Int. j. adv. multidisc. res. stud. 2022; 2(4):471-479

Received: 11-06-2022
Accepted: 21-07-2022

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

A Shift in Approach Towards Income Enhancement of Agricultural Households Through 'Doubling Farmers Income' in Uttar Pradesh

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Abstract
In India, majority of its households depend significantly on agriculture and allied activities for their livelihood. It forms the backbone of the economy by providing food security for a vast majority of low-income, poor and vulnerable sections of society. But the Indian farming is changing rapidly and significant shifts have been noticed during the last few decades. Farmers are now earning more from wages than from crop cultivation, indicating that cultivation is becoming less lucrative. The agrarian structure of India also has been undergoing a process of reduction in the size of farms and an increase in the marginalization of holdings for the past several decades. The marginal and small holdings, even if having a high productivity level, are not able to generate sufficient income to sustain the farm households. Keeping in view in 2016, Prime Minister Narendra Modi set a target of 'Doubling Farmers Income' (DFI) by 2022-23', through which the approach of the government to the farmers' welfare has shifted from Raising Agricultural Output (RAO) to Income Enhancement (IE). The performance of Uttar Pradesh; the state where every fifth farmer in the country comes from, is crucial for the success of this shift in approach. In this regard, the present paper especially focuses on the state of Uttar Pradesh and investigates the underlying causes of the low level of income of agricultural households, despite being endowed with relatively rich natural resources and climate. This paper also seeks to assess the performance of the country as well as the state in meeting the Doubling Farmers' Income (DFI) targets. The paper also suggests the farmers' friendly policies and an appropriate strategy to achieve this challenging target set within the due course of time.

Keywords: Agriculture, Doubling Farmers' Income, Uttar Pradesh, NSSO, SAS

Introduction

This year 2022 is notable as it is the target year for doubling farmers' income which was promised six years ago in 2016, when the Prime Minister Narendra Modi-led government had set a highly ambitious target of doubling farmers' incomes by 2022-23. This target was announced on February 28, 2016, by Prime Minister Narendra Modi, while addressing a Kisan rally in Bareilly, Uttar Pradesh, who had said that by the time India celebrated its 75th Independence Day in 2022, farmers' income would have doubled. By this, the approach of the Government of India to the farmers' welfare has shifted from Raising Agricultural Output (RAO) to Income Enhancement (IE). The advantage of this IE approach is that it recognizes the role of non-farm components of farmers' income with the farm income and also gives equal importance to both production and post-production components of agricultural development and farmers' welfare.

To examine issues relating to the doubling of farmers' income (DFI) by 2022-23, the Government of India constituted an inter-ministerial committee in April 2016 with Ashok Dalwai as chairman. The committee made it clear that the target of doubling farmers' income was in real terms and the goal was to be achieved over a period of 7 years with 2015-16 as the base year. The Dalwai Committee has calculated that at the all-India level for achieving the DFI target, the compound annual growth rate (CAGR) should be 10.4 per cent. It means farmers' real incomes need to grow at 10.4% per annum during 2015-16 to 2022-23. This is too much, given that the real income of an average Indian farmer grew at the rate of just 3.7% in the preceding 13 years (during 2002-03 to 2015-16). The picture is even the same after the declaration of this target as the current growth in the Indian Farmers' real or inflation-adjusted income at about just 3.5 per cent, is barely a third of the growth rate required to achieve this goal. In 2019, an empowered body was set up to monitor and review the progress of the recommendations of this committee. The committee has also identified seven sources of income growth; improvement in crop productivity; improvement in livestock productivity; resource use efficiency or savings in the cost of production; increase in the cropping intensity; diversification towards high-value crops; improvement in real prices received by farmers; and shift from farm to non-farm occupations (PIB, 2020) [14].

As we all know that the central government has given the highest priority to agriculture and allied activities during the last few decades. The contribution of agriculture to the nation's GDP is significant, hence it is all the more imperative to strengthen the agriculture sector. Even during the pandemic, the agriculture sector stood the test of time and farmers pulled off bumper harvests. To achieve the Prime minister's dream of doubling farmers' income by 2022, the centre and state governments, and farmers of the country are working in unison. (PTI, 2021) [15]. Though doubling agricultural income by 2022 is a mammoth task, it is also one that is the need of the hour. With a majority of the country's population dependent on agricultural activities, no true development can be said to be meaningful unless it incorporates the needs of this sector (Chaudhary and Singh, 2017) [5].

