© 2016 IJSRSET | Volume 2 | Issue 6 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

Subsidies to Farm Sector in India Need to Rationalize & its Efficient Use

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ABSTRACT

At the time of country's Independence, hardly 10% of the cultivated area had assured irrigation and the average consumption of NPK nutrients was less than 1 kg a hectare. The average yield of wheat and rice was about 800 kg per hectare. Agricultural development programs, therefore, focused to achieve self-sufficiency in food production, make country free from food-import & ensure that food is available to poor consumers at affordable prices. The Government policy, therefore, focused on providing farmers subsidies on fertilizers, electric power, seeds & bank credit in particular. While this yielded rich dividends, provision of subsidies has created adverse impact on country's economy. In this context, this article briefly highlights the once-upon-a-time need for subsidies, analyses the growth of subsidies on fertilizers, power, water, credit over a period of time, pinpoints its serious consequences on country's soil health & groundwater depletion and suggests specific measures to improve the efficacy of the use of subsidy where necessary and enhance investment in specific areas to improve country's farm sector.

Keywords: NPK, MSP, CAGR, MHA, MSP, CIP, FCI, GDP

I. INTRODUCTION

India, home to 1.28 billion people, was once the epicentre of hunger and famine. The Bengal Famine (1942-43), which claimed over two million lives, compelled India to prioritize agricultural development soon after its Independence in 1947. Hardly 10% of the cultivated area had assured irrigation and the average consumption of (Nitrogen, Phosphorus and Potash) NPK nutrients was less than 1 kg a hectare. The average yield of wheat and rice was about 800 kg per hectare. Foreign experts believed that India could never feed itself. William and Paul Paddock wrote a best-seller titled Famine 1975, arguing that the world was running out of food and would suffer global famine by 1975. They said aid-givers couldn't possibly meet the food needs of high population like India. In this context, this article briefly highlights the once-upon-a-time need for subsidies, analyses the growth of subsidies on fertilizers, power, water, credit over a period of time, pinpoints its serious consequences on country's soil health & groundwater depletion and suggests specific measures to improve the efficacy of the use of subsidy where necessary and enhance investment in specific areas to improve country's farm sector.

II. METHODS AND MATERIAL

Farm Policy

Since country's independence in 1947, Government's policy for agricultural development has been to acquire self-sufficiency in food output, modernize agriculture and ensure social equity. Agricultural development programs, therefore, focused to motivate and encourage farmers to create irrigation facilities and increase land under food crops that can enhance yield per hectare and total food output. This should ultimately result in achieving self-sufficiency in food production and making country free from food-import at the earliest, boosting farmer's income from farming and making food available to poor consumers at affordable prices. Considering farmers' needs in the changing economic environment the government policy focused on [i] provision of financial assistance/support in the form of subsidies to farmers for purchasing costly yield-enhancing inputs of crop production [seeds, fertilizers, canal irrigation water, electricity to extract groundwater etc.], minimum support price[MSP] for food grains, transportation & storage facilities etc. to reduce producer's costs and simultaneously make food

available at reduced price through Public Distribution Service[PDS] to poor and most vulnerable section of the society [ii] initiating broad based measures such as subsidies, tariffs, quotas, and non-tariff measures to protect domestic producers from import competition, manage domestic price levels, and guarantee domestic supply.

The recommendations of the L.K. Jha Committee on Food Grain Prices [1964-65], *inter alia,* included provision of subsidies to farmers on farm inputs initially for extensive spread of improved seed-fertilizer-irrigation technology as a part of Kharif and Rabi Grow More Food Campaign in early 1960s. Subsidies on fertilizers to enhance soil-fertility and electrical power to extract groundwater constituted a major share in the total agricultural subsidies. Subsequently, from early 1970s after the nationalization of 14 major private commercial banks along with State Bank and its seven associates, farmers have been encouraged to access institutional/bank credit at lower interest rate [instead market interest rate] to facilitate them to purchase seeds, fertilizers and pesticides etc. as a part of seasonal crop-loans. Besides, through erstwhile Agricultural Refinance Corporation [now National Bank for Agriculture & Rural Development] long-term investment credit at subsidized interest rate has been provided to help farmers invest in land development, reclamation of degraded/alkaline/saline land, sinking of wells, installation of electric and diesel pumps, micro-irrigation units [sprinklers and drip irrigation system], purchase of a variety of farm equipment and machinery, construct farm structures, create transport, storage and processing facilities etc. In this case, government also extends capital subsidies to farmers to reduce burden of bank credit on farmers and make farm investments viable.

