

# Achieving Sustainable Agriculture in Madhya Pradesh

Dr. Janak Singh Kushwah

Assistant Professor

(Department of Commerce)

Govt. Nehru College Sabalgarh Dist. More (M.P.)

Email : janaksinghkushwah8@gmail.com

## ABSTRACT

*Madhya Pradesh is primarily an agriculture State. About 73% population of the state is rural, which is directly or indirectly depends on agriculture. Thus Agriculture Sector is the main Stay of the State economy. The Agriculture and allied services contributes about 44% share in state economy and 78% of its working force is directly engaged in Agriculture. Thus Agriculture sector forms the backbone of MP economy. Less than half of the land area is cultivable and its distribution is quite uneven because of variations in topography, rainfall, and soils.*

*The Department of Farmers welfare and Agriculture Development runs various state and national sponsored schemes, like, Agricultural extension programe, Fertilizer quality control programme, augmentation of ground water, Integrated pest management and various farmers welfare oriented schemes etc.*

*MP successfully broke ranks to set a scorching pace of growth, which has been unparalleled in the past quarter-century. Understanding the factors that helped to drive this growth and drawing lessons for other states at similar levels of development is the main objective of this chapter. Madhya Pradesh's agricultural GDP increased at 8.2% per annum during 2006–07 to 2017–18, surpassing even record holder Gujarat's 6% agricultural growth in the same period. The last three years have been even more spectacular: agricultural GDP increased at 11.8% per annum. Keeping this background in mind, this chapter has used secondary data published by the government to study the composition, sources and drivers of agriculture growth in Madhya Pradesh and the lessons that can be drawn for developing states. Although MP has recorded a significant decline in poverty rates from 53.6% in 2004–05 to 35.7% in 2011–12, there is still much to be done to improve the livelihood of the rural population. Moreover, MP's per capita income is low, standing at Rs. 51,798 per annum (FY14 at current prices) as compared to the national annual average income of Rs. 74,380. Although it is much better than that of Bihar (Rs. 31,199) and Uttar Pradesh (Rs. 36,250), it remains way below top-performing states like Sikkim (Rs. 176,491), Maharashtra (Rs. 114,392), Haryana (Rs. 133,427) and Gujarat (Rs. 106,831). Therefore, the study also makes policy suggestions to bolster agricultural growth in MP.*

## INTRODUCTION

Madhya Pradesh is primarily an agriculture State. About 73% population of the state is rural, which is directly or indirectly depends on agriculture. Thus Agriculture Sector is the main Stay of the State economy. The Agriculture and allied services contributes about 44% share in state economy and 78% of its working force is directly engaged in Agriculture. Thus Agriculture sector forms the backbone of MP economy. Less than half of the land area is cultivable and its distribution is quite uneven because of variations in topography, rainfall, and soils.

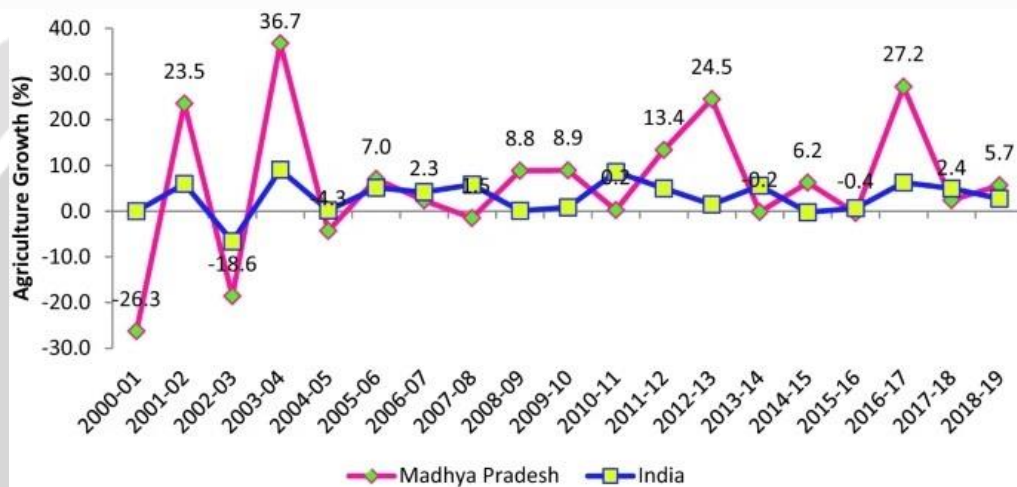
Madhya Pradesh emerged as the state with the highest growth rate in agriculture. Long clubbed with the so-called BIMARU group of poor northern, central and eastern states, MP successfully broke ranks to set a scorching pace of growth, which has been unparalleled in the past quarter-century. Understanding the factors that helped to drive this growth and drawing lessons for other states at similar levels of development is the main objective of this chapter. Madhya Pradesh's agricultural GDP increased at 8.2% per annum during 2006–07 to 2017–18, surpassing even record holder Gujarat's 6% agricultural growth in the same period. The last three years have been even more spectacular: agricultural GDP increased at 11.8% per annum. Keeping this background

in mind, this chapter has used secondary data published by the government to study the composition, sources and drivers of agriculture growth in Madhya Pradesh and the lessons that can be drawn for developing states.

