CHAPTER–VI

CONCLUSIONS AND POLICY IMPLICATIONS

The progress made by the agriculture production in State of Haryana is so well established that it hardly needs any justification. A food Deficit State prior to its inception and this turned into abundantly surplus State. It is interesting to note that the Green Revolution and Haryana State were born simultaneously. The economic development in agriculture sector of the State is the result of the new technology under green revolution. The State covers 1.3 per cent of the country’s area and around 2 per cent of its population. In-spite of the smaller State in area, but Haryana stands as “Lilliput among Titans”, because of its significant contribution in agriculture production. The remarkable achievement of State in food grain production in last five decades played a significant role in reversing the situation of food shortage to food self-sufficiency of country and achieving the food security at macro level. Our study analysed the situation of food grain production in State and its contribution at national level and assessed the future situation of food security of country.

Agriculture is the main occupation of people of Haryana. At the time of creation of State agriculture was contributing 60 percent of GDP; it reduces to 16 percent in 2011-12. But still agriculture provides employment to 51 percent of workforce which is 60 percent at the time of creation of State. So agriculture of Haryana is backbone of State economy and also important to ensure country’s food security.

Haryana covers an area of about 44212 square km. It constitutes 1.44 percent of the total geographical area of the country and ranks 20th in terms of area. Eighty percent of State area is under the agriculture production. The total cropped area of State was 6489 thousand hectares in 2011-12. At the time of inception of State the total cropped area was 4599 thousand hectares. This expansion of area was possible because of new technologies introduced under green revolution. The other factor which contributed increase in area is decrease in
forest land, which reduced to 1 percent of total land from 3.78 percent in 1966. This create ecological and sustainability challenge in front of State.

The crop sown in the State can be divided into two categories: (i) Food Grain (ii) Non Food grains. State agriculture production is dominated by food grains crop. On an average 70 percent of total cropped area of State under food grain production. In 1966-67 there was 3520 thousand hectare area under food grain production which increases to 4702 in 2010-11. The most of increase in area was witnessed during the decade of eighty. The major food grains crops grown in the State area, wheat, rice, maize bajra, jowar, pulses. The agriculture production of State plays an important role at national food grain stock.

6.1 Main Findings:

Our analysis of food grain production of Haryana and its contribution in Indian food economy reveals the following observation:

1. The green revolution brought more area under rice production in State. With the expansion of irrigation facility and introduction of new technology made possible to grow rice in that regions of State, which were not growing rice traditionally. The area under cultivation of rice had increased from 1.92 lakh hectare in 1966-67 to 12.15 lakh hectare in 2012-13. The area under rice saw major expansion during the period of 1966-67 to 1980-81. The area under rice during this period increased at the rate of 6.4 percent annually. After that area expansion under rice took place at slow rate. We have observed that during 2001-02 to 2012-13 the annual growth witnessed by rice area was 1.2 percent. Now there is no further scope of area expansion to produce more rice.

2. The production of rice also witnessed tremendous increase. During the first decade of green revolution the production of rice saw a major growth of 12.2 percent per annum, because of area expansion and increase in productivity. In the decade of 1980-81 when the green revolution technologies get wider coverage, the production of rice grow at 3.25 percent annum. In recent decade of 2001-02 to 2012-13 the rice production
increases at the rate of 3.7 percent. After the 1980’s the much of growth in rice production was because of area expansion.

3. The productivity of rice increase with the introduction of new technologies and increase at the rate of 5.5 percent during 1966-67 to 1980-81. But after that the increase in rice productivity was not so prominent; even witnessed negative growth of 1.4 percent during 1991-91 to 2000-01. The slow growth of rice productivity shows that the expansion of rice crop took place in those areas which traditionally not suit to the rice crop. It creates extra burden on State resources.

4. Haryana is the prominent wheat producer of the country. In 1966-67 the area under wheat was 743 thousand hectare; it increases to 2497 thousand hectare in 2012-13. The major increase in wheat area was also witnessed in the decade when the green revolution was introduced i.e. 1966-67 to 1970-71. Wheat area increased at the rate of 4.5 percent per annum during this period. After that area under wheat registered low growth and almost reached to plateau with only one percent growth during 2001-01 to 2012-13. There is no further possibility of expansion of area; as 94 per cent area of Rabi season came under wheat cultivation in 2012-13. It shows that Haryana totally following mono-cropping pattern and the diversity in food grain of Rabi season is totally washed out.

