BEHAVIOURAL RESPONSE OF TUR INDUSTRY DURING WTO ERA - A MANAGEMENT APPRAISAL

Thesis submitted to the University of Agricultural Sciences, Dharwad in partial fulfillment of the requirements for the Degree of

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IN
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1. INTRODUCTION

“Food science occupies the first place in the hierarchical needs of man. We can neglect agriculture only at the risk of economic instability”.

1.1 Importance of Agriculture

Agriculture forms the backbone of Indian economy despite concerted industrialization in the last five decades. Agriculture occupies a dominant position in the Indian economy. Being the largest industry in the country, agriculture provides employment to about 65 per cent rural workforce in the country. India is richly endowed by nature for agricultural production. Its arable land ratio to the ratio of total land area is 51 per cent against the world average of only 11 per cent. It has the largest irrigated land in the world. Even if half of the total rain fall received all over the country preserved and delivered to fields the entire arable land can produce two crops a year. India is fortunate in having a varied climate, which enables us to grow crops throughout the year, whereas in most parts of the world, due to severe winter, only one crop can be grown in a year. The share of agriculture in national income is declining. In 1980, it was 38 per cent. The share has declined progressively to 31 per cent in 1990 and in 2002 the share was 24.7 per cent, in 2007-08 16.3 per cent of the national income. The decline in the number of people dependent on agriculture has been marginal. At the time of independence, 77 per cent of the population was dependent on agriculture, although the figure is down to 69 per cent, which is still substantial. Hence, a high growth rate in agriculture is indeed very significant for large chunk of the population. Thus, agriculture continues to be the critical sector of Indian economy.

1.2 Significance of the International Trade

When a country specializes in the production of a few goods due to international trade, its export commodities are produced cheaply in exchange for what others can produce at a higher cost. It gains from trade and there is increase in national income, which in turn, raises the level of output and the growth rate of the economy. Thus, the international trade promotes the economic development of the nation. India has comparative advantage in agriculture, so there is considerable scope for raising the farm income and employment by stepping up agro based exports.

Economic integration and trade liberalization will have great impact on the national income in general and agriculture sector in particular. This will be a good opportunity to expand markets and receive modern and advanced technologies from developed countries.

1.3 Trade liberalization

Indian agriculture is undergoing a perceptible structural transformation due to economic reforms. The decade of 1990s witnessed two very significant developments that have had profound impact on agriculture trade. The first development relates to liberalization of the economy initiated since 1991. The second development was the free trade regime following Uruguay Round agreement and establishment of World Trade Organization (WTO).

The economics of globalization is based on Ricardo’s Principle of competitive advantage. Indian competitive advantage is mainly in the field of agriculture in the form of vast human resource (nearly 700 million people) besides diverse natural resource and production environments. The economic environment for trade in agricultural commodities is changing fast in the wake of implementation of WTO agreement. Some of the areas concerning agriculture include reduction in farm subsidies, enhancing market access, limits on public stock holdings of grains for food security, sparing use of Sanitary and Phyto-Sanitary (SPS) measures and introduction of Intellectual Property Rights. With the implementation of the provisions of Agreement on Agriculture (AOA) by the members of WTO, the international trade opportunities are expected to change as trade barriers are reduced and free trade takes place. These changes will also ensure that competitiveness of countries in individual product or commodities will play a major role in the international trade. Identification and enhancement of competitiveness is an essential ingredient of a successful trade strategy.
Competitiveness is an ability of a country to produce and distribute products and/or service that can compete in the international markets and which simultaneously increase the real income and living standards of the citizens. Therefore, it is imperative to find out not only the extent to which we are export competitive but also import competitive once the agreement is implemented and whether India can protect its major agricultural commodity sectors. These would help in understanding major challenges of Indian agriculture and examine the course of action India should take in terms of preparing itself.

Karnataka, India’s eighth largest state out of 30 states has a population of nearly 60 million. It accounts for 5.89 per cent of India’s land and 5.30 per cent of India’s population. It contributes 5.50 per cent of Indian GDP. Karnataka is one of the fastest growing state. It has a prominent position in the agriculture economy of India. Its agriculture sector grew at an average rate of 4 per cent compared to all India average of 3.60 per cent.