Among the many measures taken by the state government to make rapid strides in agriculture, three interventions stand out—expanded irrigation, a strong procurement system put in place for wheat along with bonus over MSP for wheat and all-weather roads to connect farmers to markets. Irrigation coverage through tube wells was expanded through the state government’s strategy of initially focusing on providing good quality power supply to farmers during the wheat irrigation season. Canal irrigation, on the other hand, was expanded by utilising financial resources to complete several major and medium irrigation projects that had been under construction for quite a few years. Once irrigation cover expanded for wheat cultivation, acreage and production under the crop increased significantly. Consequently, the government strategised to improve the supply chain of wheat by re-modelling the procurement system through digitisation and initiating “e-Uparajan” and by increasing storage capacity significantly. The third important factor that contributed to agricultural growth was the expansion of all-weather roads.

## MADHYA PRADESH AGRICULTURAL GROWTH

The last three years have been even more remarkable: agricultural GDP grew at 11.5% per annum as compared to the national average of 4.7%. The sector faced instability, but the extent of volatility has declined in recent years. The coefficient of variation for agriculture growth stood at 626% in the period of 2000–01 to 2008–09 and declined to 113% in the period between 2009–10 and 2018–19. In the initial years, agriculture was affected by successive droughts. However, in later years, investment in irrigation enabled the sector to overcome rainfall deficiencies.



## AGRICULTURAL LIVELIHOOD IN MADHYA PRADESH

According to the 2011 Census, Madhya Pradesh has a population of 72.7 million and the estimated population for 2018 is 82.3 million, which is 6% of India’s population. Madhya Pradesh had 54.6% of its workforce engaged in agriculture in 2015–16 (Labour Bureau, 2015–16) while the contribution of agriculture to overall GSDP was 40% in TE 2018–19 (CSO). The agricultural sector is largely dominated by small and marginal farmers. In 2015–16, 75.5% of small and marginal farmers with a holding size of less than 2 ha accounted for 48% of the total area operated. The average size of landholding declined from 2.28 ha in 1995–96 to 1.78 ha in 2010–11 and further to 1.57 ha in 2015–16.

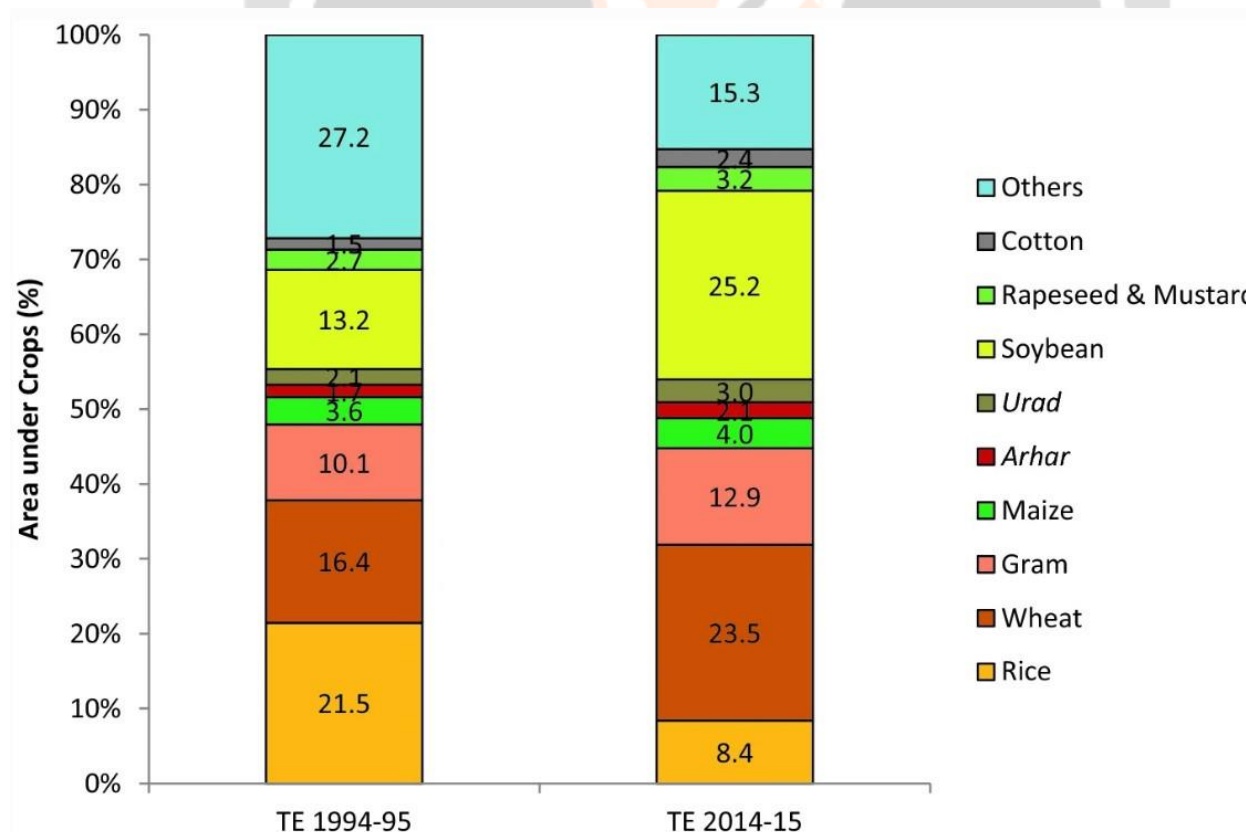
	1995–96			2010–11			2015–16		
	Area (%)	Number (%)	Size of holding (ha)	Area (%)	Number (%)	Size of holding (ha)	Area (%)	Number (%)	Size of holding (ha)
Marginal	8.2	40.4	0.46	12.1	43.9	0.49	17.62	48.33	0.49
Small	15.2	24.1	1.44	21.9	27.6	1.42	30.58	27.24	1.41
Semi-medium	24.2	20.0	2.76	28.5	18.6	2.73	28.20	16.74	2.70
Medium	33.6	12.9	5.94	28.7	8.9	5.76	18.38	7.07	5.67
Large	18.8	2.7	16.08	8.8	1.0	15.77	5.22	0.63	14.83
All	100	100	2.28	100	100	1.78	100	100	1.57