5. The wheat production increased significantly during the 1966-67 to 1980-81 because the effect of both area expansion and rise in productivity. The production during this period rise at 6.9 percent. During the period of 1981-1990-91 the production increase at the rate 5.6 percent per annum and the main driver of this robust growth was increase in productivity. The wheat production of wheat witnessed positive trend in State. But now growth of wheat production is not so impressive because of stagnation in area expansion and fatigue in productivity trends.

6. Haryana secure highest position in terms of wheat productivity in India. The productivity of wheat saw significant increase during the decade of 1980-81 when the green revolution technologies get wider coverage and
increase at the rate of 4.2 percent per annum. Now the wheat productivity shows the trend of fatigue in State and rise at the rate of 1.7 percent during the period of 2001-02 to 2012-13.

7. The area and production of pulses get major setback in the State after the onset of green revolution. The area and production of pulses mostly witnessed the downward trend since the inception of State. The production of pulses pushed to marginal and rain fed areas of the State. The pulses area witnessed negative growth during all periods of the study. The major decline was registered during 1990-91-to 2000-01, when area under pulses decline at the rate of 9 percent per annum. The pulses production registered the decline of 15 percent annually during 1966-67 and since then the production of pulses declining in the State. The productivity of pulses also declined. During the 11th FYP with the introduction of schemes like NFSM the production of pulses get focus. During the period of 2001-02 to 2012-13 the productivity of pulses increases at the rate of 2.2 percent.

8. The main reason for stagnation in area under pulses has been differential impact of technology and relative profitability of pulses and other crops. The high yielding varieties of wheat, introduced during green revolution era raised productivity and profitability relative to Gram and pushed the latter out of cultivation in almost all the area where wheat could spread. Expansion of irrigated area is another factor, which majorly in Kharif season shifted the area of pulses towards other remunerative crops. Relative returns from other crops are the main reason of downfall of pulses area and production.

9. The area under all the coarse cereal was registered decline in State. Bajra is the most grown coarse cereal of State. The production of State restricted to less irrigated area and dry area. The major decline was registered in barley and maize production because of most of these areas under this crop was shifted to wheat cultivation. Bajra witnessed fewer declines because mostly it is used for fodder purpose in the State. Haryana contributed 3.3 percent of total coarse grain production of the country. With the advent of green
revolution the production of coarse cereals decline. Only the Bajra registered good growth from 1991-92 to 2012-13. The production of barley also increases due to increase in demand by food processing industry. After witnessing a slow pace of growth the productivity of coarse cereals registered rising trend in time period from 2001-02 to 2012-13. Jowar is the coarse cereal which witnessed highest growth in productivity.

10. The India faced the hard situation on food front when it gets independence. Improvement in agriculture productivity was not only necessary to ensure food security but also require for economic improvement because half population was working in this sector. The situation changed during the mid sixties. The green revolution helped the country in ensuring the sufficient food grains and Haryana is the one State who holds the bacon of green revolution high. During the early green revolution, from 1966-67 to 1980-81 the production of food grain of India rise with the growth of 2.8 percent per annum. Wheat was the crop which recorded highest growth rate of 6.5 percent per annum, followed by the rice which grow at the rate of 2.7 percent of per annum. But green revolution shifted the focus away from coarse grain and pulses, which did not recorded such a significant growth because of the area under their production was shifted to wheat and rice cultivation. The area of coarse grain recorded negative growth of 0.38 percent during this period and pulses area increase with marginal rate of 0.17. Self sufficiency created during this period mostly come from the increase in productivity and dominated by the wheat and rice.

11. But now food grain production is facing the stagnation of growth rates. After the reform period the public investment in agriculture decline and there is no new break trough in technologies and there is no further scope of area expansion. The future improvement in production will depend upon the increase in productivity but yield growth of major food grain showing stagnation. Even during the period of 2001-02 to 2006-07 yield of wheat registered a negative growth. During 11th FYP agriculture again gets policy focus and the productivity of food grains witnessed improvement. Even the
productivity of pulses increase at the rate of 2.1 percent per annum during the 11th FYP, it is very much important to ensure nutrition security of the country. But still the yield per hectare of country is less compare to other countries of the world. So there is significant scope to increase the productivity of food crops.