A shift in approach: From Raising Agricultural Output (RAO) to Income Enhancement (IE)

Past strategy for the development of the agricultural sector in India has focused primarily on raising agriculture output and improving food security. This strategy involved an increase in productivity through better technology and mechanization of agriculture; increased use of fertilizers, irrigation and agrochemicals; better varieties and increased use of quality seeds; incentive structure in the form of remunerative prices for some crops and subsidies on farm inputs; public investment in and for agriculture and facilitating Institutions. The strategy paid dividends as the country was able to address the severe food shortage that emerged during the mid-1960s. During the last half a century (1965 to 2015), since the adoption of the Green Revolution, India's food production multiplied 3.7 times while the population multiplied by 2.55 times. The net result has been a 45% increase in per-person food production, which has made India not only food self-sufficient at the macro level, but also a net food exporting country. This strategy, however, explicitly recognises the need to raise farmers' income and did not mention any direct measure to promote farmers' welfare. However, the NITI Ayog report on Doubling Farmers' Income states that in some cases, growth in output brings a similar increase in farmers' income but in many cases, farmers' income did not grow much with an increase in output (Chand, 2017) [4]. The net result has been that farmers' income remained low and increasingly erratic weather patterns further add to the problem. Low level of absolute income as well as large and deteriorating disparity between the income of a farmer and non-agricultural workers constitute an important reason for the emergence of agrarian distress in the country during the 1990s, which turned quite serious in some years. This distress is reflected in a high incidence of suicides among farmers during 1995 to 2004. Losses from farming, shocks in farm income and low farm income are identified as the important factors for this. It is now better understood that growth in agricultural output means nothing if it is not translated into improved incomes, living standards and welfare of the farmers. Hence the shift from the RAO approach to the IE approach is all the more relevant to the welfare approach of the development of a nation today. In this background, the goal set to double farmers' income by 2022-23 is central to promoting farmers' welfare, reducing agrarian distress and bringing parity between the income of farmers and those working in non-agricultural professions.

Agricultural Income and Agricultural Households: The Conceptual Framework

Agricultural Income: The agricultural income was calculated by deducting the operational cost of cultivation (excluding the value of family labour) from the gross value of agricultural output, whether sold or self-consumed. The operational cost of cultivation covered items like the cost of ploughing, wages paid for hired labour, cost of machinery, irrigation, fertilisers, seeds, interest on capital, etc. Whether purchased or self-supplied but excluded the value of family labour and interest on own capital. Similarly, income from animal husbandry was derived by deducting the cost incurred on maintenance of livestock from the gross value of the output of milk and other animal products, whether sold or self-consumed and income from the sale of animals. Non-agricultural sources of income included wages, salary and income from business, trade or industry (Singh, 2013) [21].

Agricultural Households: As per the NSSO's 'SAS' report for 2018-2019, 'Agricultural Households' are defined as households having at least one member self-employed in farming and whose annual value of produce from such activity exceeds Rs 4,000. Farming or "agricultural activity" includes the cultivation of crops (field, horticultural, plantation and fodder) as well as animal husbandry (dairying, poultry, goat/sheep-rearing, piggery, inland fishery, beekeeping, sericulture, etc.). India, as per this report, had 93.09 million "agricultural households" in 2018-19 (July-June) and 101.98 operational holdings. Of these, 89.58 million holdings were possessed by agricultural households, while 12.40 holdings were possessed by non-agricultural households (Damodaran & Agarwal, 2021) [6].

Doubling Farmers' Income by 2022: Still A Dream

In September 2018, the Dalwai committee submitted its report on the policies to be followed and recommended the strategies to achieve the goal of doubling the income of farmers by 2022. After acceptance of the panel's recommendations, the government has set up an 'empowered body' to review and monitor the progress. Nevertheless, we are almost approaching the appointed year but do not seem to be anywhere near the ambitious goal. Even in the state of Uttar Pradesh, the current government after coming in had assured that they would double the income of farmers by 2022 but the current reports indicate that UP is far from meeting the assurance (Ranjan, 2021) [16].

The budget presented during all these years was silent on how the government plans to double their income. On the contrary, growing prices of seeds and diesel have only brought down the profit margins of the farmers. The prices of essential commodities, including pulses and cooking oil, have increased but the price rise and prosperity have not percolated down to the poor farmers. Actually, the economic marginalization of UP began in the colonial era through the establishment of an exploitative landlord class, which constantly resisted economic and social development even after independence in 1947 (Rasul and Sharma, 2014) [17].

The Committee estimated, by extrapolating 2012–13 'Situation Assessment Survey' (SAS) data of NSSO, that the benchmark average farming household income in India was Rs. 8059 per month in the base year, 2015-16 (as per the NABARD's All India Rural Financial Inclusion Survey-

NAFIS, this was estimated to be Rs. 8931) and this was promised to be doubled in real terms, taking inflation into account. As such, the target income by 2022 is Rs 21,146 (accounting for inflation) per month. At the mid-way point of the six-year period, the estimated monthly income of farm households in 2018-19 was Rs 10,218 per month in nominal terms, as shown by NSSO 77th Round data released in 2021. A projection for the next 3 years adjusting for the annual agricultural growth rates gives an estimated income of Rs 12,445 per month in 2022 (Vissa, 2022) [24]. Thus, the target of Rs 21,146 remains a mirage as the appointing year of 2022-23 is here, and the target of doubling monthly income (Rs 8059 or 8931) at an all-India level is unlikely to happen. No individual state is likely to achieve it either. The latest estimate of the income of agricultural households is based on the 'Situation Assessment Survey' of Agricultural Households, conducted by the National Sample Survey Office (NSSO) in September 2021 during the 77th round (January-December 2019), reveals the pathetic income level of Indian farmers.