### MADHYA PRADESH CROPPING PATTERN

In Madhya Pradesh, 50% of the reported utilised area was under cultivation. Madhya Pradesh is primarily a food grain-growing state—around 62% of its gross cropped area (GCA) was under food grains and 32% under oilseeds in TE 2014–15. Within food grains, 39% of GCA was under production of cereals while 23% was under pulses. Wheat is the most important cereal grown in the state, accounting for around 24% of the GCA. Among pulses, gram is the main crop grown with around 13% of GCA dedicated to the crop (63% of pulse area), followed by *arhar* (2% of GCA and 10% of area under pulses). Wheat is the major crop grown during the *rabi* season and it is intercropped with gram while in the *kharif* season, MP mostly grows oilseeds, specifically soybean. Around 25.2% of GCA is under soybean cultivation.

Moreover, acreage under the two main crops in MP—wheat and soybean—has increased significantly over the years. Acreage under wheat increased from 4 million ha in TE 1994–95 to 5.6 million ha in TE 2014–15. Similarly, the acreage under soybean increased from 3.2 to 6.0 million ha in the same period. Further, the relative importance of wheat has also increased over the given period. In TE 1994–95, wheat contributed around 16% of GCA; this has increased to 24% in TE 2014–15. Similarly, the share of area under soybean as a percentage of GCA has increased from 13 to 25%, almost doubled in the past two decades. Acreage under gram, on the other hand, has increased only marginally from 2.4 million ha in TE 1994–95 to 3.0 million ha in TE 2014–15. Consequently, its share in GCA has only increased from 10 to 13% in the same period.

Although MP is one of India’s major food grain-producing regions, there has been an increasing trend towards the cultivation of horticultural crops as a cash crop. There has been a significant expansion of area under vegetables in MP after 2010–11. Acreage under vegetables increased from 284,000 ha in 2010–11 to 930,000 ha in 2017–18. This has almost tripled the share of area under vegetables in GCA from 1.3% in 2010–11 to 3.9% in 2017–18. While the expansion of area under vegetables was sudden and took place after 2010–11, in the case of fruits, the expansion began as early as 2008–09. The area under fruit cultivation increased from 47,000 ha in 2007–08 to 92,000 ha in 2008–09 and further to 355,000 ha in 2017–18.



### IRRIGATION

Irrigation has played a critical role in the growth and development of agriculture in the state. Gross irrigated area has increased from 4.3 million ha in 2000–01 to 10.3 million ha in 2014–15.

shows the position of MP as compared to the position at the country level during the period 2000–01 to 2014–15. At the outset (2000–01), the irrigation ratio in MP was 24%, which was around 17.1% points lower than the all—India average. By 2014–15, the ratio had moved up to 43.3%, decreasing the gap with the all—India average to 5.7% points, which is a commendable achievement for the state.