12. Haryana is the front runner State, which saw the dawn of Green Revolution and contributed in making India food secure. Haryana consist only 2.3 percent of country’s total area and has been contributing significantly to the food basket of the country. Haryana share around 4 percent of country’s food grain area but contribute around 6 percent production of food grain, greater than many larger States. Haryana contribution is highest in wheat production. The State contributes 11 percent wheat in national poll whereas for rice the contribution of State was around 3 percent. The State has high marketable surplus ratio for wheat and rice compare to other States, which is the major factor to ensure food security of the people who is not indulge in agriculture activities.

13. The future food self-sufficiency depends upon the increase in productivity of food grain crops. The analysis of yield gap of wheat and rice, of Haryana with other States, shows that Haryana is more productive in comparison of other States. Only Punjab is the one State, which performs better than Haryana in terms of productivity. The analysis of yield gap shows that the yield gap almost remains same if we compare present time period with the period when the green revolution was initiated even though these States also witnessed robust growth rates in yield per annum. It means States other than Haryana-Punjab has structural constraint, which keeping their yields of food grain at low level and without realising the full potential of HYV seeds. If the given analysis is correct, there is most likely that this yield gap will persist in future also and Haryana will remain prominent State in production of food grains.

14. Public Distribution System (PDS) is the pillar on which the country’s food security stands. To run the PDS government procure food grains through
the FCI from surplus States. The procurement data from 1996-97 to 2012-13 shows that the contribution of Haryana in rice procurement remain around 9 to 5 percent and around 25 percent for wheat. State has low CV for procurement data compare to other States. It shows a stable contribution by the Haryana in procurement of food grains and play important role in country’s food security.

15. The number of factors has been contributed in marvellous achievement of the State in food grain production. The analysis of theses factor by running regression analysis shows that, cropping intensity, irrigation and fertilizer production are the most significant factors, which affects the State food grain production. Cropping intensity depends upon the net sown area. But net area sown is showing a decline in the State because of shift of agriculture area to non agriculture sector. This can be a threat to the food self sufficiency of the country. The fertilizer consumption is the, second most significant factor that affects the food grain production. But the State consumption of fertilizers is tilted towards nitrogen based fertilizer. It is the reason that the State has highly imbalanced N: P: K ratio i.e. 20.6:6:1 instead of 4:2:1. It is creating ecological and sustainability problems. The other factors like mechanization of agriculture the area under HYV seeds, irrigation facilitates etc all grow over the time and contributed in increasing the food grain production of the State.

16. The stagnation in productivity and decline in net availability makes a case to forecast demand and supply of food grain to assess the future food security situation. The projection based on the normative approach based on the requirements of National institute of Nutrition the demand for food grain will range from 212 million tonnes to 252 million tonnes in 2015-16 based on different life style. In 2030-31 the demand for food grains will be range from 244 million tonnes to 290 million tonnes. The demand projection based on absorption approach showed that the food grain demand will be range from 271 million tonnes to 287 million tonnes in
2030-31. The supply of food grain for this time period will be around 305 million tonnes. It means there will be surplus of food grain.

17. The future demand and supply projection for wheat and rice shows that there will be surplus in case of both the crops. The surplus in case of rice in 2030-31 will range between 14 to 19 million tonnes and 13 to 17 million tonnes for wheat. In case of coarse cereals there will also a situation of surplus. But in case of pulses, which is the major source of nutrition the huge deficit is noted. The gap between demand and supply of pulses will be around 20 million tonnes in 2030-31. To meet the requirement of pulses consumption in future, India has to depend upon the imports.

18. The future estimates of Haryana, shows that the rice production will be around 4 to 5 million tons in 2030-31 and 16 to 20 million tons in case of wheat. The contribution of Haryana will remain consistent in wheat and rice production of the country. Haryana- Punjab region will remain important in future also to maintain food self-sufficiency of the country.

6.2 Major Concerns and Policy Implications:

Food self sufficiency is not only necessary to ensure food security but also important part of national security. In country like India agriculture sector is not only essential to ensure the food security of country; also important for economic development of nation where still 50 percent population engaged in this sector. It is cleared from our analysis that Haryana is the important State in terms of its contribution to the national food grain pool. But the study also shows that agriculture both in Haryana and in India as well showing stagnant trend and with no further possibility of area expansion and future improvement in agriculture production can only be possible only by the vertical improvement in agriculture performance. The other factors which area cause of concerns not only for agriculture performance and future food security of country has been discussed in this section and in the last based on the observation of our study, policy implications have been drawn.
Land holding is an important component for agriculture development. Fragmentation of land holding is an issue of concern. The small size of land holdings makes agriculture a costly activity for farmers and also discourages the use of new and improved technologies because of the limitation of credit to invest. In 1980-81, 165 thousand hectares of land under the marginal holdings (below 1 hectare), that area increased to 360 thousand hectares. It shows over the time period of more fragmentation of land took place. In 1980-81, 38 percent of farmers were marginal farmers’ categories but in 2010-11, 48 percent farmers were marginal farmers in the State. Small and fragmented holdings are major barriers to adopt new technologies to increase productivity. If more farmers are coming in the categories of marginal and small, it means economic well-being of farmers is also declining in the State.

