considered as non-essential inputs (Sankar, 1997:2, 4). In addition, to estimate the impact of these factors on productivity create statistical impediments because more often than not, these explanatory variables become collinear with each other. Estimation of the impact of various components of agrarian reforms on productivity also suffers from various computational barriers because a long time series contains a number of effects simultaneously and segregation of them often become difficult. Statistical obstacles more often deter the researchers to undertake studies that may elucidate the impact of various economic, non-economic factors, including institutional reforms of varied nature and policy intervention on agricultural productivity. It needs to be reiterated again, the studies conducted so far to identify the underlying factors for major turn around in growth of agricultural production and productivity in West Bengal either explicitly or implicitly exemplifies the role of institutional reforms or more directly, distribution of ceiling surplus land among the land-less and conferring quasi-land rights or limited transfer of property rights to the share croppers or operation *barga* and introduction of local level self governance or *panchayati raj*.

Both theoretically and empirically, it has been well established that institutional reforms coupled with devolution of power at the grass root level have contributed towards the increase in the use of high yielding variety of seeds, access to more institutional credit, increase in investment in private irrigation, right incentive to produce more, improvement in the general functioning of market, especially land and credit market, increase in efficiency in small sized farm, expansion of rural infrastructure, increase in rural wage, decrease in inequality and reduction of poverty. All these contributed towards the rise in agricultural production and productivity in West Bengal (Chadha and Bhaumik, 1992; Lieten, 1992; Bhaumik, 1993; Saha and Swaminathan, *op.cit.*; Sen and Sengupta, 1995; Banerjee and

Ghatak 1996; Sengupta and Gazdar, 1996; Mukherji and Mukhopadhyay,1996; Rawal Swaminatan, *op.cit.*; Ghosh, 1998; Sanyal, Biswas and Bardhan, 1998; William, 1999; Banerjee *et al.*, 2002, Ghatak and Ghatak, 2002; Chakraborty, 2002; Raychaudhuri, 2004; Bardhan and Mookherjee 2004; Bhattachayya 2005; Bhattacharyya and Bhattacharyya 2007).

Harris (1992, 1993) on the other hand, have preferred to ignore the role of institutional reform for enhancing production and productivity growth in agriculture in West Bengal during eighties, rather he emphasised that growth in production of boro and simultaneous expansion of private shallow tube-wells have propelled the growth of agriculture. Seemingly these opposite view points has been synthesised best by Sengupta and Gazdar (*op.cit*: 168). While they argue that ' the amount of cropped land distributed under ceiling laws represents around 6.5 per cent of total cropped area in the state, less than a third of which was distributed after 1977. Precise estimates of the total area registered under operation *barga* are not available, but this is unlikely to exceeded 15 per cent of the total cropped area. For land redistribution and operation *barga* to be the driving forces behind accelerated growth, these relatively small areas of land would have had to achieve extraordinarily high rates of productivity growth. This, clearly, has not been the case. Instead, there has been wide adoption of HYVs for aman and an extensive increase in (irrigated) boro cultivation. The dichotomization of the explanations of recent agricultural growth in West Bengal between market versus non-market innovations and reforms versus private incentives is problematic from both conceptual as well as empirical viewpoints'.

Banerjee. *et al.*, (*op.cit.*:275& 276) covered the period between 1979 and 1993 and they chose 1979 because it marked the beginning of operation *barga* programme and measured the magnitude of the effect of operation *barga* on productivity by multiplying the coefficient on the registration rate with change in registration over the period. Their estimation ascertained that operation *barga* raised average productivity of rice in West Bengal by 20 per cent.

Raychoudhri (*op.cit.*: 1 &13) attempted to reconcile the interdependence of various land reform measures, decentralized decision-making and 'autonomous and induced technological changes' by using cross-section time series pooled data regressions over districts of West Bengal. Owing to data limitations, data were pooled over districts for the years 1985 and 1994. To ascertain the impact of *barga* registration on yield rate per acre of aman, percentage of *barga* households as percentage of total number of households were calculated and districts were ranked accordingly. To identify the impact of *barga* or to ascertain the critical level of *barga* registration in a single measure, four cut-offs (at 15 per cent, 20 per cent, 25

per cent and 30 per cent) were used in a manner while using a dummy for particular cut-off percentage, that percentage was assigned value 1 and the rest take on the value 0. It was further assumed in this model that a *barga* registration should reach a particular percentage to ensure the use of complementary inputs and simultaneous effects of these two would allow the production to rise. For this, four interactive variables (interaction between *barga* registration and fertiliser use) in accordance with above mentioned cut-offs of *barga* registration percentages were incorporated in the model. The results so derived showed that operation *barga*, along with irrigation, fertiliser, rural roads and labour use had considerable impact in raising agricultural productivity in West Bengal.

Here the study intends to accomplish two specific objectives: first, to measure the impact of various economic and non-economic factors that influenced the growth in productivity in West Bengal in general and her districts in particular and second is to examine how changes in growth of agricultural productivity has influenced the economy and employment of the state vis-à-vis districts by taking aforementioned statistical impediments into consideration.

7.2 Methodology to Measure the Impact of Various Factors on Foodgrain Productivity

Against this backdrop, initially, the effects of operation *barga*, role of *pachayat*, Green Revolution, labour use per hectare, farm size, institutional credit at rural level, and economic reform on agricultural productivity, have been measured by using standard pooled regression over districts and time. Ordinary least squares (OLS) method was applied to estimate the coefficients. Data on 15 districts and for the time period of 1980-81 to 2008-09 were pooled together for the analysis. As dependent variable, log value of yield rate (kg/ha) of foodgrain (FDGRN-PDVTY) has been considered. Among the independent or explanatory variables, *barga* households as percentage to total number households operating (BARGA %) has been incorporated as proxy for operation *barga*. To measure the impact of the activities of *panchayat* on productivity, rural road constructed by the *Zilla Parishad* in terms of kilometre road per thousand square kilometres area (ZILLA ROAD) has been considered. Logarithmic value of districtwise fertiliser use (LNFERT) has been pooled for the period of 1980-81 to 2008-09 and incorporated as an independent variable to capture the impact of Green Revolution technology on agricultural productivity. If fertiliser is considered as a non-essential input, labour is considered as an essential input for production. Therefore, labour engaged on per-unit of land (AGRI LAB-NCA) has been obtained (total number of agricultural labourers divided by Net Cropped Area or NCA) for districts over time and included as one of the independent variables in the model. Average land holding (AV TL

HLDN) has been calculated by as dividing total landholdings by total number of operational holdings (in hectare) and this has been incorporated to verify the farm size-productivity relationship. A dummy has been used to measure the impact of economic reform (RF D1) so that from 1990-91 to 2008-09, assuming value '1' and for rest of the period '0'. While applying the OLS method, VIF statistic and Durbin-Watson statistic (DW) have been considered to check the problems of multi-collinearity and autocorrelation in the model.

The model to be estimated thus takes the following form:

$FDGRN\text{-}PDVTY = \beta_1 + \beta_2\ BARGA\ \% + \beta_3\ ZILLA\ ROAD + \beta_4\ LNFERT + \beta_5\ AGRI\ LAB\text{-}NCA + \beta_6\ AV\ TL\ HLDN + \beta_7\ RF\ D1 + \mu$ ---------- (1)

Where,

FDGRN-PDVTY = Log Value of foodgrain productivity (kg/ha)

BARGA % = *Barga* households as percentage to total number households operating.

ZILLA ROAD = Rural road constructed by the *Zilla Parishad* in terms of kilometre road per - thousand square kilometres area.

LNFERT = Log value of fertiliser use (kg)

AGRI LAB-NCA = Labour engaged on per-unit of Net Cropped Area (NCA).

AV TL HLDN = Ratio of total landholdings and total number operational holdings.

μ = Random Term.

Results of the estimated parameters of Equation 1 are presented in Table 7.1.

Table 7.1: Results of Estimated Parameters of Equation 1

Dependent Variable: Log Value of Foodgrain Productivity

Explanatory Variables	Coefficients	Std. Error	T-statistic	Sig.	VIF
Constant	-565.816	139.41	(-4.06)	0.000	
BARGA %	0.079	1.89	(2.66)*	0.008	1.36
ZILLA ROAD	0.015	0.043	(0.44)	0.657	1.73
LNFERT	0.392	30.349	(9.36)*	0.000	2.71
AGRI LAB-NCA	0.560	44.918	(13.43)*	0.000	2.68
CREDIT SCOIETY	0.005	0.397	(0.11)	0.912	2.57
AVG TL HLDN	0.315	65.077	(7.48)*	0.000	2.74
RF D1	0.175	40.556	(4.88)*	0.000	2.00
R Square	Adjusted R Square	Std. Error of the Estimate			Durbin-Watson
0.723	0.719	290.20			0.689

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Source: *Calculation based on data collected from various volumes of West Bengal Economic Review and District Statistical Handbook, Government of West Bengal.*

7.3 Interpretation of the Regression Results (Equation 1)

The results of estimated parameters of equation 1 are been shown in Table 7.1. The value of adjusted R^2 indicates that 72 per cent of the total variation has been explained by the explanatory variables. The value of Durbin-Watson statistic is greater than 0 but less than 4, therefore, the absence of first-order auto-correlation is pronounced. The Variance Inflation Factor or VIF of all the explanatory variables are found to be much less than 10, hence, presence of multi-collinearity among the explanatory variables is negligible. Among the estimated explanatory parameters, except ZILLA ROAD and CREDIT SOCIETY, the rest of the variables have considerable impact on foodgrain productivity. Coefficients of BARGA %, LN FERT, AGRI LAB-NCA, AV TL HLDN and RF D1 are all positive and prove to be significant factors in influencing the foodgrain productivity at 1 per cent level. *Barga* households as percentage of total number of households operating (BARGA %) or operation *barga* has significant impact on agricultural productivity. In other words, rise in *barga* registration by 1 per cent, would raise the foodgrain productivity by 0.079. This result validates the empirical studies of Banerjee *et.al.*, (*op.cit.*), Raychaudhuri (*op.cit.*). The productivity enhancing capacity of fertiliser (LN FERT) have also been validated with strong positive value of its coefficient. Similarly, 1 per cent rise in agricultural labour per hectare net cropped area should enhance the productivity by 0.560. In this model, the estimated coefficient of average land holding (AV TL HLDN) reveals that 1 per cent increase in land holding size will raise the productivity of foodgrain by 0.315 and thus inverse relationship between farm size and productivity does not hold. The result also reaffirms the logic that the increase in labour (AGRI LAB-NCA) and average total holding (AV TL HLDN) shall increase the agricultural productivity as general input-output relationship, as neo-classical economics presupposes. It has also been observed that economic reform whose effect has been captured by reform dummy (RF D1) has a positive impact on agricultural productivity. It is also attempted to capture the impact of the role of *panchayat* in building roads. Taking kilometre road constructed by *zilla parishad* per thousand square kilometres area, as the proxy variable, it does not show any significant effect on foodgrain productivity and neither was any impact visible so far as the number of credit societies is concerned. It has been observed that since 1980-81 number of primary credit societies per thousand square kilometre area has either declined or remained static for all the districts except Darjeeling (Table 7.2). As a result, this component, in spite of having an important role in agricultural development, has turned out to

be insignificant in affecting agricultural productivity, and it must have wider negative influence in meeting up credit requirement in agriculture.