## POWER FOR AGRICULTURE

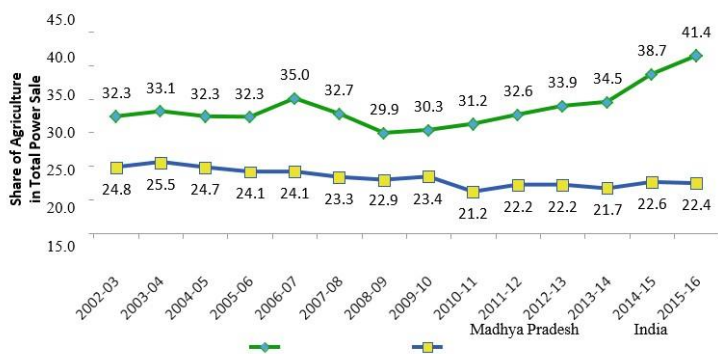
As mentioned in the previous section, one of the main reasons for the rapid expansion of tube well irrigation in MP was the government's conscious efforts to ensure assured power for agriculture. The state government started with the unbundling of the power business to bring efficiencies in 2005, and it has made special efforts to ensure separate feeders for power supply to rural areas. The main reason to undertake feeder separation was that rural feeders in MP earlier provided power supply to mixed load for an average of approximately 12 h. There was no supply during the rest of the day due to constraints in generation. Consequently, the agriculture sectors faced several bottlenecks, which are listed below.

- Agricultural pumps during the “pre-feeder separation” period usually received three-phase supply for 6–8 h; for the rest of the period, only one phase supply was available.
- Villages did not get power supply round the clock.
- There was unbalanced loading on distribution transformers (DTR) and power transformers (PTR).
- There were frequent load shedding and high technical losses. The government made the following interventions to improve the electricity situation for agricultural use in the state:
  - Ensured 24 h power supply in the state, out of which 8 h power supply was exclusively for agricultural purposes.
  - Provided power to agriculture at a flat rate of Rs. 1200/year, with the facility to pay in two instalments.
  - Provided separate rural feeders for agriculture; 43,517 villages have been provided with a separate feeder of 11 KW line comprising 71,688 km and 1516 transformers of 21 KW, which are the country's largest feeders for the agricultural sector.

The *Deen Dayal Upadhyaya Gram Jyoti Yojana* (DDUGJY) is a centrally sponsored scheme, which was initiated in 2014 with a feeder separation component. The scheme makes funds available to state governments to take up works to strengthen the distribution system and the separation of feeders for agricultural and non-agricultural consumers. Under DDUGJY, a sum of Rs. 28.7 billion has been sanctioned for MP so far, of which Rs. 15.8 billion is to strengthen the system and Rs. 8.2 billion is for the segregation of feeders.

The objective of the programme is to separate domestic load from irrigation in rural areas and to provide uninterrupted, quality power supply to domestic rural consumers. In other words, feeder separation refers to the supply of electricity to agricultural consumers and to non-agricultural consumers (domestic-non-domestic) separately through dedicated feeders. This arrangement allows the distribution company to regulate power supply to agricultural consumers as and when needed for effective demand-side management (DSM). The separation of feeders helps flatten the load curve by shifting the agricultural load to off-peak hours and thus facilitates peak load supply to agricultural consumers and continuous power supply to non-agricultural consumers in rural areas (DDUGJY 2014).

The efforts of the state government to attract investment for power generation and to expedite feeder separation were long-term policy reforms. In the short-term, the state government strategised to provide temporary power connections for the winter season. Irrigation demand for power during winter was high and farmers were willing to pay a premium of Rs. 2.7–3.0 per unit for assured electricity. The state government contracted advance power purchase for the winter months and began liberally issuing winter season irrigation connections (Shah et al. 2016). Between 2010 and 2013, the state issued 3.12 million winter connections to farmers, increasing the area under wheat cultivation by 1.8–2 million ha/year, leading to increased production.