Karnataka is endowed with varied agro-ecological, agro climatic, bio diversity, soils and climate conditions across the state. Its economy, particularly agriculture economy is experiencing significant changes for the past three decades. Agriculture sector in the state registered a growth of 3.37 per cent during the period 1980-98. Its contribution to the GDP in the eighties was 40.7 per cent but over the years the contribution is declining. It was 28.20 per cent during 1997-98. Despite declines in its contribution to GDP, it still continues to be the major sector in terms of its contribution to employment creation, export earning and supply of raw material to various industries in the state.

A large proportion of the cultivated area in the state is devoted to the production of principal crops. They are paddy, maize, tur, groundnut and cotton. These crops account for more than 40 per cent of the cultivated area in the state. State contributes about four per cent of rice, 17 per cent of maize, 11 per cent of tur, 14 per cent of ground nut and 10 per cent of cotton production to the countries total production. With agriculture now having been brought under the realm of WTO, freedom of government to support agriculture sector beyond a point is limited. Production pattern will be dictated by consideration of comparative advantage of crops. It is in this context, that this study has been undertaken.

1.4 Importance of Pulses in Economy

India is the largest producer and consumer of pulses in world accounting for 33 per cent of world area and 22 per cent of world production of pulses. Pulses occupy an important place in Indian agricultural economy, as they are rich sources of protein and constitute 10 to 15 per cent of food diet of Indians. Major portion of Indian population belong to vegetarian group and every person on an average is required to consume 70-80 gms of pulses per day in order to maintain good health.

About a dozen varieties of pulses are grown in India. The more popular being bengal gram, pigeon pea, green gram, black gram and lentil. Bengal gram dominates with over 40 per cent share of total pulse production, followed by pigeon pea (20%). Among these pulses, Pigeon Pea and Urad are mainly cultivated in khariff and bengal gram in rabi season as mixed crop with coarse cereals.

It has often been argued that market prices of pulses are very high and these should provide enough incentives to the farmers for increasing the production of these crops. But most of the times the prevailing marketing network is against the interest of farmers. Hence, pulse marketing system has to be made more competitive so that price signals arising out of pulse shortage are transmitted to farmers.

1.5 Importance of pigeon pea in Indian economy

Pigeon Pea (Cajanus cajana) also known as tur or redgram, is one of the major pulse crops of tropics and sub-tropical regions of the world. It ranks second among pulse crops next to bengal gram.

Pigeon pea is considered to be native of peninsular India. It is a perennial shrub and a short annual crop in India and as a perennial crop in many other countries, where the pods are harvested at a regular interval.
More than 350 vernacular names of Pigeon Pea have been recorded. However, it is commonly known as tur. The name pigeon pea was first reported from Barbados, where the seeds once were considered to be very useful as feed for pigeons.

Pigeon pea is one of the major pulse crops, endowed with several unique characteristics. It finds an important place in the farming systems adopted by small holding peasants in a large number of developing countries. In India, it is mainly used as ‘dal’ which is a processed product. Its green seeds are used as vegetable and are of dietary importance with a seed protein content of about 21 per cent that compares well with that of other important grain legumes. Besides the human diet, the green leaves and dry seeds of pigeon pea are used as fodder for animals.

India accounts for 90 per cent of world’s production of pigeon pea with an area of 3738 thousand ha and production of 3090 thousand tons; and in Karnataka, it is grown on an area of 600 thousand ha with production of 280 thousand tons with the productivity of 467 kg/ha. Karnataka occupies second position and third position with respect to area and production of pigeon pea, respectively.

Pigeon Pea is a dry land crop and hence it is largely grown in Northern parts of the state like Gulbarga, Bellary, Raichur, Bidar and Yadgiri. Gulbarga is major pigeon pea growing area in the state and hence is called as “Pigeon pea or Tur bowl of Karnataka” next to it is Bidar, followed by Raichur.

The lower productivity of pigeon pea is due to many factors, among which the loss due to severe incidence of pests is predominant in recent years. In India, pigeon pea is prone to attract more than 200 species of insect pests, among which pod borer causes enormous loss. The loss has been estimated to vary from 46.6 to 63.6 per cent. Thus, cultivation of pigeon pea mainly depends upon the management of pest which accounts for a major share in the total cost of cultivation.

