CHAPTER - 8
SUMMARY, FINDINGS AND SUGGESTIONS

8.1 Summary:

Cropping pattern and Crop diversification are intended to provide a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to lessen the risk. Crop diversification in India is generally viewed as a shift from traditionally grown, less remunerative crops to more remunerative crops. The crop shift (diversification) also takes place due to governmental policies and thrust on some crops over a given time, for example: the creation of the Technology Mission on Oilseeds (TMO) to give thrust on oilseeds production as a national need. This is done to facilitate lower national imports. Market infrastructural development and certain other price related supports also induce crop shift. Often low volume high-value crops like spices also aid in crop diversification. Higher profitability and also the stability in production also induce crop diversification, for example sugar cane replacing rice and wheat. Crop diversification and growing multiple crops are practiced in rain fed lands to reduce the risk factor of crop failures resulting from drought or less rains. Crop substitution and shifts are practiced in places with distinct soil problems. For example, the growing of rice in high water table areas replacing oilseeds, pulses and cotton; promotion of soybean in place of sorghum in verticals (medium and deep black soils) etc.

The present study deals with impact of W.T.O on cropping pattern at the national and state level. The study has taken the area, production and yield of total food crops and nonfood crops at the national and state level. Besides, it also considers area, production and yield of selected agricultural crops. The study has selected two food crops such as rice and wheat, two commercial crops such as sugarcane and cotton, and two horticulture crops such as potato and onion at the national and state levels. The period of the study has been divided on the basis of their significance in the total agricultural area and production.
The study intends to analyze the average change in area, production and yield of selected agricultural crops, Selected Agricultural commodity Exports, Select Agricultural commodities, Prices before and after the WTO regime. It also aims to analyze the agricultural expenditure and subsidy in India.

The study points out that the change in cropping pattern cannot be analyzed in isolation from changes taking place in the farming system. These changes are determined by factors such as land ownership, access to resources, labor relations, livelihood strategies, farming practices, traditions and culture. The main causes of the changes may be grouped into (i) population growth and change in family structure, (ii) state intervention through land reforms, acquisition of land, deforestation, public distribution system etc. (iii) modernization and commercialization of agriculture, (iv) labor market conditions, and (v) price factors. The impacts of changes are (i) economic (changes in production, farm income, employment, women's participation etc.); (ii) social and cultural (cultivator-labor relation, negative attitude to agriculture, loss of traditional skills, etc.) and (iii). Environmental (loss of local varieties of seeds, breeds, and trees, receding water tables, decrease in biodiversity, etc.). Although it is required to evaluate the accuracy of estimation in detail, the method adopted in this study has a potential to accumulate the information on land use change, which is indispensable in environmental problems.

8.2 Summary of Major Findings of the Study

8.2.1 Findings related to trends in cropping pattern and diversification in India and Karnataka

At the National level the area under food crops has decreased by 3.26 million hectares but in the state level the area under food crops has increased by 1.05 lakh hectares in the post WTO period.
At the National level the area under non-food crops has increased by 16.14 million hectares but in the state level it has reduced by 2.37 lakh hectares in the post WTO regime.

The area under all crops has increased by 12.87 million hectares at the National level but in the state level it has declined by 3.42 lakh hectares.

It is observed that area under rice, wheat, potato and onion have increased both at the National and State level

It is observed that the land used to grow commercial crops like Sugarcane has increased both at the national and state level but the area used to grow cotton increased only at the national level. It has reduced at the state level.

The production of food crops and non-food crops has increased in cooperation at the national and state level.

It is noted that the production of selected agricultural crops has increased during the post WTO regime, at both the National and state level.

Under food crops the yield of rice, wheat, sugarcane and cotton increased both at the national and state level.

The yield of potato and onion increased at the National level; however it decreased at the State level.

8.2.2 Findings based on measure of impact of WTO on cropping pattern and diversification.

The result reveals that the area under food crop during the WTO period decreased by 3.269 million hectares. It was statistically significant with a probability value of 0.001. This indicates that the area under food crop was more stagnant during WTO period. But at the State level the area under food crops during WTO period increased by 1.050 lakh hectares. It is not statistically significant with a probability value
of 0.304. This indicates that although increase in the area under food crop it is not statistically significant due to there is no change in cropping pattern.

