



Asset Creation through National Rural Employment Guarantee Scheme (NREGS) and its Impact on West Bengal Agriculture: A District Level Analysis

Amit Kundu¹ and Sanjib Talukdar²

The intention of the National Rural Employment Guarantee Scheme (NREGS) popularly known as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is to provide employment guarantee in rural areas. The scheme continues to be one of the most ambitious centrally sponsored schemes of the independent India. Until August 2014, the scheme has generated 1760.78 crores of man days of work in rural areas with an expenditure of Rs. 2, 65,727 crores.³ It is expected that NREGS can generate income support for the poor and can raise agricultural productivity as well as profitability in the long run through creating different productive assets related to agriculture. As for example, the Employment Guarantee Programme (EGP) in Maharashtra was able to avert famine during draught of 1970-73 and reduced poverty. Similarly, Rural Public Works Programme in Bangladesh contributed to rural development and increased agricultural productivity through the creation and maintenance of rural infrastructure (Dreze and Sen, 1991).

The NREG Act indicates the kinds of works that may be taken up for this purpose. As per Schedule I of the Act, the focus of the National Rural Employment Guarantee Scheme (NREGS) shall be on the following works.⁴

- Water conservation and water harvesting;
- Drought proofing, including afforestation and tree plantation;
- Irrigation canals, including micro and minor irrigation works;
- Provision of irrigation facility, plantation, horticulture, land development to landowned by households belonging to the SC/ST, or to land of the beneficiaries of landreforms, or to land of the beneficiaries under the Indira AwasYojana/BPL families

¹ Professor, Department of Economics, Jadavpur University, Kolkata-700032, E-mail: akundu29@gmail.com, akundu1970@gmail.com

² Assistant Professor In Economics, Sree Chaitanya Mahavidyalaya, Habra, 24 PGNS (N). E-mail: reach4gb@gmail.com

³Mishra, Viswanathan, Bhattacharai, 2014

⁴NREGA 2005, Operational Guidelines 2008, 3rd edition

- Renovation of traditional water bodies, including de-silting of tanks;
- Land development
- Flood-control and protection works, including drainage in waterlogged areas;
- Rural connectivity to provide all-weather access. The construction of roads may include culverts where necessary, and within the village area may be taken up along with drains. Care should be taken not to take up roads included in the PMGSY network under NREGA. No cement concrete roads should be taken up under NREGA. Priority should be given to roads that give access to SC/ST habitations;
- Any other work that may be notified by the Central Government in consultation with the State Government.

The assets created under the NREGS (see details in Table 1) can be broadly classified into two categories: (i) assets created in individuals' land and (ii) assets created in community land (Mishra, 2011).

Table 1: Nature of work required for asset creation under NREGS

Type of work	Nature of work
Water conservation and harvesting	Digging of new ponds/tanks etc
Draught proofing and plantation	Afforestation and tree plantation etc
Flood control and protection	Drainage in water logged areas, construction and repair of embankments etc
Land development	Plantation, land leveling etc.
Micro irrigation works	Minor irrigation canals etc.
Renovation of traditional water bodies	Desalting of tanks/ponds, desalting of traditional open wells etc.
Provision of irrigation facilities	In the land of SC and ST, beneficiaries of land reforms, IAY etc. This is actually asset creation work through NREGA in private land
Rural connectivity	Construction of village roads etc.
Any other work approved by the ministry of Rural Development	Other works etc.

Source: Compiled from Mishra, 2011

Land development, water conservation, water harvesting, drought proofing, flood control etc. would help improving crop yields per unit of land in a sustainable manner. It is expected that improvement in irrigation capacity, apart from bringing new area under cultivation, can also improve crop yields due to availability of more water, and

can result in multi-cropping as well (Haque, 2013). The present paper attempts to explore whether irrigation works under NREGS, have been able to convert the mono cropping areas into multi-cropping ones or not.