1.6 Significance of the study

The liberalization of the Indian economy has provided enormous opportunities for agricultural exports, to step up the rate of growth of exports. The Government of India has embarked upon a major program of macro economic stabilization and structural adjustment in the exchange rate of the rupee were effected to bring it in line with the equilibrium in order to improve the country’s international competitiveness. The exchange rate policy was followed by major structural reforms in trade policy aimed at substantial liberalization of controls and licenses, decimalizations of many items of trade, reduction in peak tariff rates, abolition of export subsidies and other measures to encourage competitiveness in the economy. In this context, it is important to understand the global competitiveness of tur crop produced in the state.

Against this background, the present study is an attempt to analyze the competitiveness of Karnataka agriculture in the wake of trade liberalization. Therefore, the present study intends to analyze the global competitiveness of tur crop in Karnataka. In this study, attempt has been made to estimate the Supply Response and Behavioral Response of Tur industry in Gulburga district in Karnataka. The findings of the study would help planners and policy makers to formulate appropriate agricultural development, export and stabilization policies for the state as a whole.

1.7 Specific objectives of the study

The specific objectives of the present study are:

1. To analyze the growth in area, production and productivity of tur crop in the study region.
2. To estimate the supply response of tur crop in Karnataka
3. To document the policy changes in tur industry
4. To analyze the tur processors behavioural responses in the post WTO period
5. To identify the problems faced by the tur processors and suggest appropriate policy measures.
1.8 Hypotheses

1. Growth rate of area, production and productivity of tur in the post-WTO period is more compared to that of pre-WTO era.
2. Indian tur growers are responding positively to the tur price in area expansion.
3. Tur processor have unfavorable attitude towards WTO.

1.9 Scope of the study

The results of the study would give a real picture of the tur economy in Karnataka. This would be much helpful for the producers, processors, traders and policy makers in taking timely decisions that would favour the entire tur industry in the state.

The study will throw light on the changes in area, production and productivity with specific reference to the tur crop. Pinpointing the reasons behind the acreage changes will help the government in taking appropriate steps to safeguard the interest of the tur growers and processors of the country.

The results of this study would help to grasp the related problems in its true perspective and provide a platform for sound policy decisions so as to promote production of tur in India. The study will be useful to policy makers for designing proper policies to harness the competitive advantage and thereby developing India’s tur sector.

The study on hand would enable the case firms to have a holistic picture of the supply position of tur in the country and its potential. It will help the firms to design its future production and marketing programmes relating to tur products. It will help the firms in identifying their competitors and understanding their strategies and performance.

1.10 Limitations of the study

The study was confined only to Gulbarga district. The case method was adopted for collecting relevant data, which obviously had its recall bias especially from processors. There were no records available with the respondents regarding the data relating to purchase, sales, inventory and investment, which were elicited, by the respondents from their memory. These limitations were minimised by repeated crosschecks then and there. The implication of the case study has to be used with caution before generalization as the study was confined to only one State at a particular point of time.

The present study also used secondary data collected from various published sources. Though analyses were carried out both in static and dynamic settings, the behavioural response of tur industry in WTO era was assessed within the specified time period.
2. REVIEW OF LITERATURE

The process of dibbling through the selected literature provides some sort of confidence in the researcher and consequently the investigator could get a clear picture of the area or problem (Agarwal, 1996).

In this chapter, an attempt has been made to critically review the literature of the past research works having relevance to the present study.

2.1 Growth Rate Analysis

2.2 The supply response of tur crop in Karnataka

2.3 Policy changes in tur industry

2.4 Tur processors behavioural responses in the post WTO period

2.5 Problems faced by the tur processors

2.1 Growth Rate Analysis

Bhatia (1981) found that the growth rate of rice production in India during 1960-61 to 1978-79 was 2.05 per cent per annum against 2.64 per cent per annum during 1967-68 to 1978-79. For wheat, growth rate of production was 7.54 and 6.02 per cent per annum respectively in the long run and in the later period. The growth rate of food grains production was 2.56 per cent and 2.71 per cent respectively during the above period.

