Ilkogretim Online - Elementary Education Online, 2021; Vol 20 (Issue 4): pp. 4141-4154
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.04.451

Pradhan Mantri Fasal Bima Yojana (Pmfby): Overcoming Regional Economic Disparity In India By Technology Enabled Crop Insurance

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ABSTRACT

Regional imbalance in agriculture sector in India is a cause of concern. The study evaluates the Pradhan Mantri Fasal Bima Yojana (PMFBY) crop insurance scheme geographically on south-east and north-west regions of India. The sample comprised of twenty-four states of India. The study uses crop insurance data of three financial years 2016-17, 2017-18, 2018-19 from website of government of India on PMFBY crop insurance scheme and mobile phone subscriber data from Telecom Regulatory Authority of India (TRAI) for the study. The study uses t test to analyze the data. The study reveals that north-west region has less farmer benefit ratio in spite of having significantly larger number of farmers insured per million people. Political benefit of NDA was significantly higher in north-west region. South-east region had a farmer benefit ratio of 117% as compared to just 21% for north-west region. There was no regional disparity in mobile phone subscribers. Deprivation of north-west region of India should be addressed for inclusive and sustainable growth and prosperity of farmers. Technology diffusion supported by enabling framework integrating all stakeholders will reduce regional disparity in benefits of crop insurance in south-east and north-west regions of India.

Keywords: Regional Imbalance, Pradhan Mantri Fasal Bima Yojana (PMFBY), South-East, North-West, Crop Insurance, Technology, India

1. INTRODUCTION

The contribution of agriculture in Indian GDP was 54% in 1951 and has come down to 16% in 2017-18 (Kumar et al. 2019). Fifty eight percent population in India depend on Agriculture for livelihood. Agriculture sector registered growth rate of 2.9% in 2018-19 as compared to 6.9% for industry and 7.5% for service sector (PRS India, 2019). Food processing industry had grown at growth rate of 5.06% annually during 2011-12 to 2017-18 (Sally, 2020). Economic growth

in India has not been inclusive, as India accounts for world's largest poor people population (Lele, 2017). Despite several policies, reforms regional disparity prevalent in India (Dholakia, 1985, Nayyar, 2008; Gopalakrishna & Rao, 2012) is a cause of concern (Kumar & Pattanaik, 2018). Factors that influence regional disparity have been identified as socio-economic factors, capital, and labor (Choudhury 1992). Unless technology is not managed properly, increasing investment in backward areas will also not yield desired results in overcoming regional disparity (Dholakia, 1985). Technology can be a strong foundation for developing regions (Fritsch & Slavtchev, 2010).

According to Niti Aayog study only 21% farmers were happy about Minimum Support Price (MSP). Only 10% farmers know MSP before sowing season, though 81% were aware of MSP for crops (Niti Aayog, 2016). MSP cover 25% of output. According to T.N. Prakash Kammaradi, single MSP does not make sense India due to diversity, variations in soil fertility, irrigation facilities, water availability and agricultural infrastructure (Kumar, 2020). The minimum support price policy has not provided any significant relief to farmers, procurement by government is a small fraction of total output, MSP policy not is applicable for all crops and inefficient warehousing infrastructure further limits the capacity of government to procure from farmers. Systemic neglect of farmer issues has been overlooked by successive governments due to lack of independent identity of farmers as vote bank.

Monsoon variations impacts seventy percent output in agriculture sector in India. Weather shocks impact 60% variation in yields (Raju et al. 2016). Pradhan Mantri Fasal Bima Yojana (PMFBY) crop insurance scheme was introduced by central government of India in 2016. PMFBY crop insurance scheme provides crop insurance at a low premium of 1.5%, 2% and 5% respectively for rabi, kharif, and cash crops. The remaining premium is shared by state and central government (Tiwari, 2020a). PMFBY is the third largest crop insurance scheme in the word (The times of India, 2019). In 2016 version the scheme was mandatory for farmers taking loans. However, the scheme was made optional from 2020 (Tiwari, 2020b).

The present study attempts to evaluate regional disparity of the benefits derived from PMFBY in south-east and north-west regions of India. The benefit received by farmers since the launch of scheme in 2016 are evaluated with benefits received by politicians regarding 2019 parliamentary elections in south-east and north-west region of India. Mobile penetration is evaluated in these regions to examine regional disparity of technology adoption.