Enhancement of irrigation facility is one of the most important aspects of asset creating works through NREGS. In most of the villages irrigation works have been undertaken, people have reported recharging of ground water. Renovation of ponds or canals using NREGS resources helped improve irrigated area and cropping pattern positively. There are reports on the revival of water bodies and canals under the NREGS. In many parts of the country, a large number of farmers could raise crops after works undertaken in NREGS like renovation of long canal where there was hardly any crop (Reddy, 2013). In a study across 10 semi-arid villages spread in three states of Gujarat, Madhya Pradesh and Maharashtra, Mishra, Viswanathan and Bhattarai (2014) found that the implementation of the NREGS has varied experiences. But as regards asset creation in the Scheme, the beneficiaries appreciated the community wide benefits of rural assets and infrastructure created. Even though it may not have any direct benefit to the labor households, it certainly has a community level benefit. Sudha Narayanan, Krushna Ranaware, Upasak Das and Ashwini Kulkarni (2014) based on a study on over 4100 works created under the National Rural Employment Guarantee Act (NREGA) and over 4800 randomly selected users across 100 villages in 20 districts in Maharashtra found that an overwhelming 90% of respondents considered the works very useful or somewhat useful; only 8% felt the works were useless. Overall it appears that the works are supportive of agriculture and of small and marginal farmers.

A study conducted by the Institute of Rural Management Anand (2010) reveals that there is overall positive impact of assets created under NREGA in the state of Sikkim and it also foresees a positive second round multiplier effect of the Scheme. However, it added that the mechanism to ensure durability and sustainability of the assets created under the Scheme needs to be strengthened and clearly suggests some strategies in this regard. According to MGNREGA Sameeksha (2014), 146 lakh works have been taken up since the beginning of the Scheme, of which about 60 per cent have been completed.

Of these works,

- 19 per cent relate to rural connectivity (e.g. village roads)
- 25 per cent relate to water conservation and water harvesting
- 14 per cent relate to irrigation canals and renovation of traditional water bodies
- 13 per cent relate to flood protection and drought proofing
- 13 per cent relate to land development
- 14 per cent relate to work done on private lands (lands belonging to small and marginal farmers/SCs/STs/Below Poverty Line (BPL) households/Indira Awas Yojana (IAY) and land reform beneficiaries)

So far as the West Bengal scenario is concerned, we present below an idea regarding the works done under NREGS in the last few years towards creation of assets.

Table 2: Works done under NREGS in West Bengal in last few financial years:

Works	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Number of Ongoing Works [in lakhs]	5.86	21.69	2.357	2.32	3.97	6.06
Number of Completed Works	5.08	5.10	2.11	2,45,345	1,82,494	1,67,827

Source: www.nrega.nic.in

The table shows that the number of completed works shows a downward trend. Not only that, the gap between the number of ongoing works and that of completed works has been ever widening except 2012-13.

Research objective: In the light of the above proceedings, the present study has tried to investigate whether introduction and persistence of different kinds of works and the resulting asset creation related to agriculture under NREGS has any impact on the cropping intensity of West Bengal over the years. We know that agriculture has been occupying a prime position in West Bengal economy since independence. The backdrop of the significant role of agriculture in West Bengal economy and taking into account the emphasis given in the NREG Act to create long term assets with a view to enhance agricultural productivity, we consolidate the matter of selection of West Bengal as the subject of study. Moreover, as far as our warm up study goes, no objective investigation has been undertaken so far to examine the influence of asset creation under NREGS on agricultural activities in West Bengal.

Here within West Bengal, we have taken each NREGS implemented district as the unit of study and three asset creation activities relevant to agriculture, viz, provision of irrigation facilities, micro irrigation works and rural connectivity works whose impact on agriculture would be evaluated. We consider only the said asset creation activities because only these three asset creation activities related to agriculture were mainly done in the entire reference periods through NREGS in West Bengal.

Provision of Irrigation facility implies arranging irrigation facility through NREGS work in the land owned by the households belonging to the SC, ST or in the land of the beneficiaries of land reform or that of the beneficiaries of IAY of the government of India. In West Bengal, as regards number of works done under this head, most of the districts are less than moderate performers on the question of this kind of asset creation. On the extreme ends, Darjeeling (DGHC) is the worst performer, because the extent of creation of this facility was minimal in the district. On the other hand, West Midnapur has done comparatively better than others. Thus there is wide scale fluctuation across

the districts as regards creation of this kind of asset. We below present a glimpse over the variation in this kind of works done for the relevant years i.e, 2006-07 to 2013-14.

