Agriculture activities are of great significance to the economy of India and Gujarat. It is also evident that improving income of people dependent on agriculture is imperative for achieving objectives of growth with equality. To improve the lot of rural population an improvement in agriculture productivity and growth of agro-based business is imperative. Exports of agriculture products and value added products are likely to boost income levels of population dependent on agriculture. These exports are dependent on domestic demand, government policy, and competitiveness of production in international market besides other factors affecting international trade. During present study an attempt has been made to study provision of World Trade Organization affecting agriculture production and trade. In light of WTO provisions, India’s foreign trade, in particular trade in agricultural products has been studied. A study of exports from Gujarat of selected agriculture products and agriculture processed products has been done under changed provision of economic liberalization and WTO regulations conditionality.

3.1 Rationale of the Study

Gujarat has been registering a much higher growth rate of GDP than the national average during decades since its formation. Its agriculture growth rate of 4.7 percent per annum during 1990s is also high compared to national average. During the decade 2000-01 to 2010-11 it has succeeded in achieving double digit growth rate annually in agriculture production, which is a significant achievement. Hence, it was decided to study growth of agriculture in Gujarat in light of agricultural growth in the country. Also export performance of agriculture sector has been studied to find how growth in agriculture in the state contributes to agricultural exports and what has been its performance in pre WTO period and post WTO period implementation period. An increased export from agricultural sector is important for improving standard of living of rural population and population dependent on agriculture which entails more benefits of growth for rural people dependent on agriculture.

Therefore, the present study attempts to analyze export performance of selected agro commodities and value added products in Gujarat during 1980-81 to 2008-09 and an attempt
has been made to study changes in agriculture production and agriculture exports from Gujarat prior to 1995 the year of WTO formation and the period after 1995. This will reveal impact of WTO implementation on agriculture production and exports. This is likely to help planners and policy makers to formulate policies appropriate for agriculture development in the state for enhancing lives of masses in rural areas.

3.2 Objectives

Looking to the significance of agricultural production and its contribution to lives of rural population agricultural performance in Gujarat has been studied since 1980. How the WTO provisions have impacted its production and export has been studied to identify impact of liberalizing economy on Indian agriculture sector and exports. Further, an attempt has been made to study issues and prospects faced by exporters of agro commodities and agro based products from Gujarat and to gain an insight into bottlenecks experienced in promoting export from agriculture sector. The government policies and WTO provisions relating to agriculture were also studied. Thus, following objectives were chosen for present study.

1. To study provisions of WTO affecting trade and agriculture sector;
2. To study national export-import policy with particular reference to policies influencing agricultural export from Gujarat;
3. To examine the performance of the agriculture sector in Gujarat during sub period (1980 to 1994) and (1995 to 2008) i.e pre and WTO periods.
4. To study the performance of export of major agriculture commodities and their value added products from Gujarat during pre and post WTO periods;
5. To study performance of export of selected agro processed products from Gujarat during pre and post WTO periods;
6. To study the constraints in processing and export of agriculture commodities and agro based products from Gujarat; and
7. To suggest suitable policies implications for improving export of agriculture and agro based products commodities and agro based products from Gujarat.

Following hypotheses have been framed for this study.
3.3 Hypotheses of the Study

In the light of above objectives following hypotheses have been framed.

1) There is no significant change in the improvement of exports from Gujarat due to WTO implementation.

2) There is no significant change in the improvement of production from Gujarat due to WTO implementation.

3) There is no significant improvement in exports due to policy reforms.

4) There are no significant difficulties faced by agriculture exporters in post WTO period.

The methodology used for fulfilling above is described below.

3.4 Methodology

This research is based on both the primary and secondary data. The collection of secondary data related to production and exports were undertaken by referring to published information of government, both Gujarat and Government of India. Relevant data was also collected from published articles and research papers. The data on exports was collected from DGCIS and EXIM institutions and cross checked from data of importing countries. The relevant data was segregated and classified for study and analysis in view of the objectives of the study. Primary data was collected for each selected value added commodity from forty processors and exporters out of approximated 400 exporters from four different regions of Gujarat. Regions are marked as per their number of market committee. These regions are: Region 1 - Junagadh (Amreli, Surendranagar, Rajkot, Jamnagar), Region 2- Mehsana (Banaskantha, SabarKantha), Region 3 - Ahmedabad (Kheda, Anand, Panchmahal) and Region 4- Vadodara (Surat, Bharuch). For Value added products, following products were considered. Pickles, Mango Pulp, Tobacco manufactured Mango pulp, Process fruit juice, castor oil, etc. Also the agro commodities taken for the study were Castor, Cotton, Tobacco, Groundnut and Sesamum. Data was collected in respect of quality, production and exporters, export destinations, compliance with quality standards demanded in export markets, costs, and problem faced etc. Specially structured questionnaires were used for collecting information from processors and exporters.
The selected products were those in which Gujarat has maximum contribution to export from country. For collection of primary data, the respondents were selected through stratified convenient sampling in terms of the various regions of Gujarat. The data were analyzed by using various statistical techniques.