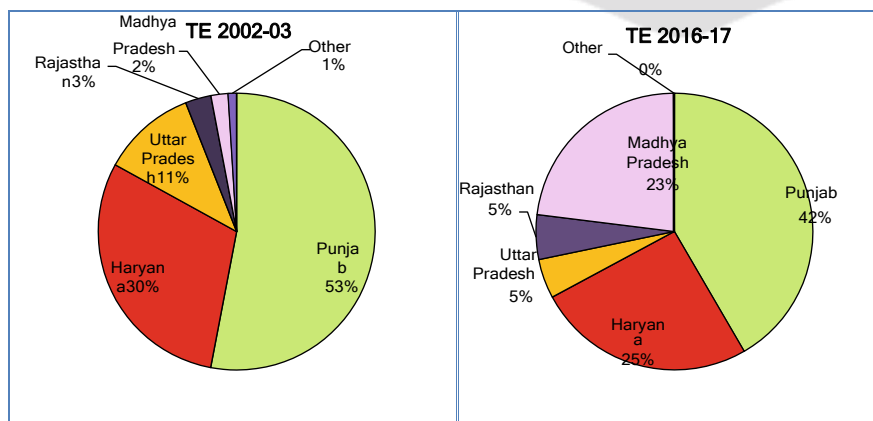
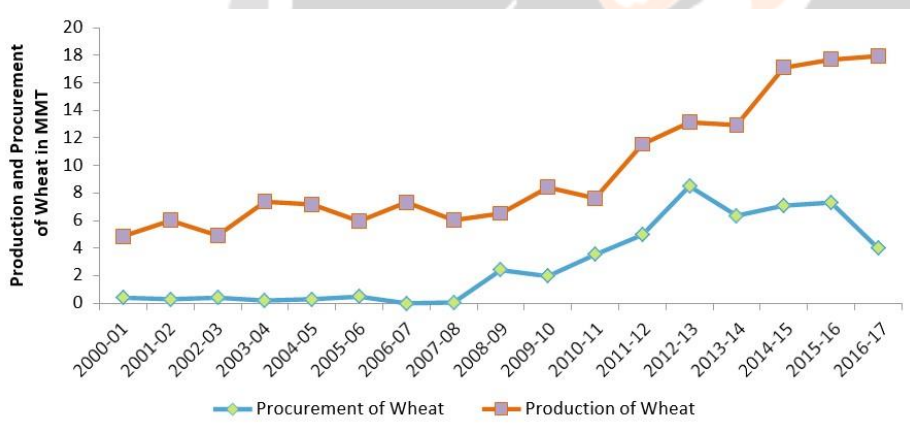
These efforts have resulted in an increase in the use of electricity for agricultural purposes in MP. It has gradually increased from 4843 MW in 2003 to 10,231 MW in 2013 (GoMP 2016). The share of agriculture in total power consumption in MP is around 33.7%, which is much higher than the national average of 20.8% and higher than in states like Karnataka (33.7%), Punjab (30%), Gujarat (23.6%) and Maharashtra (22.0%).

Although the share of agriculture in total power sales is high (41.4%) (Fig. 6.6), total power sales/gross cropped area (GCA) is low standing at 641 kWh/ha in

TE 2015–16 as compared to states such as Tamil Nadu (2019 kWh/ha), Andhra Pradesh (1854 kWh/ha), Karnataka (1517 kWh/ha), Punjab (1356 kWh/ha), Haryana (1414 kWh/ha), Maharashtra (1247 kWh/ha) and Gujarat (1087 kWh/ha). Therefore, there is still scope for improvement in power availability.

**PROCUREMENT POLICY**

Once assured water was made available for wheat cultivation through assured electricity during the 110 days of the wheat season, acreage under the crop as well as wheat production increased significantly. Improved irrigation along with the Madhya Pradesh government’s bonus policy on the minimum support prices (MSP) for wheat over and above the centre’s MSP between 2007–08 and 2014–15 played a significant role in increasing the production and procurement of wheat (Fig. 6.8). The state bonus on MSP over and above the centre’s MSP for wheat between 2007–08 and 2012–13 was Rs. 100 per quintal, while in 2013–14 and 2014–15, it was Rs. 150 per quintal. Consequently, government purchases from the state swelled from around 2% of total wheat procurement in TE 2002–03 to 23% in TE 2016–17, making MP the third-largest contributor to wheat procurement (Fig. 6.9). However, wheat procure-



ment as a percentage of marketed surpluses was around 67% in MP as compared to 81% in Punjab and 74% in Haryana. This shows that despite giving a bonus on MSP, around 33% of marketed surplus was not procured by public agencies, implying that besides public agencies, the private sector too procures wheat. The economic cost of procuring wheat by the Food Corporation of India was around 32 to 43% higher than the MSP during 2008–09 and 2013–14, mainly due to high procurement incidentals (market fees, development cess, *arhatiya* commission, cost of gunny bags, charges to state governments for storage and interest, etc.) and distribution cost. A major contribution to increasing procurement incidentals comes from the high rates of statutory market levies imposed by states. High statutory levies add to the cost of procurement for FCI, which ultimately adds to the food subsidy bill. States have an incentive to keep these levies high since it contributes to their tax revenues.

