

Doubling of Farmers' Income by 2022: Challenges and the Road Ahead

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Abstract

Agriculture and related activities are the main source of livelihood for around 58% of population of India but nearly one fifth of the farmers of our country live below the official poverty line. In the past various strategies have been taken by the Government of India for development of the agriculture sector but these strategies did not explicitly recognize the need to raise farmers' income. So, in 2016, the Government of India has brainstormed on the topic of 'Doubling Farmers' Income' by the year 2022. In this background, the objectives of the paper are to analyze the structure of present income of the farmers in our country and to examine the challenges and opportunities in achieving the goal of doubling of farmers' income.

Key-words: Agriculture, Doubling Farmers' Income, Diversification, Policy, Government of India

1. Introduction

Agriculture is the backbone of the Indian economy, employing almost half its workforce – over 250 million people. The sector has been transformed since independence in 1947 through the 'green revolution', which staved off famine by dramatically increasing crop yields, and the 'white revolution', which turned India into the world's largest milk producer. Yet, most of the country's farmers work plots of less than two acres and most remain trapped in the cycle of poverty. The average income of an agricultural household during July 2012 to June 2013 was as low as Rs. 6,426, as against its average monthly consumption expenditure of Rs. 6,223. As many as 22.50 % of the farmers of our country live below the official poverty line in 2016.¹ Large tracts of arable land have turned problem soils, becoming acidic, alkaline & saline physico-chemically. Another primary

¹ Source: <http://agricoop.gov.in/sites/default/files/DFI%20Volume%201.pdf>

factor of production, namely, water is also under stress. Climate change is beginning to challenge the farmer's ability to adopt coping and adaptation measures that are warranted. India's yield averages for most crops at global level do not compare favourably. The costs of cultivation are rising. The magnitude of food loss and food waste is alarming. The markets do not assure the farmer of remunerative returns on his produce. In short, sustainability of agricultural growth faces serious doubt, and agrarian challenge even in the midst of surpluses has emerged as a core concern.

In order to tackle this situation, a total of 60 selected participants representing Department of Agriculture, Government of India, national research institutions, state agricultural universities, corporate, international research centers and NGO groups brainstormed on the topic of 'Doubling Farmers' Income' by the year 2022 as envisioned by Honourable Prime Minister of India. In consequence, the strategy platform is built by the following four concerns: (i) Sustainability of production, (ii) Monetisation of farmers' produce, (iii) Re-strengthening of extension services and (iv) Recognising agriculture as an enterprise and enabling it to operate as such, by addressing various structural weaknesses.

In August 2016, a Committee on Doubling of Farmers Income (DFI) was set up, under the chairmanship of Mr. Ashok Dalwai, to look into the various aspects of growth of farmers' income. The committee has submitted its report in August 2017 wherein it touched upon various delicate issues which will help in doubling the income of the farmers. The committee has suggested 'Seven Point Strategy' for Doubling Farmers Income by 2022. These are:

- Focus on irrigation with per drop-more crop;
- Quality seed and soil health;
- Investments in warehousing and cold chains;
- Value addition through food processing;
- Creation of a national farm market;
- New revolutionary crop insurance scheme to mitigate risks at affordable cost; and
- Promotion of ancillary activities like poultry, beekeeping, and fisheries.

2. Literature Review

The Committee on Doubling Farmers' Income (2017) stated that the focus on income security of farmers, as propounded by the agenda of Doubling Farmers' Income, is taking agriculture into the phase of risk management with a view to neutralising or minimising the impact of risks. All development, directed to build financial independence for the farmers and their income, or minimise their costs, are directly linked to risk management in agriculture.

Deshpande (2017) found that as of 2011, about 10% of Indian farmers were covered under a crop insurance scheme. Some persistent issues with the crop insurance system include (i) unawareness about insurance schemes, (ii) inadequate coverage of insurance schemes, (iii) assessment of the extent of damages in case of crop losses, and (iv) timely settlement of claims.

Mandal et al. (2017) has concluded that doubling of farmers' income in West Bengal is a challenging tasks, particularly due to low agricultural growth (< 2%), lack of market innovations and private investment, but is achievable. For improving small farm production and productivity a major development strategy, through enhancing cropping system intensification using technological options, attracting private investment, attracting private investment, value addition and marketing innovations are needed.