Table 3: Coefficient of Variation across districts in the works done under provision of irrigation facilities in NREGS for different years.

Year	Coefficient of Variation
2006-07	184.75
2007-08	184.75
2008-09	110.23
2009-10	149.29
2010-11	143.53
2011-12	184.05
2012-13	186.63
2013-14	195.45

Source: Calculation made by the authors on the data from www.nrega.nic.in

The above table shows that there seems wide scale variation across the district in the number of works done under provision of irrigation facilities in almost all the years. Micro irrigation means construction of irrigation canals for micro irrigation activity in the public land. Again simply considering the number of works done, majority of the districts appear at par as far as creation of this kind of facility is concerned. Again DGHC has not done well as long as its year wise performance goes, whereas Birbhum, Burdwan and Purulia are the better performers.

Table 4: Coefficient of Variation across districts in the works done under micro irrigation facilities in NREGS for different years.

Year	Coefficient of Variation
2006-07	214.63
2007-08	163.24
2008-09	102.24
2009-10	115.72
2010-11	68.84
2011-12	75.87
2012-13	80.12
2013-14	75.44

Source: Calculation made by the authors on the data from www.nrega.nic.in

As regards number of micro irrigation works done across districts, Table-4 stands by the fact that the extent of variation has come down over the years establishing the proposition that there appears relatively more parity than the previous kind of works done across districts.

Rural connectivity covers construction of village roads through NREGS works. The extent of works done on this kind of asset appears much more commendable as compared with the previous ones. In all the districts except DGHC, a moderate performance has been sustained. However, on this count, West Midnapur and Birbhum have done really well.

Table 5: Coefficient of Variation across districts in the works done under rural connectivity through NREGS for different years.

Year	Coefficient of Variation
2006-07	134.01
2007-08	134.01
2008-09	90.2
2009-10	105.22
2010-11	77.91
2011-12	84.58
2012-13	66.18
2013-14	49.15

Source: Calculation made by the authors on the data from www.nrega.nic.in

Rural connectivity works through NREGS have been done more or less uniformly across districts in the relevant years. Moreover, for most of the years, we observe a downward trend in the degree of variation over the works done across districts under this head.

We have considered cropping intensity as the outcome variable which is measured by the percentage of gross cropped area to the net sown area. Cropping intensity can be regarded as a proper measure of multiple cropping on a specific plot of arable land. In this connection, alternative measures like crop diversification could be accommodated, but the concept of cropping intensity in fact acts as a super set in this regard. Enhancing cropping intensity is primarily the decision of the farmer. It is observed that all the farmers in West Bengal cultivate paddy in the rainy season where little amount of fertilizer as well as irrigation facilities are required. But in the post rainy season, the farmer has to decide whether he will continue his production or not. If a large number of farmers agree to do that, then the cropping intensity of the district would increase.

In West Bengal, cropping intensity has increased for most of the districts during the period 2006-07 to 2013-14. Table-6 below reflects the fact.

Table-6: Average Annual Growth Rate of Croppnig Intensity of different districts during the period 2006-07 to 2013-14

District	Average Annual Growth Rate(in % term)
N 24 Pgns	30.6
S 24 Pgns	67.7
Bankura	7.5

Birbhum	70.1
Burdwan	-44.2
Coach	69.2
DGHC	95.8
D Dinajpur	35.2
U Dinajpur	92.3
E Medinipur	-42.2
Hooghly	65.7
Howrah	-41.1
Jalpaiguri	44.7
Maldah	58.6
Murshidabad	6.5
Nadia	6.2
Purulia	101
W Medinipur	158

Source: Calculated by the authors from the “Estimates of Area & Production of Principal Crops in West Bengal” of different years compiled by Evaluation Wing, Directorate of Agriculture, Government of West Bengal.