Chengappa (1982) studied the growth rates of area, production and productivity of coffee in India. Linear model of the type \( Y_t = a + bt \) and exponential model of the type \( Y_t = a + bt \) were used to work out the growth rates. The exponential function indicated a good fit and obtained an annual compound growth rate in production of 5.68 percent for Arabica and 7.4 percent for Robusta. The combined growth rate was 6.1 percent per annum.

Nair and Gopinathan (1982) estimated the trends in respect of area, production and productivity of coconut in Kerala across districts during the sixties and seventies. Area under coconut was found to be rapidly expanding during sixties and the first half of the seventies. However, the production of nuts started declining by early 1970s. By comparing the yield performance over the period of Alappuzha district, situated at the heart of the coconut root (wilt) disease belt and other districts, he repudiated the often repeated villainous portrayal of the root (wilt) disease in the coconut economy of the state.

Dass et al. (1985) analyzed the trends in coffee exports in relation to general exports from India for the period 1956-57 to 1982-83. The annual compound growth rates of exports in general had failed during the period 1972-73 to 1982-83 in spite of buoyant world demand and high domestic production. The shares of coffee exports in total exports, in value terms, had increased in the period 1956-57 to 1971-72 and 1972-73 to 1982-83. However, unit values, quantity and export values recorded chronic instability during the same period.

Prakash (1986) analyzed the growth rates in production, consumption, exports and imports of Indian coffee. He used a modified exponential growth function of the form \( \log Y_t = a + bt + et^2 \), where growth is \( b + 2ct \). He indicated that the growth rate in production of Indian coffee increased consistently and recorded a compound growth rate of 4.51 percent per annum during 1962-63 to 1981-82. The consumption growth recorded was 1.69 percent per annum for the same period. Exports, however, had registered a significant increase during the study period, which recorded a compound growth rate of 6.94 percent per annum.

Achoth et al. (1988) analyzed the data to document changes that had occurred in pulse production in Karnataka and to identify the important components of variability during and after the green revolution. The study revealed that production of pulses in Karnataka had registered a significant increase during the decade following the green revolution period. This increase was contributed by the increase in production in Gulbarga district. The instability for the state as a whole had increased in the decade after the green revolution. Most of this instability was contributed by minor pulse growing districts. The instability induced by changes in the area variances was the single largest component, which increased instability of pulse production in the state.
Gemtessa (1991) compared the performance of Ethiopian coffee exports during the pre-revolution and post-revolution periods. The exponential growth model of the form $Y_t = ab^t$ was employed. The results showed that the export growth in the pre-revolution period was lower (1.51 per cent) when compared to the post-revolution period (1.77 per cent).

Jain and Singh (1991) estimated the growth rates for different pulse crops in Punjab during the pre-and post-green revolution phase to examine whether the new cereal technology had got diffused to pulses. During the pre-green revolution period area, yield and production of total pulses registered a positive but non-significant growth rates indicating stagnation. Whereas, in the second period all the three variables gave negative growth rates which were significant in the case of area and production, denoting deceleration. Continuous substitution of area under pulses with HYV cereal crops was the main reason for the desperate performance of pulses in the post-green revolution period.

Krishnan et al. (1991) worked out trends in growth rates of area, production and productivity of major crops in Kerala for the period 1970-71 to 1986-87 and compared them with the corresponding trends at the all-India level. Negative growth rates of output were registered by four out of the ten crops studied viz., rice, tapioca, areca nut and coconut. Growth rates of production were positive and significant for only two crops namely, dry ginger and rubber. Negative and significant growth rates of area of rice and tapioca indicated a shift in cropping pattern in favour of cash/plantation crops.

Haffis et al. (1992) fitted an exponential function to examine the emerging trend in area, production and productivity of food grains in India. The results revealed that there was a declining trend in area under food grains especially in rice and cereals. For calculating the compound growth rate the exponential function was fitted.

Veena (1992) analyzed the growth of Indian coffee exports for the period 1965 to 1990 using an exponential function of the form $Y = a + bt$. She found that exports of plantation type of coffee exhibited a compound growth of 3.6 percent per annum while arabica grew at a growth rate of 3.0 percent. Robusta exports registered a marked compound growth rate of 10 percent per annum.