Capital is the base of all economic activities. Like all other economic activities, agriculture also requires capital to adopt new technologies to increase production, to buy good quality input like seed, fertilizers, and creating agriculture infrastructure like irrigation facilities. So it is well said by an old proverb “Credit supports the farmer as the hangman’s rope supports the hanged.” This statement is fully apt in the case of India where agriculture still remains a risky activity as major agriculture production depends upon the monsoons. Easy availability of credit minimizes the risk of farmers and promotes them to adopt new technology, expand investment, and thus contribute in agriculture productivity. But the NSSO survey shows that even the spread of banking facility in rural areas, in post-reform era the share of non-institutional credit among the farmers has increased. The report by some local newspaper of Haryana shows that small and marginal farmers in the State are in the clutches of money lenders, who charged very high interest rates even 120 percent on very small amounts of money. The lengthy process and lot of paperwork are the few reasons of which farmers take money from money lenders. In case of small and marginal farmers
lack of security also make reluctant banks to lend credit to them. That trap created by the high interest rates of money lenders and the failure of crops by unpredicted weather is the main cause of recent farmer suicides in State. The other area of concern is that after post reform period increase in indirect credit, so there is shift in the direct credit away to the farmers. There is disparity in distribution of credit also. In the recent years there rise in number of marginal farmers but the share of loan account held by marginal farmers declined continuously. Marginal farmers share in total loan account declined 42.7 per cent in 1981-82 to 37.2 per cent in 2010-11, whereas share of large farmers in total account registered continuous rising trend.

- The gross capital formation in agriculture and allied sector in total gross capital formation (at current prices) has declined from 11.2 percent in 2001-02 to 6.7 percent in 2007-08 and improved in preceding years and becomes 8.2 percent in 2010-11. The GCF in agriculture and allied sectors in proportion to the GDP in agriculture which was stagnated at around 14 percent during the first half of last decade, increased to over 20.1 percent during 11th five year plan. The important issue is that the share of public sector in gross capital formation is continuously declining which is major bottleneck in improving the agriculture infrastructure. To achieve the 4 percent growth rate of agriculture, there is need to increase investment but agriculture is getting only 2.7 percent share of total GDP in which public sector contributes only 0.4 percent remaining 2.3 percent comes from private sector.

- The future improvement in agriculture depends upon the vertical growth. To increase the productivity of agriculture and particularly food crops require sincere research efforts. However, public spending on agriculture research, education, and extension is about 0.6-0.7 percent of agricultural GDP which is much lower than the international norms of 2 percent. It can be said that current stagnant trends in agriculture because of declining GCF and
inadequate investment in research and development activities leads to a vulnerable situation of macro level food security and have significant implication on access to food because this supply side bottleneck can make food prices to swell and make poor population more vulnerable in terms of nutrition and calorie intake.

- The increasing cost of agriculture activity is also of area of concern. The MNREGA, largest employment and social security programme run by GOI, but also influencing the cost of agriculture production. In most of States MNREGA wage rates are more than agriculture wage rate, it is increasing the labour cost of agriculture production. Haryana is the State which is paying highest wage rates under MNREGA. Farmer faced huge labour shortage during the sowing season because of more lucrative wage rates under MNREGA and construction activity. It is creating more burden particularly on small farmers who more dependent on labour input instead of machineries. Increasing price of other input and machinery is also contributing of rising cost of agriculture. During the last ten years the cost of production per quintal of major crops has increased by over 2.5 times. In Haryana the cost of non basmati paddy increased from 462.32 Rs Q/ha in 2002-03 increased 2.6 time in 2011-12 and become 1206 Rs Q/ha. In the same time period the cost of wheat increased from 464 Rs Q/ha to 974 Rs Q/ha. Even the most profitable crops of the State, the MSP of these crops did not increase that rate.