Paroda (2017) argued that, as India primarily depend on agriculture; we must prepare national strategy for shaping the destiny of agricultural for smallholder farming community, though Doubling Farmers Income by 2022 is not a easy yet a very laudable goal. If concerted efforts, as per suggested action plan, are made in a Mission Mode, chances of making agriculture an engine of national economic growth and for smallholder farmers a respectable profession are indeed much brighter.

Chand (2017) stated that Doubling Farmers Income by 2022 is challenging task. He mainly focused on three strategies i.e. development initiatives, technology and policy reforming in agriculture for doubling farmers income. For increasing the productivity and income of farmer country need to increase use of quality seed, fertilizer and power supply to agriculture by 12.8%, 4.4%, 7.6% every year. Area under irrigation has to be expanded by 1.78 million hector. He has suggested that various research institutions like ICAR and SAUs should develop models of farming system for different type of socio economic and bio physical settings combining all their technologies in a package with focus on farm income.

Ramadas, Balaji, Kumar & Chatrath (2018) stated that for doubling the income of the farmer it is necessary to pay more attention to the region-specific farmers' needs, which has to be driven by technology, extension, institutions and policy governance. It has to be comprehensive from a set of commodities/cropping system/farming system approach along with other sources of income (wages, livestock and non-farm income). Shifting to high value commodities (horticulture, fisheries, livestock, bee-farming etc.) with improved value chain is highly relevant to enhance the farmers' household income and livelihood security.

Singh, Sendhil, Kumar & Singh, Tripathi (2018) have discussed the pathway and strategies for doubling the income of wheat producers by 2022. They suggested that the ambition of the Government of India has to be met coherently through productivity enhancement coupled with cost reduction, price realization and policy support. Income from a single crop or commodity will not fulfill the target of doubling farmers' income but it has to emulate from farm and nonfarm sources. Diversification of activities which yields better remuneration (region specific) should be the ideal strategy.

3. Objectives

The objectives of this paper are as under:

- (a) To analyse the structure of present income of the farmers in our country and to point out the ways to increase the income of the farmers.
- (b) To examine the challenges and opportunities in achieving higher income for the farmers.

4. Database and Methodology

The study is basically exploratory in nature. The data have been collected from various secondary sources like books, journals, websites, and reports by government organizations, newspaper articles, etc. The present study is divided into three parts. In the first part the authors has discussed the structure of farmers' income in the country and the sources of growth in farmers' income. The second part is however identified the challenges in achieving the goal of doubling farmers' income. And finally in the third part the author has highlighted the prospects of the programmes. Simple tables, graphs and percentages have been used to analyse and present the data.

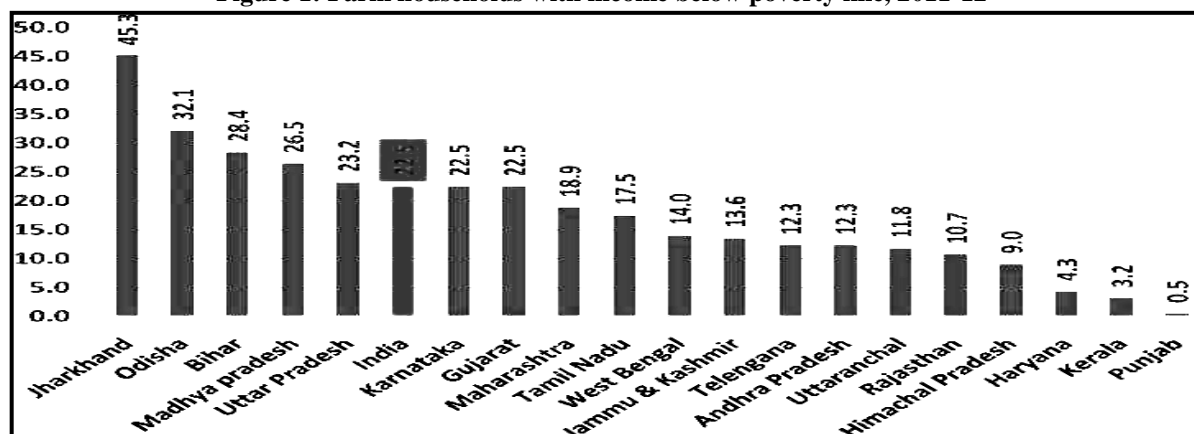
5. Present Income of the Farmers and the Ways to Enhance the Income