As it is known that the income-related data of farm households in India are released by the NSSO and it is popularly known as the 'Situation Assessment Survey' (SAS) of farm households. For the first time, this data was released in 2002-03, with the initiative of the Ministry of Agriculture. Following this, the second SAS data series was published by NSSO for 2012-13 and now the third survey of SAS for the year 2018-19 has been released in September 2021 (Narayanamoorthy, 2021) [12]. There is no data after the assessment year 2018-19 on the average income of farming households and the pandemic has probably worsened the last-mile delivery of several schemes the Centre has over the years said would augment the income of farmers. A report by the standing committee on agriculture submitted to Parliament on March 3, 2020, said that the Union government has asked all departments to work towards doubling farmer income. As part of the initiative, the Indian Council of Agricultural Research (ICAR), Delhi, has prepared plans for each state and sent them for implementation. But there were no details on how states should work or how the government will analyse the progress (Shagun, 2021) [18].

Status of farmers' income in the Indian context

In India, as per the third-round survey results of SAS, the average monthly income per agriculture household, from all sources, was estimated only at ₹ 10,218 from July 2018 to June 2019. In the previous SAS survey for the agricultural year from July 2012 to June 2013, the average monthly income of agricultural households was Rs 6,426. Thus, by 2018-19, the average monthly income had increased by 59%. The income was calculated after factoring in paid-out costs. When imputed costs—i.e., use of self-owned inputs like machinery and seed stock, owned animals and unpaid family labour were factored in, the average monthly income of farmers' households in 2018-19 was Rs 8,337, per the SAS 2019 survey (Paliath, 2021) [13]. This means that the per day income of farm households is only about ₹277, which is not much different from the minimum wage rate paid under the national employment guarantee scheme (MNREGA) (Narayanamoorthy, 2021) [12]. The data on imputed costs were not collected in the previous survey. Thus, during the first four years (out of the total seven) of the DFI project, the average monthly income of an Indian farmer increased by less than 27%, that too, in nominal terms, not real terms. As per the survey of SAS, the rate of increase in income of agricultural households decelerated between 2012-13 and 2018-19, as compared to the period 2002-03 to 2012-13. The average annual increase of total farm income was 20.38 per cent between 2002-03 and 2012-13, which decelerated to 11.90 per cent between 2012-13 and 2018-19 (Narayanamoorthy, 2021) [12].

The most glaring fact is that among different sources of income (wages, crop cultivation, farming of animals and non-farm business) of farm households, the growth of income realised from crop cultivation declined sharply between 2012-13 and 2018-19. The annual increase of income from crop cultivation was just 4.65 per cent between 2012-13 and 2018-19, whereas, in the 2002-03 to 2012-13 period, it increased by 21.80 per cent. This is a very worrying fact towards achieving the required target of doubling farmers' income (DFI) by 2022-23. The lesser the farm income, the more the effort to draw credit, sometimes from multiple sources. The average farm debt increased to Rs 74,100 in 2018-19 from Rs 47,000 in 2012-13. About half of agricultural households carried outstanding loans (Bhattacharya, 2022) [2].

The SAS data clearly shows the income is not coming from crop cultivation, but mainly from wages and farming of animals; they registered an average annual increase of 19.24 per cent and 21.47 per cent respectively between 2012-13 and 2018-19 (Narayanamoorthy, 2021) [12]. This should indicate a positive impact of the Mahatma Gandhi National Rural Employment Act (MGNREGA) on increasing farmers' income. This is the largest intervention in the wage/labour market. Also, the National Livestock Mission (NLM), which was launched in 2014-15 by the government to enhance the breed development of farmed animals, the level of nutrition for livestock and provide extension services, has helped improve the standards of living of livestock farmers, especially the smallholders (Buragohain, 2022) [3]. Though, income has increased since 2016 but maybe not as much as expected, because of the last two years of lockdowns and restrictions due to COVID-19. Overall, the data indicate a worsening in profitability in agriculture and a need to supplement farm income with income from other sources on an urgent basis. The Dalwai committee on the policies to be followed and action to be taken to double the income of farmers by 2022, suggested ways of augmenting farmers' income through related, non-agri activities like dairy, poultry, fishing etc. Also, as per the report of the Dalwai committee, doubling in real income is possible only with a 10.4% annual growth rate in the farm sector. This requires investments "in" agriculture like irrigation, the agriculture market and land development and "for" agriculture like roads, power and transport and this gross capital formation has to be stepped up in both public and private sectors (Ranjan, 2021) [16].