- Water and land is crucial factor for sustainability of agriculture. Over-irrigation and alarming rate of ground water depletion during green revolution period have caused land degradation and other environmental problems. The over exploitation of natural resource like water has direct bearing on agriculture productivity, food security and public health. The problem is most profound in green revolution belt. In Haryana total water availability is 18.75 MHF and total water requirement are 32 MAF, so there is deficit of 13.25 MHF. Tubewells are the major source of irrigation
in the State and free the State from the monsoon dependence, but it is creating burden on the ground water resources of the State. In Haryana, 55 blocks are over exploited. Some faulty policies like easy availability of credit from financial institutions for installing tube wells and provision of highly subsidized or free electricity for pumping water in many States has encouraged increased extraction of water which is major threat to sustainability of future agriculture and food security.

- Chemical fertilizers are essential in new modern technology and play important role in agriculture productivity growth in India. While analysing the determinants of food production in Haryana, fertilizer consumption comes most significant factor. The consumption of Nitrogen (N), Phosphorus (P) and Potash (K) are on rise and highly tilted towards nitrogen based fertilizers. In Haryana NPK ratio is highly imbalanced i.e. 20.6:6:1 instead of 4:2:1. This high use of fertilizers have adverse impact on ecology, damage soil quality, create environment pollution and create burden on farmer in terms of increased cost. This imbalance is partly the result of a difference in price of different nutrients, and partly due to the lack of knowledge among farmers about the need for balanced fertilizer use.

- Deteriorating soil health because excessive use of chemical fertilizer and pesticides and intensive farming is the also a threat to the future food security of the country. In Haryana 4 lakh hectare soil is saline and water logged in State and 86000 hectare is alkine soil and 40 percent area is deficient of micro nutrients. Increase in barren land because of degradation of soil is also a reason of decline in net sown area.

- The change in net sown area in recent years is either because of degradation of land or putting the agriculture land to other uses such as extension of township and for industrial purposes. In India area under non agriculture purposes increased from 21.087 million hectares to 26.513 million hectares in 2010-11, a net increase of 5.42 million hectares. With
the increase of population and urbanization, pressure on land will increase further, which will prove a threat to food security with less area for agriculture use and also leads to import dependence of food grains in future. The net sown area in Haryana is also declining. Land not available for cultivation has increased in recent decade in State. It was 519 thousand hectare in 2005-06 and increase to 643 thousand hectare in 2012-13. This decline is mainly because of increase use of in land non agriculture uses. In 1966-67 the area under non agriculture uses is 257 thousand hectare and 542 thousand hectare in 2012-13. This increase in use of land in non agriculture uses is mainly because of construction of extensive township and industrial uses. The new amendment in Land and Acquisition Act, which further simplify the procedure to acquire land, can create stress to the agriculture production in State as well as in country.

- Increase in temperature due to climate change also affects agro-eco system of country. In previous years monsoon shows a varying pattern. Studies shows that increase in temperature will change current rainfall pattern. This will have major bearing on Indian agriculture where monsoon still plays important role in agriculture production. It has been found in various studies that increase in temperature will decline the average yield of major crops, especially wheat, because of shortening of winters. According to the some studies, short period of exposure of wheat crop to high temperatures results in sharp decrease in productivity, ranging from 10-20 percent. According to Haryana State Action Plan on Climate Change (2011) the mean maximum temperature is likely to increase by 1.3°C and mean minimum temperature by 2.1°C by 2050. Mean annual rainfall is projected to decrease marginally by about 63 mm (3%) by mid century and it will negatively affect the food and agriculture production. The need of hour is sustainable agriculture with stress on environmentally curative and preservative practices.
Currently India is facing a situation of abundant of food grains and still high food related inflation and a large number of populations of food insecure. The main cause of this problem is inefficient food management. FCI is the agency which stores the food grain. But, most of the food grain in FCI stores rotten and waste because of lack of proper storage facility. There is no provision of storage at local levels. So, farmers are compelled to sell all there produce at a time of harvest and not able to ripe the benefits from seasonal variation. The large scale of corruption also creating problem for the country to secure food security for all in spite of abundant of food grains. PDS, life line of Indian food security schemes to ensure distribution is suffering from the corrupt practices and the benefit is not able to reach to them, for which they are meant.

