Chapter 7

Performance of Agriculture in Uttar Pradesh

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7.1 Introduction

Uttar Pradesh is an agrarian economy where 47% of the population is directly dependent on agriculture for their livelihood. Even though the share of agriculture in overall GSDP has dropped to only 12% in TE 2017–18, agriculture still remains an important sector because the income of a substantial section of the workforce still comes from this sector.

UP is blessed with the fertile Indo-Gangetic plains and, given the size of the state's geographical area, it is a significant contributor to the food security of the nation. About 28% of India's wheat and 12% of rice is produced by the state. Sugarcane is also produced in large quantities, accounting for 44% of the country's total production. However, farm distress is prevalent in the state. Given the enormous size of the state, its four regions namely—Western region, Eastern region, Central region and Bundelkhand—will be studied in this paper. There is large variation in the agricultural performance in these regions of the state. Western UP is the most progressive region in terms of its contribution to value of output from agriculture and allied activities while Bundelkhand lags far behind.

Over the past few years, the contribution of cereals to the value of output has declined while there has been a rise in the share of the livestock sector. Milk is the most important sector contributing significantly to UP's agricultural growth and it has the potential to enhance farmers' income in future. UP is also well endowed with

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resources needed to produce a variety of fruits and vegetables. The state must focus on agricultural diversification, which will not only result in additional income for farmers but will also provide them better nutrition.

In this chapter, we focus on the performance of the agricultural sector in Uttar Pradesh by identifying the sources of growth as well as the role of existing policies. Section 7.2 discusses the overview of agriculture in the state of Uttar Pradesh. Section 7.3 deals with the composition and the sources of growth of agriculture. Section 7.4 presents the drivers of agricultural growth in the state. Section 7.5 makes an assessment of the budgetary allocations to agricultural and allied activities followed by section 7.6 on the conclusion and policy recommendations.

7.2 Overview of Agriculture in UP

UP is surrounded by Uttarakhand, Himachal Pradesh, Haryana and Delhi in the North and West; Rajasthan, Madhya Pradesh and Chhattisgarh in the South-West and South; and Jharkhand and Bihar in the East. This is the fourth largest as well as the most populous state in the country occupying 7.33% of the total area of the country with 199.8 million people (Census 2011), accounting for 16.5% of India's total population.

UP is divided in nine agro-climate zones—Terai, western plains (WP), mid-western plains (MWP), western semi-dry plains (SWDP), mid-western south plains (MWSP), south-western semi-dry plains (SWSDP), Bundelkhand (BUND), north eastern plains (NEP) and Vindhyaachal (VIND) (Fig. 7.1). There are wide climatic variations across the zones—while Bundelkhand is drought-prone, eastern UP sees frequent floods and waterlogging. Given the large size of the state and its diverse geography, climate and topography, UP is generally divided into 4 zones or regions—Western, Central, Eastern and Bundelkhand.

Fig. 7.1 Agro-climatic zones of Uttar Pradesh. *Source* Created using QGIS from Government of Uttar Pradesh’s data

7.2.1 Agricultural Growth in Uttar Pradesh

The state’s agricultural growth has been lower than the all-India average in most years. In the period between 2005–06 and 2018–19, the agricultural growth rate was 3.0% per annum (at 2011–12 constant prices) while the all-India average rate of growth was 3.6% per annum (Fig. 7.2). However, agricultural growth in Uttar Pradesh has been relatively less volatile than that experienced at the all-India level in the past two decades.

Fig. 7.2 Agricultural growth in UP and India. *Source* Central Statistical Organization, MoSPI

7.2.2 Agricultural Livelihood in Uttar Pradesh

Uttar Pradesh is largely dominated by small and marginal farmers with 93% of agricultural households operating 65% of land. The average landholding size declined marginally from 0.76 ha in 2010–11 to 0.73 ha in 2015–16. (Table 7.1)

Agriculture is the main occupation in the state. According to the Situation Assessment of Agricultural Households (2012–13), UP had 18 million agricultural households, which accounted for 20% of the total agricultural households in rural India.

In 2012–13, the average monthly income per agricultural household was the fifth-lowest in Uttar Pradesh and stood at Rs. 4923; other states lower than UP were Bihar, Jharkhand, Uttarakhand and West Bengal. The situation worsened in 2015–16 and UP ranked last in farmers' income (NABARD, Financial inclusion survey, 2018). According to this survey, the average monthly income per agricultural household

Table 7.1 Distribution of operational holding in UP

	Area (%)	2010–11		Area (%)	2015–16	
		Number (%)	Size of holding (ha)		Number (%)	Size of holding (ha)
Marginal	40.69	79.45	0.39	41.82	80.18	0.38
Small	24.08	13.01	1.40	23.92	12.63	1.39
Semi-medium	20.59	5.72	2.72	20.40	5.51	2.71
Medium	12.48	1.71	5.52	11.89	1.58	5.51
Large	2.16	0.11	15.01	1.97	0.10	14.98
All	100.0	100.0	0.76	100.0	100.0	0.73

Source Agricultural census

stands at Rs. 6668, which is about 25% lower than the all India average of Rs. 8931 in 2015–16 (Fig. 7.3).

According to the Situation Assessment Survey (SAS), the share of income from cultivation and farming of animals has increased from 54.4% in 2002–03 to 69% in 2012–13 while the share of receipts from non-farm business and wages has decreased in the same period (Fig. 7.4). However, the NABARD All India Rural Financial Inclusion Survey (NAFIS) shows that the first two components declined and income from wages registered an increase in 2015–16.

Fig. 7.3 Farmers' income in UP and India. *Source* NSSO and NAFIS

Fig. 7.4 Change in the composition of farmers' income from 2002–03, 2012–13 and 2015–16. *Source* NSSO

7.2.3 Land use and Cropping Pattern

The land use pattern has remained unchanged in the state. The net sown area has declined marginally from 68.9% in TE 2004–05 to 68.5% in TE 2014–15. The area under forest and fallow land is 6.9% and 7% respectively. Other uncultivated land excluding fallows is 3.7% and area not available for cultivation stood at 14.3% of total geographical area in this period.

The gross cropped area (GCA) has increased marginally from 25 million ha (mha) to about 26 million ha between TE 2002–03 and TE 2014–15. Gross irrigated area has also increased from 17.9 mha to 20.5 mha during the same period. With an increase in area under irrigation, cropping intensity increased from 150 to 157% in this period.

Even though agro-climatic conditions vary widely in the state, food grains comprise an important component of UP's production basket. It is one of the major producers of food grains in the country. Cereals accounted for 69% and pulses for 9.1% in the GCA in TE 2014–15. Within cereals, wheat is the most important crop, accounting for 38% of GCA. Sugarcane is another important crop in Uttar Pradesh accounting for roughly 8.5% of GCA and its share has remained almost the same since TE 2002–03. The area under oilseeds has seen a marginal rise as a proportion of GCA from 3.3% in TE 2002–03 to 4.4% in TE 2014–15. The share of vegetable in GCA increased from 3.3% in TE 2002–03 to 4.4% in TE 2014–15 whereas GCA under fruits has marginally declined from 1.2% to 1.1% in this period. The share of

Fig. 7.5 Share of major crops, fruits and vegetables in gross cropped area in UP. *Source* Directorate of economics, and statistics, GoI

vegetables has increased mainly because of an increase in the area under potatoes where GCA has increased by almost 27%age points between 2002–03 and 2014–15 (Fig. 7.5).

7.3 Determinants of Agriculture Growth

Physical infrastructure such as irrigation, power and road plays a critical role in the growth of this sector. In this section, we discuss the development of infrastructure in Uttar Pradesh to understand which factors helped in stimulating high productivity and growth in the agricultural sector.