On the flip side, high taxes deter private sector procurement and make the state the largest buyer in the wheat market. Interestingly, of the three main contributors to the wheat procurement pool, Punjab and Haryana levies a tax of around 14.5% of MSP and 11.6% of MSP respectively, while MP's rate of taxes was around 7%. The lower taxes in MP may have persuaded private trade to buy wheat from MP rather than Punjab or Haryana. Moreover, in Punjab and Haryana, wheat procurement is mainly through *arhatiyas*, while in MP it is through co-operative societies. MP has been successful in organising its procurement as a decentralised procurement system where wheat is procured by state agencies and only the surplus wheat stocks over and above the state's requirement under the targeted public distribution system/National Food Security Act and other welfare schemes have been taken over by the FCI for dispatch to other consuming regions. In comparison, Punjab and Haryana follow a centralised procurement system, wherein state agencies procure wheat and then preserve the stocks under their custody for which carry overcharges are paid to them. Later, FCI takes over the stocks for dispatch to consuming states as per requirement/movement plan (Fig. 6.8).

## PRICE DEFICIENCY PAYMENTS SCHEME

The Government of Madhya Pradesh introduced the *Bhavantar Bhugtan Yojana* in September 2017 covering eight *kharif* crops. Under this scheme, farmers selling crops in the notified APMC yard will obtain the difference between the MSP and average sale price (ASP) where ASP is the average of the prevailing modal *mandi* prices in MP and two other states. The crops covered under the scheme are maize, *moong*, *urad*, *tur*, soybean, groundnut, sesame and *ramtil*. The scheme also provides warehouse storage incentives (WSI) for registered farmers. A study by Gulati et al. (2018) reviewed the scheme. The analysis shows that MP could benefit only 23% of production, which poses the question whether the scheme benefits the majority of farmers. It also estimates that extending this scheme to other crops will escalate the costs from Rs. 56,518 crore to Rs. 1.13 lakh crore, given that the market price is 10% lower than the MSP.

## FOODGRAINS SECTOR

In MP, the largest segment in terms of acreage and value is food grains. Within cereals, wheat and rice are the major crops produced in MP; gram and *arhar* are important pulses. The decline in the share of food grains has been because of a decline in the share of *jowar*, barley, maize and small millets within the cereals segment. Wheat, the main cereal grown in MP, has shown a gradual increase in importance in the production basket.

In line with the expansion of acreage under wheat cultivation, the production of wheat also increased significantly in MP from 6.4 million metric tonnes in TE 1994–95 to 17.6 million metric tonnes in TE 2016–17. Between 2010–11 and 2011–12, wheat production jumped by 51% from 7.6 million metric tonnes to 11.5 million metric tonnes and thereafter, kept a high growth trajectory. Currently, MP is the second-largest wheat producer, after Uttar Pradesh, contributing around 16% of total production. However, this was not the case in the early 2000s. In TE 2002–03, MP contributed only 8% to total production of wheat and it was the fourth-largest producer after Uttar Pradesh (36%), Punjab (22%) and Haryana (14%). Productivity of wheat cultivation in the state also increased from 1.5 MT/ha in TE 2002–03 to 2.9 MT/ha in TE 2016–17. However, MP has much to achieve in terms of productivity as its productivity is still lower than that of Punjab (4.7 MT/ha), Haryana (4.4 MT/ha) and Rajasthan (3.0 MT/ha).

In comparison, the share of the pulses segment in GVOA declined in both the major pulse crops—gram and *arhar*. However, in terms of production, gram production increased from 2.1 million metric tonnes in TE 1994–95 to 3.3 million metric tonnes in TE 2016–17 while *arhar* production increased from 0.4 million metric tonnes to 0.6 million metric tonnes in the same period. Currently, MP is the largest producer of gram (39% of the total production) and third-largest producer of *arhar* (13% of total production) in India.

## HORTICULTURE

The largest increase in production has been in the fruits and vegetable segment. Shows the increase took place after 2010–11, with the value of output from fruits and vegetables as a percentage of GVOA increasing from 8.5% in 2010–11 to 19.5% in 2013–14. Private sector investment in irrigation augmented productive capacity and the involvement of public investment in roads connected the hinterland to markets, bolstering the production of perishables like fruits and vegetables.

## NON-FOOD CROPS

In TE 2015–16, the non-food segment consisting of oilseeds, fibre and sugar comprised around 15% of the total value of output from agriculture and allied activities. In MP, oilseeds alone constitute around 12.8% of GVOA vis-à-vis the national average of 5.3%. At a disaggregated level, soybean accounts for around 78% of the total value of output from oilseeds while rapeseed and mustard account for around 10% and groundnut 5%. The production of soybeans has doubled from 3.3 million tonnes in TE 2002–03 to 6 million tonnes in TE 2016–17. MP was the largest producer of soybeans contributing around 51% of the total production in the country, followed by Maharashtra (35%) in 2016–17.