Tripathy and Srinivasa Gowda (1993) used exponential functions to estimate and compare the district wise compound growth rates of area; yield and production of groundnut in Orissa during the seventies (1970-71 to 1979-80) and the eighties (1980-81 to 1989-90). The structural change in the growth pattern between the decades was examined employing a Chow's test. Despite negative growth rates of yield in both decades, growth rate of production had been impressive, which increased from 4.56 per cent per annum in the seventies to 7.87 per cent in the eighties mainly because of high growth rate in area increase. The structural change in the growth function, especially that of yield and production in almost all the districts covered was apparent from the significant 'F' values obtained in the Chow's test.

Bastine and Palanisamy (1994) analyzed the growth rates of area, production and productivity of major crops in Kerala including the cereal crops and the plantation crops. They indicated that pepper showed positive but non-significant growth rates in area and production while insignificant in case of productivity. Old and senile plants requiring replacements, poor genetic traits and poor management, attack of quick ill slow and pollu disease and high cost of production acted as major factors for low productivity in pepper.

Goswami (1995) made an attempt to analyse the growth trend change in area of oilseeds and pulses in India after independence by using compound growth rate. They found that growth of area, yield and production of oilseeds were significant during the periods of 1980-81 to 1990-91 but the trend was reverse in the case of pulses.

Vani and Vyasulu (1996) studied the growth rates for three important cereals crops in Karnataka, namely rice, jowar and ragi in the three sub-periods 1955-56 to 1964-65, 1965-66 to 1979-80 and 1980-81 to 1989-90. The results indicated that in the case of rice there was a positive growth rate in the production and yield over the entire period and a negative growth rate in area. In case of ragi, the growth rate of production was higher than that of rice. A positive growth rate in area and production over the entire period with the highest growth in the second sub period was reported. In the case of jowar, there was a high growth rate in area and production in most of the districts. Productivity in most of the districts was high in the second period compared to the first and third sub periods.
Reddy et al. (1998) used semi-log trend equation of the form \( \ln Y_t = a + bt \) where \( Y_t \) is production or area or productivity or any other time-series datum for the \( t \)th year. The above model was fitted to the time-series data on sorghum area and productivity and the results showed that sorghum area decreased at an annual rate of 0.74 per cent from 1949-50 to 1969-70 and noticed a quantum decline and then further decreased at 0.71 per cent per year from 1970 onwards. Sorghum productivity showed an increasing trend with a jump in between. The productivity increased at an annual rate of 1.03 per cent during 1949-50 to 1973-74 and then showed a quantum jump and then further increased at an annual rate of 0.75 per cent from 1974-75 to 1985-86.

Pervez (2001) analyzed the growth in area, production and yield in the major crops of Pakistan for a period 1970-71 (period I) to 1984-85 (period II). The study revealed that the increase in crop production was contributed largely by area than by productivity in Punjab and Sindhu during period I. Sindhu region recorded a higher growth in area, production and yield as compared to Punjab in period II. It was also observed that Punjab recorded a low degree of instability in growth rates in most of the crops as compared to Sindhu region in period II.

Sharma and Sharma (2003) studied the production and export performance of tea and reported that the growth rates were positive for area, production and productivity of tea. The share of Indian tea export in the total export was as high as 72.17 percent in 1950, which had steadily declined to 23.79 in 1999.

Varghese (2004) worked out the trend in area, production and productivity of cardamom in Kerala for a period from 1970-71 to 2002-03 using semi-logarithmic growth equation. The area under cardamom registered a negative percentage annual trend growth rate of -1.216 which is statistically significant. The output grown at an average annual trend growth rate of 4.14 per cent and yield registered an average annual growth rate of 5.51 per cent.

Lathika and Ajith Kumar (2005), analysed the growth trends in Area, Production and Productivity of coconut in India of all the coconut producing states/union territories for which the period has been divided into two sub-periods as phase I (1951 to 1995) and phase II (1996 to 2002).