Table 7.2: Districtwise Number of Primary Credit Society per 000 sq-km Area

District/Year	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2008-09
Burdwan	87	77	87	87	84	89	88
Birbhum	79	69	75	78	78	75	74
Bankura	42	42	40	41	35	38	38
Midnapore	143	144	138	140	125	125	121
Howrah	160	157	159	148	148	152	134
Hoogly	301	290	242	238	226	226	222
24 Parganas	71	73	73	73	62	72	69
Nadia	116	119	112	116	107	115	115
Murshidabad	96	134	91	93	88	91	87
West Dinajpur	96	95	100	75	64	60	63
Malda	84	87	82	62	64	59	59
Jalpaiguri	30	30	35	29	27	26	26
Darjeeling	21	20	33	31	32	33	33
Cooch Behar	85	67	73	72	71	70	70
Purulia	34	53	36	39	39	28	27
West Bengal	85	87	83	81	75	76	74

Source: *Calculation based on data collected from various volumes of District Statistical Handbook, Bureau of Applied Economics and Statistics Government of West Bengal.*

7.4 Methodology to Measure the Simultaneous Impact of Operation Barga and Green Revolution

The methodology used by Roychaudhuri (2004) has been adopted in the present study with certain modifications. His model is based on the hypothesis that when *barga* registration will reach to a particular percentage, then the beneficiaries of operation *barga* would be able to access the complementary inputs (nitrogen, phosphorous and potassium based fertilisers) and simultaneous effects of these two would allow a rise in production. Here an attempt has been made to verify the plausibility of the hypothesis by pooling the data for a much longer period (from 1980-81 to 2008-09) for the districts. Four interactive variables (consisting of fertiliser and *barga* registration) have been generated and while doing so, first the percentage of *barga* registration is calculated (*barga* households as percentage of total number households operating) and four cut-off percentages, viz., at 15, 20, 25 and 30 per cent are identified and corresponding to each cut off percentage an interactive variable (fertiliser use per hectare times the number of *barga* registration) has been generated. They have been denoted as int 15, int 20, int 25 and int 30 respectively (Raychaudhuri, *op.cit.*: 13). Four regression equations have been framed for the four above mentioned interactive variables and in every equation road constructed by the *Zilla Parishad* as proxy for activities of *panchayat*, average land holding (AV TL HLDN), economic reform dummy (RF D1) and log value of fertiliser

(LNFERT) have been retained as explanatory variables. Here to measure the individual impact of Green Revolution on foodgrain productivity LNFERT has been taken as a variable in addition to interactive variables. These equations are as follows:

FDGRN-PDVTY = α_1 + α_2 LNFERT + α_3 ZILLA ROAD + α_4 AV TL HLDN +α_5 RF D1+α_6 int 15 + μ_2 ----------(2)

FDGRN-PDVTY = γ_1 + γ_2 LNFERT + γ_3 ZILLA ROAD + γ_4 AV TL HLDN + + γ_5 RF D1 γ_6 int 20 + μ_2 ---------- (3)

FDGRN-PDVTY = δ_1 + δ_2 LNFERT + δ_3 ZILLA ROAD + δ_4 AV TL HLDN + δ_5 RF D1+δ_6 int25+ μ_3 ---------- (4)

FDGRN-PDVTY = ε_1 + ε_2 LNFERT + ε_3 ZILLA ROAD + ε_4 AV TL HLDN + ε_5 RF D1+ ε_6 int30+ μ_4 ---------- (5)

Results of the estimated parameters of Equation 2, 3, 4 and 5 are presented in Table 7.3, 7.4, 7.5 and 7.6 respectively.

Table 7.3: Results of Estimated Parameters of Equation 2

Explanatory Variables	Coefficients	Std. Error	t-statistic	Sig.	VIF
Constant	-23.976	197.571	-0.121	0.903	
ZILLA ROAD	0.125	0.043	(3.74)*	0.000	1.17
LNFERT	0.606	33.468	(3.13)*	0.000	2.24
AVG TL HLDN	0.129	61.549	(3.24)*	0.001	1.67
RF D1	0.282	43.034	(7.37)*	0.000	1.53
int 15	-0.034	165.312	(1.04)	0.299	1.09

R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.592	0.587	351.6268	0.455

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Source: *Calculation based on data collected from various volumes of District Statistical Handbook, Bureau of Applied Economics and Statistics Government of West Bengal.*

Table 7.4: Results of Estimated Parameters of Equation 3

Explanatory Variables	Coefficients	Std. Error	T-statistic	Sig.	VIF
Constant	-148.129	157.341	(-0.941)	0.347	
ZILLA ROAD	0.123	0.044	(3.61)*	0.000	1.22
LNFERT	0.592	34.457	(12.46)*	0.000	2.36
AVG TL HLDN	0.122	62.292	(3.02)*	0.003	1.70
RF D1	0.284	43.556	(7.34)*	0.000	1.57
int 20	0.004	37.548	(0.12)	0.899	1.19

R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.591	0.586	352.0631	0.452

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Source: *Calculation based on data collected from various volumes of District Statistical Handbook, Bureau of Applied Economics and Statistics Government of West Bengal.*

Table 7.5: Results of Estimated Parameters of Equation 4

Explanatory Variables	Coefficients	Std. Error	T-statistic	Sig.	VIF
Constant	14.046	155.21	0.09	0.928	
ZILLA ROAD	0.115	0.04	(3.55)*	0.000	1.16
LNFERT	0.529	33.14	(11.58)*	0.000	2.30
AVG TL HLDN	0.079	61.17	(1.99)**	0.047	1.73
RF D1	0.314	42.616	(8.30)*	0.000	1.58
Int 25	0.150	36.15	(4.73)*	0.000	1.10

R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.611	0.607	343.2176	0.475

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Source: *Calculation based on data collected from various volumes of District Statistical Handbook, Bureau of Applied Economics and Statistics Government of West Bengal.*

Table 7.6: Results of Estimated Parameters of Equation 5

Explanatory Variables	Coefficients	Std. Error	T-statistic	Sig.	VIF
Constant	76.372	145.806	0.52	0.601	
ZILLA ROAD	0.058	0.041	(1.85)***	0.066	1.23
LNFERT	0.531	30.45	(12.64)*	0.000	2.17
AVG TL HLDN	0.067	57.276	(1.79)***	0.074	1.69
RF D1	0.287	39.798	(8.12)*	0.000	1.53
Int 30	0.257	44.111	(8.56)*	0.000	1.10

R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.651	0.647	325.367	0.532

Significant at 1% level, ** Significant at 5% level, * Significant at 10% level*

Source: *Calculation based on data collected from various volumes of District Statistical Handbook, Bureau of Applied Economics and Statistics Government of West Bengal.*

7.5 Interpretation of the Regression Results (Equation 2, 3, 4 and 5)

The log linear regression results of equation 2, 3, 4 and 5, the values of Durbin-Watson statistic are found to be greater than '0' but less than '4', and this reaffirms the absence of first-order autocorrelation. The Variance Inflation Factor or VIF of all the explanatory variables are also found to be much less than '10', hence, presence of multi-collinearity among the explanatory variables is negligible in regression results of estimated parameters of equation 2, 3, 4 and 5. Regression results presented in Table 7.3, 7.4, 7.5 and 7.6 show that the expansion of roads constructed by *Zilla Parishad* (ZILLA ROAD) has had a yield-raising effect with significance level varying from 1 per cent to 10 per cent. The *panchayats* execute many rural development schemes sponsored by the Central government; most of the schemes have been designed to create rural infrastructure, especially roads and in some cases, excavation of tanks and ponds. It is thus evident that this effort of improving the rural infrastructure has a positive impact on productivity. Precisely, rural roads and connectivity to

urban centres reduces transportation cost and transaction cost, and also allows farmers to realise better prices of their farm products.

Logically wide spread application and success of Green Revolution technology depend on use of HYV seeds, irrigation and fertiliser. In all above regression results, role of fertiliser to enhance agricultural productivity has doubly been confirmed. Therefore, implicitly, it can be said that the spread of HYV seeds and irrigation must have taken place. In 2008-09, more than 55 percent area of Gross Cropped Area (GCA) is under HYV rice (West Bengal Economic Review, 2008-09).However, presence of high multicollinearity among fertiliser uses, area under HYV and irrigation act as deterrent to incorporate them together as explanatory variables.