It is to be noted that the period we considered refers to the initial eight years of the implementation of NREGS. It is observed from the table that in majority of the districts except Burdwan, East Medinipur and Howrah, cropping intensity has increased during the referred period. Thus, we make an apprehension that this increase in cropping intensity might be a positive response towards asset creation through NREGS during the same tenure. The farmer may be encouraged to cultivate in the post rainy season in his own land if irrigation facilities are sufficiently available. In West Bengal, the expansion of irrigation facilities is done mainly through NREGS in the last decade (Different statistical abstracts published by Government of West Bengal in different years). It is easily understandable that provision of irrigation facilities and micro irrigation are expected to influence the cropping intensity. In West Bengal, a gigantic size of the farming households are marginal farming households whose members remain immensely concerned about the marketability of their produce. Again, the exposure to market of their produce badly depends on availability of rural infrastructure consisting largely of rural connectivity. Rural connectivity works under NREGS can improve the condition of rural infrastructure, and the farming households may become confident enough to go for the second crop production which in turn will increase in cropping intensity. Thus the inclusion of rural connectivity, not to mention about the other two, is justifiable.

Hence, we want to investigate whether expansion of asset creation through NREGS has been able to play any significant role through encouraging mainly the marginal farmer households of West Bengal to move towards multiple cropping.

Data and Methodology:

We have taken in all 18 districts (except the Kolkata Metropolitan) in West Bengal where NREGS has been implemented. Since, NREGS was implemented in West Bengal from 2006-07, we have taken that year as the base year and subsequently studied the progress through different years up to 2013-14.⁵ In this way, we track the chronological variation in cropping intensity after implementation of NREGS starting from a base year when it was initiated. Thus we have a panel data comprising of 18 districts (cross section units) and 8 time periods. Hence we have 144 pooled observations.

Our a priori hypothesis is that, variation in cropping intensity is likely to be influenced positively by provision of irrigation facilities, micro irrigation works, rural connectivity works all of which are undertaken in NREGS, average rainfall and average harvest price of the principal crops.⁶

In our study, we are considering the lagged value of the indicators like 'provision of irrigation facility', 'micro irrigation' and rural connectivity'. Actually most of the NREGS work is done in the post rainy season which is expected to give agricultural benefit at least in the next farming season. Hence asset creation through NREGS in the $(t-1)^{\text{th}}$ period in a particular district under three heads may influence cropping intensity of that district in the t^{th} period because the farmer can enjoy the benefit of asset creation in the next period at the earliest. Likewise, farmers' general decision of a particular district to go for second crop and so on in the t^{th} period would depend on the average harvest price of principal crops of the previous period, i.e, $(t-1)^{\text{th}}$ period of that district. Only for 'rain fall' we consider the data of the t^{th} period.⁷

⁵Data on district wise cropping intensity, average rainfall and average harvest price has been available from the source we explored up to 2013-14. Hence, due to inadequacy of data, we could not proceed beyond 2013-14 as far as our source of data is concerned.

⁶ Average rainfall in a district in a particular year is considered as an indicator of the overall agro-climatic condition of the same. Agricultural credit may influence the cropping intensity. But in West Bengal, most of the farmers are marginal in nature and most of the times; they have to depend on different kinds of agricultural credit mostly from informal sources. Besides that, district wise data of sanctioned agricultural credit over the time period is not available. Secondly, district wise data on use of machineries in cultivation is also not available. Thirdly, consumption of fertilizer might be important for productivity enhancement, but in this case it may not be an appropriate explanatory variable. Last but not the least, the average agricultural wage of the t^{th} period in a particular district depends on the average agricultural wage of the same district in the $(t-1)^{\text{th}}$ period which in turn is highly influenced positively by NREGS works (Haque 2013, Reddy 2013). So this is not considered as an explanatory variable in our model.

⁷Data on cropping intensity across districts of the relevant years and that for district wise average rainfall and average harvest price in the same relevant years are obtained from the "Estimates of Area & Production of Principal Crops in West Bengal" of different years compiled by Evaluation Wing, Directorate of Agriculture, Government of West Bengal, whereas data on 'provision of irrigation facility', 'micro irrigation' and rural connectivity' pertaining to NREGS are collected from official website of NREGS, i.e, www.nrega.nic.in

The Model and its Results:

The equation depicting the influence of three NREGS asset creation activities as well as average rainfall and average harvest price on the cropping intensity can be conceptualized as follows:

$$\ln \text{cropint}_{it} = f(\text{proirrifclty}_{i(t-1)}, \text{microirriwrks}_{i(t-1)}, \text{ruralconnctvty}_{i(t-1)}, \text{avgrnfall}_{it}, \text{hprice}_{i(t-1)}) \dots \text{Eq}(1)$$