In past various strategies have been taken by the Government of India for development of the

agriculture sector in India but that have focused primarily on raising agricultural output and improving food security. The strategy paid dividends as the country was able to address severe food shortage that emerged during mid-1960s. During the last half a Century (1965 to 2015), since the adoption of 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 per cent increase in per person food production, which has made India not only food self-sufficient at aggregate level, but also a net food exporting country. (Chand, 2017)

But these strategies did not explicitly recognise the need to raise farmers’ income and did not mention any direct measure to promote farmers’ welfare. The net result has been that farmers’ income remained low, which is evident from the incidence of poverty among farm households. The National Sample Survey Organisation (NSSO) data on Consumption Expenditure Survey for the year 2011-12 reveals that more than one fifth of rural households with self-employment in agriculture as their principal occupation were having income less than the poverty line. The proportion of farm households suffering from poverty was quite high in some states. The highest incidence was observed in Jharkhand where 45.3 per cent of farm households were under poverty.

Figure 1: Farm households with income below poverty line, 2011-12



Source: Estimated from unit level Consumption Expenditure Survey data 2011-12, NSSO

Present Income

The Table – 1 shows the estimates of farmers’ income both at current price and real price for the period 1983-84 to 2011-12. Here it is important to mention that farm income in real terms is not the same as the income at constant prices. During the past 22 years, between 1993-94 and 2015-16, farmers’ income in nominal terms increased 9.18 times. During the same period, CPIAL (consumer price index for agricultural labour), which measures price change in rural India, increased 4.62 times. Taking away the effect of inflation, real farm income just doubled during past 22 years. Meanwhile, the farm income per cultivators shows a slightly higher increase due to the decline in the number of cultivators after 2004-05. That means it took nearly 22 years to double the farmers real income.

Table 1: Trend in farmers’ income in India, 1993-94 to 2015-16

Year	Net value added at market prices (Rs. crore)	Wage bill at market prices (Rs. crore)	CPIAL (2004-05=100)	Total farm income of all farmers’ (Rs. crore)		Cultivator s (Number in crores)	Farm income per cultivator (Rs.)	
				Market price	Real prices		Current price	Real prices

1993-	223709	45755	59	177954	303814	14.39	12365	21110
1999-	426582	90951	90	335631	372923	13.88	24188	26875
2004-	527289	93130	100	434160	434160	16.61	26146	26146
2011-	1409932	252804	183	115712	632514	14.62	79137	43258
2012-	1558480	245750	220	131273	596695	14.36	91416	41553
2013-	1753691	276532	245	147715	602922	14.10	104763	42760
2014-	1849931	291708	261	155822	597020	13.85	112507	43106
2015-	1940636	306010	273	163462	598764	13.60	120193	44027

Notes: Farmers' income are expressed in real terms using CPIAL (2004-05=100) as deflator.

Source: NITI Policy Paper No 1/2017

Ways to enhance the farmers' income

The income of the agricultural households originates from four sources, viz., crops, livestock, non-farm business, and wages and salaries. Agriculture and allied sectors explicitly cover the first two components of the household income, and are within the purviews of the Ministry of Agriculture and Farmers Welfare. The other two components, though doubtlessly important for agricultural households, are not directly influenced by agricultural policies even though there may be indirect linkages. The focus is on the first two components of the agricultural households' income, viz., crops and livestock increase the farmers' income. Doubling real income of farmers till 2022-23 over the base year of 2015-16, requires annual growth of 10.41 per cent in farmer's income. This implies that the on-going and previously achieved rate of growth in farm income has to be sharply accelerated. Therefore, strong measures will be needed to harness all possible sources of growth in farmers' income within as well as outside agriculture sector.

The DFI Committee has identified the following major sources of growth operating within the traditional agriculture sector:

- (i) Improvement in crop productivity
- (ii) Improvement in livestock productivity
- (iii) Resource use efficiency or saving in cost of production
- (iv) Increase in cropping intensity
- (v) Diversification towards high value crops

Further, the following two sources of growth operate outside the traditional agriculture sector, but contribute to farmers' incomes:

- (i) Improvement in real prices received by farmers.
- (ii) Shift from farm to non-farm occupations.