Results shown in Table 7.3, 7.4, 7.5 and 7.6 further reflect that inverse relationship between farm size and productivity does not hold. Here average total holding has been considered and in West Bengal, the difference between average total holding and average marginal holding is quite narrow. The average size of total holding stands at 0.77 ha and average marginal holding at 0.49 ha (Calculated from the data available from Agricultural Census 2005-06). Evidently, the possible inverse relationship between farm size and productivity provided a logical basis and favoured a redistribution of land to the landless, and brought substantial improvement in production and productivity. The present study also corroborates the fact that the then prevailing agricultural practices were mostly dependent on inputs procured out of the resources owned by the households. Free resources from nature also contributed substantially. Land was the only resource that such farmers did not have secured access to. Providing access to land, either through redistribution or through a secured tenancy contract, would have been effective in increasing the productivity of agricultural practices. The situation has, however, changed significantly with the Green Revolution that altogether altered the basis of the input supply system faced by the farmer. The inputs are no longer to be procured from out of family resources or from nature. They are to be purchased from market, be it seeds, fertilisers, water and even labour. The poor tenants, small and marginal farmers face a difficult situation not only in procuring the complementary inputs at affordable prices but also realizing the optimum value for the output produced. Our study also corroborates the observations made by Ghosh (1979) and Lipton (1993). According to Ghosh, with the advancement of technology, inverse relationship disappears. Lipton observed that until Green Revolution, the inverse relationship was valid (at least for rice and wheat in Asia) but after Green Revolution the relationship was reversed. Ashok Rudra (1968) is thus perhaps

right while he observed that, 'there is no scope for propounding a general law regarding farm size and productivity relationship.'

Economic reform which is represented by reform dummy (RF D1) has proved to be highly significant in raising the foodgrain productivity in all successive regression results mentioned above. During the reform era, cost of production has increased firstly, because of the withdrawal of subsidy on fertiliser and price being determined by the market, and secondly, public investment in agriculture has declined. There has been continuous hike in diesel prices which is one of the propelling factors behind the sharp expansion of tube-well irrigation in the state. Even other inputs also got dearer to the farmers. Various studies have shown that economic reform laid emphasis price factors and infrastructure while the institutional aspects of agriculture did not receive adequate attention. (Chadha, 2002; Majumdar, 2002; Bhalla, 2002; Kumar, 2002).

Notwithstanding all the negative aspects, West Bengal continued to achieve high growth in production and productivity of rice and foodgrain compared to agriculturally advanced states like Punjab, Haryana and Western Uttar Pradesh. Couple of factors might be held responsible: firstly, agriculture in West Bengal is dominated by small and marginal farmers, since they do not have other alternatives. Under the circumstances, the farmers are compelled to produce rice on their diminishing land. Secondly, many of the small and marginal farmers apart from cultivating their own land are forced to work as agricultural wage labourers. Thirdly, the rate of growth in productivity and harvest price sometimes offsets the rate of rise in cost of production. Fourth, crop diversification, especially production of potato and rapeseeds and mustard partly compensates for the rise in cost of production. Since, mid-2000, various development programmes like interest subvention on crop loans, the National food Security Mission, National Rural Employment Guarantee Scheme (NREGS), have partly stabilised the economic condition of the small and marginal farmers and agricultural labourers. Having said so, to justify the positive impacts economic reform on foodgrain productivity, a deeper empirical probe is imperative to identify the factors that are still propelling foodgrain productivity growth in West Bengal during the post-economic reform era.

From regression results depicted in Table 7.3, 7.4, 7.5 and 7.6, it is also evident that among the four cut-off percentages used for *barga* registration (15 per cent, 20 per cent, 25 per cent and 30 per cent) to create four interactive variables of *barga* registration and fertiliser used (int 15, int 20, int 25 and int 30), int 25 and int 30 were significant at 1% level and do display

considerable impact in raising foodgrain productivity. However, int 15 and int 20 do not have any statistical significance so far their influences to raise productivity of foodgrain are concerned. Therefore, if *barga* registration percentage, reaches 25 per cent or surpasses this percentage, then fertiliser per hectare will successfully utilized by the *bargadars*. Below this percentage, *bargadars* would fail to access required complementary inputs. The changing pattern of tenancy relations in West Bengal substantiates this fact. The field studies of Chadha and Bhaumik (*op.cit.*: 1092) show that there is no strong evidence that rich and big landowners only lease out the land to unrecorded tenants. A vast number of small and middle category farmers who have been identified as self-cultivators also lease out land to overcome short-term difficulties in carrying out the production process. Similarly, those who have been identified as tenants do not always necessarily belong to the category of pure tenant/landless category.

There is a strong possibility that many small cultivators have also identified themselves as tenants and the impact of 'operation *barga*' has had more far reaching influence in enhancing the agricultural production and productivity in West Bengal. Therefore, in this study, Raychaudhuri's (*op.cit.*) hypothesis the *barga* registration has to reach a particular percentage for the beneficiaries of operation *barga* to access the complementary inputs and the simultaneous effects of these two will allow the production to rise, gets validated.

It has also been observed that the districts which are having higher average productivity, the number of *bargadars* registered as percentage of total number of operating households (BARGA %) remained relatively high (Table 7.7). Districts of Birbhum, Bankura, Burdwan, Hoogly, Malda and Midnapore bear the testimony. Commensurate increase in fertiliser use will further make the case stronger in the sense that operation *barga*, coupled with increased use of fertiliser, will be having a stronger impact in raising foodgrain productivity in the districts as well as for the state. Among the districts of West Bengal, Burdwan, Midnapore, 24 Parganas, Hoogly, Murshidabad, West Dinajpur, Nadia and Birbhum achieved high average productivity of foodgrain and average use of fertiliser (kg/ha) also remained relatively higher (Table 7.7) in comparison to the other districts of West Bengal.

Table 7.7: Districtwise Average Foodgrain Productivity (kg/ha), percentage of *Barga* and Average Fertiliser Use (kg/ha) from 1980-81 to 2008-09

District	Average Foodgrain Productivity (kg/ha)	District	Barga %	District	Average Fertiliser Use (kg/ha)
Burdwan	2549	Birbhum	37.6	Midnapore	111.5
Hoogly	2347	Hoogly	31.4	Burdwan	98.0
Birbhum	2307	Bankura	30.1	24 Parganas	93.0
Bankura	2196	Burdwan	28.4	Hoogly	84.6
Nadia	2079	Cooch Behar	27.1	Murshidabad	59.4
Murshidabad	2048	Midnapore	24.8	West Dinajpur	54.1
Malda	1945	Jalpaiguri	23.3	Nadia	53.2
Midnapore	1944	West Dinajpur	22.0	Birbhum	52.9
Howrah	1885	Malda	21.8	Malda	44.6
24 Parganas	1882	24 Parganas	17.4	Bankura	40.7
West Dinajpur	1757	Howrah	17.3	Howrah	39.1
Darjeeling	1696	Nadia	15.4	Cooch Behar	37.6
Purulia	1620	Darjeeling	14.6	Jalpaiguri	33.9
Cooch Behar	1385	Murshidabad	13.7	Purulia	27.4
Jalpaiguri	1282	Purulia	2.5	Darjeeling	20.8

Source: *Calculation based on data collected from various volumes of West Bengal Economic Review, Government of West Bengal.*

7.6 Role of Irrigation in Augmenting Agricultural Productivity

The present study while explaining the role of various factors in influencing the agricultural productivity, has failed to incorporate irrigation as one of the explanatory variables in the above econometric models. The prime reason is the unavailability of comparable time series data at district level. However, an attempt has been made to fill this gap by using various research documents on irrigation in West Bengal. Till 1970, there was slow progress in irrigation, especially the growth of tube-well irrigation was very slow (Rawal, 2001:4017). During 1982 only 16 per cent of the groundwater potential of the state was used (Boyce, op.cit). Within the period till 1970, three major river valley projects were commissioned; Damodor Valley Corporation (DVC) Project was commissioned in 1933 which became the major source of irrigation for Burdwan, Hoogly, Howrah and Bankura. In 1954, the Mayurakshi Project started operating and it provided irrigation to major parts of Birbhum, and certain parts of Burdwan and Murshidabad. The Kangsabati Project became operational in 1968 and irrigated agricultural land in Bankura, Midnapore and Hoogly. During late - seventies and eighties, 11 medium canal irrigation projects and several minor surface irrigation projects were initiated to cater to the irrigation needs of western part of the state and Purulia was largely benefited by these projects. From the Teesta project (awaiting completion), irrigation of agricultural lands of Jalpaiguri, plains of Darjeeling District, Cooch Behar, West Dinajpur and Malda districts are partly accomplished.

However, major turn around in irrigation system as well as increase in net irrigated area took place between eighties and nineties with the massive growth of tube-well irrigation in West Bengal. According to the study made by Rawal (op.cit:4018), one notices that from 1975-76 to 1992, net irrigated area had increased by 115 per cent and tube-well irrigation had increased by more than 460 per cent and irrigated 636 thousand hectares of land. Density of tube-well per 100 sq kms was found to be high in 24 Parganas, Nadia and Murshidabad. High percentage increase in numbers of tube-wells (both driven by electric and diesel) was observed in Jalpaiguri, Cooch Behar, West Dinajpur, Bankura, and Malda, although the density remained much lower in comparison to the eastern districts of West Bengal (Rawal, op.cit, 4018-4023). It has been observed that there is a close relation between introduction of HYV summer paddy and rapid expansion of tube-well irrigation in West Bengal. As a matter of fact, until late seventies, major proportion of agricultural land in the state was mono-cropped. Paddy cultivation in large scale in many low-lying and flood prone areas commenced after the introduction of HYV summer paddy, especially boro paddy. Boro paddy is a highly water intensive crop. During the early eighties, i.e., early period of the transition to boro cultivation, canal irrigation, irrigation by using deep tube-wells or river-lift irrigation were the major sources of irrigation for boro cultivation. Gradually, diesel powered shallow tube-wells and thereafter, with the fall in water level, submersible pump tube-well systems were extensively used. Investment on shallow tube-wells and submersible pump tube-wells were mostly borne by the users from their personal savings, private borrowings from local money lenders (Moitra, 2005:128-140). This opened up the market for the supply of ground water. Therefore, from the aforementioned empirical results and discussion since the eighties, the wider penetration of seed-fertiliser-water technology got established and it certainly contributed positively to the growth in production and productivity of foodgrain in West Bengal.

7.7 Agricultural Productivity and its Impact on Employment and Economy

A common notion of development establishes the fact that as the economy progresses, the share of agriculture and industries declines and that of services increase. These structural changes generally occur through market adjustment in inter-sectoral resource allocations and as a result, in an early stage of economic growth, demand for industrial goods increases and ultimately it leads to the rise in demand for services with relative saturation in consumption of industrial commodities (Clark, 1940; Kuznets, 1966; Syrquin and Chenery, 1988). However, confusion exists as we turn to East Asian, African and Latin American countries.