2. LITERATURE REVIEW

Studies on regional imbalances in India (Nagaraj et al., 1998; Trivedi, 2003; Nayyar, 2008) have found that the regional disparity in increasing among the states on account of differences in human resource, technology, and infrastructure. Divergence has increased after independence in India (Dasgupta et al. 2000; Trivedi, 2003; Bhattacharya & Sakthivel, 2004). After green revolution, regional disparity was noticed in output. Haryana, Punjab, Western Uttar Pradesh, Andhra Pradesh and Tamil Nadu gained more than others in green revolution (Dev, 2008). After economic reforms in 1991, regional disparities have increased in India

(Birthal, Singh & Kumar, 2011). Economic reforms of 1991 made global competition a reality and without a level playing field, the distress in Indian agriculture aggravated post reforms (Reddy, 2006). Low technology, poor governance of education institutions, unemployment leads to poor economic growth (Khem Chand et al. 2017).

Dholakia (2006) evaluated the imbalance at regional level in light of federal governance in India and Canada. It was observed that technology is the main cause of regional disparities in growth rates. In Canada the regional disparity was attributed to factor proportions or capital intensity. In India between 1961 and 1981 the regional disparity was also attributed to factor proportions or capital intensity (Dholakia, 1985), but technology was the major determinant for disparity in growth rate. Poor supply of electricity to agriculture has aggravated the farm sector distress (Chand, Raju & Pandey, 2007). Das et al. (2016) suggested area wise planning instead of macro level planning to reduce regional imbalances in agriculture sector in India. Inorganic growth is not sustainable (Tiwari et al. 2019).

Ranganathan (2015) examined state wise farmer income and found that Bihar with 71.9%, Uttaranchal with 66.9%, Uttar Pradesh with 66.8%, and Jharkhand with 62.12% farm households are most backward states. In these states only 40% farm households live above poverty line, while rest of states in India have less than 60% farm households below poverty line. Only 27% villages in India have access to banking services within 5 kilometer (Lele, 2017). The credit supply to agriculture sector also exhibits regional disparity. In 2017-18 five states from Southern region accounted for 43% of entire agricultural credit of India, whereas Northern region accounted for just 22%, Eastern region 8.10%, central region 14%. The credit supply pattern does not match the cropped area pattern southern states had a cropped area of only 18.68%, northern states 20.11%, eastern states 14.65% and central states 27.26% (Bhanwala & Mehrotra, 2019). Eastern and north-eastern states have witnessed decline in credit deposit ratio (Dev, 2008).

Crop insurance schemes have failed to provide coverage to most of the agriculture sector, despite various types of crop insurance schemes launched since Independence (Rajeev & Nagendran, 2019). Comptroller and Auditor General of India audit for the period 2011 to 2016 found that only one third farmer were aware about crop insurance (Rao, 2019). Even after the launch of PMFBY crop insurance scheme, 66% farmers were not aware of crop insurance (Rajeev & Nagendran, 2019). Mukherjee & Pal (2019) found that awareness about crop insurance scheme needs to be enhanced by extension programs and financial inclusion does not determine awareness about crop insurance. Rajeev & Vani, (2014) argued that poor awareness has resulted in poor penetration of crop insurance in India. Rohini, (2020) raised concern about imbalances in crop insurance as tenant farmers are not included.

Jayan (2019) highlighted the regional imbalance in crop insurance benefits, as just fifty districts are getting fifty percent of all benefits under PMFBY. It needs investigation to rule out manipulation, and moral hazard in administration of PMFBY crop insurance scheme. Rai (2019) examined state wise farmers insured for PMFBY crop insurance scheme and highlighted the concern of manipulation in crop cutting experiments done by state governments

for damage assessment. It was recommended that states must increase investment for capacity enhancement and incentivise technology adoption in crop insurance. Singh (2016) also expressed concern on regional imbalances in benefit pattern on crop insurance schemes being confined to few areas. Focus on clusters, autonomy and better management can deliver expected outcomes (Sharma et al. 2013). The lack of research has led to lack of understanding on the relationship between farmer benefit and political benefit and regional disparity on PMFBY benefits and impact of technology to overcome regional disparity. Thus, following hypothesis are proposed:

H_1: There is no significant difference between farmers insured in South East and North West regions

H_2: There is no significant difference between farmer benefit ratio of PMFBY in South East and North West regions

H_3: There is no significant difference between mobile subscribers in South East and North West regions

The previous studies have examined the regional imbalances at macro level and crop insurance studies have focussed on awareness about PMFBY. A gap is found as previous studies have ignored region wise crop insurance benefit pattern and influence of success of political party in central government with crop insurance. The present study attempts to fill the research gap by analysing the PMFBY crop insurance scheme in light of region wise farmer benefit ratio of crop insurance with political benefit of the political party in central government along with technology adoption in the form of mobile phone penetration in north-west and south-east region of India.