Where $i = 1 \dots 18$ and $t = 1 \dots 8$

Here ' $\ln \text{cropint}_{it}$ ' is 'log of cropping intensity of the i^{th} district in the t^{th} period, ' $\text{proirrifclty}_{i(t-1)}$ ' implies total number of works completed under 'provision of irrigation facilities' in the i^{th} district in the $(t-1)^{\text{th}}$ period. Similarly ' $\text{microirriwrks}_{i(t-1)}$ ' and ' $\text{ruralconnctvty}_{i(t-1)}$ ' are total number of works completed under micro irrigation scheme and under 'rural connectivity scheme' in the i^{th} district in the $(t-1)^{\text{th}}$ period respectively. ' avgrnfall_{it} ' is average rainfall⁸ of the i^{th} district in the t^{th} year and ' $\text{hprice}_{i(t-1)}$ ' is average harvest price⁹ of the i^{th} district in the $(t-1)^{\text{th}}$ period.

Here we consider only three asset creation activities namely, 'provision of irrigation facility', 'micro irrigation' and rural connectivity' because only these three asset creation activities were mainly done in the entire reference periods through NREGS in West Bengal. In order to evaluate the impact of asset creation through NREGS on the cropping intensity in West Bengal, we adopt Random Effect estimation techniques suggested through Hausman test because the Hausman test yields the following results:

$\chi^2(5) = 4.03$ which is statistically not significant.

The results clearly lead us to accept that Random Effects model is consistent during the time of estimating Eq.(1).. Moreover, according to Kmenta(1986), the dummy variables represent a lack of knowledge about the (true) model where we fail to include relevant explanatory variables that do not change over time (and possibly others that do change over time but not over cross-sectional units). Hence, it is better to express this ignorance through the disturbance term u_{it} which is precisely the approach suggested in the error components model (ECM) or Random Effects model (REM). We know that in the Random Effect model, the unobserved factors are not correlated with the

⁸ Average rainfall of a particular district in a particular year is calculated by taking simple average of rainfall spread in different months.

⁹ Average harvest prices of different principal crops cultivated in the post rainy season are calculated by taking simple average of prices of principal crops except rainy season crop(s) in each year of each district on the basis of constant price considering 2005 as the base year. The conversions were on the basis of consumer price index of the rural labourers of West Bengal published by Ministry of labour, Government of India in different years.

explanatory variables. In our hypothesis, the explanatory variables are related to NREGS works and are assumed to be uncorrelated with other unobserved factors which may influence the cropping intensity of a particular district. Also 'average rainfall' can be considered exogenous and uncorrelated with the unobserved factors. In addition, in our study, we have a short panel data where number of cross sectional units (N) is greater than the number of time points(T). For a short panel data, Random Effects model becomes more appropriate. Moreover, according to Taylor's (1980) rule of thumb, if $T > 3$ and $(N-K) > 9$, where T implies number of time periods, N stands for number of cross section of individuals and K signifies number of explanatory variables, then Random Effect estimates are more efficient than the Fixed Effect estimates. Here $T=8 > 3$ and $(N-K) > 9$, where $N=18$ districts and $K=4$ explanatory variables. Hence, by this rule, in the present condition, Random Effect estimates are more efficient than the Fixed Effect estimates. After carrying out the Random Effect estimation process, we get the following results:

Table 7: Results of Random Effect Estimation (Generalized Least Square): Dependent variable: logofcropint

Variable	coefficient	Standard error
proirrifclty	$3.54 e^{-06}$	$6.30 e^{-06}$
microirriwrks	.0000243**	.0000141
ruralconncvtvy	.0000129*	$3.93e^{-06}$
Avgrnfall	.0005251*	.0001253
Hprice	.0000572*	.000021
Constant	5.170331*	.0574676

Number of observations = 144

R^2 : within = 0.2339 Wald $\chi^2(5)$ = 35.89*

between = 0.0006

overall = 0.0067

'*' and '**' implies level of significance at 1% and 5% level.