State-wise scenario

At the state level, very high growth rates were observed in Uttarakhand (17.1%), followed by Meghalaya (14.2%) and Bihar (11.2%), which clearly show that the targets are being achieved by certain states and the marginal farmers with landholding size of up to 1 hectare are benefiting the most. However, in India as a whole, it is still a long road ahead (Bhattacharya, 2022) [2]. Income also varied greatly between states. Of the 28 States for which SAS data is available for

2018-19, the average monthly income is more than ₹10,000 only in 12 States. The rest of the 16 States' incomes are in the range of ₹4,013-9,995. In large states like Bihar, Uttar Pradesh, Madhya Pradesh, Telangana, West Bengal and Chhattisgarh, which are important in terms of agriculture and agricultural allied activities, incomes were lower than the national average. Jharkhand and Odisha reported the lowest at Rs 4,985 and Rs 5,112 per month, respectively. Punjab and Haryana reported the highest monthly farmer incomes among large states, at Rs 26,701 and Rs 22,841, respectively (Paliath, 2021) [13]. In some states like Jharkhand, Madhya Pradesh, Nagaland and Odisha, the average incomes of agricultural households actually declined in nominal terms.

So far as Uttar Pradesh is concerned, according to the Situation Assessment Survey of Agricultural Households (NSS, 70th round), in 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 in Uttar Pradesh at Rs. 4923 was the fifth-lowest in the country; 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, as per NABARD's NAFIS. According to this survey, the average monthly income per agricultural household in UP was Rs. 6668, which is about 25% lower than the Indian average of Rs. 8931 in 2015–16. As per the NSSO 77th round data, the mean income of UP farmers increased to ₹ 8061 in 2018-19 (PIB, 2020) [14]. Comparing this to NABARD's estimate for 2015-16, we observe that during the first four years of the DFI project, farmers' income in UP grew by less than 21% in nominal terms. Clearly, the goal of doubling farmers' income from the level of 2015-16 by 2022-23, in real terms, is a highly optimistic policy posturing (Tripathi, 2020) [23].

Pandemic created hurdles in achieving the target

While the Covid-19 pandemic drove more people back onto the farms in 2020 and increased the acreage and production under monsoon crops in 2020, this may not help increase farmers' incomes. Due to increased costs and a less-than-adequate increase in output prices, farm households did not reap the full benefits of increased production in the Kharif season having less income than the previous year. The government has announced a hike in Minimum Support Price (MSP) or the government's procurement price for monsoon and winter crops for 2021-22 but farmers did not sell to a procurement agency as the awareness about MSP among agricultural households was mostly low for various crops grown, the SAS 2019 report found. The government must decide on a long-term plan to deal with MSP and ensure that procurement is done equitably and in a decentralized manner within states to enhance the income of farm households. There were problems in marketing in the first Covid-19 lockdown that affected farmers who grow for distant markets needing traders and transport, but small farmers selling in local markets revived faster than others. But increased cost of cultivation, price rise due to inflation and pandemic-related economic distress will have an impact on farmers' income, even in post-pandemic seasons. With the pandemic, much of the income has come from cultivation and livestock, and other sources were lost (Paliath, 2021) [13].

Measures taken by the government

The government has adopted several developmental programmes, schemes, reforms and policies that focus on higher incomes for the farmers. All these policies and programmes are being supported by higher budgetary allocations, non-budgetary financial resources by way of creating corpus funds, and supplementary income transfers under PM-KISAN (PTI, 2021) [15]. Further, the Government of India has included various new farmers' friendly schemes in the budget 2016-17. The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Soil Health Card, Pradhan Mantri Fasal Bima Yojana (PMFBY), National Agriculture Market (e-NAM), Paramparagat Krishi Vikas Yojana (PKVY), Sub-Mission on Agroforestry (SMAF) under National Mission for Sustainable Agriculture (NMSA) and Mahila Kisan Sashaktikaran Pariyojana (MKSP) are the important schemes launched to achieve the target set by the Government of India (Singh *et al*., 2018) [22].

About 29.29 crore farmer applicants enrolled themselves under the Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016. Over 8.99 crore (provisional) farmer applicants have received claims of over ₹1,03,903 crore. During this period, farmers paid nearly ₹21,448 crores as a premium, against which claims of over ₹1,03,903 crore (provisional) were disbursed. Institutional credit for the agriculture sector had increased from ₹7.3-lakh crore in 2013-14, with a target to reach ₹16.5-lakh crore in 2021-22. Under the Agriculture Infrastructure Fund, the government had mobilised ₹7,700 crores for more than 7,300 projects. But experts insist on more investment in infrastructure from the government and the private sector (Jadhav, 2022) [10]. The latest major intervention includes the 'Atma Nirbhar Bharat- Agriculture package' which includes comprehensive market reforms and the creation of the 'Agricultural Infrastructure Fund' worth Rs 1 lakh crore (PTI, 2021) [15]. In the Union budget for 2021-22, finance minister Nirmala Sitharaman announced several initiatives:

- The MSP regime has already undergone a "sea change" to assure a price that is at least 1.5 times the cost of production across all commodities, even as procurement also continued to increase at a steady pace. This has increased payment to farmers substantially.
- The agricultural credit target had been increased to Rs 16.5 lakh crore for FY22 and assured increased credit flow to animal husbandry, dairy and fisheries.
- The allocation to the Rural Infrastructure Development Fund has increased from Rs 30,000 crore to Rs 40,000 crore.
- Corpus of the Micro Irrigation Fund had been doubled to Rs 10,000 crore.