Malthus profound the theory that population grow much faster than the food supply. India’s population 2011 registered 17.65% decadal growth rates. Food grain production is not able to catch-up with population growth; which is the reason of declining per capita availability of cereals. In 1991 net per capita availability of cereal was 468 grams per day which declined to 407 grams per day in 2010. Pulses which is the major source of protein, their net per capita availability was highest at 51 grams per day in 1971 which declined to 41.6 grams per day in 1991, which further declined to 31.6 grams per day in 2010. Rising population and increased urbanisation is the major reason of demand side stress on food grain production and rising inflation of food products. According to the United Nation report around 2050 India’s most population will leave in urban areas, it will create further stress on price of food products.

Increasing population will put pressure on agriculture in terms of increase in food demand, employment and can further shift agriculture land area to non agriculture use. Only stable population can assure sustainable food security.
The area of concern of Indian agriculture on which food security of country depends as well as Haryana can be summarised by the observation made in World Bank Report (India Country Overview 2008):

“Slow agriculture growth is a concern for policy makers as some two-thirds of India’s people depend on rural employment for a living. Current agriculture practices are neither economically nor environmentally sustainable and India’s yield for many agriculture commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmer’s access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation”

6.2.1 Policy Implications:

Haryana is one of the pillars State for the food security of India. The sustainable agriculture development of Haryana as well as India is essential not only to achieve self reliance of food grains at national level but also for food security at the household level. The most fundamental way in which agriculture can contribute to all the three dimension of food security by making food available at affordable price through agricultural growth and productivity. The robust agriculture growth with increase in productivity enhances food availability and affordability through income growth, poverty reduction, and lower real food prices.

Based on our observations in the study, the following policy implications are drawn for ensuring future food security of the country:

- The rice-wheat system of cultivation is the backbone of the food security of country. The study shows that the country will be surplus in two crops for coming decade. Thus, there is need to create extra storage capacity in the country. Instead of centralized storage we should go for decentralized storage system. The community grain bank should be established at local level, and other cold chain facility should also be created. It will not only enhance the food security, but also contributes in enhancing the profits of the farmers at the time of unseasonal demand. The creation of grain bank
can also reduce the government burden of food subsidy, by reducing the storage cost.

- To set community grain banks and storage capacity at local level, help from the corporate sector should be taken. There is paucity of funds at lower rung of the government to set up such facility. It can be bring under corporate social responsibility (CSR). Under the new company act the companies has to spend 2 percent of their profit as corporate social responsibility. This fund can be used to set up state to art storage facility at village level. It will help in efficient management of food in country.

- The traditional method of agriculture should be continued. Traditionally, Dhaincha (Seabania Aculeate) is grown in the State before the rice cultivation. It incorporated 45 days before transplanting the crops. It work as green manure and enhance the productivity of growth. This type of traditional method should be preserved and this knowledge should also be provided to the new farmers. The traditional methods are not only sustainable but also cost effective, maintain the soil health and enhance productivity.

- For ensuring efficiency, sufficiency and equity in the agriculture sector, the minimum support price (MSP) policy should be revised to address increasing costs and should be linked to the prevailing inflation rate. A portion (5-10 percent) of MSP can be paid to the farmers in foreign exchange which will be the best possible use of the foreign exchange reserves in the country. Farmers should be motivated to open foreign exchange accounts in the banks. It will raise the income of farmers and make agriculture profitable. With the increase in the income the demand for high value food commodity is increasing. So the crops like potato, tomato and onions should also be brought in the ambit of MSP. It will work in two ways on the one hand it enhances the profitability of the farmers and on the other hand it makes the said crops attractive to farmers,
which increase the supply and check the upward movement of prices of these commodities.

- To promote research and development (R&D), there should be more agriculture universities at the zone or district level. The students of the universities can be involved to work as intern with the farmers. It will not only enhance the farmer’s knowledge of efficient method of production but also help in easy dissemination of new technologies.

- The MNREGA increased the wages without raising the productivity; it raised the agriculture cost and pushed the food inflation. For making the availability of labour to farmers, the domain of MNREGA should be extended. The wages under MNREGA should be less than prevailing agricultural labour wages of the region. So, that only those labourers go for MNREGA work, who does not find the work on prevailing wage rate. There can be provision under MNREGA for workers on the farms during cultivation season, where half of wages be paid by the farmer and half by the government. It will not only reduce the cost of the farmer but also the fiscal burden of the government.