Figure 2: How to increase Farmers' Income



Source: NABARD Monograph on 'Doubling Farmers' Income by 2022

As per NABARD Monograph on 'Doubling Farmers' Income by 2022', fundamentally there are three ways through which income of the farmers may be enhanced, viz., increasing the gross income, reducing the costs, and stabilizing the income. Possible routes to achieving these objectives are showcased in Exhibit above.

6. Challenges in Achieving the Goal of Doubling Farmers' Income

Despite various proposals the agricultural economists have differing views. Some have even expressed doubts and consider the goal unrealistic and unachievable since there is negligible information available on farmers' income and also there is no clarity as to how to double the income (Gulati and Saimi, 2016). This is because the real income in the past has increased only by 5.2% per annum between 2002-03 and 2012-13. At this rate, it may take at least more than a decade to double the real income of farmers, unless a new and dynamic strategy is put in place and implemented in a Mission Mode (as suggested later) to achieve higher than 10% income per annum, which appears to be a gigantic task. In this section the major challenges in achieving the goal of doubling of farmers' income have been discussed.

6.1. Increase in small land holdings

Nearly 140 million hectare of land is used as agricultural area, as of 2012-13. Over the years, this area has been fragmented into smaller pieces of land. As seen in Table 3, the number of marginal land holdings (less than one hectare) increased from 36 million in 1971 to 93 million in 2011. Marginal and small land holdings face a number of issues, such as problems with using mechanisation and irrigation techniques.

Since smaller land holdings are either fragments of larger holdings which have been passed on within the family or have been informally leased by a large holder, farmers who cultivate these holdings often do not have a formal lease agreement. The absence of such land records does not allow these farmers to access formal credit or be eligible for government benefits such input subsidies or crop insurance schemes. At the same time with small land holding the farmers could not achieve the economy of production and as a result the productivity reduces and that in turns reduces the income of the farmers. The following table-2 shows the agricultural land holding pattern of the farmers over the years.

Table 2: Agricultural holdings (millions)

Holding	1970-71	1980-81	1990-91	2000-01	2010-11
Marginal (Up to 1 hectare)	36	50	63	75	93
Small (1-2 hectares)	13	16	20	23	25
Medium (2-10 hectares)	19	21	22	21	20
Large (over 10 hectares)	3	2	2	1	1
All sizes	71	89	107	120	138

Source: Agriculture Census 2011; PRS

6.2. Access to agricultural credit

Access to agricultural credit is linked to the holding of land titles. As a result, small and marginal farmers, who account for more than half of the total land holdings, and may not hold formal land titles, are unable to access institutionalized credit. Table - 4 shows the distribution of agricultural loans according to sources, as of 2013.

Table 4: Land holdings and sources of agricultural credit (as of 2013)

Size of Land (Hectare)	Co-operative Society	Bank	Money lender	Shopkeeper /Trader	Relatives /Friends	Others
0-1	10%	27%	41%	4%	14%	4%
1-2	15%	48%	23%	2%	8%	6%
2-4	16%	50%	24%	1%	6%	4%
4-10	18%	50%	19%	1%	7%	6%
10+	14%	64%	16%	1%	4%	2%

Source: Table 3.2 of, Report of the Committee on Medium-term Path on Financial Inclusion, Reserve Bank of India; PRS

The above table shows that farmers with land holdings of less than a hectare primarily borrow from informal sources of credit such as moneylenders (41%), whereas those with land holdings of two or more hectares primarily borrow from banks (50% or more). Other major sources of agricultural credit include shopkeepers, relatives or friends, and co-operative societies. Key issues relating to agricultural credit are lack of access to formal credit owing to unclear land records, skewed ratio between short term and long term agricultural credit, and inadequate access to crop insurance.

6.3. Quality of soil

Soil is one of the most important factors in the productivity of agriculture. While the levels of food production have increased over the past few decades, it has also led to issues such as an imbalance of nutrients in the soil, decline in the water table as well as the quality of water, and overall depletion of soil health. The Ministry of Agriculture has noted that the quality of Indian soil is deteriorating. About 5.3 billion tonnes of soil gets eroded annually, at a rate of about 16.4 tonne/hectare. Imbalance in the use of fertilizers in soil may also result in a loss of fertility. If farmers are unaware about the kind of fertilizer which is required for the soil in which they sow their crops, the productivity of the soil will be subsequently affected.