During 1960s, these policy initiatives motivated farmers to adopt high-yielding varieties of food crops and scientific agricultural techniques which enabled India to usher in Green revolution resulting in a record grain output of 131 million tonnes in 1978-79. This established India as one of the world's largest agricultural producers and food secure country. Yield per unit of farmland improved by more than 30% between 1947 and 1979. The crop area under high yielding varieties of wheat and rice grew considerably during the Green Revolution.

Subsidies

With the liberalization of Indian economy and introduction of financial sectors reforms in early 1990s, it was expected that subsidies on inputs of crop production would be progressively reduced and based on the success of green revolution in 1970s and 1980s and achieving significant self-sufficiency in food output, farmers would be encouraged to access institutional credit both for their seasonal agricultural operations as also for long-term investment in agriculture from a number of rural outlets of cooperative banks, public sector banks and regional rural banks. However, during the 17 years [1995-96 to 2011-12] for which data are available, the total input subsidies on fertilizers, power, irrigation, seeds & credit increased substantially by 867.08% from Rs.43.4123 billion to Rs.331.5087 billion indicating 15.24% compound annual growth rate [CAGR]. Total input subsidy as percentage of value of agricultural output was 3.99% in 1995-96 which progressively increased to 7.25% in 1999-00 but then marginally declined to 6.44% in 2011-12 except in three years [2003-04 to 2005-06].

Share of power subsidy which was predominantly high at 55.33% of the total in 1995-96 remained almost the same [55.21%] in 2011-12. The share of fertilizer subsidy shot up to 32.50% from 9.99% whereas share of irrigation subsidy significantly declined to 11.63% from 32.14% and that of credit to 1.86% from 2.48%. Seeds had 0.06% share in 1995-96 and were net taxed in 2011-12 due to higher increase in domestic prices than international prices.

Between 1995-96 and 2011-12, the fertilizer subsidy recorded substantial rise by 3045.37% as compared to power subsidy [865.07%], credit subsidy [624.50%] and irrigation subsidy [249.93%].

The CAGR was the highest for fertilizer subsidy [24.05%] as compared to power subsidy [15.22%], credit subsidy [13.18%] and irrigation subsidy [08.14%].

In India, agricultural subsidies [fertilizers, irrigation, credit and power] are now equivalent to 13% of the Government expenditures [average of 2008-12] but accounts for 226% higher than that of non-subsidy provision in the budget for agriculture.

Table 1. Year-wise Input Subsidies for Agriculture [Rs.lakh] & Percentage Share in Value of Agricultural output

Year	Fertilizer	Power	Irrigation	Credit	Seed	Total
1994-95	--30474	151598	124920	11139	456	257639 [2.64]
1995-96	43378	240186	139532	10766	261	434123 [3.99]
1996-07	177702	267002	159568	11441	407	616120[4.63]
1997-98	277156	309630	160485	12457	589	760317[5.20]
1998-99	287067	460404	307380	8115	928	1063894[6.23]
1999-00	565424	588910	293289	23010	891	1471526[7.25]
2000-01	439847	733500	329131	30273	601	1533352[6.88]
2001-02	327288	896600	294192	19724	368	1538172[5.66]
2002-03	627052	1094100	320366	3969	210	2045687[6.54]
2003-04	1030038	1360600	395151	10894	-086	2796617[8.16]
2004-05	1156196	1558600	367303	12749	-049	3075099[7.69]
2005-06	816697	1902100	396985	-5160	-002	3110620[7.29]
2006-07	647516	2247300	493338	-5976	-017	3382181[6.67]
2007-08	444067	2485643	392650	-7241	-032	3315087[6.44]
2008-09	527647	2402995	570638	33314	571	3541165[6.83]
2009-10	600515	2492920	544749	20255	299	3648738[6.38]
2010-11	654141	2596420	578119	57851	-093	3886438[6.94]
2011-12	1364400	2317978	488268	78000	-303	03

Figures in parentheses indicate total input subsidy as percentage of the value of agricultural output

Fertilizer Subsidies

Subsidy per ton on nitrogenous fertilizers increased progressively in seven years from Rs.1506.31 in 1996-97 to Rs,11,812.78 [784%] in 2011-12 over the previous increase. Similarly, subsidy on potassic fertilizer per ton progressively increased during six years from Rs.1923.40 in 1996-97 to Rs.4885.00 [254%] in 2007-08. It was net taxed during only one year [2000-01] due to higher increase in domestic price than international price. Phosphatic fertilizer subsidy increased in seven years from Rs.962.56 per ton in 2005-06 to Rs.3652.14 [379%] in 2006-07 whereas it was net taxed during 10 years when domestic price was higher than international price.