Jose and Jayasekhar (2009) conducted a study on growth trends in area, production and productivity of arecanut in India. Time series data on area, production and productivity of arecanut had been obtained various sources such as Directorate of Economics and Statistics, FAO and CMIE for a period of 30 years. Compound growth rate and linear regression were employed to analyse data. The finding of study revealed that during last fifteen years due to favourable price, area had increased more than two times and production increased by more than three times.

### 2.2 Supply Response Analysis

Subba Rao (1969) found that changes in relative acreage under sugarcane were positively associated with changes in its relative price to rice and its own price. No measurable yield response to price of rice was observed.

Rajagopalan et al. (1971) examined the efficacy of three alternative models to predict acreage response and output response of tea in India. The results indicated significant relationship between acreage and lagged prices of tea.

Madhavan (1972) utilized Nerlovian type adjustment model including the price of the crop lagged by one year, competing crop’s acreage lagged by one year and yield per acre lagged by one year in the final estimating equation. He concluded that his model yielded better results than those obtained from Nerlov-Rajkruna type formulation.

Tyagi (1974) estimated supply response using both the auto regressive model and Nerlovian model and concluded that Nerlovian model would be biased and inconsistent if auto correlation was present.

Basavaraja (1982), who worked on supply response of cotton in Karnataka, felt that it would be in fitness of things to estimate both acreage and yield response with a view to properly gauging the impact of price and non-price variables on the supply of cotton.
He estimated production response also, in addition to acreage and yield response, for the purpose of comparison.

Mahajanashetti (1987) studied the supply response of jowar in Karnataka. He used the area under competition crops of jowar to deflate the relative price factors and incorporated this relative price of jowar into the area, yield and production response models.

Janaiah et al. (1991) while studying the farm supply response of cotton in Andhra Pradesh for the period 1956-57 to 1985-86 used both the farm harvest price of cotton and its competing crops (chillies). The results revealed that the previous year price had exerted significant positive influence on current area in the state as a whole and its regions except in Rayalseema, whereas the price of competing crop (chillies) in Rayalseema region and the state as a whole was observed to have negative relationship with current years area.

Deshpande (1994) in his study on supply response of chilli in Karnataka state for the period of 1969-70 to 1990-91, conducted that the increase in the total output of chilli in the state was the result of shifting land from other crops rather than by increasing the yield of the crop.

Thakur et al. (1997) studied the market supply response and marketing problems of farmers in the hill state of Himachal Pradesh during the agricultural year 1992-93. The results revealed that the elasticities in the case of maize and wheat were positive for all categories of farmers, indicating there by that all categories of farmers respond positively to changes in the prices of these crops. The elasticity was higher for small farmers, indicating that small farmers were more supply response conscious to price changes in the case of maize and wheat.

Kumar and Rosegrant (1997) worked on the dynamic supply analysis of cereals with an intention to separate the output decision into area and yield per hectare decisions. They assumed that the farmer tested decades on area allocation among the crops and than the intensity of outputs used and hence yield.

Bhowmick and Goswami (1998) studied the supply response of major oil seed crops in Assam for the period 1972-73 to 1988-89. The results showed that increase in oilseeds production had been related to increased acreage rather than intensification of production.

Parhi (1998) conducted a study on acreage response to price for groundnut in Orissa. The study was conducted to know the effect of lagged price and current high fertilizer price of groundnut on its acreage allocation. Four major groundnut growing districts Cuttack, Dhenkanal, Ganjam and Sambalpur were selected since they accounted more than 71 percent of area as well as production. Secondary data were collected from Directorate of Agriculture and Food production, Orissa and lagged price, current fertilizer price were collected from the Orissa. Linear, double log area response model to lagged price and for combined effect of logged prices of groundnut and current fertilizer price were worked out. Higher lagged price of groundnut encouraged the farmers to have more acreage under groundnut cultivation in succeeding year even if fertilizer price increased.

Singh (1998) approximated that output decisions of farmers in terms of area under the crop rather than its yield while studying supply response of oilseeds in Uttar Pradesh. According to him this was because the area enjoyed by the crops could be considered as a barometer of the farmers land allocation decision. Further, the allocation under a crop was a function of rural indigenous factors, whereas the yield was influenced by rural exogenous factors. But, also between that the farmers could keep area constant and increase output by varying yield level.