Irrigation

One of the most important variables that has positively influenced agriculture in UP is irrigation. The state is well-endowed with a rich irrigation system with a gross irrigated area of 80.2% in 2014–15 (Fig. 7.6). It ranks relatively higher than most Indian states and stands next only to Punjab (98.7%) and Haryana (89.1%). UP has about 74,659 km of canals, 28 major and medium-lift canals, 249 minor lift canals, 69 reservoirs/*budhis* and about 32,000 running tube wells operated by the government. The major source of irrigation is wells (80.2%) followed by canal irrigation (17.9%).

Within the state, however, there are wide variations in irrigation coverage. While regions like Western UP, Central and Eastern UP have a high irrigation ratio of 90%, 83% and 77% respectively; Bundelkhand has less than half its area (48%) under irrigation.

The GoI had identified 99 ongoing major/medium irrigation projects under the *Pradhan Mantri Krishi Sinchayee Yojana* (PMKS) for completion by December

Fig. 7.6 Irrigation ratio in Uttar Pradesh and India. *Source* Directorate of Economics and Statistics

2019. These projects were sanctioned under the Accelerated Irrigation Benefits Programme (AIBP) and had been under implementation for several years.¹

Up to March 2014, 33.59 million hectares has been created through major, medium and minor irrigation projects (Ministry of River Development and Ganga Rejuvenation). Several canal systems are more than fifty years old. These include the upper Ganga canal, eastern Yamuna canal, Agra canal, lower Ganga canal, Sharda canal, etc. Sedimentation of dams and canals has affected their efficiency. Repair works have not been taken up on time, farm development works below the outlets have not been done and average water use efficiency is in the range of 30–40% only. Moreover, cropping patterns have changed and several crops requiring large quantities of water, e.g. paddy and sugar cane, now occupy a much larger area. Cutting of distributaries and minor canals is very common, leading to farmers at the tail end of canals suffering from water shortages.

In August 2013, the World Bank sanctioned the second phase of the USD 515-million water sector restructuring project in UP to improve water use and agricultural productivity and ensure a proper policy framework for more efficient use of water resources. Modernisation and rehabilitation of irrigation and drainage systems are also covered in the project. It seeks to promote participatory irrigation management.

As of March 2018, the progress of the water restructuring project was quite satisfactory on many parameters but there are a number of other important deliverables on which progress has been rather slow. Figure 7.7 portrays source-wise irrigation in Uttar Pradesh in TE. 2002–03 and TE. 2013–14.

Fig. 7.7 Source-wise irrigation in Uttar Pradesh in TE 2002–03 and TE 2013–14. *Source* Directorate of Economics and Statistics

¹There were four projects identified in UP. These were Banasnagar canal, Arjun Sahayak in Bundelkhand, Madhya Ganga canal phase II and Saryu Nahar. Of these four projects, having the potential of irrigating 16.53 lakh hectare, the Banasnagar canal project, started in 1978, was finally inaugurated by Prime Minister on July 15, 2018, in Mirzapur. Other projects are scheduled to be completed by June 2019.

Micro Irrigation

Until 2018, the area under micro-irrigation in UP was only 82,546 hectares, comprising less than one per cent of the total area under micro-irrigation in the country as compared to 1.8 million hectares in Rajasthan or 1.6 million hectares in Maharashtra. It is clear that there is enormous scope for expanding the area under micro-irrigation, not only in Bundelkhand but also in the cane growing region of western UP, which is increasingly faced with deficient rainfall.

Of the 75 districts in UP, 34 are in the category of overexploited, with fast depleting levels of groundwater. According to the Central Ground Water Board, out of 822 blocks, 37 blocks are overexploited, 13 are critical and 88 are semi-critical. Therefore, micro-irrigation practices need to be promoted in all these blocks, especially in districts having a low irrigation ratio like Bundelkhand.

Roads

The development of roads plays a significant role in the growth of the rural economy. It helps farmers realise better prices for their produce through better connectivity with urban areas. A good road network system helps reduce transportation costs, accelerates the movement of farm inputs and opens up opportunities for agricultural trade. Thus, roads are found to have a powerful impact on poverty alleviation and in accelerating agricultural growth. In UP, the total road density increased from 690 km per 1000 km² in TE 2002–03 to 1711 km per 1000 km² in TE 2015–16. The surfaced road density went up from 337 km per 1000 km² to 1410 km per 1000 km² in the same period (Fig. 7.8).

Fig. 7.8 Roads in Uttar Pradesh. *Source* Ministry of Road Transport and Highways

Procurement Policy

In the absence of a robust procurement system, a large number of farmers in UP are forced to sell their produce below the market price or MSP. Although UP is the largest producer of wheat in the country, the share of total procurement of wheat as a percentage of production in the state is only 8% as compared to 65% in Punjab in TE 2017–18 (Fig. 7.9). Similarly, in the case of rice, the share of rice procured in UP is 21% of total production as compared to 88% in Punjab (Fig. 7.11). Moreover, there are large fluctuations in the quantity of wheat or paddy that is being procured by the government at MSP as seen in Figs. 7.10 and 7.12.

Taking this into account, the government in Uttar Pradesh decided to purchase wheat at a minimum support price (MSP) of Rs. 1735 per quintal, with an additional Rs. 10 per quintal as transport charges in March 2018, for rabi marketing season 2018–19. It was further directed that the policy would be totally transparent and the farmers would be paid online within 72 hours of their sale. The government would purchase wheat from farmers between April 1 to June 15 and all purchase centres would be linked online.

For paddy, the government set a target of 50 lakh metric tonnes of paddy in *kharif* 2018 and laid emphasis on the RTGS (real-time gross settlement) mode of payment to farmers. Under this policy, MSP for the common variety of paddy was fixed at Rs. 1750 per quintal while that for grade A was fixed at Rs. 1770 per quintal. Besides, Rs. 20 per quintal for winnowing and cleaning the paddy was also added to MSP by the state government.

Fig. 7.9 State-wise production and procurement of wheat in TE 2017–18. *Source* Department of Food and Public Distribution, GoI

Fig. 7.10 Procurement of wheat in Uttar Pradesh (2009–10 to 2018–19). *Source* Department of Food and Public Distribution, GoI

Fig. 7.11 State-wise production and procurement of paddy in TE 2017–18. *Source* Department of Food and Public Distribution, GoI

Power

Uttar Pradesh requires a sustainable power sector to augment agricultural growth and productivity. Figure 7.13 shows the share of agriculture in total power sales and the trend in power intensity in the agriculture sector. The share of agriculture in total power sales in UP remained stagnant from 2004–05 to 2015–16. However, power intensity in the state's agricultural sector has increased from 199 kwh/ha in 2004–05 to 483 kwh/ha in 2015–16. The power sector in Uttar Pradesh suffers from high transmission and distribution losses, which amounted to 24.5% in 2015–16. Due to erratic and inadequate power supply to the agriculture sector, most small and marginal farmers depend on diesel pump sets for irrigation. The state government

Fig. 7.12 Procurement of Paddy in Uttar Pradesh (2009–10 to 2018–19). *Source* Department of Food and Public Distribution, GoI

Fig. 7.13 Power sales (%) and Power intensity (kWh/ha) in the agricultural sector (UP), 2004–05 to 2014–15. *Source* Statistical abstract of Uttar Pradesh, various years

needs to address power shortages, which often lead to inadequate irrigation. UP government can improve power supply to the agricultural sector by replacing diesel pumps with solar pumps, especially in the case of small and marginal farmers.