Average subsidy per annum was the highest for nitrogenous fertilizer per ton [Rs.5553.47] which was higher by 195% and 92% than that of phosphatic and potassic fertilizer respectively. It is argued that increase in fertilizer subsidy is mainly due to increase in international prices of various types of fertilizers specifically the nitrogenous fertilizer. Studies show negative relationship between the price and utilization of nitrogenous fertilizer.

Table 2. Economic Subsidy per ton of Nitrogenous, Phosphatic and Pottassic Fertilizer to Farmers On import parity basis [RS,]

Year	Per ton economic subsidy [Rs]			Year	Per ton economic subsidy[Rs.]		
	N	P	K		N	P	K
1995-96	670.39	-118.89	896.74	2004-05	11239.56	-1358.52	1851.16
1996-97	1506.31	1761.66	1923.40	2005-06	6789.56	962.56	2830.00
1997-98	2646.57	1721.82	2550.00	2006-07	3875.65	3652.14	4303.34
1998-99	2530.94	1509.41	2714.22	2007-08	2198.91	2240.65	4885.00
1999-00	5928.53	1176.10	3626.23	2008-09	4228.69	-74.27	4401.17
2000-01	6540.80	-3612.79	-075.00	2009-10	5034.78	-1104.92	4768.34
2001-02	4576.30	-2877.03	790.00	2010-11	5663.04	-322.50	4618.33
2002-03	7356.67	-2846.42	986.33	2011-12	11812.78	-252.38	4149.62
2003-04	11809.56	-4864.07	947.00	Average	5553.47	1883.75	2890.37

The utilization of nitrogenous fertilizers progressively increased from 57,16,080 tons in 1995-96 to 1,15,92,500 tons [202.80%] in 2007-08 during 13 years out of 17 years whereas utilization of phosphatic fertilizers progressively increased during eight years from 21,87,100 tons in 1995-96 to 47,97,900 tons [219.37%] in 2007-08 and utilization of potassic fertilizers progressively increased during six years from 8,80,500 tons in 1995-96 to 16,78,400 tons [190.62%] in 2007-08. The CAGR during 1995-96 to 2011-12 was 3.19%, 2.86% and 2.36% for utilization of nitrogenous, phosphatic and potassic fertilizers respectively.

Average utilization of nitrogenous fertilizer per annum was the highest [94,45,460 tons] which was higher by 175% and 638% than that of phosphatic and potassic fertilizer respectively. Similarly, average subsidy of nitrogenous fertilizer per annum was the highest [Rs.5503.47 crore] which was higher by 698% and 1238% than that of phosphatic and potassic fertilizer respectively.

Between 1995-96 and 2011-12, actual amount of total subsidies provided increased by 1251.5% as compared with 260.6% budgeted subsidies. The CAGR was 17.67% for actual amount of total subsidies and 8.35% for budgeted ones. Total subsidies going to farmers as percentage of budgeted subsidies progressively increased in six years from 55.51% in 1996-97 to 152.94% in 2003-04 over the previous increase. On an average during the entire period, the share of farmers in the budgeted fertilizer subsidy was 75.13% and the balance 24.87% can be deemed to be going to the fertilizer industry or to its feedstock supplying agencies.