## LIVESTOCK

Livestock is the second-largest segment after food grains in MP, contributing around 18.8% of the GVOA. The milk segment contributes around 83% of the total value of output from livestock and the meat segment contributes around 5%. The livestock sector's share in GVOA has declined from 25.4% in TE 2002–03 to 18.8% in TE 2015–16. This is primarily because other segments such as fruits and vegetables have expanded more than livestock.

## MILK SEGMENT

In MP, the share of milk in the GVOA has declined from 21% in TE 2002–03 to 16% in TE 2015–16. However, this segment continues to be an important segment for improving farmers' livelihood in MP.

Milk production in MP has grown from 4.8 million metric tonnes in 2000–01 to 13.4 million metric tonnes in 2016–17, an average annual growth rate of 6.6%. Around 45% of milk production is cow milk and 49% is buffalo milk.

In terms of volume, MP is the sixth largest milk-producing state contributing accounting for around 7% of the total milk production in the country. Although milk production in the state has been increasing, milk productivity in MP is lower than in some other states; for example, while MP's productivity in milk production stood at 0.8 MT per female animal, Punjab's productivity was 2.4 MT per female animal, Gujarat's 1.1 MT per female animal and UP's 1.0 MT per female animal.

## MEAT AND EGGS SEGMENT

Meat accounts for only 5% of the total value of output from the livestock segment. Its share in GVOA has marginally increased from 0.6% in TE 2002–03 to 1% in TE 2015–16. Between 2006–07 and 2014–15, meat production increased from 20,000 to 60,000 tonnes an increase of 200%. The poultry segment in MP got a stimulus with the establishment of the Madhya Pradesh Women Poultry Producer Company Pvt. Ltd. (MPWPCL). It has ten producer organisations operating under it, each holding a stake in the producer company. Each of these producer organisations is an independent entity involved in providing services such as raw materials, working capital assistance, risk mitigation from input and output price movements and production support, besides marketing broiler poultry for its members and providing training and building capacity among women. The cooperative membership extends to 4214 women poultry producers belonging to poor tribal and Dalit families. Currently, MPWPCL is one of the biggest producers of broiler chicken in the state. This was achieved by first establishing four feed processing units, which supplied feed to the co-operatives, and then taking on the contract for manufacturing medicines. Marketing is done under the brand name "Sukhtawa Chicken". In 2011, a parent farm and hatchery were commissioned.

Egg production in MP has also increased significantly from 951.8 million in 2006–07 to 1942 million in 2017–18. Such a phenomenal rise in the production of meat and eggs requires enlargement of storage capacity so as to minimise wastage and damage. Although there are at present around 122 cold storages in the state with a total capacity of approximately 712.3 million MT (2012–13), there is a pressing need to develop storage and marketing infrastructure to further bolster the segment.

## FISHERIES

Since Madhya Pradesh is landlocked, inland fishery is favourable in the state. Although only 0.65% of the GVOA is contributed

by fishery, this sector has huge potential. MP has around 4.03 lakh ha of reservoirs and tanks, which can be utilised for fishing.

### DRIVERS OF AGRICULTURE GROWTH: ECONOMETRIC ANALYSIS

Agricultural growth is influenced by a number of supply-side factors. A priori, we would expect (i) technology (seed replacement rate, irrigation, fertiliser use, farm mechanisation, extension, etc.), (ii) incentives (terms of trade), (iii) infrastructure (electricity, roads) and (iv) weather conditions to drive agricultural growth. However, it is difficult to analyse the effect of all variables in a single framework, both because of paucity of data and because many of these variables can be correlated. The correlation matrix of these variables is presented in annexure. Therefore, we use a parsimonious model to analyse the potential drivers of growth.

### ESTIMATING EQUATION

In our model, log GDPA is the dependent variable and the variables mentioned above are independent variables. The equation has been estimated using data from 2000–01 to 2015–16. The variables that had a positive and significant correlation with GSDPA that have been used in our regression model are: (i) irrigation ratio (IRR), (ii) surfaced road density (Road) and (iii) terms of trade between agriculture and industry.

In Model 1, it can be seen that irrigation and roads have a significant and positive effect on agricultural GDP. The two independent variables together explain around 96% of the variation in agricultural GDP for the studied period. Since we have estimated a double log model, the results can be interpreted as follows: *ceteris paribus*,

	Model 1	Model 2
Irrigation ratio (lnIRR)	1.25***	1.43***
Surfaced road density (lnRoad)	0.20**	
Terms of trade between agriculture and industry (lnToTAI)		0.26*
Constant	10.3***	10.9***
No of observations	16	16
Adj R-square	0.96	0.96

\*\*\* significant at 1% \*\* significant at 5% \* significant at 10%

1% growth in irrigation ratio increases agriculture growth by 1.25%. Similarly, a 1% growth in surfaced road density increases agriculture growth by 0.20%. In Model 2, it is observed that irrigation and terms of trade in favour of agriculture have a significant and positive effect on agricultural GDP. The two independent variables together explain around 96% of the variation in agricultural GDP. As in the case of Model 1, the second model can be interpreted as follows: *ceteris paribus*, a 1% growth in the irrigation ratio increased agriculture growth by 1.43 and a 1% change in terms of trade in favour of agriculture increased agriculture growth by 0.26%.