- No one can deny the fact that to maintain the food security of country; it is difficult to shift away from rice- wheat system. So, the diversification of agriculture cannot be achieved at the sake of food security of the country. Thus, there is need to promote inter cropping, where two crops can grow simultaneously. Like mustard is grown on the sides of wheat crop and many pulses can also be grown along with other crops. It will promote sustainability and diversification without decreasing in the production of major food crops.

- To improve the Productivity, Performance and Potential (3Ps) and sustainability, there is need of farmers with knowledge. Dissemination of knowledge is very much required to turn labour into affective labour force and open new vistas for the farmers. With the spread of knowledge they can use the best available technology. It will enhance the productivity.
Recently launched DD Kisan channel with 140 million farm houses as target audience by the government is good effort in this direction.

- The increasing number of marginal and small farmers, because of fragmentation of land holding, makes a case for contract farming. It is difficult to use of the machines on the small land holdings and these holdings are not profitable. Under contract farming some big agriculture firm take land of these farmers on contract and produce with the best possible technology. These small farmers can also work as labour input on those farms. It will not only increase the yield but also ensure the stable income for the farmers.

- In 2014 the GOI launched the Agro Forestry policy. Agro forestry can contribute in sustainable agriculture and also check the soil degradation and other climate related issues. In Haryana, agro forestry can be implemented for increasing the tree coverage in the State. It can be recommended that new technology of planting Poplar tree around the fields can supplement the income of the farmers without adversely affecting the benefit from agriculture. It will contribute immensely in creating more income to the farmers, generating more employment and healthy environment for the society. So, with the promotion of agro-forestry, the food security of country can be maintained without any further loss to forest areas.

- The agricultural credit flow has witnessed robust increase over the time period but the easy and adequate access to credit is not up to the needs and requirements of the farming community inspite of the conscious efforts of institutionalization of agriculture finance. The Schedule Commercial Banks (SCB) have major share in credit expansion story of India, where as the share of co-operatives is declining and Regional Rural Banks (RRB) share remain stagnant. This declining trend for the RRBs and co-operatives will certainly have an influence, if not seized at the earliest, on our agricultural credit delivery system. The co-operatives have a great potential not only enhancing credit facilities to the poor, but also distributing
agriculture inputs at the village level. The need of the hour is to revitalize the co-operative credit in India over the years. There is need to liberalize RRBs from the clutches of their sponsoring banks and provide with the long-pending financial and administrative autonomy.

- A big challenge for sustaining food self-sufficiency is raising production which, given that available land is fixed if not diminishing, has to come from improved productivity. There is need to boost investment agriculture credit to raise productivity. Direct and indirect credit both is essential for agriculture, but there is need to maintain balance between two. Indirect finance and finance through NABARD’s Rural Infrastructure Development Fund (RIFD) provided an easy escape route for banks to meet their overall target under priority sector lending. There is need to review this policy as it adversely affecting the overall credit flow. There are several gaps in the system like inadequate provision of credit to small and marginal farmers, paucity of medium and long-term lending and limited deposit mobilization and heavy dependence on borrowed funds by major agricultural credit purveyors. These have major implications for agricultural development as also the well being of the farming community. Efforts are, therefore, required to address and rectify these issues. It requires a facilitating environment, to achieve financial inclusion and adequate credit facilities for agriculture. It is recommended that the government should enhance and simplify the agricultural credit disbursement particularly to marginal and small farmers. To reduce the risks in agriculture sector, crop insurance, scheme like Kisan credit Card must be strengthened. Agricultural credit (adequate, timely and low cost) is necessary and sufficient condition for the inclusive growth of the farmers, to increase the productivity of agriculture sector and maintain future food security of the country, deserves top priority by the government.

- There should be effort and research to develop new seeds which is more resistant to dry conditions and can bear the negative effects of climate
change. The location specific research should be promoted, instead of “one size fit for all” approach. It will create balanced development of all areas and also the food security of every region. So there is strong case for increasing the expenditure on research and development activities at least two percent of GDP.

- The uses of biotechnology should be enhanced in agriculture. With use of bio technology more draught prone and pest resistant variety can be developed. It will increase the productivity of agriculture production. Further biotechnology can also be used in achieving nutritional security of the population. Golden rice is example of this, the variety of this rice is high vitamin A content, with genetic modification. It proved highly effective in many African regions in reducing Vitamin A deficiency.