The outcome indicates that the area under non-food grain after WTO establishment increased by 16.143 million hectares. This is statistically significant with 1 \% level of significance. This indicates that the area under nonfood crop was less stagnant during the WTO period. Similarly at the state level the area under non-food grain has increased by 2.373 lakh hectares and it is statistically significant at 10\% level.

The result reveals that the area under all crops during the WTO period increased by 12.874 million hectares. This is statistically significant with a probability value of 0.00. This indicates that the area under all crops increased after WTO establishment. Likewise at the State level, the result reveals that the area under all crops during WTO regime increased by 3.423 lakh hectares. This is statistically significant with a probability value of 0.052. This indicates that the area under all crops increased due to increase in demand for agricultural commodities.

Similarly the areas under all selected Agricultural crops are statistically significant at 1 \% level both at the national and State level.

**8.2.3 Findings related to trends in cropping pattern and diversification across divisions in Karnataka.**

In Belgaum division area under rice, cotton, and potato has decreased, whereas wheat, sugarcane and onion have increased, similarly in Bengaluru division area under rice, cotton, and sugarcane has declined but area under wheat, potato and onion has increased, Likewise in Kalburgi division area devoted for rice, sugarcane, potato and onion have increased but area under wheat and cotton have decreased after WTO establishment, Whereas in Mysuru division area devoted for all selected crops have increased except wheat(declined).
In Belgaum division production of all selected crops increased whereas in Bengaluru division only rice, wheat, potato and onion have increased but sugarcane and cotton have decreased. Similarly in Kalburgi division the production of all selected crops increased except sugarcane. Likewise in Mysuru division production of rice, cotton, potato and onion have increased but production of sugarcane and wheat has declined during post WTO regime.

In Belgaum division yield of rice, wheat, sugarcane and cotton have increased except potato and onion whereas in Bengaluru division yield of rice and wheat has raised but sugarcane, cotton, potato and onion have decreased. In Kalburgi division yield of all selected agricultural crops have increased except Onion. But in Mysuru division yield of all selected crops have decreased only yield of rice has increased.

8.2.4 Findings related to Agricultural Exports in India and Karnataka

Agricultural Exports at National level

The percentage share of agricultural exports to total national exports has decreased during the study period except the last few years due to internal and other international factors.

Under Food commodities Rice and Wheat have been considered. The Exports of rice have increased from 722.725 crore rupees to 13966.27 in the post WTO Period which was 13243.54 crore rupees higher than the pre WTO Period. Likewise, the Exports of Wheat has also increased from 31.41 crore tons to 1704.54 crore during the same period.

Under Commercial commodities we have selected Sugar and molasses and Cotton (including Waste) The Production of Sugar and molasses has risen significantly from 105.325 crore to 2890.34 crore in the period of post WTO Regime. Similarly the Production of Cotton also increased from 298.1625 to 6194.22 crore during the pre and post WTO Period.
With respect to Horticultural commodities Fruits and Vegetables have been considered. The Exports of Fruits and Vegetables have increased in the last 2 1/2 decades. The Exports of Fruits and Vegetables have risen from 278.275 to 4302.29 during the post WTO Regime.

Overall the Export of all Selected Agricultural Commodities has augmented during the WTO Regime.

**Agricultural Exports at State level**

The exports of major agricultural commodities have increased over the period of time; especially the exports of coffee, cashew, spices, gherkins and agricultural and processed food products have increased during the study period (2001-02 to 2015-16). But the exports of silk products have declined 2005-06 onwards. On the other hand exports of flower are stable during the reference period.

The average exports of selected agricultural and processed commodities during 2005 to 2017 have increased significantly. With respect to the food crops, the average export of rice is rupees 449.07 Lakhs, whereas export of wheat was 2002.74 lakhs during the period 2005 to 2017. Among the commercial crops, the average export of jaggery and confectionary was 3046.73 lakhs. Among the horticultural crops the average exports of fresh vegetables was rupees 3567.42 lacs but the export of onion was only rupees 8.11 lakhs. The level of exports was very less to fulfill the state consumption and other internal factors.