Especially the countries that achieved independence after World War II and remained as the colonies of Western powers, had started as laggard countries in the process of industrialisation while they failed to replicate the structural changes that took place in western or early industrialised countries. Under colonialism these economies mostly acted as a provider of raw materials and market for manufactured commodities from the West (Hayami & Godo, 2005). Unlike the early industrialised nations, most of present day's developing countries started the process of industrialisation with a high degree of capital scarcity bypassing the phases of investment of agricultural surplus in the industrial activities. Even though many developing countries like India and China achieved considerable success in industrial expansion but they failed to reduce the dependence of the majority of population on agriculture and allied activities for livelihoods.

A cursory look at the sectoral shares of GDP in few selected countries unfolds the fact that share of agriculture in GDP was 44 per cent, 38 per cent and 3 per cent respectively for India, China and USA in 1965, that witnessed a reduction to 25 per cent, 17 per cent and 1 per cent by the end of 2000. But the percentage of population depending on agriculture stands at around 60 per cent for all developing countries as against 2 per cent for USA. Indian economy during the past few decades has also been undergoing a structural transformation with the decline in the share of agriculture in Gross Domestic Product (GDP) and gradual increase in the share of industries and services. Although share of agriculture has come down to 17 per cent in 2008-09 from 55.1 per cent in 1950-51, the dependence of the rural workforce on agriculture in India has not diminished in proportion to share of agriculture to the GDP. As a consequence the gap between agriculture and non-agriculture is likely to get widened and the disparities between rural and urban areas will be on the rise. India, though identified as a fast growing economy, it is observed that in rural areas nearly 63 per cent of the male workers and 79 per cent of the female workers are still engaged in agriculture (GoI, 2011). Similar situation is discernible for the state of West Bengal too.

For West Bengal, doubts may be raised that rise in the growth of agricultural productivity in the eighties and subsequent fall in the nineties may have some negative impact on agricultural income, employment and economy at large. And, lack of alternative employment and income opportunities outside agricultural may further complicate the situation. To get into the depth of these problems, simultaneous interplay of various sectors of economy, contribution of various sectors to Gross State Domestic Product (GSDP at current prices) and kinked exponential growth of various sectors from 1980-81 to 2009-2010 with three sub-periods,

1980-81 to 1989-90, 1990-91 to 1999-2000 and 2000-01 to 2009-10 are being analysed. GSDP series from 1980-81 to 1997-98 at 1980-81 prices, GSDP series 1993-94 to 2004-05 at 1993-94 prices and 2004-05 to 2009-10 at 2004-05 prices, have been converted in 1993-94 prices to obviate the impact of inflation. To understand the structural change of the economy of West Bengal from 1980-81 to 2009-10, changing share of various sectors towards the GSDP at current prices have also been analysed.

7.7.1 Sectoral Growth of GSDP (at 1993-94 Prices) from 1980-81 to 2009-10

Results show that over-all growth scenario of West Bengal is quite impressive (Table 7.8). The GSDP at constant prices (base year 1993-94) is growing at an annual rate of 8 per cent between 1980-81 and 2009-10. A close look at the three sub-periods suggests that between 1980-81 and 1989-90 (sub-period I), the economy of West Bengal experienced most sluggish growth rate (3.4 per cent per annum). However, a major upsurge in growth rates are observed in two subsequent sub-periods, viz. 1990-91 to 1999-2000 (sub-period II) and 2000-01 to 2009-10 (sub-period III). From 1990-91 to 1999-2000, the economy grew at an annual exponential rate of 7.4 per cent and between 2000-01 and 2009-10, the growth rate further increased to 9.6 per cent per annum. The decade of the eighties experienced most slow growth rates in three sub-periods and as a matter of fact, the growth rate in tertiary sector became insignificant and highest growth rate was achieved by the primary sector. To be precise, agriculture propelled the growth of the primary sector vis-à-vis the economy.

During the eighties, West Bengal experienced major turn around in growth of foodgrain and rice production and productivity which propelled the growth of agricultural income or output (at constant price) of West Bengal. In sub-period II and III, the growth rate in agricultural SDP tapered off. In sub-period II, agricultural SDP grew at an annual exponential rate of 4.7 per cent and in sub-period III, it declined further and grew at 3.7 per cent per annum. However, growth performance of secondary sector and tertiary sectors improved significantly during sub-periods II and III. In the secondary sector, manufacturing experienced impressive growth rate of above 5 per cent. An interesting feature of manufacturing is that the exponential growth of contribution of unregistered industries remained higher than that of growth of the registered industries from 1980-81 and 2009-10 and in all the three sub-periods. This implies the strong role of small-scale industries in boosting the economy of West Bengal vis-à-vis less penetration of large-scale manufacturing units.

The small scale industries of West Bengal have strong antecedents of producing cotton cloth, jute products, garments, silk, hosiery items, jewellery, leather products, food products,

wooden items, tobacco products (*bidi* making in rural areas), metal works, spare parts, etc. There is a presence of skilled artisans in large numbers, capable of making diverse handicrafts items. Construction and electricity, gas and water supply also maintained impressive growth. The tertiary sector experienced double digit growth in these two sub-periods especially in transport, storage and communication, real estate, ownership of dwelling and business services, trade, hotels and restaurants, and other services. A major upsurge in growth of public administration was also observed in sub-period III. It needs to be mentioned here that the activities under public administration broadly cover the services of the state government administration. Therefore, growth of public administration reflects the income generated for the government employees. Again, other services cover activities pertaining to educational, medical and veterinary, scientific research, sanitary, recreational, rest of the services, international and extra territorial bodies and lottery services. Therefore, bulk of the income generated under 'other services' are primarily coming from government and quasi-government employment. Shifting the focus to agriculture, it can be reiterated that during the nineties, and subsequent periods, the growth rate agricultural SDP declined despite the substantial improvement in the growth rate in GSDP for the state as whole during these periods. This naturally is expected to have an adverse impact on employment and economic status of agrarian community if economy outside agriculture failed to generate off-farm employment and income.

Taking sectoral share into consideration (Table 7.9), it is observed that from 1980-81 to 1995-1996, the share of agriculture to GSDP experienced a gradual increase and thereafter it started declining in subsequent years. The decline became sharp since 2000-01. However, contribution of the secondary sector to GSDP failed to surpass the share of primary sector from 1980-81 to 2009-2010 and decline in share became faster since 1990-91. Within the secondary sector, the secular fall in share of contribution of both registered and unregistered manufacturing sectors has also been observed. Absence of large-scale manufacturing sector is a reality in West Bengal and small-scale industries act as a backbone of industrial activities in the state. Inspite of the fact that contribution of registered and unregistered industries to GSDP (at constant prices) being 4.2 per cent and 5.1 per cent per annum respectively between 1980-81 to 2009-10, it became sluggish during the eighties and picked up during nineties and onwards. Share of registered industries started declining since 2000-01 and from 2005-06 and the share of unregistered industries was also declining sharply. This indicates that the number of units in operation must have declined or closed down during this period.

It is clearly evident from Table 7.10A that since 1990, barring the district of Howrah, number of small-scale units registered with Directorate of Micro and Small-Scale Enterprises of the state have declined for all the other districts. However, registration of small-scale industries does not necessarily imply the setting up of the units (Report on the West Bengal Economy, 2003: 46). On the other hand, concentration of registered factories remained high in the districts of Howrah, Hoogly and 24 Parganas. Moderate concentration was observed in Burdwan, Darjeeling and Jalpaiguri. Though the number of registered factories per thousand sq-km increased for all the districts of West Bengal, it however removed low in the districts of Cooch Behar, Purulia, Murshidabad, Malda, Nadia, West Dinajpur, Bankura and Birbhum between 1980 and 2009.

Therefore, these are the districts that are likely to be affected by the deceleration of growth in agriculture since they have low absorbing capacity of the excess workforce released from agriculture. However, situation would have been different if even unregistered small-scale units expanded in those districts. Share of construction and electricity, gas and water supply had either remained static during the period under study or marginally declined. As analysed in the previous chapters, it was observed that growth in production and productivity of foodgrain production in West Bengal had started declining since 1990-91 and deceleration became faster since 2000-01. Simultaneously, the manufacturing sector though experienced increase in growth rates but contribution to GSDP declined sharply. Hence, scope of workforce to move from agricultural to industry remained a contentious issue. The major contribution to GSDP is thus coming from the tertiary sector. Within tertiary sector, trade, hotels and restaurant, real estate and other services contributed significantly. It has been observed that tertiary sector experienced very healthy growth during nineties and in subsequent periods too. Therefore, the overall picture which comes to light from the foregoing discussion is that agriculture almost generated one-third of the state's income till 2000-01 and from 2000-01, half of the income of the state was being generated from services.