Table 3. Amount of subsidies and share of economic subsidies of fertilizer as percentage to budgeted subsidies going to farmers

Year	Fertilizer Utilized [000 Tons]			Economic Subsidies [Rs.crore]			Total Subsidy 5+6+7	Budgeted Fertilizer Subsidy	%share Subsidy Farmers
	N	P	K	N	P	K			
1	2	3	4	5	6	7	8	9	10
1995-96	5716.08	2187.10	880.50	383.20	-26.00	76.58	433.78	2164	20.05
1996-97	7251.00	2720.70	1068.40	1092.23	479.29	205.50	1777.02	3201	55.51

1997-98	7385.90	3014.20	1168.00	1954.73	518.99	297.84	2771.56	4542	61.02
1998-99	7997.20	3221.00	1328.00	2024.04	486.18	360.45	2870.67	4389	65.41
1999-00	8046.30	3321.20	1380.60	4770.27	390.61	493.38	5654.26	4800	117.80
2000-01	8426.80	2843.80	883.90	5511.85	-1027.2	-86.18	4398.47	5796	75.89
2001-02	8788.30	2669.30	908.70	3969.06	-767.97	71.79	3272.88	4400	74.38
2002-03	9507.10	2931.70	1124.80	6994.06	-834.48	110.94	6270.52	5241	119.64
2003-04	9822.80	2897.50	1155.80	11600.29	-1409.36	109.45	10300.38	6735	152.94
2004-05	10001.80	2976.80	1029.60	11578.77	-404.40	190.60	11364.96	7578	149.97
2005-06	10901.80	3913.69	1372.50	7401.84	376.71	388.42	8166.97	9918	82.34
2006-07	11353.80	4112.20	1331.50	4400..34	1501.83	572.99	6475.16	11387	56.86
2007-08	11592.50	4797.90	1678.40	2549.09	1075.04	816.54	4440.67	13244	33.53
2008-09	10920.20	4214.60	1567.50	4617.81	-31.30	689.96	5276.47	13800	38.24
2009-10	11310.20	4382.40	1667.10	5694.84	-484.22	794.93	6005.15	12595	57.68
2010-11	10474.10	4018.80	1601.20	5931.52	-129.61	739.69	6541.41	11014	59.39
2011-12	11077.00	4124.30	1597.90	13085.02	-104.09	663.07	13644.00	11847	115.17
Average	9445.46	3432.19	1279.08	5503.47	689.81	411.38	5862.61	7803	75.13
CAGR%	3.19	2.86	2.36				17.67	8.35	

Prices of urea [nitrogenous fertilizer] are highly subsidised, with the farmer paying about Rs.5,360 a tonne and the government paying Rs.11,760 [219.40%] a tonne. Since subsidy on other fertilisers is capped, farmers use urea disproportionately high which leads to imbalanced use of N.P &K. It is argued that the purchase of estimated 50 million tons of urea is more than what is actually required and for which farmers and the government are spending additional sum of Rs.2,680 crore and Rs.5,860 crore, respectively. These costs are ultimately paid by the consumers in the form of higher food prices and higher taxes. It is widely acknowledged that the intensity of fertiliser use and in particular the subsidy-sensitive disproportionate use of urea has contributed to the degradation of India's productive soils in many parts of the country and affected the growth in per hectare yield of crops over recent years. Field experiences suggest that farmers feel prompted to make even more intensive use of fertilisers under the wrong notion to maintain the level of productivity and income from their limited landholdings that are getting progressively diminished in size and becoming more fragmented.

Agricultural Census [2010–11] reveals that out of 138.35 million operational holdings, 85% (accounting for 44.6% of the total area) are less than two hectares characterising India's agriculture a small-scale-farming. Average size of small-holding is only 0.61 hectare whereas overall average size of holdings declined from 1.33 hectare in 2000–01 to 1.15 hectare in 2010–11.

While cereal production has grown about five fold since 1950s, fertilizer consumption has increased more than 320 times. This rapid growth is, at least in part, attributable to fertiliser subsidies, which in real terms have more than quadrupled over the past 30 years.

Power Subsidies

Data on agricultural statistics at a glance reveal that share of agricultural sector in total consumption of power which was 21.66% in 1994-95, has reached its peak level of 30.95% in 2003-04. From 2003-04 it started declining and dropped to 22.9% of total consumption in 2012-13. Currently, not only the share but the number of units of power utilized in agriculture has declined.

In 2010-11,the net area irrigated in India was 60.86 million hectares [MHA] and the share of groundwater and surface water irrigated area was 59.01% and 40.99% respectively exhibiting that groundwater was the major source of irrigated cropping. The provision of subsidy on electricity in agriculture was instrumental to accelerate the groundwater development. There were 19.76 million tube wells out of which electric and diesel operated tube wells were 11.05 million [55.92%] and 6.30 million [31.88%] respectively. Farmers mainly used electric pumps in

those areas where the availability of groundwater is in deeper aquifers and relatively electric supply to the farm sector is sufficient. As against this, farmers use diesel pumps in those regions where groundwater availability is in the shallow aquifers and electrification in the farm sector is inadequate and uncertain.