3.5 Sources of Data

Secondary data were collected from different published sources like, monthly bulletin of India’s exports and imports, DGCIS Ministry of Commerce, APEDA, Indian Agriculture Research Institute, Socio-economic review of Gujarat, export import institutions agriculture institutions of state governments and government of India. The CMIE, EPW research foundation, World Bank and other sources of data were also referred.

The analysis is done based on the secondary time series data available from sources like International Financial Statistics, IMF, World Bank, FAO Yearbook of trade statistics, UNCTAD Yearbook of commodity statistics, World Trade Statistics, WTO, data on Indian economy compiled by CMIE, Export data as compiled by MPEDA, various issues of economic survey of India, Government of India and economic review and Government of Gujarat. A survey was conducted to analyze problems faced by exporters and processors. The survey was limited to exporters and processors located in Gujarat and concerned with export of agriculture commodity and value added products selected for study.

Primary data has been analyzed by using regression and correlation analysis and ANOVA, Chi square and T test. The data for agricultural produce and exports from 1990-91 till the 2009-10 year was collected. For assessing the impact of WTO on exports, comparative analysis for two periods of time, (1980-81 to 1994-95) period-I i.e. pre WTO and (1995-96 to 2008-2009) period –II i.e. post WTO will be done in respect of changes in commodity and market composition of exports. Markov chain analysis has been used to find probability of change in direction of selected agriculture export from India.

3.6 Analytical Tools and Techniques

1. For estimating the growth of production area, productivity, the exports, compound growth rate was computed using the following function

\[ Y = a b^t \]

\[ \log Y = \log a + t \log b \]
Where \( Y \) = Area, Production, Productivity, exports.

\[
t = \text{Time variable}
\]

\[
a = \text{Constant}
\]

\[
b = (1+r) = \text{where} \ r = (\text{compound growth rate}) = (\text{Antilog } b-1) \times 100
\]

Variability was examined by computing coefficient of variation

\[
CV = \frac{\text{Standard Deviation} \times 100}{\text{Mean}}
\]

Index Instability = \( CV \times (1 - R^2) \)

Coefficient of variation was multiplied by \((1 - R)\)

The empirical study is based on data analysis using statically and econometric methods. Period-wise growth rates and trend-breaks are worked out to find out any possible shifts in the trend behavior of the trade variables under study. While growth rates are worked out by using Regression method, for the year’s pre and post WTO trend breaks.

The growth in area, production, productivity, quantity exported and export value were analyzed using the exponential growth function. To know the changes in economics of production simple tabular analysis is used. The structural changes in direction of exports were examined using Markov chain model. In order to assess the competitiveness of the selected crops, regression analysis is used.

3.6.1 The trade directions was calculated by using Markov chain analysis

The trade directions of Indian Groundnut exports were analyzed using the first order Markov chain approach. Central to Markov chain analysis is the estimation of the transitional Probability matrix \( P \). The elements \( P_{ij} \) of the matrix \( P \) indicates the probability that export will switch from country \( i \) to country \( j \) with the passage of time. The diagonal elements of the matrix measure the probability that the export share of a country will be retained. Hence, an examination of the diagonal elements indicates the loyalty of an importing country to a particular country’s exports. In the context of the current application, six major importing
countries of groundnut were considered. The average exports to a particular country were considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically.

\[ \text{Ejt} = r \sum_{i=1}^{r} \text{Eit-1} * \text{Pij} + \text{ejt} \]

Ejt = Exports from India to jth country during the year t.

Eit-1 = Exports to ith country during the period t-1.

Pij = Probability that the exports will shift from ith country to jth country.

ejt = The error term which is statistically independent of Eit-1.

t = Number of years considered for the analysis

r = Number of importing countries

The transitional probabilities Pij which can be arranged in a (c * r) matrix have the following properties.

\[ 0 \leq \text{Pij} \leq 1 \]

\[ \sum_{i=1}^{r} \text{Pij} = 1 \text{ for all i} \]

Thus, the expected export shares of each country during period’s’ were obtained by multiplying the export to these countries in the previous period (t-1) with the transitional probability matrix.