Table 7.8: Kinked Exponential Growth in Various Sectors from 1980-81 to 2009-2010 with three sub-periods, 1980-81 to 1989-90, 1990-91 to 1999-2000 and 2000-01 to 2009-10 (at 1993-94 Price)

Sector	Whole Period (1980-81 to 2009-2010)	Sub-Period I (1980-81 to 1989-90)	Sub-Period II (1990-91 to 1999-2000)	Sub-Period III (2000-01 to 2009-10)
Agriculture	4.2	6.0	4.7	3.5
	(22.2)*	(10.8)*	(9.5)*	(17.2)*
Primary Sector	**4.2**	**5.7**	**4.6**	**3.7**
	(26.6)*	(11.9)*	(10.9)*	(20.8)*
Registered	4.2	2.5	5.4	4.7
	(37.0)*	(6.9)*	(16.9)*	(34.6)*
Unregistered	5.1	3.3	5.7	5.7
	(40.0)	(8.2)	(16.2)	(38.5)
Manufacturing	4.6	2.8	5.6	5.2
	(43.3)*	(9.40)*	(21.1)*	(46.5)*
Construction	6.2	4.9	7.4	6.6
	(37.1)*	(7.1)*	(12.1)*	(25.9)*
Electricity, Gas and Water Supply	7.3	9.2	6.4	6.7
	(52.7)*	(20.2)*	(15.8)*	(39.3)*
Secondary Sector	**5.2**	**3.6**	**6.1**	**5.6**
	(60.1)*	(16.0)*	(30.4)*	(66.5)*
Transport, storage & communication	8.2	6.3	8.8	8.8
	(59.1)*	(14.4)*	(22.9)*	(54.8)*
Trade, hotels and restaurant	14.5	1.2	10.4	19.1
	(9.3)*	-0.2	(2.3)*	(10.0)*
Real estate, ownership of dwelling and business services	8.3	1.2	8.3	10.6
	(17.5)*	-1.6	(12.2)*	(37.2)*
Public administration	4.6	6.2	5.1	4.0
	(14.7)*	(5.0)*	(4.6)*	(8.6)*
Other services	6.7	1.4	5.7	8.5
	(12.3)*	(-0.8)	(3.8)*	(13.6)*
Tertiary Sector	**12.8**	**1.5**	**10.2**	**16.7**
	(10.8)*	-0.4	(3.1)*	(12.1)*
Gross state domestic Product	**8.0**	**3.4**	**7.4**	**9.6**
	(18.0)*	(2.5)*	(6.1)*	(19.0)*

Source: *Calculation based on GSDP data collected from Ministry of Statistics and Programme Implementation, Government of India [www.mospi.nic.in] and Department of Planning, Government of West Bengal [www. wbplan.gov.in]*

T-statistics are shown in parentheses.

* Significant at 1% level, ** Significant at 5% level and *** Significant at 10% level

Table 7.9: Share of Various Sectors (in percentage) in GSDP (at current prices) from 1980-81 to 2009-10

Year/sectors	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2009-10
Agriculture	26.0	27.2	26.1	30.1	25.0	19.3	18.9
Forestry & logging	1.1	1.1	1.0	0.9	0.8	1.1	1.1
Fishing	3.0	3.5	3.4	3.7	3.8	3.6	3.5
Mining & quarrying	1.2	1.3	1.2	0.8	1.4	1.3	0.8
Sub Total of Primary	**31.2**	**33.1**	**31.8**	**35.5**	**30.9**	**25.3**	**24.3**
Manufacturing	21.7	17.9	18.6	15.4	12.7	10.2	9.6
Registered	12.9	9.9	10.6	8.3	4.9	5.1	4.8
Unregistered	8.8	7.9	8.0	7.1	7.7	5.1	4.8
Construction	7.3	7.6	7.0	5.4	5.1	7.5	6.1
Electricity, Gas and Water supply	1.0	1.9	1.6	2.0	1.9	2.0	1.9
Sub Total of Secondary	**30.0**	**27.3**	**27.2**	**22.8**	**19.6**	**19.8**	**17.7**
Transport, storage & communication	4.8	5.9	7.2	7.3	6.5	8.5	8.9
Trade, hotels and restaurants	11.7	12.4	11.6	13.1	10.8	16.1	15.1
Banking & Insurance	5.0	5.2	5.4	7.4	11.0	6.0	5.7
Real estate and etc.	8.1	6.7	5.1	4.1	7.6	8.0	9.3
Public administration	3.0	3.7	4.8	4.2	5.6	5.5	6.0
Other services	6.1	5.7	6.9	5.6	8.0	10.9	13.2
Sub Total of Tertiary	**38.7**	**39.6**	**41.0**	**41.6**	**49.5**	**55.0**	**58.1**
Gross State Domestic Product (GSDP)	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: *Calculation based on GSDP data collected from Ministry of Statistics and Programme Implementation, Government of India [www.mospi.nic.in] and Department of Planning, Government of West Bengal [www. wbplan.gov.in]*

Table 7.10: Districtwise Number of Small-Scale Industrial Units Registered with Directorate of Micro and Small Scale Enterprises and Number of Registered Factories in per '000 sq-km area

Dist/ Year	Small Scale Units				Registered Factories			
	1980	1990	2000	2009	1980	1990	2000	2009
Burdwan	236	465	106	162	53	74	108	154
Birbhum	75	96	24	65	18	22	32	37
Bankura	72	149	58	61	6	8	13	22
Midnapore	197	586	169	142	7	11	16	28
Howrah	308	601	139	486	1005	1372	1811	2199
Hoogly	74	184	45	69	103	161	250	327
24 Pargans	142	559	121	276	223	314	419	516
Nadia	76	267	67	78	29	45	53	68
Murshidabad	103	222	135	97	3	4	5	13
West Dinajpur	42	113	49	34	6	7	13	19
Malda	183	216	89	79	2	6	9	18
Jalpaiguri	47	240	46	63	41	55	70	85
Darjeeling	71	151	25	18	51	65	78	93
Cooch Behar	49	81	36	45	4	6	8	13
Purulia	98	138	38	41	8	9	11	15
West Bengal	1570	3750	1033	1537	66	92	124	157

Source: *Calculation based on data collected from various volumes of West Bengal Economic Review, Government of West Bengal.*

7.7.2 Districtwise Change in Employment Scenario in West Bengal

Against the backdrop of the above-explained economic scenario of the state, a critical review of the employment scenario becomes necessary. Data on successive census years have been analysed to understand the changes in work participation rate, changing employment scenario of agrarian sector vis-à-vis industry. Total workers as percentage of population have been used to measure the work participation rate. Total workers consist of both main and marginal workers. From Table 7.11, it is evident that work participation rate has increased in successive census years since 1981 in the state of West Bengal as well as for her districts. However, since data on main workers and marginal workers are not shown in census year of 1981, it is not possible to ascertain that rise in work participation implies an increase in main workers. However, looking at districtwise figures of percentage of cultivators[1] to districtwise total workers, the employment scenario that emerges is not much encouraging. It is observed that in three successive census years, i.e., 1981, 1991 and 2001, cultivators as percentage of total workers had been consistently falling. From Table 7.12, it can be observed that between 1981 and 1991, the fall in percentage of cultivators is relatively much less compared to the percentage fall in cultivators during 1991 to 2001.

During 1981 to 1991, most of the districts in West Bengal experienced a decline of 2 to 3 percentage point, however, the fall in percentage of cultivators stood at 8 per cent in 24 Parganas, 5 per cent in Malda and Cooch Behar, while Jalpaiguri experienced a decline of 4 per cent. For the state as a whole the decline in percentage of cultivators to total workers was 1.2 per cent. However, the period between 1991 and 2001 was marked by more rapid fall in percentage of cultivators to total workers. As a matter of fact, for large number of districts, viz. Midnapore, Murshidabad, Malda, West Dinajpur, Darjeeling, Cooch Behar, Purulia, Birbhum and Burdwan, the fall in percentage of cultivators was hovering around 7 to 12 per cent. Here, decline in percentage of cultivators indicates a couple of possibilities: first, it may lead to an increase in percentage of agricultural labourers and precipitate the marginalisation of the rural workforce; second, expansion of rural non-farm activities and absorption of rural workers there in; third, movement of people from rural areas to secure a place at urban sector and finally, demotion of cultivators to marginal workers[2].

It has further been noticed that between 1981 and 1991, there was barely any increase in agricultural labourers as percentage to total workers (Table 7.12) across the districts of West Bengal. Districts like Midnapore, Murshidabad experienced a fall in percentage of agricultural labourers to total workers. A nominal increase in percentage of agricultural labourers was observed in West Dinajpur, Malda, Jalpaiguri and Purulia. It is not out of place

to mention here that during the eighties, redistribution of ceiling surplus land among the landless labourers and marginal farmers and registration of sharecroppers and granting them quasi land rights (commonly known as operation *barga*) gathered momentum in West Bengal and most of the districts experienced major resurgence in agricultural productivity. Resultantly, landlessness did not increase much during this period. Percentage of workers engaged in household[3] industrial activities either declined or increased marginally for most of the districts in West Bengal (Table 7.12) during this period. Rise in agricultural yield and production indirectly contributed to the expansion of market for mass consumption goods and partial increase in non-agricultural activities (West Bengal Human Development Report, 2004: 37). In Murshidabad and Malda the percentage of total workers engaged in household industries increased more than 8 per cent and 7 per cent respectively.

The agrarian scenario underwent a change between 1991 and 2001 and marginalisation of rural workforce became rampant and prominent. As mentioned earlier, decline in cultivators as percentage of total workers experienced a sharp decline and significant rise was observed in percentage of agricultural labourers as well as marginal workers in West Bengal and in many of its districts (Table 7.12). Major rise in percentage of total workers working as agricultural labourers was observed in Purulia and Midnapore. The percentage rise in agricultural labourers was found to be 15 per cent and 10 per cent respectively for these two districts. 3 to 6 percent rise in percentage of agricultural labourers was observed for the districts of West Dinajpur, Cooch Behar, Bankura and Birbhum. Employment in household industries, however, showed a moderate increase of 3.1 per cent during 1991 to 2001 for the state as whole and most of the districts also experienced a rise in percentage of workers engaged in household industrial activities. Districts like Howrah, Murshidabad, Purulia, Malda experienced a rise in percentage of household industry workers by 4 to 8 per cent. In districts like Burdwan, Birbhum, Bankura, Nadia, West Dinajpur, 2 to 4 per cent rise in employment in household industry was observed (Table 7.12). This indicated that during 1991 to 2001, employment opportunities in rural non-farm activities had experienced an expansion. This has been corroborated by West Bengal Human Development Report, 2004. Industrial recovery experienced by the state of West Bengal was not due to the improvement in the performances of organised industry. The growth of sectors like jute and leather was neutralised by the relative decline in growth of engineering and that had also adversely affected the investment in railways in the eastern region (ibid.: 76).

In addition, there was a significant rise in the percentage of marginal workers to total workers across the districts in West Bengal. Highest rise was observed in the district of Purulia where

percentage of marginal workers in relation to total workers increased by 25.3 per cent in 2001 compared to 1991. Followed by Bankura, in Purulia the rise in percentage of marginal workers stood at 24.6 per cent. Around 15 to 20 per cent rise in percentage of marginal workers was observed in Burdwan, Birbhum, Midnapore, West Dinajpur, Malda, Jalpaiguri and Cooch Behar. 10 to 14 per cent rise in percentage of workers engaged in marginal works was experienced by Howrah, 24 Parganas, Nadia, Murshidabad and Darjeeling.