7.4 Sources of Agricultural Growth in Uttar Pradesh

To arrive at the contribution of various sources to agricultural growth, the ratio between the value of output from different segments and the total value of output from agriculture and allied activities (at current prices) has been calculated. To determine the sources of growth, we have deflated the current series of each segment by the

WPI at 2011–12 prices and then decomposed the year-on-year growth in the GVO from agriculture and allied activities by taking the absolute year-on-year difference in GVO from each segment as a proportion of the previous year's GVO from agriculture and allied activities.

Figure 7.14 shows the shares of different sectors in the value of output of agriculture and allied activities for two periods—TE 2002–03 and TE 2015–16. There is a significant decline in the share of food grains in the value of output from agriculture—the share of cereals declined from 30% in TE 2002–03 to 20.6% in TE 2015–16, and that of pulses declined from 4.1 to 2.1%. The share of fruits and vegetables has also declined from 13.8% to 13.4% during this period. The decline in the contribution of these sectors has been picked up by livestock and fisheries. The value of output from the livestock sector has increased from 24.7% to 33% between TE 2002–03 and TE 2015–16, and that of fisheries from 1.0% to 1.2% during this period.

In the 16-year period between 2000–01 and 2015–16, the value of agriculture and allied activities in UP grew at an average annual rate of 5.1% at 2011–12 constant prices. Decomposing this growth into various sectors, the largest share (41.9%)

Fig. 7.14 Share of sectors in the value of output of agriculture and allied activities. *Source* Calculated by authors using CSO data

Fig. 7.15 Shares of sectors in average annual growth of value of output of agriculture and allied activities between 2000–01 and 2015–16. *Source* Calculated by authors using CSO data

comes from the livestock sector, followed by fruits and vegetables (17%). Sugar contributes 11% of the value of agriculture and allied activities—almost all of it coming from sugarcane and *gur*. Forestry is the next most important contributor (8.9%), followed by drugs and narcotics (7.6%) cereals (6.9%) and fisheries (1.4%). Oilseeds contribute a meagre 0.3% to agricultural growth. Within the livestock sector, milk has the highest share in agricultural growth followed by meat (Fig. 7.15).

Within UP, there is wide regional variation in the value of output from agriculture and allied activities. The Western region contributed 49.6% of the total value of output from agriculture and allied activities, followed by the eastern region (27.7%), central region (17.2%) and Bundelkhand (5.5%) in TE 2015–16 (Fig. 7.16). In the western region, most of the value of output was from livestock (34%), followed by cereals (16%) and sugarcane (15%). In the eastern region, livestock and cereals together contribute 62% of the total value of output. In the central region, livestock accounts for 27%, followed by cereals (22%) and sugarcane (16%). In the Bundelkhand region, which is the lowest contributor to UP's agriculture, livestock and cereals contribute about 46% to the value of output from agriculture and allied activities (Fig. 7.17). Thus, most of the value of output in agriculture in UP comes from the livestock, cereals and sugarcane sectors.

Fig. 7.16 Region wise contribution in value of output from agriculture and allied activities. *Source* Economics and Statistics Division, State Planning Institute, Planning Department, GoUP

7.4.1 Food Grains

Food grains are an important source of agricultural growth in UP, contributing 7.2% to agricultural growth between 2001–02 and 2015–16. The state is the largest producer of foodgrains in the country, producing 17% of the total produce and accounting for 15.8% of the total area under food grains in TE 2015–16. Wheat is the most important crop in UP, covering 31.5% of the total area (9.7 mha) under wheat in the country and contributing 28.1% of the total production (26 million tonnes) in TE 2015–16. However, its yield is 3113 kg/ha lower than the all-India average of 3200 kg/ha. Rice is the second most important crop, contributing 12% of the total produce and covering 13.5% of the total area under rice cultivation in TE 2015–16. UP is one of the few states in the country that recorded an increase in the production of coarse cereals from 3.7 million tonnes in 2012–13 to 3.9 million tonnes in 2016–17. Its productivity is higher at 1947 kg/ha in 2016–17 against the all India average of 1750 kg/ha. Thus, despite being a high producer of foodgrains, the state is grappling with the issue of low productivity.

7.4.2 Fruits and Vegetables

With its varied agro-climatic zones, UP is able to produce a wide variety of horticultural crops. These include fruits, vegetables, flowers, medicinal plants, mushrooms, honey and spices and so on. In 12th five-year plan, special emphasis was given to the development of horticulture in UP. It was envisaged that an increase in production and productivity will not only result in additional income for farmers but will also provide them with better nutrition.

Fig. 7.17 Value of output from agriculture and allied activities in TE 2015–16: regionwise. *Source* Adapted from an upcoming ICRIER study of the performance of agriculture in Uttar Pradesh: district wise analysis

UP is the third-largest producer of fruits in the country with 11.2% (10.35 MMT) of total fruit production in 2016–17. The state is the largest producer of vegetables, accounting for 13.6% of the all-India area under vegetables. UP produced 15.1% (26.4 MMT) of the country's total vegetable production in the same year. Fruits and vegetables together contributed 17% to overall growth in agriculture in UP between 2000–2001 and 2015–16. However, the share of fruits and vegetables in the value of agricultural output has declined marginally from 13.8% in TE 2001–02 to 13.4% in TE 2015–16. UP is the largest producer of mango, guava, muskmelon and watermelon among fruits, and potato, peas and bottle gourd among vegetables.

Potato is the major horticultural crop in UP. In 2016–17, UP produced 15.54 million tonnes of potato, which was 31.9% of India's production. UP has created large infrastructure for cold storage. It has 31.6% of the total cold storages that account for 42.8% of the total capacity (Task Force on Cold Chain, MoFPI). Based on current

consumption patterns, a 2015 study done by NABCONS estimated that 10.56 million tonnes of bulk cold storages, 1.09 lakh tonnes of hub cold storages, 72,945 tonnes of onion storage and 10,691 tonnes of ripening chambers will be required in UP (NCCD—All India Cold Chain Infrastructure Capacity—Assessment of Status Gap, 2015).

In March 2017, potato prices in UP crashed to Rs. 200–250 per quintal, forcing farmers to dump potatoes on the streets. Many farmers did not lift their potato stored in cold storage. On April 11, 2017, the state government announced a plan to procure one lakh tonnes of potato at Rs. 487 per quintal but there were problems of quality specifications and ultimately, only 13,000 kg of potatoes were procured. By December 2017, cold storages started dumping potato on the streets and fields.

Although UP is the largest producer of potatoes, there are only a few processing units in the state. UP produces the table variety of potato while processable varieties (*kufri*, *chipsona* I and II, *Rosetta* and *Santana*) are not produced in large quantities. In 2014, the UP government announced *Aaloo Vikas Neeti* for seeds of varieties of potato that can be used by food processing industry. Under the scheme, a grant of Rs. 10,000 per hectare was to be given to farmers on a first come first serve basis in identified districts.

Mango is the major fruit produced in UP. The state produces the best of succulent varieties—*dussehri*, *chausa*, *langda*. The productivity of mango in UP at 17.14 MT/ha is almost twice the all-India average of 8.71 MT/ha. UP contributed the largest share of the value of output from mango at the all-India level, accounting for 22.8% in 2015–16. In 2016–17, India exported 52,761 tonnes of mangoes (valued Rs. 443.66 crore) but mango exports from UP were negligible. The value chain for the export of mango varieties produced in UP has not been developed and the grading facilities developed by UP *Mandi Parishad* near Lucknow remain grossly underutilised. For the export of mango to the USA, registration of orchards with pack houses and irradiation at minimum absorbed dosage of 400 GRAYS is mandatory. Interventions similar to those taken in grapes in Maharashtra are needed for mangoes, if UP has to emerge as a significant exporter of mangoes. In the case of grapes, the Government of Maharashtra and ICAR have set up a comprehensive system of traceability and testing of grapes. In 1997, ICAR set up a national research centre for grapes at Pune. In 2016–17, India exported 2.32 lakh tonnes of grapes and earned foreign exchange of USD 314.11 million.