6.4. Access to quality seeds

Quality seeds are another input necessary for agricultural productivity, and good quality seeds account for 20%-25% of increased crop productivity. Three varieties of seeds commonly used are (i) farm-saved seeds, which account for 65%-70% of the total seeds consumption, (ii) commercially produced seeds of the breeder, foundation and certified varieties, and (iii) genetically modified and hybrid seeds. Some of the challenges identified in the development and distribution of quality seeds are (i) access to quality seeds, and (ii) inadequate research support.

6.5. Food loss concerns

The Central Institute of Post-Harvest Engineering and Technology (CIPHET) study in 2015 indicates, that in India the postharvest loss incurred, in per cent of production, in cereals is in the range of 4.65 to 5.99, in oilseeds & pulses 3.08 to 9.96, in spices 1.18 to 7.89, in livestock produce (milk, meats, fish) 0.92 to 10.52, and in fruits & vegetables at 4.58 to 15.88. The losses in India, reported by CIPHET, are far lower than those reported globally by FAO. However, other estimates in documents of Indian Council of Agricultural Research (ICAR), state that the Indian agriculture sector incurs 18 to 25 per cent losses in the entire supply-chain.

6.6. Storage facilities

After agricultural produce is harvested, it requires a robust storage infrastructure in order to minimize any losses due to adverse weather conditions or in the process of transportation. The quantity of food which is wasted during the harvest and post-harvest processes in the country has increased over the past five years. Some of the reasons for this wastage are crop damage, improper harvesting techniques, poor packaging and transportation, and poor storage. Some of the issues with the state of storage facilities in the country are inadequate capacity and poor conditions of storage.

In cases where the storage capacity is found to be sufficient, the conditions of the Godown are unfit, either because of the damp condition of the storage or because of its remote location.

6.7. Water Resources in India

India is a vast country with a population of 1.27 billion comprising 18.9% of the global population. India occupies about 2.2% of the world's land mass and has 4.3% of water resources in the world. Therefore, limited water and land resources have pressure of huge population in the country. India's water demand from all sectors is estimated to be 843 billion cubic meters (BCM) during the year 2025 and 1180 BCM in the year 2050, which is going to cross the availability of 1123 BCM before the year 2050. Before 2050 we are going to face water shortages with a deficit of about 57 BCM. Demand for water in irrigation sector is highest among all i.e. nearly 78%. So with the increasing problem in availability of water the farmers will also face difficulties in harvesting. The following table shows distribution of resources in India.

Table 5: Water Availability and Demand

Particulars	Water Demand in km ³ or BCM		
	Year 2010	Year 2025	Year 2050
Water Demand from all sectors	710	843	1180
Irrigation	557	611	807
Drinking water	43	62	111
Industry	37	67	81
Energy	19	33	70
Others	54	70	111
Availability of Utilisable water	1123	1123	1123
Excess or shortfall	413	280	-57

Source: Ministry of Water Resources, GOI

6.8. Marketing of Agricultural Produce

In India, poor marketing linkages and infrastructure constraints have led to high and fluctuating consumer prices resulting in only a small share of consumer rupee reaching the farmer. In addition to this, the issues of poor produce handling, wastage of producing, lack of scientific grading and storage facilities have also affected the efficiency of agricultural marketing in India. Despite the structural transformation in terms of its linkage with the international economy as well as the increasing role of private players, the farmer's share in consumer's rupee is quite low. Long supply chains with a number of intermediaries have resulted in high marketing costs, while the share of producer in consumer rupee is found to be 66 per cent it is as low as 20 per cent in the case of fruits and vegetables. This reflects the extent of inefficiencies existing in the agricultural marketing system of India (Gulati, 2009).

7. Way Forward towards Doubling of Farmers' Income

There may have various challenges in achieving the goal of doubling farmers' income by 2022, but at the same time this is not impossible also. Because a number of initiatives have been taken by the Government of India, various technological advancement have been incorporated by the Indian agricultural sector and a number of policies have been set up to achieve the target of 'Doubling of Farmers Income'. In this section the initiatives and the prospects with regards to enhancing of farmers income have been summarized.