**8.2.5 Findings related to Agricultural Prices in India and Karnataka**

**Findings related to wholesale price index in India**

The wholesale price index of selected agricultural commodities between the periods from 1997-98 to 2004-05. The year 1993-94 was taken as the base year. From 1997-98 to 2000-01 the wholesale price index of selected commodities have index
number of above 150, but in the later stage it has the index number of lesser than 150 except nonfood articles. After the year 2001-02 it shows greater variations.

During the periods from 2005-06 to 2014-15 the wholesale price index shows a continuous increase. The increase in case of onion however, showed a much higher increase in comparison to the index of all commodities. The food prices maintained an upward trend though the increase is lower during 2005-06 to 2010-11 compared to the rise in 2010-11 to 2014-15.

Findings related to wholesale price in Karnataka

But the average wholesale prices of selected agricultural commodities with different varieties in Karnataka for the time frame before and after WTO has shown a significant upward rise.

In Food crops average wholesale price of Rice with fine variety is 635.96 rupees in pre WTO period which is increased to 2325.63 rupees in post WTO period. In the same time Rice with medium variety raised from 540.777 to 1868.18 rupees, likewise rice with coarse variety goes up from 449.256 to 1384.08 rupees during the same period.

In Commercial crops the average wholesale price of Sugar cane rises from 784.04 rupees per quintal to 2009.12 rupees per quintal during post WTO period. Cotton with kapas variety in before WTO period was 1058.27 rupees per quintal which was increased to 2784.15 rupees in after WTO period. Similarly Cotton with lint variety was raised from 1789.69 rupees to 4032.05 rupees during the same period.

In Horticulture crops the average wholesale prices of potato was 264.75 in before WTO period which is increased to 1002.16 rupees in after WTO period. By the same token average wholesale price of onion improved from 212.33 rupees to 977.61 rupees during the post WTO period.
8.2.6 Findings related to the influence of WTO on agricultural expenditure and subsidy in India and Karnataka.

The annual growth of food subsidy in 1997-98 was 217.28% as compared to 1990-91. In 1998-99 the growth was 13.92 followed by 42.61% in the year 2001-02. In the year 2011-12 it was 13.74 % but in the year 2014-15, it was 30.45%. Thus as is evident, there is much variation in food subsidy. Likewise the annual growth of Fertilizer subsidy in 1998-99 was 6.61%. It was decreased to 14.75% in the year 2001-02, but in the year 2004-05 and 2008-09 it was raised to 89.26% and 135.77% respectively. After 2014-15 the fertilizer subsidy was reduced slightly.

The plan wise percentage share of public expenditure on agriculture and allied activities to total public expenditure shows a constant trend over the period of time. It is almost 4 to 5 percent spent for agriculture and allied activities during the reference period in India.

The average expenditure on agriculture and allied activities was raised during the WTO regime; it included the average expenditure on crop husbandry, soil, water conservation, food storage and ware housing. In the same way, expenditure on irrigation, power and export promotion was increased over the period of time.

In Karnataka, the expenditure on agriculture and allied activities shows increasing trend from 2010-11 to 2013-14 later it shows decreasing trend. But government expenditure on crop husbandry, irrigation shows increasing trend over the period of time, on the other hand government expenditure on soil and water conservation, and power fluctuated during the reference period. The major expenditure made by state government on agriculture and allied activities and power; which covers almost 76 % of agriculture expenditure during the reference period.
8.3 Suggestions:

The in-depth analysis on shifts in cropping pattern in India has resulted in the following broad suggestions. These suggestions are intended to provide a beneficial and bright future to the agricultural scenario. If the suggestions are fine-tuned and made practicable by the administrators, several problems that persist in this sector can be resolved to a greater extent. In this connection the following suggestions can provide a guideline in making and shaping appropriate policies related to this sector.

1. To increase the area under agricultural crops the first and foremost remedy to be administered should address the problem of the sharp deterioration of the land use pattern especially with regard to paddy cultivation. The remedy lies in the administration and strict enforcement of laws relating to the land use. The revenue authorities and the department of agriculture authorities should be very keen in administering the legislations enacted so as to save the land use pattern.

2. To control the volatility in Price, the price fixation should be made by an appropriate agency like agriculture price commission taking into account the regional production cost structures. It is highly imperative to constitute a separate agency consisting of experts in fields related to agriculture price commission and central statistical organization.