3. METHOD

The present study adopts a descriptive research design using secondary data. Skewed growth and development have been a key concern for India. Some regions have developed faster while other regions have lagged. Skewed growth and development are detrimental to achieving millennial goals of sustainable development. To evaluate weather crop insurance scheme (PMFBY) launched in 2016 is discriminating between the regions the crop insurance scheme was evaluated geographically. The study covered 24 states of India. States that have not implemented PMFBY; Arunachal Pradesh, Mizoram, Nagaland, Delhi, and Punjab were excluded from the study. All union territories were excluded from the study. Geographically two regions have been used for the study. South-East region comprised 10 states, Kerala, Karnataka, Andhra Pradesh, Assam, Manipur, Telangana, Tamil Nadu, Tripura, West Bengal and Sikkim. North-West region comprised 14 states; Gujarat, Jammu and Kashmir, Chhattisgarh, Jharkhand, Bihar, Himachal Pradesh, Haryana, Madhya Pradesh, Maharashtra, Goa, Rajasthan, Odisha, Uttar Pradesh and Uttarakhand. Secondary data from website of Government of India on PMFBY was used for the study. Three financial year data 2016-17 to 2018-19 after launch of PMFBY scheme in 2016 was used for the study. The average of three-year data was considered for calculating farmer benefit ratio and farmers insured per million people. Mobile subscriber data was obtained from Telecom Regulatory Authority of India. State wise mobile subscriber data of April 2020 was used for the study. Mobile subscriber data

was not provided separately for Manipur, Arunachal Pradesh, Mizoram, Tripura, Nagaland, Sikkim, Meghalaya, so the combined data of mobile subscriber of these states has been used in the study. Mobile subscriber per million people was used to compare regional disparity in mobile subscribers.

Farmer benefit ratio is obtained by ratio of number of farmers benefitted to number of farmers insured under PMFBY crop insurance scheme for each region. Data of number of farmers insured and benefitted is obtained from website of PMFBY scheme. Political benefit is obtained by ratio of seats won in the region to total seats in 2019 lok sabha elections. Data of number of parliamentary seats won by NDA is obtained from election results of 2019 lok sabha elections. The data is analysed using t test.

4. RESULTS

North-West region has 50,224 farmers insured per million people as compared to 17,858 farmers in southeast region (table 2). A significant difference ($P<0.05$) was found between the number of farmers insured per million people in south-east and north-west region. Thus hypothesis 1 is rejected.

Table 1. Region Wise Number of Farmer Insured Per Million People for PMFBY

Region	Mean	Std. Deviation	T Value	Sig.
North-West	50224	37871	2.466	0.022
South-East	17858	19620.3		

Source: Author's Computation from PMFBY

South-east region has a farmer benefit ratio of 117% on crop insurance as compared to just 21% benefit ratio in north-west region (table 3). The difference was not significant ($P>0.05$). Thus hypothesis is not rejected.

Table 2. Region Wise Farmers Benefit Ratio (%) of PMFBY

Region	Mean	Std. Deviation	T Value	Sig.
North-West	21	12.6	-1.891	0.091
South-East	117	160.77		

Source: Author's Computation from PMFBY

Table 3. Percentage of Seats (%) Won by NDA in North-West and South-East Region

Region	Mean	Std. Deviation	T Value	Sig.
North-West	83	21.68	3.321	0.006
South-East	37	38.99		

Source: Author's Computation from Election Commission

A significant difference (P<0.05) was found between percentage of seats won by NDA in north-west and south-east region. Political benefit, measured by percentage of seats own by NDA was 83% in north-west region and just 37% in south-east region (table 4). North-west region has given significantly more benefit to Mr. Narendra Modi's NDA as compared to south-east region.