So far as Uttar Pradesh is concerned, galloping into a pro-farmer mode, the Yogi Adityanath government has come up with a formal plan to double farmers' income by 2022. This plan includes the following aspects:

1. **Reduction in the cost of cultivation:** To reduce the cost of cultivation and boost productivity, the major focus of the government is on the judicious use of fertilizers, the promotion of farm mechanization, the promotion of organic farming and the distribution of solar pumps and sprinklers for irrigation.
2. **Productivity growth:** For boosting productivity, the state has also identified suitable districts for different

crops and is promoting their cultivation based on that. It has identified 31 districts for wheat, 23 districts for paddy and 20 districts for coarse cereals. This is expected to help the state in harnessing the comparative advantages of its different agro-climatic regions. These crops would also receive the support of new agricultural techniques investment. At the same time, value addition will be done for maximizing cost-benefit.

3. **Minimising post-harvest losses:** To reduce the post-harvest losses, the Government of Uttar Pradesh is focusing on upscaling warehousing and cold-storage facilities, and reforms in agriculture marketing. All these measures are very important as the state is lacking in these facilities.
4. **Food processing and grading:** Grading agricultural produce and promoting the food processing industry would also help the farmers in getting better prices for their produce. It would also employ a rural workforce which, in turn, would reduce the burden on the agricultural sector.
5. **Agricultural diversification:** The state is also encouraging agricultural diversification by promoting the production of fruits and vegetables, milk and milk products, fish, egg and meat. The state has set the target of 221.74 lakh ha of the cultivated area under fruits, which is currently about 132 lakh ha. Similarly, a target of 9.1% of growth in milk production has been set in the state. Though several targets have been set, the strategy to achieve them is yet unclear (Tripathi, 2020) [23].

Other highlights of the plan

- Besides, as per the plan, the state government will fast-track the 'Atma Nirbhar Krishak Samanvit Vikas Yojana' or Self-dependent Farmer Integrated Development Scheme (SFIDS), while pitching the farming sector as a "focal point of development" with forward and backward linkages to corollary sectors like horticulture, food processing, cane development, dairy and animal husbandry.
- The SFIDS, in fact, seeks to work on two scales. First, accelerating the constitution of the Farmer Producer Organisation (FPOs) and promoting them in trade pursuits. And second, timely and strategic spending of the Centre's agricultural infrastructure funds. The state cabinet green-flagged SFIDS in December 2021, which lays special focus on setting up 1,475 FPOs in development blocks across the state over three years. The concept of FPO entails farmers forming groups and registering themselves with the government for buying and selling farm products.
- At the same time, the Centre had come up with a formal policy for setting up 10,000 FPOs with help of the National Bank for Agriculture and Rural Development (NABARD), National Cooperative Development Corporation (NCDS), National Agricultural Cooperative Marketing Federation of India Ltd. (NAFED) and Small Farmers Agribusiness Consortium (SFAC). As per the Centre policy, the state government will be setting up at least 2,000 FPOs every year, beginning 2021-22 (Shah, 2021) [19].
- The plan also envisages the development of markets to boost the sale of agricultural products.
- During the first tenure of the Yogi-led government, 17 out of the 18 irrigation projects in Uttar Pradesh have been completed with which almost 15 lakh hectares of land in UP's 9 districts have now found a great way for irrigation to double the income of farmers. Hailed as the biggest river linking project in Uttar Pradesh, the 'Saryu Canal National Project', which is to be completed in the country under the Pradhan Mantri Krishi Sinchayee Yojana will facilitate irrigation to over 14 lakh hectares of land and is likely to benefit over 25 lakh farmers to double their income (Shankar, 2021) [20].
- Strategies to harvest rainwater in drought-prone regions, through the collaborative Doubling Farmers' Income project, received a boost with inputs from the state Agriculture Minister of Uttar Pradesh, recently. In the Doubling Farmers' Income project in the Bundelkhand region, the 'International Crops Research Institute for the Semi-Aried Tropics' (ICRISAT) along with the Central Agroforestry Research Institute and Banda University of Agriculture and Technology (BUAT) is stepping up its efforts toward rainwater harvesting through the construction of check dams and farm ponds, renovation of traditional tanks (Havelis), desilting of water harvesting bodies and large-scale field bundings. The project has also introduced new varieties of wheat, chickpea, mustard, agroforestry interventions and agronomic techniques such as laser land levelling, zero-till method etc.