Banana has also emerged as a major fruit crop in the state and its production has gone up from 1.9 MMT in 2014–15 to 3.1 MMT in 2016–17.

7.4.3 Sugarcane

UP is the largest producer of sugarcane in the country and it plays a critical role in UP's economy, especially in Western UP. The area under sugarcane is largely irrigated. There has been a decline the area under sugarcane from 22.47 lakh hectare in 2006–07 to 21.6 lakh hectare in TE 2016–17. The yield of sugarcane in UP was 59.6

tonne/ha in 2006–07; this increased to 64.7 tonne/ha by TE 2016–17. The recovery rate of sugar from sugarcane has almost always been lower than that in Maharashtra. In 2006–07, the average recovery rate in UP was 9.47% while it was 11.39% in Maharashtra. The recovery rate of sugarcane in UP has risen to 10.61% while that in Maharashtra was still 11.34% in 2016–17.

In 2006–07, sugar production in UP was only 84.8 lakh tonnes; this increased to 119.2 lakh tonnes in 2017–18. The increase in production, productivity and recovery of sugar from sugar cane is attributed to the development of a new variety of sugarcane—Co-0238—by Dr Bakshi Ram of the sugarcane breeding institute, Karnal. The variety gives a yield of 80 tonnes per hectare, which is about 10 tonnes higher than the yield of CoS 767, CoSe 92423 and other varieties that were grown in UP until recently. In 2017–18, the area under this variety reached 12.08 lakh hectares, which is 52.6% of total cane area in UP.

The processing of cane and payment of sugarcane price continue to be major challenges for any government in UP. The FRP (Fair and Remunerative Price) for 2017–18 was Rs. 255 per quintal, based on a recovery rate of 9.5%. Every increase in recovery of sugar by 0.1% increases the FRP by Rs. 2.68 per quintal. For a long time, the Government of UP has been declaring a SAP (state advised price) for sugarcane, which is higher than the FRP. The following figure (Fig. 7.18) shows the FRP and SAP price of sugar.

The announcement of SAP has remained a sore issue between sugar mill owners and farmers. Since the SAP is not linked to the market price of sugar, mill owners keep complaining that they are unable to pay the SAP to farmers for many years as their realisation from sugar was not enough. For the 2018–19 season, the UP government has retained the SAP at Rs. 315 per quintal although farmers were demanding Rs. 340 per quintal.

Fig. 7.18 FRP and SAP for sugarcane in UP. *Source* CACP Sugarcane Reports

7.4.4 Livestock

The entire livestock sector in UP registered a high rate of growth between 2001–02 and 2015–16. Milk contributed the most to agricultural growth followed by meat. Other livestock products such as wool, skin, eggs, etc., made small contributions to agricultural growth.

UP faces a shortage of green as well as dry fodder since the area under fodder (8.78 lakh hectares) has remained almost stagnant. Therefore, animals largely eat agricultural crop residues.

The poultry sector in UP has not witnessed the fast growth observed in the milk sector and UP has to import about one crore eggs and 972 lakh broilers every day from other states including AP, Haryana and Punjab (Annual Plan Document 2016–17, Government of UP).

Goat rearing is another major occupation of the poorer sections of UP's rural population. There are 155.85 lakh goats, which are mostly reared for meat.

Livestock is a major occupation for small and marginal farmers who combine it with growing crops. It is mostly women who are engaged in the care and management of livestock. The development of the livestock sector, therefore, can help reduce poverty and add to the income of farmers. Male buffalo calves are not nurtured by farmers to save on milk and the cost of feeding. If slaughter of buffaloes is not discouraged, it is quite possible that farmers will rear male calves for the production of meat, adding to their income.

NABARD launched a scheme for salvaging and rearing of male calves under which loan and interest subsidy were available for financing and rearing of male calves. However, the scheme did not take off and the cumulative sanctions until November 2017 were only Rs. 40 lakh in the entire country.

7.4.5 Milk

UP is the largest producer of milk in the country. In 2016–17, milk production in UP was 27.5 million tonnes, which was 16.8% of India's milk production. About 70% of milk produced in UP comes from buffaloes. The processing of milk in the organised sector in UP is only 12% while the all-India average is 17% and that of Gujarat, 49%. UP announced a milk policy in January 2018 that proposed increasing the processing of milk in the organised sector to 30%. The policy objectives include an increase in the production of processed milk and milk products, remunerative prices to dairy farmers, increase in their income and improvement in infrastructure to attract private investment. It also aims to create awareness about the quality of milk and milk products and develop marketing and research & development in the milk sector.

In order to attract investment, the policy provides a 25% subsidy (with a cap of Rs. 50 lakh) for the establishment, expansion and modernisation of milk processing

units to be given on a first-come, first-serve basis. Further, the policy provides for interest subsidy to tiny and small milk processing units for loans taken for plant and machinery, civil works, etc. The entire interest paid by such units can be claimed as subsidy. For other milk processing units, interest subsidy of 7% can be claimed for five years with a cap of Rs. 50 lakh per year. The impact of this policy will be known only after a few years.

The co-operative sector in UP has not been doing very well. The Pradeshik Co-operative Dairy Federation (PCDF) has seen a decline in the number of village dairy co-operatives from 16,856 in 2006–07 to 7255 in 2015–16. Farmers' membership in the village dairy co-operatives (VDCs) has also come down from 5.9 lakh in 2006–07 to 3.1 lakh in 2015–16. The PCDF has been incurring huge losses.

The biggest challenge to the dairy sector in UP is the widespread adulteration of milk. In a Public Interest Litigation (PIL) petition in the Supreme Court, the UP government's food safety assistant commissioner himself admitted (India Today: Drink milk from UP at your own risk, January 30, 2014) that out of 4503 samples collected between January 2012 and May 2013, 1280 samples were found adulterated with detergent, starch, carbohydrates and whitener.²

Setting up of modern milk processing plants can help UP shed this image of being at the centre of milk adulteration. In recent years, UP has been able to attract a number of dairy projects in the private sector. MoFPI has sanctioned grants to six dairy projects in UP under its cold chain scheme. NABARD recently sanctioned projects of Rs. 766 crore to set up eight new milk processing units. In addition, NABARD is funding the refurbishment of four existing milk processing units. However, the reach of the co-operative sector is quite limited and the state needs to aggressively pursue private investment in the dairy sector.

In the last few years, the Gujarat Co-operative Milk Marketing Federation (GCMMF), the owner of brand Amul, has entered UP through the Banas Dairy Co-operative. It has already commissioned milk processing units at Lucknow and Kanpur with a capacity of 5 lakh litres per day. GCMMF also proposes to increase milk procurement to 20 lakh litres per day by 2021. However, of about 8 crore litres of milk produced per day, PCDF and Amul procure just about 3 lakh litres per day. Even though PCDF is implementing the Rs. 983 crore NABARD-funded expansion project, the co-operative sector is not truly independent of government intervention and there is no stability in the tenure of its chief executive. It is unlikely that PCDF can find the resources to substantially increase procurement of milk by setting up additional processing units. Therefore, investment by the private sector in milk processing is the only way UP can substantially increase the processing of milk in the organised sector.

²While disposing of the PIL, the SC (Swami Achyutanand Tirth and others vs. Union of India and others decided on August 5, 2016) directed the union and state governments to implement the FSSAI Act, 2006, in a more effective manner. FSSAI was also directed to identify high-risk areas and times (festivals, etc.) when the risk of adulteration is high.