Discussion:

On the basis of the results presented in Table-7, we can draw the following inferences:

- (i) The NREGS work like 'provision of irrigation facility' has no impact in enhancing cropping intensity

- (ii) Micro irrigation work through NREGS has created a positive impact on Cropping Intensity. But the impact is very small because the value of the co-efficient is very small (though it is statistically significant)
- (iii) Same thing also happens in 'rural connectivity work' through NREGS. Its impact is very small so far as the value of the coefficient is concerned, but the estimated value is statistically significant.
- (iv) Rain fall still plays a significant role to enhance the cropping intensity of West Bengal. The value of the coefficient is relatively large and also statistically significant.
- (v) Harvest price also plays a significant role to enhance the cropping intensity of West Bengal. The value of the coefficient is small but statistically significant.

Thus in spite of the expansion of NREGS work, 'average rainfall' throughout the year and average harvest price of the previous period still play a major influential role among the farmers of West Bengal during the time of taking decision regarding expansion of agricultural activities in a given period.

Investigation on variation of cropping intensity across districts:

Hausman test is based on certain extreme assumptions. It is observed that random effect estimation procedure can be applied if and only if (i) the cross sectional units are random in nature and (ii) individual error component are uncorrelated with the explanatory variables. But in West Bengal we have considered 18 out of 19 districts. Hence, the selected districts are not fully random in nature. Besides that Table- 4, Table- 5 and Table-6 show that still there exist inter district disparity in number of works related to asset creation completed through NREGS. So there may be some district specific unobserved factors which may influence NREGS work in different districts. Further, we have a panel data set where there are no time invariant variables. Hence Fixed Effects model can be attempted. On the basis of the above logic and to identify the district specific effect on cropping intensity in NREGS implementation periods we further consider Fixed Effects model which is given in Eq.(2)¹⁰

$$\begin{aligned} \text{Incropint}_{it} = & \sum_{i=1}^{18} \alpha_i D_i + \beta_1 \text{proirrifclty}_{i(t-1)} + \beta_2 \text{microirriwrks}_{i(t-1)} \\ & + \beta_3 \text{ruralconnctvty}_{i(t-1)} + \beta_4 \text{avgrnfall}_{it} + \beta_5 \text{hprice}_{i(t-1)} \\ & + u_{it} \dots \dots \text{Eq. (2)} \end{aligned}$$

¹⁰ Initially we have done least square dummy variable technique considering the time dummy. It is observed that all the values of the coefficients of the time dummies are positive and statistically significant. So 'Time Effect' is present. This establishes the fact that cropping intensity has increased in West Bengal in the post NREGA implementation period.

Ignoring the intercept term, we are using 18 district specific dummies to avoid dummy variable trap along with four covariates (already considered in Eq.(1)) to estimate the fixed effects model which can also be recognized as Least Square Dummy Variable model. We observe the following results summarized in Table- 4 below.

Table 8: Results of the fixed model where dependent variable is ‘Incropint’

Variable	Coeff.	Std. Err.
Provofirri	3.42e-06	6.27e-06
Microirri	.000023**	.0000141
Ruralconnctvty	.0000127*	3.92e-06
Avgrnfall	.0005509*	.0001257
Hprice	.000055*	.0000209
N 24 PGNs	5.271071*	.0347517
S 24 PGNs	4.975013*	.0372776
Bankura	4.995812*	.0360162
Birbhum	5.089118*	.0390868
Burdwan	5.173626*	.0390593
Coach	5.259618 *	.0438369
Darjeeling	4.890647 *	.0476274
D Dinajpur	5.131004 *	.0383286
U Dinajpur	5.173005*	.040206
E Midnapore	5.161753*	.0424566
Hooghly	5.512903*	.0338815
Howrah	5.248352*	.0323004
Japaiguri	4.999936*	.0500376
Maldah	5.275942*	.0378031
Mushidabad	5.432765*	.037974
Nadia	5.470713 *	.0378901
Purulia	4.748745 *	.0409851
W Midnapore	5.126821*	.0386546

$R^2 = 0.9999$

$F(23,120) = 94435.26$ $\text{Prob} > F = 0.0000$

*=> significant at 1% level and **=> significant at 5% level.

Discussion:

In all the districts the parameter estimate is statistically significant. So we can say that cropping intensity has increased in all the districts of West Bengal between 2006-07 and 2013-14 (the time period when NREGS work was gradually expanding in all the districts). Apart from this, except provision of irrigation facilities, all other factors remain statistically significant as before but having meager marginal impact. So with respect to this bag of explanatory variables, the Random Effect and the Fixed Effect models produce almost same results.