3. To increase the productivity of crops setting up of a steering committee to identify and locate places suitable for appropriate crop cultivation. This is to be done to suit the existing and emerging trends visible that are associated with the agriculture field.

4. To increase the area, production and exports of agriculture commodities Leasing of Land is essential. Consolidation of small land holdings is pre-requisite for economies of agricultural operation, as this would ultimately lead to cost reduction and render agriculture competitive. In this context, the government's
proposal to facilitate leasing of land is a welcome step. However, this should be strictly on voluntary basis as Indian farmers have emotional attachment with their land holdings. However, the government may lease wasteland under its control to the private sector specially for promotion of Agricultural Research & Development, which would require vast size of land. Similarly, Cultivation for export purpose, like medicinal plants, could be considered under this scheme.

5. To promote and create confidence among the farmers it is highly essential to constitute an agency either at the government level or at the co-operative level for procuring certain crops from farmers immediately after reaping.

6. The concentration on wet crops is creating more pressure on water, fertilizers, pesticides, and other inputs. So, the policy should be to encourage alternative food grains, which demand less amount of water and other inputs.

7. It can be observed that, increasing production through modern agricultural technology will always demand more energy resources in Indian agriculture. For that, the encouragement of alternative energy sources such as solar, wind, and some traditional sources of energies are acceptable alternatives for meeting the future challenges. Promotion of Traditional Farming: After Independence, especially since 1968 the entire emphasis has been on increasing the production of food grains. For this purpose, the dwarf varieties of wheat and rice was adopted. The special feature of this kind of varieties of wheat and rice is that they require more water and fertilizers as compared to the traditional crops and could provide more produce per acre. This strategy paid rich dividends as expected which was termed as green revolution. However, now it is realized that due to excessive use of irrigation and fertilizers, the fertility of the areas under green revolution has come down rapidly. Out of 23 micro-elements, 16 elements including iron element, zinc, manganese, Sulphur, Ferron, nitrogen, phosphate, potash etc. have been found lacking in the soil of these areas.
8. Government price policy towards various crops should be re-examined. It should encourage alternative food crops, which can reduce demand side pressure on energy in Indian agriculture in near future. The Concept of minimum support price (MSP) has been devised in order to rescue farmers with procurement of agricultural produces when the market is volatile - which obviously would mean that procurement by the government agencies be the last resort. Minimum support price should also strike a healthy balance keeping in view interests of consumers so that the latter would also play supporting role to farmers. However, when MSP is kept at unrealistically high level, the government's supporting role would be curtailed as the same could not be extended to consumers due to high issue prices.

9. With the help of multi spectral, multi data satellite it is possible to prepare land use/land cover map, to analyze cropping pattern and cropping intensity scenario. For change detection study satellite remote sensing and GIS plays an immense role towards the country’s future development plan to be executed by decision makers.

10. Meaningful Minimum Support Price: The Concept of minimum support price (MSP) has been devised in order to rescue farmers with procurement of agricultural produces when the market is volatile - which obviously would mean that procurement by the government agencies be the last resort. Minimum support price should also strike a healthy balance keeping in view interests of consumers so that the latter would also play supporting role to farmers. However, when MSP is kept at unrealistically high level, the government's supporting role would be curtailed as the same could not be extended to consumers due to high issue prices.

11. Removal of Restrictions on Sugar Industry: Because of excessive production of sugarcane 10 million tons of extra sugar stocks have accumulated after meeting the annual requirement of the country. There are great possibilities of value addition in this industry. Unfortunately even today value addition in the sugar industry is made only in the form of sugar. On account of development of
technique and technology in the sugar industry throughout the world, it has now become possible to have only 18 per cent value addition in the form sugar from sugarcane. The remaining 82 per cent value addition could be done through other commodities. The process of modernization and diversification has remained stagnant in this industry due to imposition of various licensing and other control systems.

12. Free Movement of Agricultural Commodities: There are restrictions even today, on trade--internal as well as international--in food grains and agricultural commodities. All these restrictions must be removed. However, under the changed circumstances of globalization with liberal import-export of agricultural products under the World Trade Organization, it would be ironical to continue internal restrictions.