7.4.6 *Meat*

In 2014, India became the largest exporter of bovine meat (USD 4.78 billion), higher than the traditional earning from the export of rice (USD 4.5 billion). In the entire country, there are 78 export-oriented abattoirs (as on July 4, 2018) from where buffalo meat is exported. These are registered with APEDA and they have integrated facilities for animals waiting to be slaughtered (lairage), stunning, slaughter lines, dehousing, washing, deboning, chilling, blast freezing and packaging. Of these, UP has 42 export-oriented integrated abattoirs with processing units. All these projects are in the private sector and they exported 67% of India's buffalo meat from UP.³

In the last three years, several cases of violence against cattle traders have been reported from UP. The production of buffalo meat in UP decreased from 14.17 lakh tonnes in 2015–16 to 13.46 lakh tonnes in 2016–17. Restrictions on the transportation of animals are likely to affect the income of small and marginal farmers due to the lower market price for animals because of the fear of violence during transportation. It is also likely that due to the closure of municipal abattoirs, small meat shops may be slaughtering animals in residential localities, thus causing the pollution of drains. It is necessary that the state government invests in the modernisation of municipal abattoirs so that the local population can get clean and hygienic meat and the pollution of drains and rivers is minimised. In fact, there is a need to ensure that even poultry slaughtering is done in approved municipal abattoirs.

Another option for the state government is to invite private investment in the public-private partnership mode under which private investors are invited to invest in the modernisation and upgradation of municipal abattoirs. Under this model, the private investor is allowed to use one shift of the abattoir for export while another shift is used for local consumption. In UP itself, the Bareilly Municipal Corporation modernised its abattoir in the PPP mode at a cost of Rs. 23.62 crore. It has a capacity to slaughter 200 buffaloes and 550 sheep or goat each day. The entire investment in this project has been made by a private investor.

³For local consumption of meat, UP's Municipal Corporations Act, 1959 mandates municipal bodies to construct and maintain abattoirs. Most of the municipal abattoirs, however, do not meet the stringent norms of the UP Pollution Control Board. In 2015, the Board identified 129 industrial units as very hazardous for the environment. Of these, there were 44 abattoirs owned by municipal boards. The list included abattoirs in the major cities of UP including Lucknow, Lakhimpur Kheri, Sitapur, Barabanki, Agra, Basti, Mau, Allahabad, Varanasi, Mirzapur, Bareilly, Pilibhit, Shahjahanpur, Bulundshahr, Badaun, and even Aligarh, which has a number of private APEDA-approved abattoirs. All of these municipal abattoirs are closed for slaughtering, some for several years; it is not clear where the animals for local consumption are being slaughtered. While municipal abattoirs have been closed, it seems other polluting units included in the list of 129 notified by UPPCB are still operating. These include paper and pulp, textile and yarn and aluminium smelting units.

7.4.7 Fisheries

The contribution of fisheries in UP was 1.4% to overall growth in agriculture and allied activities between 2000–01 and 2015–16 and its share in the value of output of agriculture and allied activities has risen significantly from 0.98% in TE 2002–03 to 1.19% in TE 2015–16. Fish production in UP has increased from 28,958 tonnes (4.4% of all-India production) in 2005–06 to 504,808 tonnes (4.7% of all-India production) in 2016–17. The state ranks ninth in fish production in the country.

Uttar Pradesh has a vast area of freshwater resources in terms of a network of rivers and canals, flood plain wetlands, reservoirs, ponds and tanks that can be used for fishery. Some of the challenges faced by Uttar Pradesh may be attributed to non-availability of quality fish seeds, feed, non-scientific fish farming practices and low subsidy for fish farming that is limited to only a few selected species.

7.5 Drivers of Agriculture Growth

The performance of the agricultural sector in any state is influenced by a host of supply-side factors such as the use of inputs (irrigation, power, agricultural-credit) in farming operation, price incentives and infrastructure facilities. In this section, we make an attempt to find out the drivers of agricultural growth in UP through a simple econometric model. In this study, we have used irrigation as representative of the inputs used in agriculture, terms of trade between agriculture and industry and surfaced road density for infrastructure. The model shows that GSDPA shows a significant and positive correlation with these three variables.

The function is defined as:

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots \quad (1)$$

Here, X_1 is irrigation ratio; X_2 is surfaced road density; and X_3 is terms-of-trade between agriculture and industry.

In our model, the logarithmic value of GSDPA is the dependent variable and the log values of the variables mentioned above are the independent variables. The equation has been estimated using data from 2001–02 to 2014–15. We have run the model with different variables and have presented only those variables that have a significant effect on agricultural GDP (Tables 7.2 and 7.3).

The results from the model show that (i) irrigation (ii) terms of trade and (iii) surfaced road density, have a positive and statistically significant impact on gross domestic product from agriculture and allied activities. Model 1 shows that a one per cent increase in the irrigation ratio increases UP's agricultural GSDP by 2.38%, while a one per cent increase in terms of trade increases agricultural GSDP in the state by about 0.25%. Similarly, Model 2 shows that a one per cent increase in TOT

Table 7.2 Variables and definitions used for the model

Variable	Definition
Ln_GSDPA	GSDPA is the log of gross domestic product from agriculture and allied activities (2011–12 prices)
Ln_IRR	Log of ratio of gross irrigated area (GIA) to gross cropped area (GCA)
Ln_TOT	Log of the ratio of the GDP deflator for agriculture and industry in UP
Ln_SRD	Log of surfaced road length per thousand square kilometer of area

Table 7.3 Regression results for determining drivers of agricultural growth in UP between 2000–01 and 2014–15

	Model 1	Model 2
Constant	6.28 (4.51)***	15.47 (145.53)***
Ln_IRR	2.38 (7.36)***	
Ln_TOT	0.25 (2.6)**	0.25 (3.43)***
Ln_SRD		0.17 (10.07)***
<i>R</i> -squared	0.89	0.93
Adjusted <i>R</i> -squared	0.87	0.92
Number of observations	15	15

Note ***Significant at 1% level (p -value < 0.01); **significant at 5% level (p -value < 0.05); *significant at 10% level (p -value < 0.1)

increases UP's agricultural GSDP by 0.25% and a one per cent increase in surfaced road density increases agricultural GSDP by about 0.17%.

7.6 Assessment of Budgetary Allocation to Agriculture and Allied Activities

The allocation of budgetary expenditure on agriculture has a significant impact on poverty alleviation. Results from a modelling exercise comparing investments and input subsidies in agriculture reveal that the marginal returns in terms of the number of people brought out of poverty from investments in R&E, roads, education and irrigation outweigh the benefits from input subsidies in power, fertiliser and irrigation (Gulati and Terway upcoming paper). In this section, we make an attempt to analyse how resources are allocated in this state and how well these expenditures are aligned with growth in various agricultural sub-sectors.

We have analysed the budgetary expenditure of the three latest financial years—FY 2015–16 (Actual), FY 2016–17 (RE) and FY 2017–18 (BE) (Fig. 7.20). The broad allocation under the agriculture and allied activities for TE 2017–18 is shown in

Fig. 7.19. It shows that food grains (35%) accounted for the highest share followed by animal husbandry and dairy development (25.6%) and fisheries (11.7%) in TE 2017–18 (Fig. 7.19). Within crop husbandry, most of the resources have been allocated for farmers' extension and training (24.4%), followed by food grains (21.3%) and crop insurance (18.1%) (Fig. 7.21). The government had announced loan waivers to small and marginal farmers and had allocated Rs. 32,400 crore for this purpose in 2017–18. This forms the largest chunk of expenditure under crop husbandry and if this figure is combined with the total budget under this segment, it takes away 88% of the total budgetary allocation. Thus, there is a clear diversion of resources away from long-term investments towards ad hoc policies such as loan waivers.