Bhowmick and Goswami (1998) conducted a study on supply response of some important crops in Assam- an inter district analysis. Secondary data were compiled from various issues of statistical hand book of Assam, basic agricultural statistics and agricultural situation in India pertaining to the period 1974-75 to 1990-91. Nerlovian partial adjustment lag model was worked out. The findings of the study revealed that price incentive alone was not found to be sufficient in bringing desirable changes in cropping pattern, the factors like supply of quality seed, fertilizer, infrastructure like irrigation turned out to be decisive factor in determining acreage under particular crop.
Shakuntla Gupta (2000) conducted a supply response of major food crops in Southern district of Tamil Nadu. The secondary time series data on area, production, productivity of different crops, rainfall, prices were collected for the three districts namely Tirunelveli, Thoothukudi and Kanyakumari from various sources like season and crop reports and from Department of Statistics. Nerlovian adjustment lag model was employed for analysis. The findings of the study revealed that supply response function for major food crops, indicated price had a strategic role in acreage allocation while other factors like area allocation under non-food crop, rainfall and area allocation for competing crops in preceding year also had significant influence on the acreage allocation under food crops during current year.

Chandrasekhara Rao (2004) worked out the aggregate agricultural supply response in Andhra Pradesh. The study revealed that partial regression coefficients of terms of trade with respect to aggregate agricultural output, crop, food grain and non-food grain were not statistically significant and they were positive. Thus it could be concluded that the response of agricultural output (includes livestock, crop, food grain and non-food grain output) to changes in terms of trade was positive and non-significant.

Suleiman Abrar et al. (2004) explained the crop level supply response by region wise in Ethiopia. The results showed that the output prices were clearly an important part of the incentive structure, but non-prices factors were the binding constraints. This was most apparent in the relatively non-commercial Northern highlands where these factors were far more important in affecting production and resource use than price incentives.

Pramod Kumar and Anil Sharma (2006), conducted a study on perennial crop supply functions; the case of Indian rubber, tea and coffee. The data were collected from the sources like database on coffee published by market intelligence unit, Coffee Board, Indian rubber statistics published by Rubber Board and tea digest and tea statistics published by Tea Board. Single equation OLS was used for the estimation. The short supply function showed that growers response well to the price incentives. In long run it was observed that in all the three crops own expected price had effect on the planted area.

Babu et al. (2009) conducted a study on growth, variability and supply response of major crops in Tamil Nadu. Secondary data from 1970-71 to 2005-06 on area, production, productivity, farm harvest prices of major crops and rainfall were collected for Tamil Nadu state from various sources like season and crop report and Tamil Nadu state Economic Appraisal. Compound growth rates were worked out by fitting exponential function. Variability was assessed through Coefficient of Variation (CV) Nerlovian lagged adjustment model was used for analysis of acreage response function. The findings of study revealed that supply response function for major crops indicated that price had a strategic role in acreage allocation. Lagged area, lagged price and lagged yield of own crop were significant factors affecting decision about allocation of area under crop.

2.3 Policy changes in Tur Industry

Premnath, Former Asst. Director General, FAO, (2001) had conducted a study on the WTO and related issues in Agriculture and Food Government of Karnataka. He tried to explain the implications of the WTO Agreement, particularly the Agreement on Agriculture (AOA) involving major and minor issues and the steps influencing the national and state agriculture production and trade. The report contributed to the national response to the WTO, and also highlighted the implications and constraints envisaged for the state of Karnataka. It further emphasized on the concessions and privileges as contained in the WTO framework and recommended the state to ask the central government for such privileges and allowances including creation of the EPZ.

Ramakrishnappa (2002) opined that positive policy of State and Central governments for development of medicinal and aromatic plants, availability of vast forest resources, well informed farmers, scientific, trading and processing community and availability of research and development support from state organizations, private institutes as the strengths; over-exploitation of natural resources from the wild habitats, inadequate information on international demand and supply, inadequate research on sustainable harvesting, processing and value addition, lack of infrastructure facilities for collection, drying, storage and processing and lack of management planning as the weaknesses;
Growing trend of international market for herbal products, increasing trend of consumers’ preference on organically grown products and large stretches of drylands suitable for cultivation as the opportunities; and depletion of natural resources at an alarming rate; development of extra-legal market mechanisms; high fluctuations in the international market price and vagaries of nature like droughts; flood and forest fire as the threats with relation to the impact of cultivation and gathering of medicinal plants on biodiversity.