The electricity subsidy to agriculture increased from Rs.73.34 billion to Rs.455.61 billion [621.23%] during 1992-93 to 2011-12. The CAGR for electricity subsidy was 8.65% during 1992-93 to 2011-12.

The share of groundwater in total net irrigated area [20.85 MHA] in 1950-51 increased from 28.67% to 61.40% in 2010-11. The CAGR of net irrigated area by groundwater was 3.54% during 1950-51 to 2010-11. Total electric pumps for pumping groundwater increased from 10.27 million to 11.05 million during 2001 to 2006 whereas diesel operated pumps declined from 6.55 million to 6.30 million.

Adverse impact of subsidies

Farmers and country have indeed benefitted because of extending subsidies. However, there has been significant adverse impact of farm subsidies too in terms of long-term effects on the productivity of land, water and crops and widening the inequality between a large number of small, marginal and tenant farmers and a miniscule number of large-sized land holders.

According to the World Bank [2014], an important consequence of policy driven incentives particularly in case of minimum support prices of wheat and rice has been the farmers' inability to diversify cropping system from continuing to grow cereals, despite better income prospects for higher value crops apart from improving soil-health and land productivity. Besides, there have been leakages, pilferages, corruption and misuse of subsidies creating long-term impact on country's financial and human resources and economic growth. Some economists have termed this as" Waste" a major concern associated with subsidies.

Disproportionate use of Urea

India has been experiencing the consequence of fertilizer subsidies due to the change in relative prices of plant nutrients. The heavily subsidized price of urea has led farmers to excessively use nitrogen [relative to phosphorous and potassium-based fertilizers and important micro-nutrients]. Using district-wise data on nutrient use and land productivity shows a significant negative impact of excessive use of nitrogen on land productivity due to imbalance in the use of nutrients. Most farmers in Punjab and Haryana and even the poor small farmers in Bihar appear to operate on the declining returns portion of the curve, compromising their land productivity to almost 25% below the optimum level. Then, there are additional invisible costs associated with excessive use of nitrogenous fertilizers, viz. environmental pollution, greenhouse gas emission, groundwater contamination, and soil degradation causing pernicious effects with significant potential negative long-term consequences. In parts of Punjab and Haryana, chemicals have leached into the soil and started polluting the groundwater, affecting water quality and creating health hazards and other problems.

In nutshell, policy on fertilizer subsidies for a very long time has been yielding worse outcomes, viz. [i] benefits have gone to well-endowed farmers with large holdings rather than a very large number of small & marginal farmers who constitute 85% of total and cultivate 44% land area [ii] long-term economic losses, viz. deterioration in soil health and ecological damage [iii] inefficient domestic fertiliser production and inefficient fertilizer use.

Power for Groundwater

Groundwater through wells has 60.86% share in total irrigation. Almost 70% of groundwater potential has been utilized. For decades, farmers in agriculturally-predominant regions of Punjab, Haryana, Uttar Pradesh and Rajasthan were encouraged to sink tube wells to get free water for crop production for which electricity for pumping out water was supplied virtually free or at heavily subsidized rates. This not only led to over-exploitation of groundwater but also encouraged farmers to flood crops like rice, wheat and fruit trees with water indiscriminately. This impacted on soil and environmental degradation and low crop productivity.

Rate of groundwater depletion raced faster than the rate of replenishment in many States. NASA scientists in the US, using satellites to track groundwater loss in India's north-western grain basket have found annual

average 33 cubic km drop in the water table in the region, much higher than the estimates of the Government of India. The satellite study has revealed a loss of 109 cubic km groundwater in Punjab, Haryana and Rajasthan between August 2002 and October 2008, twice the capacity of India's largest surface water reservoir, the Upper Wainganga in Madhya Pradesh.

According to World Bank [2001], the growing dependence on groundwater threatened crop productivity, water resource sustainability and power sector viability.

The Economic Survey acknowledged power subsidies actually benefited 67.2% of households that had electrical connections and that the top 20% of the population consumes 37% of total electricity subsidies, while the poor consume 10%.