This section discusses both expenditure in agriculture (cereals, fibre, oilseeds, fruits and vegetables, livestock and fisheries) and expenditure on agricultural infrastructure (road, irrigation, research and education, extension and training) from the state budget documents (Fig. 7.19).

Livestock is the largest contributor in the gross value added in agriculture comprising 33% of the value of output in TE 2015–16 and it makes up to about 25.7% in the total budgetary allocation in TE 2017–18. UP is the largest producer of milk in the country, contributing 16.8% of India's total milk production. However, the total allocation of dairy development has decreased from Rs. 388 crore in 2015–16 to Rs. 269 crore in 2018–19. Several new programmes, such as *Nand Baba Puraskar*, establishment of the Dairy Development Fund and setting up several plants with loan from NABARD to increase processing capacity in the state have been initiated by the state government in 2018–19 to enhance the milk sector of UP. The allocation towards animal health and veterinary services has more than doubled from Rs. 64

Fig. 7.19 Alignment of agricultural budget with GVO in agriculture and allied activities. *Source* Agriculture Department, Uttar Pradesh

Fig. 7.20 Allocation to broad heads as a share of total allocation to agriculture and allied activities.
Source Agriculture Department, Uttar Pradesh

Fig. 7.21 Allocation to broad heads as a share of total allocation to crop husbandry in TE 2018-19.
Source Agriculture Department, Uttar Pradesh

crore in 2015–16 to Rs. 143 crore in 2017–18. The government has also promised to set up one processing plant in every four districts of the state.

The food grains sector makes up 23.7% of the value of output from agriculture and allied activities and accounts for 34.5% of the total budgetary allocation (Fig. 7.19).

Fruits and vegetables contribute 13.4% in the GVOA but expenditure on the sub-sector is only 5.4% of the total expenditure incurred on agriculture and allied activities. Taking into account the importance of horticulture in augmenting farmers' income, the state government has taken steps like expansion of area, rejuvenation of old mango, guava and *amla* orchards, production of quality planting material, post-harvest management, etc. Various schemes such as the Integrated Mission for Development of Horticulture, establishment of drip/sprinkler irrigation system, National Mission on Medicinal Plants, development of horticulture in schedule caste/tribe areas, *Rashtriya Krishi Vikas Yojana* and *Sampada* scheme of Ministry of Food Processing are also being implemented by the state government. Despite the emphasis on the development of horticulture, the share of total expenditure on horticulture is less than 10% of the total budgetary outlay. Thus, given the huge opportunity and benefits that farmers could reap from the horticulture sector, there is a need to increase the budgetary allocation under this head.

Sugarcane contributes 11.8% of the GVOA in agriculture whereas the budgetary allocation for sugarcane farmers is just about 3%. The state government provides resources for sugarcane development for farmers as well as for roads and bridges for the transportation of sugarcane from farms to millers. It also provides resources for farmers' research and education, crop development and loans for reviving the sugarcane industry. The state government needs to further invest in cane development by promoting sustainable practices and efficient transportation of sugar cane to sugar mills. Expansion of area under drip irrigation is necessary to ensure the sustainability of the crop in western UP.

Expenditure on fisheries is 11.7% of total budget outlay as compared to its contribution of 1.2% in GVOA. Given the vast water resources in the state, the fisheries sector must be explored by dedicating resources to procure good quality seeds and better farming practices.

UP has one of the highest irrigation ratios (80%) in the country and it stands next to only Punjab and Haryana. Expenditure on major, medium, minor irrigation and flood control accounted for Rs. 11,990 crore in FY 2017–18. Four projects in UP have been identified under AIBP and they have the potential to bring up to 814,000 hectares of additional area under irrigation.

7.7 Conclusion and Policy Recommendations

Uttar Pradesh (UP) is largely an agrarian economy, dominated by small and marginal farmers and engaging about 47% of the population in agriculture. It is largest in terms of size and one of the largest states in terms of area. It has nine agro-climatic zones. There is a wide variation in the value of output from agriculture and allied activities

from the various regions of the state. The western zone contributed 49.6% of the total value of output from agriculture and allied activities, followed by the eastern region (27.7%), central region (17.2%) and Bundelkhand (5.5%) in TE 2015–16. The cropping pattern is dominated by foodgrains, although its share in the value of production is decreasing. Livestock is a major contributor to the growth in agriculture experienced by UP over the years. UP is a major producer of horticultural produce such as potato, pea, mango, watermelon, *amla*, etc. Although it accounts for a large proportion of food grain production, the state lags behind in terms of agricultural productivity. Besides, farmers end up receiving low prices for their produce and this implies low income from farming activities.

The regression analysis conducted for UP shows that agricultural growth is positively and significantly associated with the irrigation ratio, road density and terms of trade between agriculture and industry. UP has performed well both in irrigation coverage as well as roads.

Agriculture remains at the forefront of any discussion on the economic scene in UP but there are only a few policy interventions actively promoted by the state government. For most of the last ten years, the state government has implemented centrally sponsored schemes, be it the National Food Security Mission or the *Rashtriya Krishi Vikas Yojana* or the National Horticulture Mission.

Food Grains

One of the perennial problems confronting farmers has been their inability to realise the minimum support prices even for wheat and paddy. The procurement of wheat and rice has fluctuated widely over the years. In 2012–13, 50.62 lakh tonnes of wheat was procured but the very next year, procurement fell to 6.82 lakh tonnes. In 2018–19, 50.87 lakh tonnes of wheat has been procured but it is still to be seen whether this level will endure in the future years. One of the major reasons for such fluctuation is that the arrivals are not meticulously recorded in *mandis*. For instance, the arrival of paddy in *mandis* was 32.37 lakh tonnes between October 2015 and January 2016. It fell the next year to 25.99 lakh tonnes. In 2016–17, it rose to 45.20 lakh tonnes. There are large variations across districts. It means that a substantial quantity of agricultural produce is sold outside the *mandis*. It is possible that small and marginal farmers prefer to sell their produce in the village itself since the cost involved in transporting produce to the *mandis* may make it less remunerative.

Madhya Pradesh has successfully erected an elaborate system for procurement by using information technology in the last ten years. For procurement operations in MP, the crop sown area and production of each farmer are registered. Their mobile numbers are also taken. At the time of procurement, farmers are sent advisories through SMS and they are asked to bring their produce to *mandis* on specified dates. It prevents crowding in *mandis* and enables small farmers to hire tractors for taking their produce to the market.

In 2017–18, UP also started online registration of farmers in the portal set up by the Food Commissioner. After registration, farmers are required to take a copy of the land record (*khatauni*), Aadhar card, the first page of their bank passbook and latest passport size photograph to the procurement centre.

The guidelines for procurement also provide that any farmer can sell his produce at the procurement centre situated in *mandis*, but in the centre located outside *mandis*, farmers of only the village tagged to that centre can offer their produce for procurement. Such a complex procurement system is not conducive for delivering MSP to small and marginal farmers, who would rather sell to village traders than bring their produce to *mandis*.