13. Removal of Export Restrictions: The biological diversity of India is unique in the whole world. Our traditional crops could be sold at remunerative prices in the international market. For example, C-281, C-591 and Duram varieties of wheat could be produced with less than 40 per cent of water and less than 50 per cent of fertilizers. It is also notable that 10 per cent less protein is found in the high yielding varieties while our traditional varieties contain 12.5 per cent protein. The quantity of moisture is also lesser in these varieties. The price of high yielding varieties of wheat is Rs. 610/-while that of indigenous varieties ranges between Rs.1100/- and Rs. 1800 per 100 kilograms even today. These varieties could also be produced for international market, where there is considerable demand for such varieties because of superior quality, in spite higher prices.

14. Protection to Agriculture: With the emergence of World Trade Organization in the field of agriculture various apprehensions are being expressed. So far it is sufficient to remind that the agreement relating to World Trade Organization was signed under their regime. So far as the potential dangers under this system are concerned our view is that in spite of removal of quantitative restrictions on
imports the available maximum rates of import duty could stop import of agricultural products.

15. Anomaly in WTO Provision: It is also a fact that the developed countries still continue to heavily subsidize their agriculture. For example, all the countries belonging to the European community, on an average provide 38 per cent of their total gross agricultural products as subsidy. Japan pays 68 per cent. Similarly, U.S.A. also pays heavy subsidy to its agriculture. As per the World Trade Organization provision these countries were required to reduce their subsidy considerably, so that the developing countries could get a chance to export their products to these countries. However, last six years’ experience shows that these countries have increased their subsidy instead of decreasing it -using distortion within in the WTO provision.

16. Step up Investment on Water Resources by the Government. During the last two decades there has been a steep decline in public investment in the agricultural sector. The investment in irrigation has almost become stagnant. An outlay of at least Rs. 1,00,000 crores must be provided for the national plan for irrigation and rain water collection and water management under the next Tenth Five Year Plan. Even today India's 62 per cent agriculture is dependent on rain water. But allocation is only Rs. 402 crore during 2000-01 and Rs.477 crore during 2001-2002 for irrigation, including flood control under Central Plan expenditure as against a provision of Rs. 20,317 crore and Rs. 20,289 crores during the respective years for where the availability of underground water is comparatively low.

17. Rationalization of Fertilizers Subsidy: Subsidy amounting to several thousand crores of rupees is paid annually to chemical fertilizers. Rs. 14,170 crore during 2001-02 amounts of 13,800,14,170 crores has been allocated in 2000-01 for subsidizing the chemical fertilizers. More than half of this amount is siphoned by the chemical fertilizer companies. Two remedial measures suggested to alleviate this problem are as follows: One, dependence on chemical fertilizers be reduced
and whatever subsidy is given may be paid directly to the farmers or subsidy may be totally abolished and the minimum support price be increased in proportion to the increased cost.

18. Development of Agricultural Infrastructure: World Trade Organization is being presented only as a danger and a challenge. However, this system has created a potential for export of Indian products. Hence it is also an opportunity. But for this purpose proper utilization of bio-diversity of India and introduction of sanitary and phito-sanitary checking system besides establishment of a series of quality certification agencies to promote trade by linking transport, cold storage and a series of vehicles having cold storage system to Air Ports and Ports are required. In this context, implementation of the proposed Agriculture Export Zones should be expedited.

19. A strategy to shift public expenditures away from price support, input subsidies and toward investments that support the productivity and long-term competitiveness of the agricultural sector. Over a period of time, contribute to make staple food more affordable.

20. Enlarged Consultative Process: Government of India has made an important change. It has been laid down that in addition to the Ministry of Commerce, the Ministries of Agriculture, Food, Science and Technology and Finance would be included in all future talks. At the same time decisions would be taken after consultation with leaders and representative of various political parties, and all the state governments. This is a welcome step. Earlier the responsibility was solely that of the Ministry of Commerce of the Government of India. The Ministry of Agriculture and other Ministries were consulted very rarely on the subject and it was for them to accept their advice or not. This process could be refined further by including outside experts in the fields such as economic, legal, finance, science etc.
8.4 Conclusion:

India, being a vast country of continental dimensions, presents wide variations in agro-climatic conditions. Such variations have led to the evolution of regional niches for various crops. Historically, regions were often associated with the crops in which they specialize for various agronomic, climatic, hydro-geological, and even, historical reasons. But, in the aftermath of technological changes encompassing bio-chemical and irrigation technologies, the agronomic niches are undergoing significant changes. With the advent of irrigation and new farm technologies, the yield level of most crops, especially that of cereals, has witnessed an upward shift making it possible to obtain a given level of output with reduced area or more output with a given level of area and creating thereby the condition for inter-crop area shift (diversification) without much disturbance in output level. Besides, as agriculture has slowly but surely become drought proof and the growth has become more regionally balanced, there has been a reduction in the instability with respect to agricultural output.