Table 7.11: Districtwise percentage of Total Workers to District Population (Work Participation Rate)

Districts	Year	1981	1991	2001
Burdwan	Total	30.6	30.7	35.5
	Rural	21.3	21.2	24.5
	Urban	9.3	9.5	11.1
Birbhum	Total	30.5	33.1	37.4
	Rural	28.3	30.7	34.6
	Urban	2.2	2.5	2.8
Bankura	Total	32.9	35.9	44.7
	Rural	30.9	33.5	42.2
	Urban	2.0	2.4	2.5
Midnapore	Total	29.7	35.2	39.0
	Rural	27.5	32.4	35.9
	Urban	2.2	2.8	3.2
Howrah	Total	26.9	29.1	33.7
	Rural	13.5	14.2	16.6
	Urban	13.4	14.9	17.1
Hoogly	Total	29.8	31.1	36.9
	Rural	21.4	22.1	25.7
	Urban	8.4	9.0	11.2
24 Parganas	Total	27.2	28.6	33.0
	Rural	16.6	18.8	20.6
	Urban	10.6	9.7	12.4
Nadia	Total	27.5	29.3	35.1
	Rural	21.7	22.8	27.4
	Urban	5.8	6.5	7.7
Murshidabad	Total	40.9	31.5	34.2
	Rural	37.2	28.1	29.3
	Urban	3.7	3.4	4.9
West Dinajpur	Total	32.1	34.5	39.2
	Rural	29.2	30.9	35.3
	Urban	2.9	3.6	4.0
Malda	Total	30.3	34.7	40.7
	Rural	29.1	32.8	38.4
	Urban	1.2	1.9	2.3
Jalpaiguri	Total	33.6	33.8	38.3
	Rural	29.7	29.0	32.5
	Urban	3.9	4.8	5.8
Darjeeling	Total	36.2	34.2	35.4
	Rural	28.0	25.1	25.1
	Urban	8.2	9.1	10.3
Cooch Behar	Total	29.8	32.1	39.0
	Rural	28.0	29.9	36.0
	Urban	1.8	2.2	3.0
Purulia	Total	38.3	43.2	44.5
	Rural	35.9	40.6	41.6
	Urban	2.3	2.5	2.9
West Bengal	Total	32.5	29.9	39.0
	Rural	25.9	23.9	30.8
	Urban	6.7	6.0	8.3

Source: *Calculation based on data collected from Census of India-1981, Series 23, West Bengal, Census of India-1991, Series 26, West Bengal and Census of India-2001, Series 20, West Bengal, Directorate of Census Operation*

Table 7.12: Districtwise percentage of Cultivators, Agricultural Labourers, Household Industry and Marginal Workers to Districtwise Total Workers

Districts		Cultivators			Agri-Labourers			Household Industry			Marginal Workers		
	Year	1981	1991	2001	1981	1991	2001	1981	1991	2001	1981	1991	2001
Burdwan	Total	21.4	21.1	14.8	28.2	29.8	29.9	3.0	2.8	4.9	7.9	3.1	22.4
	Rural	20.8	20.2	14.2	27.1	28.0	28.8	2.0	2.3	3.8	2.5	2.6	17.9
	Urban	0.6	0.9	0.5	1.0	1.7	1.1	0.9	0.5	1.2	5.3	0.5	4.5
Birbhum	Total	34.9	31.7	23.1	35.4	34.3	36.9	3.3	3.3	6.5	7.9	8.2	26.3
	Rural	34.6	31.4	23.0	34.7	33.7	36.7	3.0	3.1	6.2	7.7	8.1	25.6
	Urban	0.3	0.4	0.1	0.7	0.6	0.2	0.3	0.2	0.3	0.2	0.1	0.7
Bankura	Total	36.3	37.3	33.8	30.7	30.8	35.3	4.2	3.1	5.8	11.5	8.5	33.8
	Rural	36.1	37.1	33.2	30.4	30.4	35.1	3.4	2.7	5.3	11.3	8.4	33.2
	Urban	0.2	0.2	0.6	0.4	0.4	0.1	0.7	0.5	0.6	0.2	0.1	0.6
Midnapore	Total	39.0	36.4	28.1	27.9	22.0	31.8	4.0	4.2	7.4	9.9	13.5	32.5
	Rural	38.5	35.9	27.8	27.2	21.2	31.3	3.7	4.1	7.2	9.7	13.1	31.5
	Urban	0.5	0.6	0.3	0.7	0.7	0.5	0.2	0.1	0.2	0.2	0.4	1.0
Howrah	Total	10.1	10.5	5.2	14.2	14.5	10.2	5.4	3.6	11.5	2.6	1.9	14.9
	Rural	9.7	9.9	5.0	13.3	12.8	9.7	3.3	1.9	6.9	2.0	1.5	10.3
	Urban	0.4	0.6	0.2	1.0	1.7	0.5	2.2	1.7	4.6	0.6	0.3	4.5
Hoogly	Total	23.1	20.7	14.9	26.8	26.1	24.3	3.4	6.0	5.2	3.8	1.8	17.8
	Rural	22.8	20.4	14.7	26.1	25.3	23.8	2.8	2.5	4.2	3.3	1.6	15.2
	Urban	0.3	0.4	0.2	0.8	0.8	0.5	0.7	3.5	0.9	0.5	0.2	2.6
24 Parganas	Total	20.8	12.5	12.7	21.2	21.5	18.9	2.9	2.9	5.1	3.9	4.5	17.8
	Rural	20.5	12.1	12.5	20.2	20.4	18.5	1.6	2.1	3.9	3.4	4.2	14.4
	Urban	0.4	0.4	0.2	1.0	1.1	0.4	1.2	0.8	1.2	0.5	0.3	3.3
Nadia	Total	30.5	28.8	19.8	27.9	27.0	23.2	5.6	7.2	11.4	2.8	1.8	13.0
	Rural	29.8	27.9	19.5	26.6	25.5	22.7	3.1	4.1	7.6	2.4	1.3	11.0
	Urban	0.7	0.9	0.3	1.3	1.5	0.6	2.5	3.1	3.8	0.4	0.5	2.0
Murshidabad	Total	33.3	30.0	18.7	31.6	27.9	28.0	5.4	13.0	20.4	5.8	4.6	16.6
	Rural	33.0	29.6	18.5	31.0	27.3	27.7	4.7	10.3	14.6	5.5	4.2	14.8
	Urban	0.4	0.4	0.2	0.6	0.6	0.3	0.7	2.7	5.8	0.2	0.4	1.8
West Dinajpur	Total	43.8	40.7	30.1	32.1	33.4	38.3	1.8	1.8	4.1	6.9	5.2	23.3
	Rural	43.2	39.7	30.0	31.6	32.7	38.0	1.5	1.6	3.6	6.6	5.1	22.5
	Urban	0.6	1.0	0.1	0.5	0.7	0.3	0.3	0.2	0.5	0.2	0.1	0.8
Malda	Total	36.0	31.5	20.8	30.9	31.6	30.7	3.8	11.2	15.6	10.0	8.8	27.9
	Rural	35.9	31.4	20.8	30.8	31.5	30.7	3.7	10.2	15.3	9.9	8.8	27.4
	Urban	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	0.3	0.1	0.0	0.4
Jalpaiguri	Total	31.5	27.4	20.7	15.4	15.8	17.7	1.1	1.1	2.1	5.5	6.7	21.3
	Rural	30.7	26.7	20.5	14.7	15.0	17.4	0.9	0.8	1.6	5.3	6.6	20.2
	Urban	0.8	0.7	0.2	0.6	0.8	0.3	0.3	0.3	0.4	0.2	0.1	1.2
Darjeeling	Total	25.5	24.4	15.5	8.7	11.6	10.2	1.3	0.6	2.8	3.4	1.5	15.9
	Rural	25.4	24.1	15.4	8.5	11.3	10.1	0.7	0.4	2.1	3.1	1.3	14.0
	Urban	0.2	0.3	0.1	0.2	0.4	0.1	0.6	0.3	0.7	0.3	0.2	1.9
Cooch Behar	Total	50.6	45.8	37.4	26.5	24.8	29.5	2.0	2.2	4.1	2.7	4.9	22.0
	Rural	50.4	45.6	37.3	26.3	24.5	29.4	1.8	2.0	3.7	2.7	4.8	21.5
	Urban	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.4	0.0	0.1	0.5
Purulia	Total	41.0	40.5	31.3	20.1	20.9	36.0	2.6	2.3	7.5	18.7	18.1	42.7
	Rural	40.8	40.3	31.2	19.8	20.6	35.9	2.4	2.1	7.3	18.5	17.9	41.9
	Urban	0.2	0.2	0.1	0.3	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.8
West Bengal	Total	28.7	27.1	20.5	25.4	24.7	26.5	3.4	4.5	7.6	6.7	6.5	22.9
	Rural	28.3	26.6	20.2	24.7	23.8	26.1	2.6	3.4	6.2	5.9	6.2	20.8
	Urban	0.4	0.5	0.3	0.7	0.9	0.4	0.8	1.0	1.4	0.8	0.3	2.1

Source: *Calculation based on data collected from Census of India-1981, Series 23, West Bengal, Census of India-1991, Series 26, West Bengal and Census of India-2001, Series 20, West Bengal, Directorate of Census Operation*

Increase in incidence of land alienation of *pattadars* and eviction of *bargadars* has also been observed in various districts of West Bengal. A study conducted by the State Institute of *Panchayat* and Rural Development observed that by 2001, on an average, almost 13 per cent of the *pattadars* had lost their land and around 14 per cent of *bargadars* were evicted from their land (Table 7.13). The extent of dispossession widely varied across the districts. More than 30 per cent of the *bargadars* lost possession of their land in Cooch Behar, North and South Dinajpur, and Jalpaiguri and these are also relatively agriculturally backward districts. The rate of eviction were also found to be high (around 15 to 20 per cent) in Darjeeling, Murshidabad, North 24 Parganas, Howrah and Burdwan. The percentage of dispossession, however, was low (less than 10 per cent) among districts of Malda, Purulia, Nadia and West Midnapore. It has further been observed that *pattadars* who had lost possession of land we also varied across the districts. Land alienation remained high (around or more than 20 per cent) in North Dinajpur, South 24 Parganas and South Dinajpur. Extension of tea estates in North Dinajpur and proliferation of brackish water fish cultivation and appropriation of arable land for such purposes in Sundarban regions of south 24 Parganas were identified as few possible causes, among many, for high incidence of land alienation in those districts (West Bengal Human Development Report, *op. cit.*: 41). A high percentage (14 to 16 per cent) of dispossession could also be found in Jalpaiguri, Birbhum, Murshidabad, North 24 Parganas, Purulia, Bankura and Hoogly. Among the evicted *bargadars* only 24.1 per cent reported that eviction caused the dispossession. Another important feature was highlighted in the report that around 74 per cent of *bargadars* had a feeling of tenurial security and rest were feeling insecured, inspite of the fact that their names had already been registered as share croppers or *bargardars*. However, a high proportion of *bargadars* (closer to 50 per cent) had a perceived sense of insecurity among the districts of Darjeeling, Hoogly, Jalpaiguri and North Dinajpur.