Bank Credit

Studies on farm credit dispensation reveal that share of subsidized agricultural loans of less than Rs.200,000 [which is supposed to go to small and marginal farmers] in total direct loans declined from 92.2% in 1990 to 78.5% in 2000 and further to 48% in 2011indicating the fact that the bulk of loans advanced for agriculture moved away from small and marginal farmers to medium and large farmers. Similarly, interest subvention scheme loan being implemented since 2006 for Rs.300,000 at virtually 4% per annum for seasonal agricultural operations has, also, largely benefitted farmers with medium& large holdings rather than small, marginal & tenant farmers. It shall be interesting to conduct independent evaluation studies on the relationship between interest subvention scheme & crop productivity/output on one hand and on the other income inequality among farmers of different holding size in rural areas.

Sugarcane

The sugar sector has been surviving with the help of subsidies. During 1992-93 to 2012-13, the CAGR of area under sugarcane was 1.51% as compared to 1.85% CAGR of production and 0.33 % for yield per hectare. Despite sugarcane is a commercially grown cash crop, water, fertilizers & power are heavily subsidized inputs that encourage farmers to use indiscriminately and disproportionately. Provision of subsidies in one or the other form has caused serious problems, viz. farmers use fertilizers more than the standard requirement which has led to adverse effect on soil health causing salinity and alkalinity and resulting in low yield. The heavy irrigation under canal and lift irrigation is responsible for adding huge amount of salts in the soils. Soils are ill-drained with no provision for drainage causing water logging.

Public Distribution System [PDS]

The government spends Rs.3.65 to deliver Rs.1.00 of food and 57% of subsidized food grains do not reach the intended beneficiaries. These startling findings by the independent evaluation office point to massive corruption and pilferages in the existing PDS. The known facts of inefficient and costly PDS include, [i] apart from the intended beneficiaries [Below Poverty Line families], the subsidies reach many others [ii] there are large leakages in the public distribution system, for example, grains finding their way to roller flour mills and thence to the market (bread, biscuit and savoury makers). The subsidy then yields a profit to some traders and producers at the cost of the Government exchequer [iii] the subsidy pays for the carrying cost of stocks built up with the Food Corporation of India and all inefficiency in the management of such stocks (rotted grains) [iv] there are losses ascribable to graft when procuring grains of less than Fair Average Quality.

On food, the subsidy amounts to Rs.1.25 trillion. It has doubled since 2010-11 because of the growing divergence between procurement costs MSP and central issue price [CIP], an open-ended procurement, higher procurement-linked costs and an expanded coverage. The total procurement-linked costs have also risen. The FCI is carrying larger stocks than necessary and far in excess of buffer stock requirements. This entails higher interest, storage, transport and handling costs as well as storage losses. The Committee has brought out that the procurement system has worked primarily to the benefit of 'big' farmers in the north-western states (and a few other states). A meagre 6% of all farmers sell their produce to the FCI. It is, therefore, a myth that the FCI procurement benefits all (or many) farmers.

Current Perception About Subsidies

- In 1960s and 1970s, when India had mass poverty and was deficit in food output, subsidising products, such as fertilizer, power, credit and food was a prerequisite but in the course of time when poverty has declined and India acquired almost self-sufficiency in food grain output [even exporting food grains] subsidies could have been progressively reduced both in absolute amount and its share in country's GDP, meticulously targeting beneficiaries. Continuing the product-based subsidies as usual mainly benefit the well-endowed and elite group of farmers rather than really the needy small, marginal and women farmers and those who are poor and vulnerable. Additionally, this distorts the markets.
- According to the World Bank [2014], subsidies on water, fertilizer, power and credit were catalysts to usher in the green revolution and yielded substantial returns to farmers and the country but their effects have tapered off significantly since then. Credit and power subsidies helped farmers expand minor irrigation, a major drive of the green revolution-led productivity growth since the early 1970s. A realistic comparison between investments in irrigation and subsidies on irrigation suggests that returns on investment in creating irrigation infrastructure had a higher payoff than subsidies on irrigation. The sharp fall in the impact of almost all farm subsidies, even as their costs have grown rapidly over the decades, seriously raises the question of efficacy of subsidies, need for continuing them and country's affordability when resources are scarce.
- The successful policy framework of the Green Revolution has outlived its usefulness. The same policies that gave India the food security in 1970s are now threatening to undermine the sustainability of the agricultural sector and have also corroded the financial health of country's electricity & water distribution infrastructure. Yet, these policies remain deeply entrenched and have become difficult to dislodge politically because slowing productivity growth has made farmers less secure and more dependent on the same old regimes of heavily subsidised water, electricity and chemical fertilisers. New strategies both political and economic will need to be deployed to pull agricultural sector out of this vicious cycle. India urgently and seriously needs a fundamental paradigm shift.