### CONCLUSION

As discussed before, the five main factors that have contributed to agricultural growth in Madhya Pradesh are (i) expanded irrigation through tube wells and canals, (ii) increased power supplies to agriculture, (iii) assured and remunerative price for wheat (including bonus over MSP) by strengthening the wheat procurement system, (iv) expansion of all-weather roads and (v) suitable incentives and signals for the private sector to increase the level of investments to reap the benefits of trunk infrastructure and improved services. Public investment in the development of infrastructure in the state (especially roads, power supplies and canal irrigation) has also played a vital role in transforming agriculture in MP. These findings have important policy implications for many other states like Bihar, Odisha, Uttar Pradesh, etc., which have ample scope to accelerate growth in their agriculture sector. While initiatives in each state will have to be designed to cater to local needs and priorities, the major takeaways from the experience Madhya Pradesh in agricultural development for moderate performing states can be summed up as follows.

- (i) Expand ground-water and surface water irrigation through assured power supplies to rural areas through power feeder



separation.

- (ii) Establish a strong procurement system so that farmers can reap the benefit of the government minimum support price scheme.
- (iii) Invest in all-weather surfaced roads for efficient movement of products and inputs to and from rural areas and link farmers to processing units and consumers.
- (iv) Public investments in key infrastructure such as improved power supply and better road connectivity to incentivise and attract private investment at the farm level in the form of increased investment in tube wells, expansion of area under horticulture, especially the adoption of high-value crops such as seasonal vegetables, and setting up of dairy units.

To sustain agricultural growth in Madhya Pradesh, the following points are worth considering:

1. It is also noteworthy that MP has significant under-utilised sub-soil water resources in almost all regions, especially in the eastern part. There is a case for addressing power infrastructure and supply gaps in the eastern part on a priority basis to attract farm level investment in private tube wells to exploit available water resources. This is likely to result in an expansion in assured irrigation and promote both productivity growth in existing crops and diversification into horticulture.
2. MP was among the first of the major states to remove horticultural produce from the monopoly of the Agriculture Produce Marketing Committee (APMC) controlled *mandis* in 2012. It needs to follow up this decision with policy incentives to attract private market yards offering electronic and sample-based trading. This will bring bulk buyers, processors, exporters, etc., to the state to source fresh produce and provide greater marketing choice to farmers. At present, MP is a net exporting state for fruits and vegetables, given its low urban population. Its favourable location, enabling quick access to both major northern and western urban markets, could be leveraged successfully with appropriate policy incentives.
3. A related issue in the agricultural marketing policy is the roll-out of the Government of India's e-NAM electronic marketing portal, where MP has been a relatively low key participant so far. Given the wide range of crops offered by the state and its location in the centre of the country, accelerated expansion of the e-NAM platform could benefit farmers in due course in terms of increased selling choices. MP pioneered the *e-chaupal* initiative over a decade and a half ago with a private sector partner (ITC) and saw improved price realisation for soybean farmers. e-NAM is a public initiative and could bring benefits to a much larger number of farmers across a larger area, if patronised by the state and implemented after due assaying, grading of produce and setting up of an effective dispute settle mechanism between buyers and sellers.
4. MP recently passed legislation to legalise agricultural tenancies, based on the model draft circulated by the Government of India. This is a major reform measure in a state that hitherto did not permit legal leasing of land. Implementation guidelines to follow up on the law have still to be issued. These should be released expeditiously to enable registration of tenancy under the new legal provisions. The new law should be publicised widely and a transparent dispute resolution mechanism put in place to build public confidence in this measure. Implemented fairly, the land leasing law could help increase investments in better technology and irrigation, as stable tenures and fair rents will encourage tenants to invest in productivity-enhancing measures.
5. A large number of farmer producer organisations (FPOs) have emerged in the state in the past decade, thanks to progressive policies to encourage their growth. Some of these FPOs are now doing impressive work in agricultural production, marketing and value addition. The state has put in place a set of incentives to strengthen these farmer-owned organisations through financial support, infrastructure building and relaxation of the provisions of the APMC Act. However, ready access to affordable working capital remains a challenge for many FPOs, given their weak equity base. Given that equity concerns are well addressed by such bodies, there is a justifiable case to enhance the level of public support to registered FPOs. Among the most effective measures would be a state-level credit guarantee fund, which would provide comfort to all institutional lenders licensed by the RBI for loans advanced to FPOs up to a limit (say Rs. 200 lakh).

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