Conclusion:

We know that creation and maintenance of durable and sustainable assets under NREGS is of pivotal importance so far as the objective of the scheme is concerned. Hence, it cannot be undermined alongside the objective of employment generation under the scheme, especially keeping in view the fact that, it will ultimately reduce the dependence on the scheme. Again, durability and sustainability of the assets creation can largely be examined by their impact on agriculture.

The improvement in irrigation capacity, apart from bringing new area under cultivation, can also improve crop yields due to availability of more water, and result in multi-cropping as well. Running in tandem, the present paper attempts to explore whether NREGS in West Bengal, after its implementation has been able to convert the mono cropping areas into multi-cropping ones or not. Towards this end, it was justifiably hypothesized that cropping intensity would be a proper measure and thus was considered the outcome variable.

From the present study covering all the NREGS implemented districts of West Bengal and the eight years of its implementation, we found that, cropping intensity has increased in almost all the districts of West Bengal between 2006-07 and 2013-14. This has been evident from the results of Least square dummy variable (LSDV) techniques incorporating district specific dummies. The NREGS work like 'provision of irrigation facility' has no impact in enhancing cropping intensity. Micro irrigation work through NREGS has created a positive impact on Cropping Intensity. But the impact is very small because the value of the co-efficient is very small (though it is statistically significant). In case of 'rural connectivity work' through NREGS, its impact is also very small so far as the value of the coefficient is concerned, but the factor is statistically significant. It is observed that rain fall still plays a significant role to enhance the cropping intensity of West Bengal. Thus in spite of the expansion of NREGS work, 'average rainfall' throughout the year still influences the farmers' decision regarding expansion of agricultural activities. Hence NREGS asset creation activities have not generated so far any commendable impact on agrarian scenario in West Bengal. It has also been observed that the cropping intensity is significantly influenced by the average

harvest price of principal crops in the post rainy season as far as their statistical significance is concerned. But the marginal impact is not so strong.¹¹

Policy Implication:

Referring to Table 2, it is observed that the number of ongoing works was on the rise in successive periods. If those works were completed in subsequent periods, then the positive influence on productivity of agriculture might not be done away with which the present study has not exercised. However, creation and maintenance of NREGS assets must go hand in hand in order to accomplish the objective of attaining durability and sustainability of the assets. In West Bengal numerous surveys and anecdotal evidences suggest that the job of maintenance has not been up to the mark.¹² Perhaps, that is the reason why many assets created under the scheme have not generated the anticipated benefit and as a result the aim of enhancement of productivity in agriculture with the help of NREGS assets has gone futile.

- Thus, at this juncture, the productive value of assets created by NREGS works can be enhanced with proper monitoring and maintenance activities. It is observed that in case of assets in individual land monitoring and maintenance is not an issue rather, in case of assets created in community land, the same needs special attention. Regression results have shown that provision of irrigation facilities has a feeble and statistically insignificant impact on Cropping Intensity in West Bengal. The reason may be the dismal number of works under this head. Hence there is need for enhancement of the number of works taken up in private land and the resulting ownership of assets created.
- Looking at the commendable impact of district specific dummies on the variation of cropping intensity, it is further recommended that the district level planning regarding the selection of work activities must be sensitized as per the local needs.
- Again, the listed number of works might appear insufficient to generate employment of at least 100 days based on location specific characteristics. In such circumstances, the productive value of NREGS works can also be enhanced by way of convergence.

¹¹ The authors certainly admit the fact that the study faces the limitation of not covering up adequate time points in the post NREGS implementation period in order to evaluate the impact of NREGS asset creation on cropping intensity, especially taking into account that NREGS in West Bengal did not gear up from its very inception.

¹² The National Rural Employment Guarantee Scheme (NREGS) West Bengal: A Study of Sustainable Livelihood Models. Lead Researchers- Karthik Raghavan, Niki Singh, Saswata Das, Shardul Bist, Subhamoy Das, Unnati Gajjar, Veena Singh, Vibha Singh.
Special Contributors: Development of Research and Communication Service Centre (DRCSC)
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