7.1. Initiatives by the Government

Recently, the Government has taken many new initiatives for increasing the farmers' income such as: i) "per drop, more crop", ii) availability of quality seeds, iii) soil test based nutrient management-distribution of soil health cards, iv) post-harvest crop losses- large investments in warehousing and cold chains, v) value addition by the farmers, vi) creation of a national agricultural market, by removing distortions and having e-markets to link farmers to market, vii) Pradhan Mantri Fasal Bima Yojana, viii) high priority to diversification towards high value activities – horticulture, dairying, food processing, poultry, sericulture, bee keeping and fisheries, etc. The Government in its budget of 2017-18 has made some special provisions: i) allotted INR 10 lakh crores to ensure adequate flow of credit to under-service areas, ii) allotted INR 9,000 crores to increase the coverage under Pradhan Mantri Fasal Bima Yojana, iii) emphasized contract farming for strengthening and linking horticulture sector and agro-processing units, iv) allotted INR 2,000 crore for dairy processing and infrastructure development to NABARD for modernizing milk processing units.

7.2. Income Enhancement through Diversification

Diversification can be a major game changer. Diversification can be of three types viz. product (high value enterprises), process (precision farming), and time diversification (delinking from seasonality to prevent price crash with bumper crop). Diversification towards high value crops is required to improve both income and resource use efficiency. Similarly, diversification towards livestock, poultry and non-farm activities is considered ideal, especially for small holders who do not possess adequate land to generate enough income for the family.

Diversification towards high value crops (HVCs) offers a great scope to improve farmers' income. The staple crops (cereals, pulses, oilseeds) occupy 77 per cent of the total or gross cropped area (GCA) but contribute only 41 per cent of total output of the crop sector. Interestingly, almost same value of output was contributed by HVCs (fruits, vegetables, fibre, condiments & spices and sugarcane), which just occupy 19 per cent of gross cropped area during 2013-14. Average productivity of HVCs after adjusting for cropping intensity variations was estimated as Rs. 1,41,777 per hectare as compared to Rs. 41,169 per hectare for the staple crops. This can translate into 5 per cent increase in farmers' income by 2022-23.

7.3. Micro irrigation for Efficient Use of Agricultural Water

It has been observed that more than 75% of the water of our country is used for agricultural sector. Therefore, we need to use the water for irrigation very judiciously. Micro irrigation is a modern method of water application to the crops. In this type of system water is applied through a network of pipes (generally PVC, LLDPE), filters, and emitting devices near the root-zone of the plants through very low pressure up to 1.00 kg /cm². The losses including evaporation, conveyance, seepage and deep percolation are very low and the overall efficiency of the project is very high up to 90% whereas the maximum efficiency through drainage system may be 66%.

7.4. Mega Food Parks

The Mega Food Parks scheme was launched by the Ministry of Food Processing Industries in 2008. The scheme aims to create a mechanism of linking agricultural production to the markets, by involving farmers, processors and retailers together in a cluster-based approach. Expected outcomes of the scheme would be a higher price for farmers from their produce, creation of high quality food processing infrastructure, reduction in food wastage, and creation of an efficient food supply chain, among others. The scheme is being implemented through a Special Purpose Vehicle set up under the Companies Act, 2013. As of July 2016, 42 mega food parks were sanctioned by the Ministry, of which 38 have been approved for implementation and 8 are operational.

7.5. Soil Health Card

The Soil Health Card scheme was launched by the central government in 2015. Under the scheme, all farmers are issued soil health cards, once every three years. The soil health cards contain information such as the nutrient status of the soil, and the recommended dose of nutrients to be provided to the soil to improve its fertility. As of February 2017, 2.9 crore farmers have been covered under this scheme. 2.5 crore soil samples have been collected, and 1.8 crore samples have been tested.