- There is need to increase capital formation in agriculture, particularly by the public sector. It will help in creating agriculture infrastructure. Only a strong capital base can ensure food security in broader sense, by making agriculture a profitable activity and making adequate nutritious food available and accessible to all. The implementation of NFSA gives an opportunity to the government to increase investment in agriculture. With the implementation of NFSA, the poor sections easily get the food grain at the cheaper rate, so their marginal propensity to consume (MPC) decline and marginal propensity to save (MPS) will increase. The increased saving rate of country can increase the investment and gross capital formation in the agriculture sector.

- The use of bio-fertilizers and locally available farm yard manure, vermi-compost and green manure need to be promoted. This will help in checking the soil health without compromising the productivity and also enhance the quality of food products. Mass campaigns may be organized to make farmers aware about the benefits of these inputs and harms of burning of dung, rice-wheat straw and other agriculture residuals.
• The Public-Private Partnerships need to be promoted to accelerate programmes like development of hybrids, water harvesting, processing and packaging, supply chain establishment, storage, marketing, energy management etc.

• The water and power pricing need to be rationalised for their economic and efficient use and to minimize the burden on ground water resources. Use of water saving technology and micro nutrients should be promoted. The Rain harvesting should be promoted as it is the only solution of both draught and flood in India. There is need to strengthening of input delivery mechanism for ensuring quality inputs in adequate quantity and at affordable prices.

• The procurement process in different States especially Punjab, Haryana, Andhra Pradesh show that substantial amounts are appropriated to the State exchequer through the levy of Mandi tax. It increases the price of procured grain for deficit States. This tax should be rationalized.

• The corruption is the disease which makes the whole system poisonous. To achieve the food security at all levels, corruption should be checked from FCI to PDS. The corrupt activities also contribute in shifting the land to non agricultural uses by providing change in land use certificates. It is a known reality that FCI and PDS are symbol of corruption in India. To achieve efficiency in agriculture sector, we certainly need good governance which means a SMART (SIMPLE, Moral, Action oriented Responsive and Transparent) administration at all levels in India. It will help in implementing of NFSA effectively. Under the NFSA instead of food grain direct cash should be transferred to the beneficiary. It will reduce the cost of implementation and will check the corruption also.

The 12th five year plan has set the objective of faster, sustainable & more inclusive growth which requires concrete plan of action and synergy between the public and private sector to ensure higher and sustainable growth and to increase agriculture production and productivity through providing technological support to farmers, easy availability of credit, reducing post harvest losses, integrated pest management, promoting research and development and investment in agriculture.
It requires reforming three “I”s- namely investment, institutions and incentives. In brief, agriculture needs multi-pronged strategy with political will and commitment to ensure future food security in terms of availability, access, nutrition and stability.

The availability of surplus food grain stocks not only ensure nation’s food security but also open the opportunity for India to contribute in global food security by becoming generous to the global and regional needs. India could contribute 2-3 million tons for a South Asian food grain reserve, an idea which was floated after the 2007-08 food price crisis. There could also be a window to use these surplus stocks for extending humanitarian aid to Afghanistan and some other African countries through the World Food Programme (WFP) or through bilateral cooperation. This can bring rich dividends to help the poor of the world, and also political goodwill for India, which is aspiring to be a global player. The increased agriculture production will also contribute in national foreign reserve through the increase in export. In the nutshell to improve the Productivity, Performance and Potential (3Ps) of agriculture need of hour is to focus on sustainable agriculture, for which relevance of 5 Rs should be recognised which includes Resistance, Resilience, Regeneration, Redesign and Replenishment. The process of development must be resistant to degradation and generate economic growth equitably not only intra-generational but also inter-generational keeping the future generations in mind. Resilience, the process should have flexibility to adapt and ensure least degradation of environment. Regeneration, the development process should have the capacity to regenerate the natural resources consumed during its implementation so that the net effect on the environment is minimized. Redesign, the development process should evolve after design- feedback- redesign cycle so as to ensure that the goals of sustainability are adequately addressed. Replenishment The process should attempt to replenish the natural capital rather than destroying it.
6.3 **Future Scope of Research:**

The study on the food security of India is a continuous process and this is a humble attempt in this direction. There is lot of scope to do further research on various dimensions of food security such as access, absorption and stability. The future research on food security can assess the efficiency of all major food security schemes including implementation of NFSA and its impact on food security at household level. There is a strong case for studying the implications of urbanisation and Land Acquisition Act on the quantitative and qualitative aspects of food security in terms of both demand and supply.
References:

1. All India Debt and Investment Survey and NSSO.
4. Central Statistical Office