Grass root reality of income enhancement approach in Uttar Pradesh

In Uttar Pradesh, the average size of the land holding is continuously becoming smaller and today 90 per cent of the farmers are small and marginal farmers. These small farms are not viable and so are not able to contribute to the growth in income of farmers as they are not efficient in the use of inputs (Ranjan, 2021) [16]. Raising productivity is likely the most important factor if the incomes of this group are to be doubled but there are many constraints. On the one side resources like water and land are limited and on the other hand land holding is getting fragmented (Chaudhary and Singh, 2017) [5]. It is clear that for agriculture productivity and incomes to grow, aggregation of farm holdings in the form of farmer producer organizations (FPO) is essential. NABARD is working in this direction but the pace is very slow. Further, in the state, FPOs are being set up through directives from the top instead of evolving naturally at the ground level leading to a situation where most of these FPOs exist only on paper and are not active. There is a requirement for proper training for officers and farmers so that proper functional FPOs are created. They need initial financial support also from the Government. This is perhaps the only way in getting out of the small holdings trap. Another option could be to adopt the model land leasing Act formulated by the Niti Aayog. The cost of cultivation for the farmers of UP is also steadily going up. Fertilizers are costing more and the prices of electricity as well as diesel have gone up substantially (Ranjan, 2021) [16].

However, as far as the market price is concerned the farmer is still subjected to the volatility of the market. The MSP mechanism in the state is unevenly benefitting farmers covering less than 20 per cent of the farmers and mostly those belonging to western UP. The farmers of Eastern UP are not benefited from this mechanism at all (Ranjan, 2021) [16]. Since the MSP regime favours the cultivation of wheat, rice and sugarcane, not only has it led to a reduction in the area under acreage of other crops like pulses, oil seed and coarse grains but it has also led to the accumulation of unwarranted stocks of cereals (Chaudhary and Singh, 2017) [5]. Even though the MSP is declared for 23 crops including oil seeds and pulses, there is hardly any procurement has been done for them. Very limited market intervention is resorted to by NAFED. Despite this, there is no MSP either for horticulture crops or milk where the phenomenon of prices crashing is seen more often than not (Ranjan, 2021) [16]. Because of the APMC acts, farmers are required to sell a large number of commodities in local mandis where different layers of intermediaries often manipulate the price, thus depriving them of their fair share. By and large, the APMCs have emerged as some sort of Government-sponsored monopolies in the supply of marketing services/ facilities, with all drawbacks and inefficiency associated with a monopoly. State have also failed to address the monopolistic and uncompetitive practices in the inter-state trading of agricultural products (Chaudhary and Singh, 2017) [5]. It is imperative in this situation to develop an ecosystem and institutional mechanism which protects the farmers of UP from the vagaries of the market and enables them to avoid distress sales. This requires the building up of a post-harvest infrastructure of warehouses and cold storage including WDRA (warehouse development regulatory authority) where the farmer can store his crop. Farmers should be able to choose when to sell and not be compelled to sell at throwaway prices. The agriculture market typically behaves in a manner that prices fall at the time of harvest but tend to rise in future months and farmers need to be economically empowered to take advantage of this (Ranjan, 2021) [16].

One of the most under-rated sectors of the UP economy is animal husbandry which happens to be a major source of employment and can bring about an increase in the income of the farmers. Thus, merely crop production is not sufficient and has to be complemented by animal husbandry and for this, an interest subvention and breed improvement scheme "Kamdhenu" was started in the dairy sector which resulted in a substantial increase in the income of the farmers of UP (Ranjan, 2021) [16].

What more needs to be done for income enhancement

There are two major sources of farmers' income: farm income and non-farm income. Farm income sources include incomes from cultivation, animal husbandry, fisheries, forestry and horticulture. Non-farm income sources comprise incomes from wages, salaries, pensions, business and remittances. Under the 'Income Enhancement Approach', the target of 'Doubling Farmers Income' within the stipulated time frame can be achieved by increasing both types of income. To secure the future of agriculture and to improve the livelihood of half of India's population, adequate attention needs to be given to improve the welfare of farmers and raise agricultural income. For this, the following measures can be taken in Uttar Pradesh:

- Uttar Pradesh is largely dominated by small and marginal farmers having land holdings below one hectare. The majority of these farmers grow food crops, such as wheat, paddy, etc. To meet their household food requirements, even though cash crops or commercial crops, such as sugarcane, potato, fruits and vegetables could be more lucrative. Crop diversification away from food crops to commercial crops and fruits and vegetables needs to be promoted for increasing farmers' income from cultivation.
- At present, Uttar Pradesh is the largest producer of vegetables and the third-largest producer of fruits in India. Horticulture has emerged as one of the most promising sectors in the state's economy, in terms of income enhancement for farmers. With proper planning and policy support, this sector could emerge as an engine of growth and an alternative source of income.
- Even though Uttar Pradesh is the top producer of food grains in the country (in 2016-17, its contribution to the country's food grains output was about 18%) (Tripathi, 2020) [23], there exists wide scope for raising its contribution further, through productivity improvement. The Niti Aayog has also called for substantive investment in irrigation, seeds & fertilisers and new technology to increase productivity. To increase the availability of hybrid and improved seeds, the focus should be on the production of quality seeds and an improved input supply mechanism. Input support, in the form of subsidies, also will help in increasing farmers' access to quality seeds.
- One of the most important variables that have positively influenced agriculture and farm income 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. Because of the fast-depleting levels of groundwater due to over-exploitation and inefficient use, water conservation and micro-irrigation practices need to be promoted throughout the state, with a special focus on bridging the inter-regional gaps. Further, massive investment is also needed for irrigation in the state.
- The modernisation of farms and the adoption of new technologies should be a greater priority for the income enhancement of agricultural households. One idea mooted by the Economic Survey of 2015-16 is to develop a rental market for farm equipments. The Niti Aayog has also mooted the adoption of GM crops and using new farm equipments.
- Post-harvest losses are a significant factor in keeping income from cultivation low. To minimise such losses, investment in agricultural logistics such as cold storage, warehouses, cold chains etc. Needs to be significantly enhanced. The issue of resource constraint can be dealt with by going for a public-private partnership.
- Promoting the agricultural value addition industry could be a game-changer, as it does not require huge Investments and high skills. Besides a well-developed food processing sector helps in the reduction of wastage, improves value addition, promotes crop diversification, ensures a better return to the farmers, and helps increase export earnings. Recently the Government of Uttar Pradesh came up with a scheme called 'One District One Product' (ODOP) and introduced a new food processing policy. These initiatives could be effective in promoting the food processing sector in the state if they are implemented properly at the ground level without any corruption.
- Smallholdings and low farm output also result in low levels of marketable surplus, which further decreases farmers' bargaining power in the market. Here, encouraging group/collective farming through Farmer's

Producers Organisations (FPOs) and adopting of Model Lease Act (as suggested by the Niti Aayog) could help solve the problem. The existing FPOs in UP have been found to focus mainly on input supply and marketing. They should be encouraged to shift focus to production too in order to harness the advantage of economies of scale (Tripathi, 2020) [23].

- A major factor behind low income from farming is the realisation of low prices by the farmers. It has been observed that the "price spread" (the difference between a producer and consumer prices) is about 30-40% in respect of food crops in Uttar Pradesh (Tripathi, 2020) [23]. A poor and inefficient agricultural marketing system, with firmly entrenched middlemen and poor marketing infrastructure, is primarily responsible for this state of affairs. Market reforms should, therefore, receive top priority. The orientation of such reforms must, however, be pro-small-and-marginal farmers to ensure that the benefits are broad-based and inclusive.
- It is also generally observed that farmers are penalized for producing more, as prices fall with increased supplies. The guarantee for remunerative prices, via Minimum Support Price (MSP) and government procurement is available to few crops, limited locations and better-off farmers. The majority of small and marginal farmers do not have enough marketable surplus. Besides the cost of going to the mandi and the paperwork in the mandis prevent them from selling food grains to the government and they are forced to sell to local traders at prices much below the respective MSPs. Improved public procurement and agriculture marketing system would improve farmers' incomes. Opening enough procurement centres and increasing procurement targets would be useful. Since benefits of government procurement and MSP reach paddy and wheat largely, market intervention and price support schemes like price deficiency payment schemes for other crops, not covered under the MSP, should be put in place.
- A substantial number of agriculture workers need to be moved out of agriculture to other sectors in the rural and urban economy (Singh, 2013) [21]. This will help improve average earnings from farming. In UP, the share of non-farm employment in total employment increased from 17% in 1983 to 33% in 2009-10. This increase in the share was largely attributed to manufacturing and construction (Tripathi, 2020) [23]. With proper policy support, further push for non-farm employment can be given.
- The growth of non-farm activities, such as the promotion of the traditional handlooms and handicrafts through up-gradation of technology, the introduction of new designs and materials and linking them to markets can generate substantial income and employment in the state. Public-private partnership models have to be evolved for the promotion of rural industries.
- Many NGOs have successfully worked in the field of promoting non-farm livelihoods in rural areas. These efforts need to be encouraged with greater participation of NGOs in government programmes.
- As farm incomes from small farms would not be enough to sustain families, farmers can diversify their sources of income to include livestock like dairy, work as labourers on others' farms or even outside farms (non-farm) and operate small businesses like barber shops, laundry etc.
- It is also observed that crop-based agriculture policy cannot be the only remedy for income enhancement, livestock-based livelihood policies are also very important here. Even a one-acre farmer can rear five cows and sell 30 litres of milk daily from three at any given time, while dedicating her entire land to growing high-protein fodder crops. The same land can, alternatively, house a broiler farm with up to 10,000 birds and six batches being sold in a year. There are likely to be other, agro ecologically and economically better strategies that need to be prioritised (Damodaran & Agarwal, 2021) [6].
- Animal husbandry accounted for about 17% of the average household income of farmers in UP in 2018-19. However, the potential of animal husbandry has not been fully tapped. Scientific management and development of livestock resources need to be promoted in a big way. It will require proper arrangements for feed and fodder and delivery of good quality veterinary services (Singh, 2013) [21].
- Fisheries may be considered an important secondary source of income for millions of rural families in UP and have assumed to play an important role in achieving the goal of doubling farmers' income. Recently, Uttar Pradesh also received the first prize for the best state of inland fisheries under the leadership of chief minister Yogi Adityanath. The Government of Uttar Pradesh, working closely with the Department of Fisheries, is planning to create job opportunities for the farmers of the region. Thus, it will be possible for farmers to earn extra income through fisheries as well.
- The mixed model of farming has been traditionally adopted by Indian farmers to supplement their income. This strategy is also very useful for Uttar Pradesh. It would be appropriate for the farmers to choose a combination of different animals, such as poultry, piggery, cattle and crops according to the biological diversity of their area. By growing vegetables and other crops on the pond dykes, used for fish farming or aquaculture, more income can be earned at a low cost. Integrated farming systems can be broadly classified into three categories, namely:
  1. Integrated Agriculture-Animal Husbandry System (AA)
  2. Integrated Agriculture-Aquaculture System (AA)
  3. Integrated Agriculture-Animal Husbandry-Aquaculture System (AAA)
- At a time when the government aims to double farmers' income in real terms, guaranteeing above 100 days of work guarantees under the MGREGA and larger investment in the livestock sector would perhaps be the right approach (Buragohain, 2022) [3]. It is also suggested by a committee of seven chief ministers, under the aegis of the NITI Aayog, to allow farmers to employ MGNREGA workers in agricultural operations like land preparation, sowing, transplantation of paddy, plucking of cotton, intercultural operations and harvesting of crops etc., to reduce the cost of cultivation. The idea is to pay part of the wages of labour in agricultural operations from MGNREGA. So, the option of reducing the cost of cultivation, by reducing labour costs, looks attractive for enhancing