There are several approaches to estimate the transitional probabilities of the Markov Chain model such as un weighted restricted least squares, weighted restricted least squares, Bayesian maximum likelihood, unrestricted least squares, etc. In the present study, minimum absolute deviations (MAD) estimation procedure was employed to estimate the transitional probability, which minimizes the sum of absolute deviations. The conventional linear programming technique was used, as this satisfies the properties of transitional probabilities of non-negativity restrictions and row sum constraints in estimation.

The linear programming formulation is stated as
Min OP* + Ie

Subject to,

XP* + V = Y

z GP* = 1

P* ≥0

Where,

0 - is the vector of zeroes.

P* - is the vector in which probability Pij are arranged.

I - is an apparently dimensioned vector of area.

e - Is a vector of absolute error (1 U 1).

Y - Is the vector of export to each country

X - Is the block diagonal matrix of lagged values of Y

V - Is the vector of errors

G - is the grouping matrix to add the row elements of P arranged in P* to unity

Using the estimated transitional probabilities, the exports of groundnut to various Destinations were predicted by multiplying the same with the respective shares of base year.

3.6.2 Growth Statistics of Gujarat - Agriculture v/s Total GSDP was calculated by using following formula.

The structural breaks in the agricultural GSDP and total GSDP series in Gujarat state are calculated The Quandt method using OLS (ordinary least squares) technique:

In Y = β0 + β1t + β2 (t - ti*) D1 + β3 (t - tj*) D2 + e

Where   D1=1 for t > t1*

D2 = 1 for t > t2* are two dummy variables and t, * and t2* are break dates.
3.6.3 Terms of Trade in Gujarat Agriculture.

The inter-sectoral terms of trade in a state economy is best measured with the help of GSDP data by sectors at current and constant prices. The GSDP deflators by agricultural and non-agricultural sectors in Gujarat, and Terms of Trade defined as the ratio of the two series, i.e. $P_{NA}/P_A$ - trends in terms of trade in Gujarat over the 30 years. Comparative study can be observed in three periods, i.e.

1. $P_{NA}/P_A$, during the year 1980-81,

2. $P_{NA}/P_A$, during the year 1990-1991,

3. $P_{NA}/P_A$, during the year 2000-2010

3.6.4 Kolmogorov-Smirnov Test:

- The $\chi^2$ test is used to test whether there is a significant difference between the observed numbers of responses in each category under the assumptions of null hypothesis.

- The objective is to find out how well the distribution of observed frequencies ($f_o$) fit the distribution of expected frequencies ($f_e$).

- This test is also called goodness-of-fit test.

3.7 Organization of the study

The research was undertaken over last three years. Starting with readings in the area of interest the researcher having focused on the identified problem has done extensive literature review. Subsequently the scientific research design was developed for the conduct of research. Data was accordingly collected, synthesized and prepared for analysis. On the basis of data analysis through statistical tools and interpreting the results, findings and conclusions were drawn. As per findings recommendations were made. The entire work is presented here divide into nine chapters. The scheme for the chapters is described below.

The first chapter gives a brief introduction, of the subject of study and its significance, in second chapter a detailed review of literature has been carried out as per the objectives of present study. The third chapter deals with research methodology, and tools and techniques
used have been stated. The fourth chapter discusses provisions of WTO and foreign trade policy affecting performances. Indian foreign trade and agriculture exports are covered in the fifth chapter. The sixth chapter encompasses trends on agriculture sector. Seventh chapter focuses on production of selected agriculture production in Gujarat and export of selected agriculture products. The eighth chapter comprised of constraints in processing and exporting agricultural commodities and agro based products from Gujarat based on a survey. The concluding chapter summarizes the major findings of the study and conclusions and suggests have been made.

3.8 Limitations of the study

Following were the limitation of the study:

This study depends upon primary and secondary data collected from different sources.

1. The availability of required data and; its collection may be limitation in terms of time required.

2. Gujarat has considerable agriculture diversity in terms of crops grown but in this study only the major crops, which are exported, were included.

3. For value added products primary data was collected from private producers and exporters who may not be willing to give the information. The quantitative analysis is based on secondary data collected from various sources; there are some discrepancies in the data from different sources of the data. International agencies provide data on calendar year basis, in India, most data are available on financial year basis, though every attempt was made to collect data in uniform manner, in certain cases, and this has to be relaxed. Both published and unpublished data from various agencies have been collected. The quantitative analysis is limited to the period, i.e. (1980 to1994) period-I (1995 to 2010) period-II. The survey of processors and exporters is based on a sample, and limitations applicable to any sample survey were applicable to the study.