In any case, farmers growing crops other than wheat and paddy have no recourse to MSP operations. Under the price support scheme and price stabilisation fund, the National Agricultural Cooperative Marketing Federation of India Ltd (NAFED), the Small Farmers' Agri-Business Consortium (SFAC) and the Food Corporation of India (FCI) have been procuring pulses and oilseeds at MSP in various states. Under the price support scheme (PSS), 48.68 lakh tonnes of pulses have been procured in the country in 2016–17 and 2017–18 (up to July 23, 2018). Under the price stabilisation fund, 16.70 lakh tonnes of pulses have been procured. Most of the procurement was in Maharashtra, Karnataka and Madhya Pradesh but UP farmers, especially in Bundelkhand where pulses are predominantly grown, have not benefitted as UP's procurement agencies have not been proactive in undertaking these operations. The marketing infrastructure has been created in Bundelkhand out of the funds received by the state under the Bundelkhand package but actual procurement has not seen much of an upward trend.

e-NAM

Since its launch by the GoI on April 14, 2016, e-NAM has provided an opportunity to farmers to sell their produce in any *mandi* in states that are integrated under eNAM. UP already meets the three conditions for joining eNAM platform, i.e. provision for e-trading in *mandi* regulations, single-point levy of market fee and unified licence for trading in the state. Out of 1.1 crore farmers registered across India, about 29 lakh farmers are from UP alone. Out of the 585 markets linked to the platform, 100 are from UP alone. The actual progress of auctions through eNAM and the benefit flowing to farmers in the form of better prices, however, is not known. Auctioning through the eNAM platform can bring transparency to *mandi* operations as the bids quoted by commission agents will then be known to the farmer, who will decide what price is acceptable to him. It can address the problems of collusion in *mandi* operations.

Milk

India is the largest producer of milk in the world. In 2016–17, India produced 165.4 million tonnes of milk, of which UP contributed 27 million tonnes, which is the highest in the country. However, the milk trade in UP is dominated by the unorganised sector and only 12% of milk is processed by the organised sector.

UP has a poor reputation for the quality of milk and the media carries reports of adulteration from time to time. The FSSAI conducted a national milk quality survey in 2018 under which 6432 samples were analysed in the whole country. About 10%

of the samples were found adulterated with contaminants that made milk unsafe for human consumption. This could be due to deliberate adulteration as well as poor quality of feed, unregulated use of antibiotics and poor farm practices. The FSSAI has not released state-wise data of adulteration and safety but in the public mind, milk supplied in UP is associated with deliberate adulteration. The major task for the UP government is to organise regular analysis of samples and take strict action against adulteration. Adulteration of milk with pesticides, antibiotics and veterinary drugs shakes the confidence of public in the use of an important commodity like milk, which is consumed largely by children. A number of such events of failure to meet the safety norms of the FSSAI could be due to lack of knowledge among farmers, who may be using unsafe practices resulting in adulteration. Procurement of milk by the organised sector can improve these practices and testing of milk at collection centres needs to substantially improve.

In the last two years, due to a slump in the global prices of SMP, milk prices have fallen in India too and UP farmers have also been adversely affected. They get just about Rs. 18–20 per litre of milk while in Gujarat and Maharashtra, farmers are being paid Rs. 25 per litre, which includes a subsidy of Rs. 5 per litre promised by the state government. Banas Dairy, a member of Gujarat Co-operative Milk Marketing Federation that owns the Amul brand, has set up two processing units of 5 lakh tonnes/day at Kanpur and Lucknow, and is likely to provide a fillip to milk processing in the state. By raising the standard of processing and providing better prices to farmers, the private sector may find UP an attractive destination for investment in milk processing. NABARD has sanctioned a project of Rs. 1225.01 crore to PCDF to set up eight new dairy plants and refurbish four others in the state. UP has taken a loan of Rs. 983.22 crore from NABARD under Rural Infrastructure Development Fund (RIDF). The new processing plants under this project will add a daily capacity of 16 lakh litres. Timely implementation of this project will add to the milk processing capacity in the co-operative sector. The state government must provide stable leadership to the PCDF by appointing a professional as its chief executive officer.

Fisheries

The development of inland fisheries can provide additional rural employment through aquaculture. As fish is a source of high-quality protein, the government would do well to promote the development of fisheries to address the challenge of malnutrition in the state. This can be achieved by leasing all major rural ponds to fishermen communities. For the production of quality fish seed, it may be appropriate for the government to incentivise the private sector. There is a case for privatisation of government-run fish seed farms as they have not been able to run optimally and 48 of them have been closed.

The state government already has a scheme of providing 30% grant to mobile fish parlours but the budget allocation is very meagre (Rs. 16.50 lakh in 2016–17 for ten such parlours). The main objective of the scheme is to provide hygienically prepared fish in large urban centres in UP. The demand for inland fish can easily be given a fillip by aggressively promoting the consumption of fish and fish products in cities and towns.

Horticulture

With its varied climate and large population, UP is both the source of production and market for horticulture crops. The state government has actively participated in the national horticulture mission and the production of fruits and vegetables has increased substantially in the last ten years. The state came out with a potato policy in 2014 and a food processing policy in 2013 and 2017.

The state government provides 25% subsidy of up to Rs. 25 lakh on plant and machinery and civil works for the expansion and modernisation of food processing units. Under the *Pradhan Mantri Kisan Sampada Yojana* of the MoFPI, an additional capital subsidy of 10% is also available for fruit and vegetable processing. An interest subsidy of up to Rs. 2.50 crore in a five-year period is also available. If the promises made in the policy are actually fulfilled and the food processing industry is invited to UP to invest in processing, the level of processing can increase and the horticulture sector can get a boost.

Pricing of Sugarcane

Payment of sugarcane price remains an important issue in the agricultural economy in UP. Every few years, sugar prices collapse and sugar mills start defaulting on payments to farmers. On October 29, 2018, the farmers were yet to be paid Rs. 7649 crore of cane dues, which was 21.57% of the total SAP of Rs. 35,463 crore. Cane price for 2018–19 is yet to be declared and the UP Sugar Mills Association has gone to the high court against any increase in SAP.

The Rangarajan Committee on Sugar (2012) made several recommendations to address the problem of sugarcane dues. First, it recommended that over a period of time, states should encourage contractual arrangements between mills and farmers for sugarcane. It will result in phasing out of cane reservation area⁴ and bonding of farmers with sugar mills. Farmers would then be able to decide the mill to which they want to sell their sugarcane. The second recommendation of the committee was that the current norm of a minimum radial distance of 15 km between two sugar mills should be abolished. It was expected that this would ensure a better price for farmers and the mills would be forced to pay cane dues on time. The third recommendation was the sharing of revenue created in the sugarcane production chain in the ratio of 70:30 between cane growers and sugar mills. This ratio was also to apply to primary by-products of sugar. Mills would pay FRP to farmers in the first instalment and the balance of cane dues will depend on the final price of sugar realised by sugar mills. The fourth recommendation was the abolition of levy sugar quota and the system of monthly quota release by the Ministry of Food and Public Distribution, GoI. Lastly, the committee recommended that all restrictions on the sale of by-products and prices may be removed.

If the recommendation on payment of cane dues was accepted by GoUP, the situation in UP would have been as follows (see Table 7.4).

⁴The government has specified a cane reservation area under which farmers have to sell their produce to particular sugar mill and the mill has to buy sugarcane from these farmers only.

Table 7.4 Recommended sugarcane prices in comparison with SAP and FRP (Rangarajan Committee)

Year	Average sugar price	FRP@ 9.5% recovery	(Price in Rs. per tonne)	
			75% of sugar price	SAP in UP
2013–14	3001	2100	2251	2800
2014–15	2564	2200	1923	2800
2015–16	3174	2300	2380	2800
2016–17	3364	2300	2523	3050
2017–18	3076	2550	2307	3150

Source Calculated by authors' from ISMA; CACP Sugarcane Reports

It may be observed that in years of low sugar prices, even the FRP cannot be paid by sugar mills as it will be higher than 75% of sugar prices. For meeting such situations, the sugar development fund has to be augmented in years of high prices of sugar. Since the recovery of sugar cane has increased in UP, the farmers would have to be paid a higher price if the Rangarajan formula had been accepted. In certain years (2017–18 for example), the payment by sugar mills under this formula would be lower than FRP. In such a situation, the state government would have to come forward and pay the difference between FRP and price derived from the Rangarajan formula.