III. RESULTS AND DISCUSSION

Suggestions

- **Investment:** Need of the hour is, instead heavily subsidizing farm sector, to rationalize the subsidies, its efficacy and invest in research and extension services to increase yield and farm income by saving water, power & fertilizer and minimizing their cost. The studies show that investments in core public goods [R&D, irrigation, rural connectivity through roads and ICT, farmer's education& health] have consistently yielded higher returns in agriculture than subsidies. In fact, investment in these specific areas creates enabling environment for small, marginal, tenant & women farmers, oral lessees & sharecroppers to optimally and efficiently use their farm resources and earn livelihood.
- **Scarce Natural Resources**: The situation gets complicated when the Government deals with scarce natural resources such as water, power and land. These resources/commodities should be conserved and scientifically managed to sustainably meet the rising demand of the population. Furthermore, the financial implications of such subsidies are accompanied by ecological, environmental, political & socio-economic impacts.
- **Nutrient Based Subsidy** : The NBS is reported to have worked favourably for the industry and Government. NBS has helped Government to contain its subsidy bill. The CRISIL estimates that the Government saved Rs.120 billion to Rs.150 billion in 2011-12 on its subsidy bill of complex fertilizers due to NBS. While the subsidy outgo on urea increased by 55%, that for P &K fertilizers declined by 11%. Balanced soil nutrition, a desired objective of the Government when NBS was introduced, is however yet to be fully achieved. Control on the price of urea continues to distort the consumption equilibrium. The ideal NPK ratio for India is 4:2:1: Urea prices have remained unchanged at Rs.5,310 a ton distorting fertilizer consumption pattern in the country. With prices of de-controlled DAP and other NPK

fertilizers rising significantly, the gap between prices of controlled urea and other decontrolled fertilizers has widened. High consumption of urea being cheaper, which provides 46% nitrogen to the soil, skews the nutrition ratio unfavourably and reduces crop-response to fertilizers, and at times rendering the soil acidic. The nutrition imbalance was amplified in financial year 2011-12 when urea consumption continued to grow at about 4%, but that of P&K fertilizers was arrested. This reflects reforms in the fertilizer sector by bringing urea under a market driven pricing regime to guide and motivate farmers for balanced use of nutrients. Farmers will soon be able to buy non-urea and complex fertilizers viz. DAP and MOP in smaller packs of 5,10, 25 and 40 kg besides the conventionally uniform bag size of 50 kg. This can help use of balanced fertilizers and promote fertilizer use in low consumption and in-accessible areas. Subsidy in case of urea, if based on NBS, will yield a significant amount of saving in subsidy, rein in indiscriminate use of urea, reduce imbalance in the use of NPK, restore soil health and improve crop productivity.