In the face of these new changes including the achievement of food self-sufficiency, the area shift that tended towards cereals in the immediate aftermath of the Green Revolution, has started moving in the opposite direction, i.e., from cereals to non-cereals.

Although these reverse area shifts actually took place in the mid-1970's as a part of the process of commercialization, they became more pronounced since the mid 1980's as a response partly to emerging supply deficit in major crops and partly to the changing comparative advantage of crops. Since the recent trend in inter-crop area shifts has its origin in the price and trade policy changes of the 1980's, they indicate the increasing market influence on area allocation. The area under commercial crops has increased in the last three decades. Among the food grain crops, the area under superior cereals, i.e., rice and wheat, is increasing; like any other economy, the share of agriculture in the GDP is also declining in India. Increase in income from the agriculture sector, further growth of non-crop sub-sectors within agriculture; faster growth of non-food grain crops; and faster growth of superior cereals among the food grains are all happening, but the pace of
such change is far too slow. An accelerated pace of diversification to create positive import of higher income, higher employment and conservation and efficient use of natural resources emphasize the need for efficient policies, especially in technological development, selective economic reforms and institutional change. A strategy of crucial importance is growth enhancing non-farm activities. This calls for investment in rural infrastructure and skill upgradation and it also implies a careful examination and adjustment of macro-policies, which influence the relative profitability of different activities and in turn determine the nature and pace of diversification. In order to ensure social equity, policies on structural adjustment and reforms must pay special attention to the band of marginal and small farmers and agricultural laborers. The direct benefits from diversification should reach these sections of the farmers.

From the above discussion we conclude that there are locational shifts in the areas under individual crops among the different regions, during the reference period. From the findings at national level area under nonfood crops shows increasing trend while food crops shows decreasing trend. But the area under selected food as well as nonfood crops shows increasing trend, at the same time at state level area under food crops shows increasing trend but area under nonfood crops shows decreasing trend due to decrease in the area of cotton and other commercial crops. The individual crops diversified to other crops at different levels due to geographical division of labor and specialization in production and influence of globalization and other international factors.

The production of food and nonfood crops shows an increasing trend at all levels except cotton in the state level. This is also due to the influence of globalization and other international factors. The yield of selected food and nonfood crops shows an increasing trend at all levels except potato and onion. At the state level, the yield of potato and onion shows a decreasing trend. This is because of climate changes, durability of such horticultural crops, lack of fertilizers, risk in the cultivation of such crops. On the other hand Agricultural export had been occupying the place of pride in the export basket of India. There is considerable increase in the agricultural export since the onset of globalization and liberalization. Likewise fluctuations in wholesale prices have been different in different markets depending on the local demand and supply conditions.
There is considerable variation in average prices at both the National and State level. Though agricultural subsidies are distributed by every country, the percentage is very low and numbers of dependents are very large in India. The government of India takes serious measures for the development of agricultural sector and agriculture subsidies are one of tools to help for growth of agricultural sector in India.

Hence this study concludes that there is an impact of W.T.O on cropping pattern, crop diversification, agricultural exports, prices and subsidies within the country and state level.

8.5 Area for further Research:
Since the current study is limited to cropping pattern and diversification study can be extended to farmers’ decision making interms of technology adoption. The study has considered only selected agricultural crops/commodities further other remaining agricultural commodities can be considered. In addition to this season wise or variety wise crops should be considered. This research can further be continued with agricultural imports, direction of imports and exports to know the impact of WTO on Agriculture sector. The study considered only wholesale prices further this research can be continued with retail prices of agricultural commodities. The study can be extended to other than food and fertilizer subsidy for agricultural sector. The further scope of the study is that a comparison among regional, national and international level using the same conceptual framework. Also the time period of collecting secondary data can be extended.