Table 7.13: Dispossession of *Pattadars* and Eviction of *Bargadars* (in percent) from Lands between Inception of land Reforms and the year 2000

DIST/YEAR	Dispossessed Pattadars (in per cent)	Evicted Bargadars (in per cent)
Burdwan	11.93	14.5
Birbhum	16.62	9.83
Bankura	15.45	11.09
West Midnapore	5.62	9.29
Howrah	9.34	15.9
Hoogly	14.63	10.48
North 24 Parganas	16.99	16.65
South 24 Parganas	22.07	10.31
Nadia	11.27	9.74
Murshidabad	15.87	19.06
North Dinajpur	22.35	31.49
South Dinajpur	19.17	30.73
Malda	10.41	5.66
Jalpaiguri	16.72	31.6
Darjeeling	14.71	16.0
Cooch Behar	12.33	30.9
Purulia	16.11	6.7
West Bengal	13.23	14.37

Source: *Chakraborti et al,. (2003): 35 and 57*

7.7.3 Changing Land Holding Pattern and Emerging Agrarian Structure in West Bengal

In West Bengal in general, and her districts in particular, majority of the people rely primarily on agriculture, land being the primary income generating asset. Hence, any change in landholding pattern may be viewed as a signal of relative prosperity or destitution among different segments of rural people. Alienation of rural masses from their land force them to 'lose their direct control over land and operation' and finally they 'lose their capacity to fulfil their basic consumption needs on the basis of self provisioning' (Joshi, 1982:771). In addition, with in elastic land area and with an adverse land/man ratio, it becomes imperative to transfer excess agrarian population to non-farm activities. Otherwise, absolute number of persons and households dependent on agriculture is bound to rise. As a consequence, the rise in number of marginal farmers and landless agricultural labourers become inevitable which aggravates rural distress and poverty.

In the foregoing analysis, it has already been observed that land reform and tenancy reform in terms of operation *barga* has contributed positively to the growth of foodgrain production and yield in the state as well as in the districts, during eighties and early-nineties. The positive impact of agricultural growth also helped indirectly towards the growth of unorganised small scale industries. But the scenario had started changing since the late-

nineties. Marginalisation of rural workforce is being increasingly felt. In addition, distribution of ceiling surplus land and granting tenurial security to the sharecroppers indeed helped the landless section of agrarian community. But at the same time, average size of landholdings is small and growing population makes it smaller and there is a possibility that with rising cost of production many of these holdings may prove to be uneconomical for the farmers.

To scrutinize the possible marginalisation of rural workforce, along with changing employment scenario (discussed in preceding section-7.4.2), the change in landholding patterns has been considered at state and at the district level. For this, Agricultural Census data on land holdings of major size-classes for 1970-71 and 2005-06 have been compared (Table 7.14, Table 7.15 and Table 16). It has been observed that in 1970-71, the percentage of household belonging to marginal category was relatively low in Darjeeling, Jalpaiguri, West Dinajpur and Burdwan compared to other districts and state as a whole. Further, the number of households in small, semi-medium and medium categories was relatively high. Conversely, the percentage of marginal holders was quite high in Howrah, Murshidabad, 24 Parganas and Midnapore. In comparison to 1970-71, a massive increase in percentage of households belonging to marginal category was observed for the state as well as for most of the districts. Most noticeable rise was observed in Darjeeling, Jalpaiguri, Malda and Burdwan. Growth of plantation economy in Darjeeling, Jalpaiguri and continuous migration of people from neighbouring countries Nepal, Bhutan, Bangladesh and Assam have partly contributed to the growth of percentage of households in marginal category. However, fall in percentage of households belonging to small, semi-medium and medium category across the districts proves the success of tenancy reform in West Bengal.

The major size-class wise distribution of area (in percentage) and magnitude of change that took place between 1970-71 and 2005-06 reveals that area belonging to marginal category has uniformly increased for all the districts as well as for the state. Area operated under small category declined for Howrah, Hoogly and Midnapore. However, area under semi-medium, medium category uniformly declined across the districts, reaffirming the relative equitable distribution of land through reform measures. Growth of plantation economy has increased the percentage of large land holdings in Darjeeling, Jalpaiguri, Cooch Behar and West Dinajpur. In addition, average land-holding for all districts has declined for both the districts and state.

Therefore, decreasing size of average land holdings coupled with increasing percentage of households in marginal category indicates gradual marginalisation of rural workforce.

Growth of unorganised small manufacturing units has also slowed down form late-nineties. It has been observed that the number of registered factories increased over the years but average daily employment per factory has substantially declined between 1990 and 2009. During the period between eighties and nineties per-factory average daily employment was quite high in Burdwan, Midnapore, Hoogly, 24 Parganas and Howrah while these districts experienced decline in average daily employment (Table 7.17). Large scale manufacturing units are hardly visible in the state. As a consequence, employment opportunities outside agriculture are becoming more and more inadequate. This would increase economic hardship of agrarian community of the state. Sufferings of agriculturally backward districts, therefore, would undoubtedly be on the rise.

Table 7.14: Number of Holdings of Major Size-Classes as percentage of Total Number of Holdings

Year/Dist	1970-71						2005-06					
	Marginal	Small	Semi - Medium	Medium	Large	Total	Marginal	Small	Semi - Medium	Medium	Large	Total
Darjeeling	38.1	27.9	23.3	10.0	0.6	100.0	83.2	12.6	3.7	0.4	0.15	100.0
Jalpaiguri	38.0	33.2	23.5	5.2	0.1	100.0	80.3	16.0	3.3	0.4	0.07	100.0
Cooch Behar	56.5	26.6	13.6	3.3	0.0	100.0	77.6	15.8	6.5	0.1	0.01	100.0
West Dinajpur	43.3	25.9	20.8	9.8	0.2	100.0	75.6	18.1	6.0	0.3	0.02	100.0
Malda	59.3	20.4	14.4	5.9	0.1	100.0	82.5	13.2	4.0	0.3	0.00	100.0
Murshidabad	63.8	20.2	12.2	3.8	0.0	100.0	79.6	15.9	4.2	0.4	0.00	100.0
Nadia	53.8	24.0	16.5	5.6	0.1	100.0	78.7	18.1	3.0	0.2	0.00	100.0
24 Parganas	68.2	18.9	9.9	3.0	0.0	100.0	87.0	10.9	1.9	0.1	0.00	100.0
Howrah	86.9	9.9	2.7	0.5	0.0	100.0	94.0	5.6	0.4	0.0	0.00	100.0
Hoogly	68.6	20.0	9.3	2.2	0.0	100.0	85.7	11.8	2.2	0.3	0.00	100.0
Burdwan	41.5	29.5	21.7	7.3	0.1	100.0	73.0	19.0	6.8	1.1	0.02	100.0
Birbhum	49.6	24.2	18.8	7.1	0.2	100.0	70.7	19.9	8.8	0.6	0.00	100.0
Bankura	50.0	27.3	16.7	5.9	0.1	100.0	66.6	22.0	9.5	1.9	0.00	100.0
Purulia	55.1	25.6	14.0	5.1	0.3	100.0	74.9	19.3	5.3	0.5	0.00	100.0
Midnapore	65.4	21.9	9.9	2.8	0.0	100.0	88.5	9.4	2.0	0.1	0.00	100.0
West Bengal	60.0	22.3	13.2	4.4	0.1	100.0	81.2	14.4	4.0	0.4	0.01	100.0

Source: *Calculation based on data collected from Agricultural Census 1970-71 and 2005-06, Government of West Bengal.*

*Marginal: less than 1 ha; Small: 1-2 ha; Semi-Medium: 2-4 ha; Medium: 4-10 ha and Large: more than 10 ha

Table 7.15: Area under Operational Holdings of Major Size-Classes as percentage Total Area Operated