7.6. Sources of Growth of Farmers Income

Chand (2017) in the NITI Policy Paper No. 1/2017 has discussed the various sources of growth in farmers' income and their potential to contribute to future growth in farm income and achieving the goal of doubling farmer income. The combined effect of the seven potential sources of growth comes to 75.1 per cent in 7 years and 107.5 per cent in 10 years. If the factors underlying growth in farmers' income, except price factor, rise at the same rate as experienced between 2001 and 2014, farmers' income will rise by 66 per cent by 2022-23 and it will almost double in ten years i.e. by 2025-26. The increase in real farm prices has a very high scope to raise farmers' income. (Chand, 2017). A summary of these estimates is presented in Table -6.

Table 6: Prospects of growth in farm income from various sources

S.No.	Source	Scope	Contribution		Remarks
			7 years	10 years	
1	Crop productivity 70% segment	3.1	16.7	25.0	Same as in 2001-13. For crop sector
2	Livestock value added 30% segment	4.5	10.8	16.6	Same as in 2004 to 2014
3	Improvement in resource use efficiency	2.26	16.7	25.0	Same as in 2005 to 12
4	Crop Intensity (70% segment)	1 percentage point	3.4	4.9	same as during 2001-12
5	Crop diversification (70% segment)	Area increase by 3.13 per cent, elasticity	5.0	7.3	
6	Better price realisation: crops only	13%	9.1	9.1	Implemented in 7 or 10 years
7	Shift to non -farm occupa-	1.81%	13.4	19.6	Same as in 2005 to
Total			75.1	107.5	

Source: NITI Policy Paper No. 1/2017

Madhya Pradesh Government's roadmap has delineated sub-sector wise interventions (and targets) and the financial resources required. The document also presented the projected contribution of different routes to the income increase as given below. The estimated contribution given below brings home the point that productivity increase and diversification are two important routes accounting for half of the projected income augmentation.

Table 7: Roadmap for Doubling farmers income in Madhya Pradesh

SI No.	Pathway of Income Increase Particulars	Share in Projected Increase in Income (%)
1.	Reduction in input cost for agriculture operations	15
2.	Increase in productivity	30

3.	Area increase	14
4.	Agriculture diversification	20
5.	Reduction in post harvest losses	6
6.	Better remunerative prices for farmers	15
Total		100

Source: Roadmap for Doubling Madhya Pradesh Farmers' Income in 5 Years, Government of Madhya Pradesh, 2016

8. Conclusion and Recommendations

Farming in India is characterized by small and fragmented holdings and high dependence on monsoon rains. Operating small holdings is often unviable and farming is not a profitable business or enterprise. It is an occupation in a sector marked by large-scale disguised unemployment and unending uncertainties at every stage of farm operations. In order to double farmers' income, there is a need to increase farm productivity, improve market access, and also to develop the industrial and service sectors, where the surplus farmers can find work. Apart from the limited resources, India has the problems of loss of agricultural land due to urbanization, water shortages and pollution, irrigation problems and huge water losses, shortages of arable land and land degradation. These constitute the limits and constraints of food production in the country. In India, the gap between irrigation potential created and utilized is huge. We need to fill this gap by increasing irrigation efficiencies and water use efficiency. Increasing cost of cultivation, low productivity and lack of remunerative market prices results in low incomes and poverty for small and marginal farm holders.

It has been established that prices will be one of the major sources of growth even if the status quo in the production is maintained. It does not imply that prices need to be increased essentially; it implies that we need to improve farmers' share in consumer price and need to minimize during the chain costs, margins and inefficiencies. Various studies have demonstrated that increased productivity, value chain development, market-linkages, processing and collective and cooperative arrangements can increase productivity, reduce input costs and increase profitability for the farmers. There is a need to diversify sources of income of a farmer to realize the goal of doubling the income. About one third of the increase in farmers' income is easily attainable through better price realization, efficient post-harvest management, competitive value chains and adoption of allied activities. This requires comprehensive reforms in market, land lease and raising of trees on private land. NITI Aayog has indicated that doubling the farmers' income may take a little longer than the target year of 2022, unless needed reforms are expedited. The following measures may be taken for attaining the goal of doubling farmers' income:

- Enhancing irrigation and technological advancement for higher productivity.
- Rational use of resources through precision farming, soil health card based fertilizer application, use of neem coated urea as well as capacity building.
- Cultivation of short duration crops to reduce the pressure on land.
- Venturing into high value commodities for enhancing the income.
- Shifting surplus labour to non-agriculture sector.
- Linking production to market.

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