Molasses

In the new molasses policy of 2017–18 notified on January 27, 2018, the reservation of molasses for liquor has been reduced from 25% to 12% and mills are now required to maintain a ratio of 1:7.3 for the sale of molasses to the liquor industry and in the open market. Due to record-high production of sugar, the price of molasses crashed from Rs. 800 per tonne in October 2017 to about Rs. 1 per tonne in June 2018. The sale of molasses by sugar mills outside the state of UP is also tightly regulated by state governments and sugar mills are required to seek permission for the sale of molasses from excise commissioner on a case-to-case basis. The state government must take action soon and reduce these restrictions so that fair prices could be realised by both farmers and millers.

Ethanol

In May 2018, the GoI announced a national policy on biofuels. The policy permits manufacture of ethanol from sugarcane, corn, bagasse, etc. The sugar industry has also been permitted to manufacture ethanol directly from sugarcane juice.

Oil marketing companies have already started blending gasoline with up to 5% ethanol in twenty notified states and four union territories. For the sugar year 2017–18, 313 crore litres of ethanol was required to blend petrol with 10% of ethanol. To meet the target of 20% blending by 2030, India needs 1000 crore litres of ethanol. UP is in a position to take the lead in producing ethanol to meet this requirement. Now that the GoI has permitted direct manufacturing of ethanol from sugarcane juice, it

is necessary to promote the establishment of ethanol manufacturing units by sugar mills that do not yet have the facility.

Improving Irrigation facilities

There is wide regional variation in the irrigation coverage among various regions of the state. While the western, central and eastern zones have made satisfactory progress in irrigation, Bundelkhand lags behind with less than half (48%) coverage under irrigation. Farmers in water-scarce regions like Bundelkhand and western UP should be encouraged to adopt drip irrigation and watershed-based programmes to ensure better utilisation of available water.

Annexure

Sugar sector was delicensed in 1989 and wide-ranging economic reforms were initiated by the central government in 1991. However, control over the sector continues. The condition of a minimum radial distance of 15 km between sugar mills continues to this day. The decontrol of levy sugar has come down in instalments from 45% in 1990s to 10% by March 2002. It was abolished by the UPA Government for two years in December 2014.

To attract investment in the sugar sector, the Government of UP announced the Sugar Industry Promotion Policy on August 24, 2004. The following attractive incentives were extended for fresh investment in sugar mills:

- (a) Ten per cent capital subsidy.
- (b) Reimbursement of transportation charges from factory up to 600 km from the UP border.
- (c) Reimbursement of additional cost of transporting cane from collection centres to sugar mills.
- (d) Waiver of stamp duty and registration charges on purchase of land.
- (e) Reimbursement of cane society commission.
- (f) Exemption of entry tax on sugar.
- (g) Reimbursement of trade tax on molasses
- (h) Reimbursement of administrative charges on molasses

These incentives were available for five years for any sugar mill having an investment of up to Rs. 350 crore. For investment up to Rs. 500 crore, the incentives were to be made available for ten years. Sugar mills were supposed to start production by March 2007. This period was later extended until March 31, 2008 vide an order dated November 14, 2006.

The policy was subsequently amended by an order dated December 17, 2004, through which it was clarified that the total amount of rebate/remission would not exceed the investment made during the period for which the benefit was granted. Therefore, the rebate or remission was only made to help entrepreneurs recoup their investment.

Table 7.5 Number of sugar mills in different regions of UP

Region	Private sector	Public sector	Co-operative sector	Total
East UP	33		5	38
West UP	24	1	6	31
Central UP	35		13	48

Source Handbook of sugar statistics, 2015–16, ISMA

Until the 1980s, UP had just 34 sugar mills—27 co-operatives, 6 state-owned and just one in the private sector (Palia Kalan of Bajaj Hindustan). As a result of the policy, by March 2016, UP had 117 sugar mills—48 in central UP, 38 in east UP and 31 in west UP (Table 7.5). The installed capacity in UP increased to 84.52 lakh tonnes in the private sector, 2.38 lakh tonnes in the public sector and 7.78 lakh tonnes in the co-operative sector. UP's total capacity reached 94.68 lakh tonnes but that still is lower than Maharashtra's capacity of 109.65 lakh tonnes.

As a result of the implementation of Sugar Industry Promotion Policy, 2004, 38 new sugar mills were set up in UP. Of these, 12 were in the backward region of east UP, 17 were in central UP and only 9 were in western UP.

Molasses

A number of by-products are obtained from the processing of sugarcane. From every 100 tonnes of sugarcane, a mill produces 10 tonnes of sugar, 30 tonnes of bagasse and 4.5 tonnes of molasses. Bagasse is used by mills to generate steam while molasses can be sold to the liquor or chemical industry or they can be used to manufacture ethanol.

The Government of UP exercises a great deal of control over molasses and there are frequent changes in the policy on molasses. Table 7.6 shows the changes in the

Table 7.6 Reservation of molasses for country liquor

Year	Reservation of molasses for country liquor (per cent)	Ratio of dispatch (reserved: free)
2013–14	20	1:9
2014–15	15	1:5.66
2015–16	25	1:3
2016–17	20	1:4
2017–18	12	1:7.3

Source Handbook of Sugar Statistics, ISMA

Note The ratio of dispatch (reserved: free) is a ratio that is mandated under the year's Molasses Policy. A ratio of 1:7.3 for example means that for every unit of reserved (for liquor) molasses, a mill can sell 7.3 units in the free market

last five years:

In the 2014–15 excise policy, notified on January 16, 2015, 15% of molasses was reserved for the production of liquor. On an annual basis, the mills were required to maintain a ratio of 1:5.66 so that about 20% of molasses could be sold to the liquor industry. At that time, sugar mills were realising just about 16% of the open market price of molasses from sales to the liquor industry. The support to the liquor industry was justified by the state government on account of its large contribution to revenues from excise duty. In 2018–19, the state projected an income of Rs. 9738.81 crore from country liquor, license fee for manufacturing country liquor, etc.

Ethanol

Ethanol contains oxygen, enables more efficient combustion of gasoline and causes lower emissions. The Ethanol Blending Programme was launched by the GoI in January 2003 to supply 5% ethanol-blended petrol. UP is the largest producer of ethanol. One crore litres of E10 ethanol saves Rs. 28 crore of foreign exchange at current market rates (May 2018, USD 1 equals Rs. 67.435). The government had fixed an indicative target of 20% blending of biofuels when it was made mandatory in October 2008. In May 2018, the GoI announced a national policy on biofuels. The policy permits the manufacture of ethanol from sugarcane, corn, bagasse, etc. The sugar industry has also been permitted to manufacture ethanol directly from sugarcane juice.

Oil marketing companies have already started blending gasoline with up to 5% ethanol in all twenty notified states and four union territories. For the sugar year 2017–18, 313 crore litres of ethanol is required to blend petrol with 10% ethanol. In the 2017–18 season (December to November), sugar companies and ethanol manufacturers offered approximately 160–165 crore litres of ethanol to oil marketing companies (OMCs) of which OMCs have finalised the purchase of 158.7 crore litres at a basic price of Rs. 40.85 per litre of ethanol. Of this, UP will supply 44.3 crore litre followed by Maharashtra, which will supply 40.3 crore litre. Thus, UP is likely to achieve around 9.6% of ethanol blending with petrol while Maharashtra will achieve approximately 8.6% ethanol blending by November 2018.

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