- **Power:** Agricultural power supplied at flat-rate or free and viewed as farmers' entitlement must increasingly be managed as a scarce input. Raising power tariffs in agriculture to achieve efficiency and sustainability of groundwater use is the need of the hour from social, economic and environmental point of view. As groundwater is scarce, raising water productivity to reduce total water consumption is necessary for arresting groundwater depletion. Government can consider re-introduction of electricity metering in agriculture to manage and arrest groundwater depletion. At higher power tariffs and with induced marginal cost of electricity and water, farmers will improve water use efficiency and enhance water productivity.
- **Extension Service:** Rationale for providing subsidy to encourage/promote fertilizer use is, now, no longer valid as fertilizer use is widespread. What is now required is to create significant amount of awareness among farmers to use balanced fertilizers and achieve higher fertilizer use efficiency which calls for farmers' easy and reliable access to research-based extension services. Field studies have revealed that Government's agricultural extension agencies are weak to disseminate accurate and authentic information relating to proven farm technologies and related services to small, marginal, tenant and women farmers. It has been quite disappointing that only 3% farmers receive agricultural information from the Government agencies whereas as high as 94% farmers depend upon "fellow farmers" followed by agricultural input dealers [10%], and TV/Radio [4%].According to the latest "Situation Assessment of Indian Farmers", only about 28% of all farmers use any kind of agriculture-related information that is available rather than *what they actually need*. About 72% of farmers, especially small farmers do not benefit from any source of information delivery system that can help them adopt latest technology. Unfortunately, investment in R&D and extension education is crowded out by the massive budget outlays on farm subsidies.
- **Subsidy for Seed Production &Multiplication:** Despite the fact that India's premiere agricultural research institutes have evolved a number of high-yielding and hybrid varieties of most crops, yet farmers use nearly 70%-75% of the total seed through their farm saved seeds. This is primarily attributed to non-availability of appropriate seeds on time accompanied by inability of extension agencies to demonstrate the real benefits of improved seeds better suited in the respective agro-ecological regions. In fact, there are seeds that respond quite favourably to low level of fertilizers as well as water and produce higher yields. But, currently, the subsidy on seed is provided mostly for distribution, marketing and transport of seeds as a part of various technology missions and other centralised schemes, and not for augmenting the supply/availability of seeds of HYV & hybrids through seed production and multiplication program. This has aptly been reiterated in the report, on the impact evaluation of the National Food Security Mission (NFSM) which has observed that there is serious and urgent need to increase the production of sufficient quantities of quality seeds to reach the NFSM targets in coming years. Accordingly, the Ministry of Agriculture, has recommended introduction of production subsidy to enhance production of certified seeds, inbred high yield varieties and hybrid seeds in the country.

- **Public Distribution System:** Since 2002, there has been a substantial reduction in the incidence of poverty. If 45% subsidy was deemed sufficient in 2002, there is no justification to raise it to over 80%. Secondly, the poor do not live on staples alone. The annual inflation on other items of food has been in the range of 7-12%, Surveys show that even the poorest of the poor spend only 35% of their food expenditure on cereals. This shows no need to freeze the CIP. The NFSA expands coverage to two-thirds of the population. Above Poverty Line households are also covered, which means prices are to be reduced. Entitlements for the abject poor (Antyodaya) at very low prices are obviously justified, but, not for APL households. The Shanta Kumar Committee report [2015] has aptly argued that the NFSA coverage needs urgent and immediate review. In the present form, it is unjustifiable, fiscally unsustainable and administratively impractical. The Committee has given valuable suggestions on how to reduce these costs. However, at heart, the issue is how to cap total procurement. Other measures that ought to be taken include no open-ended procurement; cap procurement to meet buffer stock requirements and PDS needs (at most 50 million tonnes); shift procurement to eastern regions; an implicit ceiling on procurement from north-western states (and Andhra Pradesh, Chhattisgarh and Madhya Pradesh). Surplus states should move to decentralised procurement to meet their own PDS requirements.

  Government should explore new technology-aided options to improve the mechanism of subsidy delivery which can ensure that subsidies invariably reach the intended beneficiaries, their efficient use and in no case misuse thereof. Monitoring of the end use and impact evaluation mechanism is equally *sine qua non.*

- **Balancing**: There is need for a perfect balancing between the provision of subsidies and essential complimentary public investment in R&D, rural roads, among others, that facilitate farmers use subsidy for the purpose for which it is extended and not misused.

- **Exit Strategy**: The principle objective for providing subsidies must be focused to encourage farmers [who are in very remote, hilly, tribal, desert and drought-prone areas and currently not using inputs] to use adequate production inputs in accordance with the research-based recommendations and to ensure that there is a clear "exit" strategy to encourage sustainable growth and limit fiscal costs

- **Action Research Project**: In designing the policy and program on subsidy Action Research Project is necessary to determine three overarching issue viz. [i] Targeting: how best to reach those who really need subsidy, as opposed to those who want the subsidy [likely all] [ii] Effectiveness: how to ensure achieving the intended objective, reduce wastage/pilferage and maximize efficiency [fully accounting for all benefit and costs, as well as detrimental impacts] [iii] Sustainability: how best to reduce the environmental footprint, ensure sustained growth and development of agriculture and significantly enhance small farmers' annual farm income.

IV. CONCLUSION

The impact of subsidies provided by the developed countries to their farmers has been that their surplus farm products are dumped in developing countries by cutting prices below long run marginal cost, which depresses the world market prices. This issue has to be vigorously researched and taken up with full determination at the WTO level both diplomatically and politically.

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