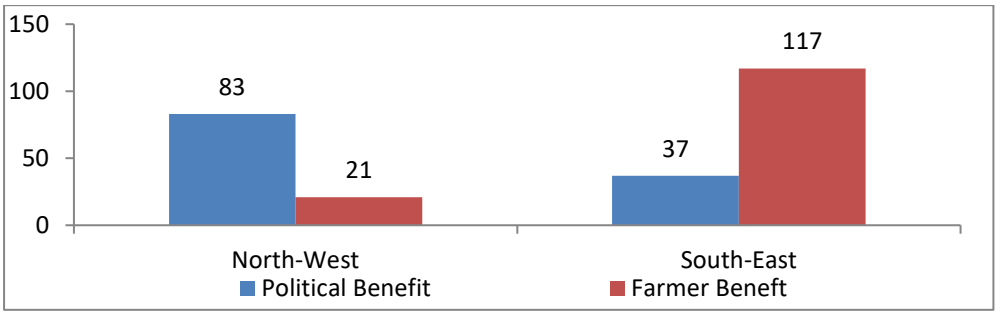

Figure 1. Comparison of Political Benefit and Farmer Benefit in South-East and North-West Region (%)

Source: Author's Computation from PMFBY, Election Commission

Farmer benefit ratio of southeast region is higher than north east region. South-east region had a farmer benefit ratio of 117% as compared to just 21% of north-west region. Political benefit of NDA was 83% in north-west region and just 37% in south-east region (figure 1). Regional disparities have been ignored by government and a silence is being maintained (Dev, 2008).
The number of mobile subscribers is compared using t test. It is found that there is no significant difference (P>0.05) between mobile subscribers per million people in south-east and north-west region in India. Thus hypothesis 3 is not rejected. The south-east region had 1029744 mobile subscribers per million people and north-west region had 1022047 subscribers per million people in India. There is no regional disparity in adoption of technology in the form of mobile phones in India.

Table 4. Comparison of Mobile Subscribers per Million People in South-East and North-West Region in India

Region	Mean	Std. Deviation	Std. Error Mean	T	Sig.

Mobile Subscribers	North-West	1022047	231732	73280		
	South-East	1029744	172710	65278	-0.074	0.942

Source: Compiled from Telecom Regulatory Authority of India (TRAI), 2020

The crop insurance benefits under PMFBY have shown regional disparity among farmers of different geographical regions. Kerala had a benefit ratio of 72%, Karnataka had 49% on the other hand Bihar had a benefit ratio of 8% and Jharkhand had a benefit ratio of 7% (PMFBY, 2020). Skewed benefit patten indicate possibility of moral hazards in the implantation is the crop insurance scheme.

5. TECHNOLOGY BASED SMART SOLUTIONS FOR CROP INSURANCE

Technology adoption enables transformation from input intensive agriculture to knowledge intensive agriculture (Lele, 1017). Technology adoption in agriculture will improve productivity and enhance the process of convergence of economic growth of states from different regions in India (Birthal, Singh & Kumar, 2011). Madaswami, (2009) recommended that geomatics technology should be used to develop agricultural resources information system to minimise the marginalisation of small farmers. Bhanwala & Mehrotra, (2019) recommended adoption of digital technology to enhance credit supply to credit starved states to reduce regional imbalances. In absence of technology initiatives, the difference between leading and lagging states will continue (Bhide, 2017). Policy for reducing regional disparities must consider region specific issues, as problems of each region are different (Kumar & Pattanaik, 2018). Technology adoption in regions with low farm productivity can reduce regional disparity by increasing farm productivity and reducing wastages (Bhide, 2017). Tiwari et al. (2020) argued that administration of PMFBY crop insurance scheme lacks in adoption of technology.

The claims of PMFBY need to be settled within 60 days of crop cutting experiment, but one third of claims of kharif 2019 were not settled till the July 2020 (Mishra, 2020). Delay in claim settlement is a cause of concern for farmers in Covid pandemic. The delivery system of services needs improvement in agriculture (Dev, 2008). The CEO of PMFBY (Bhutani as cited in Rural marketing, 2019) highlighted the need for technology to make PMFBY viable. Technology initiatives of Government of India, led by Mr. Narendra Modi have touched millions of people. The JAM trinity of Jan Dhan bank accounts to improve financial inclusion, Aadhar card for supporting digital services, and Mobile expansion has immense potential to transform rural economy. The electronic national agriculture market (eNAM) launched in 2016 has provided an online platform for farmers to buy and sell products and access information (Lele, 2017).