Year/Dist	1970-71						2005-06					
	Marginal	Small	Semi-Medium	Medium	Large	Total	Marginal	Small	Semi - Medium	Medium	Large	Total
Darjeeling	6.7	12.9	20.3	18.1	42.0	100.0	25.0	12.8	6.3	1.5	54.5	100.0
Jalpaiguri	9.5	18.8	24.3	10.6	36.8	100.0	35.0	21.1	7.6	1.6	34.7	100.0
Cooch Behar	23.5	31.7	30.6	14.1	0.2	100.0	48.5	29.0	21.0	0.8	0.7	100.0
West Dinajpur	12.9	21.8	31.8	32.1	1.5	100.0	45.4	32.6	18.3	1.7	2.0	100.0
Malda	20.0	22.8	30.9	25.2	1.1	100.0	57.4	27.5	13.5	1.6	0.0	100.0
Murshidabad	24.3	26.4	30.4	18.3	0.6	100.0	48.7	33.4	15.6	2.3	0.0	100.0
Nadia	18.3	25.5	33.3	22.1	0.8	100.0	52.1	36.7	9.7	1.4	0.1	100.0
24 Parganas	27.9	27.5	27.7	16.4	0.5	100.0	63.8	27.1	8.1	1.0	0.1	100.0
Howrah	55.3	26.3	13.5	4.8	0.1	100.0	80.5	16.7	2.1	0.5	0.2	100.0
Hoogly	30.4	30.3	26.7	12.2	0.4	100.0	59.6	28.3	9.4	2.5	0.1	100.0
Burdwan	17.2	24.6	34.7	22.5	0.9	100.0	41.6	32.7	19.6	5.8	0.3	100.0
Birbhum	14.9	23.2	33.9	25.8	2.2	100.0	39.7	32.9	24.4	2.9	0.1	100.0
Bankura	17.3	27.4	31.7	22.8	0.9	100.0	33.2	32.3	25.1	9.5	0.0	100.0
Purulia	21.6	26.5	27.6	21.6	2.7	100.0	44.6	35.2	17.2	3.0	0.1	100.0
Midnapore	28.6	30.0	25.9	14.7	0.8	100.0	66.7	23.6	8.6	0.9	0.1	100.0
West Bengal	21.5	25.7	28.9	19.2	4.6	100.0	50.7	28.9	14.0	2.5	4.0	100.0

Source: *Calculation based on data collected from Agricultural Census 1970-71 and 2005-06, Government of West Bengal.*

Table 7.16: Average Land Holding (in ha) under Various Size-Classes

Dist/Year	Marginal		Small		Semi Medium		Medium		Large		Total	
	1970-71	2005-06	1970-71	2005-06	1970-71	2005-06	1970-71	2005-06	1970-71	2005-06	1970-71	2005-06
Darjeeling	0.54	0.44	1.42	1.49	2.67	2.51	5.52	5.47	204.05	548.03	3.06	1.47
Jalpaiguri	0.60	0.52	1.36	1.59	2.48	2.76	4.87	5.01	736.62	629.99	2.40	1.20
Cooch Behar	0.48	0.53	1.37	1.57	2.59	2.77	4.98	4.85	11.41	51.05	1.15	0.85
West Dinajpur	0.49	0.54	1.40	1.62	2.55	2.73	5.44	4.82	11.95	109.99	1.67	0.90
Malda	0.42	0.55	1.38	1.64	2.65	2.67	5.32	4.91	13.96	10.00	1.24	0.79
Murshidabad	0.40	0.45	1.38	1.55	2.64	2.72	5.15	4.88	22.19	10.00	1.06	0.74
Nadia	0.45	0.56	1.40	1.70	2.65	2.73	5.19	5.48	15.36	31.92	1.31	0.84
24 Parganas	0.39	0.45	1.38	1.53	2.67	2.60	5.20	4.97	13.61	12.94	0.95	0.62
Howrah	0.32	0.38	1.34	1.35	2.55	2.37	5.00	5.32	12.22	20.00	0.50	0.45
Hoogly	0.40	0.44	1.37	1.52	2.62	2.73	5.07	4.68	17.45	9.92	0.91	0.63
Burdwan	0.70	0.57	1.40	1.72	2.70	2.91	5.20	5.05	12.85	18.52	1.68	1.00
Birbhum	0.45	0.57	1.43	1.67	2.71	2.82	5.43	4.70	16.30	173.00	1.50	1.01
Bankura	0.48	0.50	1.39	1.47	2.62	2.63	5.36	4.95	12.70	12.00	1.39	1.00
Purulia	0.50	0.49	1.33	1.50	2.54	2.64	5.40	4.91	12.50	13.91	1.28	0.82
Midnapore	0.44	0.48	1.38	1.60	2.63	2.80	5.32	4.77	18.18	51.08	1.00	0.64
West Bengal	0.43	0.49	1.38	1.59	2.63	2.73	5.28	4.94	64.20	339.60	1.20	0.79

Source: *Calculation based on data collected from Agricultural Census 1970-71 and 2005-06, Government of West Bengal.*

Table 7.17: Per-Factory (Registered) Average Daily Employment

Dist/Year	1980	1990	2000	2009
Burdwan	267	243	111	96
Birbhum	50	42	34	39
Bankura	25	22	26	49
Midnapore	204	156	137	113
Howrah	111	80	67	54
Hoogly	469	290	187	143
24 Pargans	145	96	71	61
Nadia	95	89	80	71
Murshidabad	114	174	166	75
West Dinajpur	53	69	60	59
Malda	37	36	36	39
Jalpaiguri	79	59	61	56
Darjeeling	55	49	49	50
Cooch Behar	56	49	36	61
Purulia	97	81	72	67
West Bengal	147	106	78	67

Source: *Calculation based on data collected from various issues of West Bengal Economic Review, Government of West Bnegal*

7.8 Conclusion

The important findings of this chapter has been delineate below. There has been significant growth in production and productivity in foodgrain in West Bengal and her districts during the eighties. However, such growth slowed down in the nineties and since 2000-01 the decline was sharper. The results obtained from econometric analysis provide a clear indication that the turn around in West Bengal cannot solely be attributed to institutional reforms; rather institutional reform, adoption and spread of Green Revolution technology and functioning of *panchayats,* together brought the positive changes in agricultural production and productivity. It has been shown in the present analysis that unless the number of *bargadars* as percentage of operating household is reaches a critical level of 25 per cent the fruits of Green Revolution would not be fully realised. As a matter of fact, the districts of Birbhum, Bankura, Burdwan, Hoogly, Malda and Midnapore achieved high average productivity. The number of *bargadars* registered as percentage of total number of operating households in those districts also remained relatively high in comparison to other districts of West Bengal. Of the districts of West Bengal, Burdwan, Midnapore, 24 Parganas, Hoogly, Murshidabad, West Dinajpur, Nadia and Birbhum achieved high average productivity of foodgrain and in those districts average use of fertiliser (kg/ha) also remained relatively higher.

This study has further reaffirmed the role of fertiliser in enhancing productivity with the help of regression analysis. This also proves the greater spread of HYV seeds and irrigation.

Expansion of tube-well irrigation in large scale allowed reaping the productivity gain in output of HYV varieties of rice in West Bengal. In addition, the spread of *Zilla Parishad* road and credit society per thousand square kilometres is yet to reach a level at which it may exert strong influence on the agricultural productivity to a large extent.

The study further confirms that inverse relationship between farm size and productivity does not hold good universally. The study further observed that impact of economic reforms which is captured by using a dummy variable depicted positive relationship with agricultural productivity though it was observed since late-nineties, productivity had started declining in most of the districts of West Bengal. On income-employment front, the impressive productivity gain in agriculture also helped to raise the over all agricultural income in the state and it was also responsible most for the sluggish growth in the '80s in comparison to secondary and tertiary sector of the economy. However, growth performance of secondary sector and tertiary sectors markedly improved during 1990 to 2009. Hence, the strong role of small-scale industries propelling the economy gets pronounced alternatively which also implies less penetration of large-scale manufacturing units. During the nineties and in subsequent years, the growth rate in agricultural SDP declined inspite of the fact that The growth rate in GSDP for the state as a whole improved substantially during these periods. However, the fall in contribution of agriculture to GSDP was not compensated by the proportionate increase in the share of the secondary sector.

Absence of large-scale manufacturing sector has elongated industrial backwardness of the state. Looking at the employment scenario for three successive census years, i.e., 1981, 1991 and 2001, it is noticed that cultivators as percentage of total workers is consistently falling and such downward trend became sharp between 1991 and 2001. At the same time, there was an overwhelming rise in the percentage of marginal workers to total workers across the districts of West Bengal. Increasing incidence of land alienation of *pattadars* and eviction of *bargadars* has been noticed in the state and districts. A considerable increase in percentage of households belonging to marginal category was observed for the state as well as for most of the districts. Therefore, decreasing size of average land holdings coupled with increasing percentage of households in marginal category indicates gradual marginalisation of the rural workforce. Resultantly, the huge growth and gain in agricultural production and productivity in West Bengal that ushered in during the eighties could not be sustained. The inadequacies in generating 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.

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[1] A person is classified as cultivator if he or she is engaged in cultivation of land owned or held from Government or held from private persons or institutions for payment in money, kind or share. Cultivation includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or persons or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation of land, is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or a combination of both (agricultural labourer) is not treated as cultivator.
Cultivation involves ploughing, sowing, harvesting and production of cereals and millet crops such as wheat, paddy, jowar, bajra, ragi, etc., and other crops such as sugarcane, tobacco, ground-nuts, tapioca, etc., and pulses, raw jute and kindred fibre crop, cotton, cinchona and other medicinal plants, fruit growing, vegetable growing or keeping orchards or groves, etc. Cultivation does not include the following plantation crops - tea, coffee, rubber, coconut and betel-nuts (areca).

[2] Marginal workers are those workers who had not worked for the major part of the reference period i.e., less than 6 months in a year.

[3] Household Industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas. The larger proportion of workers in the household industry consists of members of the household. The industry is not run on the scale of a registered factory which would qualify or has to be registered under the Indian Factories Act. The main criterion of a Household industry even in urban areas is the participation of one or more members of a household. Even if the industry is not actually located at home in rural areas there is a greater possibility of the members of the household participating even if it is located anywhere within the village limits. In the urban areas, where organized industry takes greater prominence, the Household Industry is confined to the precincts of the house where the participants live. In urban areas, even if the members of the household run an industry by themselves but at a place away from the precincts of their home, it is not considered as a Household Industry.
Some of the typical industries that can be conducted on a household industry basis are: Foodstuffs : such as production of floor, milking or dehusking of paddy, grinding of herbs, production of pickles, preservation of meat etc. Beverages: such as manufacture of country liquor, ice cream, soda water etc., Tobacco Products : such as bidi, cigars, Textile cotton, Jute, Wool or Silk, Manufacture of Wood and Wood Products, Paper and Paper Products, Leather and Leather Products, Petroleum and Coal Products : such as making foot wear from torn tyres and other rubber footwear, Chemical and Chemical Products :such as manufacture of toys, paints, colours, matches, fireworks, perfumes, ink etc., Service and Repairing of Transport Equipments : such as cycle, rickshaw, boat or animal driven carts etc.