farmers' earnings.

- Improvement of adequate rural infrastructure in terms of roads, transportation services, electricity, credit facilities and establishment of proper places for marketing is necessary for the growth of both farm and non-farm sectors.
- Lack of awareness about government schemes like PM Crop Insurance Scheme, Soil Health Mission, Kisan Credit Card, etc. Constrain their success. Awareness-building, therefore, has to be a crucial component of government schemes for the development of agriculture and the welfare of farmers.
- To augment the income of the Small and Marginal Farmers (SMFs), the Government of India launched a new Central Sector Scheme, namely, "Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) in February 2019. Under the scheme, ₹6000 per year will be paid to each eligible farmer in three instalments and will be deposited directly into their bank accounts. The scheme was initially meant for small and marginal farmers having landholding up to two hectares but the scope of the scheme was extended to cover all landholding farmers with effect from 01.06.2019. At a time when the economy is constrained by demand deficiency, such a scheme will go a long way in reviving rural demand. As per media reports, Uttar Pradesh is one of the top-performing states in terms of the implementation of the scheme.

Conclusion

In the state of Uttar Pradesh, the current government after coming in had assured that they would double the income of farmers by 2022 and now we are already entered in the approaching year but do not seem to be anywhere near the ambitious goal of DFI by 2022-23. Although as per the latest 77th round of NSSO's Situation Assessment Survey (SAS) 2018-19, India has 14.65 crores of agricultural households of which 10.03 crores (about 68%) belong to the category of marginal farmers and the average CAGR of these farmers having a landholding size of 0.01-1 hectare was 9.6 per cent. This growth rate is very close to the required growth rate of 10.4 per cent (Bhattacharya, 2022 [2], Buragohain, 2022) [3]. Even then, agriculture requires many more such policy interventions and finances to create an ecosystem where the income of the farmers keeps on increasing regularly. Doubling of income of the farmers by 2022 does not seem to be within the realm of possibility but substantial improvement can be brought about with the right kind of interventions (Ranjan, 2021) [16]. To conclude, a multisectoral integrated strategy for promoting agriculture and non-agricultural activities in the rural areas, with a special focus on enhancing farm and non-farm incomes of small and marginal farmers, has to be adopted to meet the challenges of sustainable and inclusive development of the state as well as the nation. Agriculture policy must incorporate the interlinkages between farm and non-farm activities and dynamics of diversification on and off the farm. Though the walk to doubling income is a long, tough and tedious one, but at least a step has been taken in this direction.

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