Worldcovr has started providing technology enabled crop insurance services to small farmers in Africa (Worldcovr, 2020). Farmers use mobile application and claim settlements are done on mobile (Bright, 2019). Middle income and low-income farmers are getting insurance by digital platform provided by Gramcover (Kapoor & Usmani 2019). Crop cutting experiments

(CCE) done for evaluation of damage to crop is prone to human errors and manipulation by administrators (Ghosh, 2018). The accuracy of crop cutting experiments is 60 to 70% (Jayan, 2019. Technology enabled assessment of damage can overcome errors and manipulations. Crop insurance claims of farmers are not being processed timely and benefits of PMFBY crop insurance is not reaching all farmers (Rai, 2019).

5.1 DRONES FOR DAMAGE ASSESSMENT

Dynamic Remotely Operated Navigation Equipments offer an opportunity to reduce moral hazard, red tape, and corruption in assessment of crop failures. Globally 145 and 40 companies in India are working in the segment of agriculture drones (Traxcn, 2020; Rawat, 2019). Claims under PMFBY are processed and settled based on yield data obtained from crop cutting experiments. Individual surveys are used for localised losses. Such assessments can be done using drones. 6000 hectares of area can be assessed using drones in a single day (FAO, 2016). Drones can provide unbiased and accurate estimation of damage for PMFBY (Rani et al. 2019). Satisfaction in claim settlement will attract more farmers to opt for crop insurance.

5.2 ARTIFICIAL INTELLIGENCE

Informed decisions can be taken in the crop insurance sector with adoption of artificial intelligence. Ministry of Agriculture, Government of India has collaborated with IBM to develop technology solutions for agriculture sector in India using artificial intelligence (Mendonca, 2019). IIT Kharagpur originated Agnext is working in the field artificial intelligence for agriculture (Agnext, 2020). Artificial intelligence can revolutionise crop insurance and extension services for farmers.

5.3 MOBILE APPLICATIONS

Mobile phones can become a potent delivery tool for technology enabled solution for agriculture as India has 520.08 million mobile phone subscribers in rural areas (TRAI, 2020). Biometric identities with 1.2 billion Aadhar cards connected with mobile phones offer a base for integrating technology solutions with financial transactions linked with Aadhar verified bank accounts and mobile phones. The success of direct benefit transfer scheme in eliminating middlemen has benefited 120 million people (Chaudhury, 2019). Picture based insurance (PBI) using smart phone pictures to make assessment of damage was found useful as a low-cost technology in Haryana and Punjab by Ceballos, Kramer & Robles (2019). The current study found no regional disparity in mobile subscribers. Mobile applications are potent tools for reducing regional imbalance in benefits of crop insurance by transparency, accuracy and efficiency in administration and damage assessment of crop insurance linked with Aadhar verified mobile phones.

5.4 DIGITISATION OF LAND RECORDS

Digitisation of land records will improve credit supply and land lease market (Bhanwala & Mehrotra, 2019). Digitisation of land records will enhance the speed and efficiency of claim

settlement in crop insurance. It has been found that one plot has been insured 8 times, due to lack of digital verification (Ruralmarketing, 2019). The Indian government launched SVAMITVA scheme in October 2020 to provide property card downloads from mobile to rural households. The property card will enable rural household to avail credit facilities and other benefits of financing (Sen, 2020). Digital database will check the moral hazard and ensure benefits reach the deserving farmers.

6. CONCLUSION

The regional disparity in benefits of PMFBY crop insurance scheme is a cause of concern. It was found that south-east region had higher benefit ratio in PMFBY as compared to north-west region of India. Political benefit of NDA led by Mr Narendra Modi was significantly higher in north-west region in 2019 parliamentary elections. There is an anomaly between political benefit of political parties and crop insurance benefit of farmers. Voting pattern does not reflect crop insurance benefits, thus limiting political incentive to resolve crop insurance delivery and administration issues. There was no regional disparity in mobile subscriber per million people in south-east and north-west region. Technology infusion in administration, damage assessment and financial transactions would enhance awareness, transparency, accuracy and efficiency of PMFBY crop insurance scheme. Technology diffusion supported by enabling framework integrating all stakeholders will reduce regional disparity in benefits of crop insurance in south-east and north-west regions of India. Technology enabled smart crop insurance is the need of hour to ensure inclusive sustainable growth of agriculture sector with equal opportunity for farmers of all regions.

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