Raghavendra (2004) assessed the competitiveness of Karnataka’s important crops in pre and post liberalization. A policy analysis matrix approach found that the NPC value for important crops of Karnataka was less than one in post liberalization period except groundnut. EPC and DRC values also less than one in post liberalization period. From this, he concluded that all important crops except groundnut are competitive in Karnataka.

Bindukumar N (2006) opined that India’s redgram export was negligible during the pre-WTO period. But in the course of time the export accelerated increment in export was improved after the WTO agreement. It could be summarized that the increase in cost of production was due to increase in the cost of variables like plant protection chemicals, human labour, bullock labour, seeds, fertilizers, but major one was the plant protection chemical. The increase in gross return was mainly attributed to increase in both prices and physical units of the yield of redgram.

Brain Clancey (2009) opined that the mix of crops which would be grown around the world in the future was clearly linked with government policy. Countries like India might use price support mechanisms to try to encourage production of one crop or group of crops over others. Similarly, evolving attitudes about bioenergy would have a clear impact on the level of subsidy available to that sector and type of ingredients that would be used. Right now, the focus was on corn because of the buildup of the ethanol industry in the United States. Oilseed crop production had also been encouraged to feed the growing bio-diesel market. India’s supply and demand situation was more complex than in countries with much higher per capita incomes. Predicting future price movement within India’s domestic market was beyond the scope of this report. It involves predicting future price movement for rice, wheat, corn and soybeans to develop a picture of the price trends which would be expected in pulses. Because pulses compete for land use, pulse values ultimately follow the price trend for the world’s major grains and oilseeds, finding a level at which enough land could be secured to produce enough to cover nominal annual needs.

Karnataka Agri-Business Development Policy (2010) suggested that progressive commercialization of agriculture and allied sector coupled with trade liberalization required that the policies had to focus on agribusiness with focus on processing and value addition to create and harness opportunities and augment incentives for agriculture sector. This necessitated substantial increase in the investments particularly aimed at streamlining agricultural value chain which would help in reducing total transaction cost and improve realization for farmers. Farmers should also be able to vertically integrate their business and take advantage of value addition opportunities.

2.4 Studies on behavioural response

Guttman (1945) had expressed his belief that the selection of small number of statements from the large number of possible statements representing a universe of content should be done upon the basis of intuition and experience.

Suganthi (2004) reported that 65 per cent of the cashew growers had high level of awareness on cashew cultivation technologies, followed by low (21 per cent) and medium (14 per cent) level of awareness.

Singh (2004) reported that 92 per cent farms were found with positive attitude including most favourable (75 per cent) to favourable (16.70 per cent) towards zero tillage, only 8.33 per cent farmers had less favourable attitude towards zero tillage.

Mary (2004) reported that most of the medicinal plant growers had medium (51.11 per cent) level of market perception; followed by low (31.11 per cent) and high level was found with only 17.78 per cent of the respondents.
Satyachitra Devi (2006) observed that two-fifths (40 per cent) of the respondents had medium level of attitude towards low cost technologies followed by high (32.50 per cent) and low (27.50 per cent) level of attitude towards low cost technologies.

Elakkia (2007) reported that a majority of the farmers (60 per cent) had medium level of market perception, followed by high level (22.23 per cent) and low level (17.77 per cent). She had the opinion that perception of farmers on market was dictated by the nature of crops grown.

2.5 Problems faced by the Tur Processors

Chadha (1989) observed the following constraints in the fruits and vegetable processing industries,

a) Non-availability of processing varieties of fruits and vegetables.

b) Short periods of raw material availability

c) Excessive costs of raw material.

Singh and Mann (1989) appraised the problems of important agro-based industries in Punjab. The low outturn in rice milling industry was attributed to lack of modernization. It was found that the capacity of these industries was mostly underutilized. The export of fully processed rice and modernization of rice mills was suggested for speedy development of rice milling industry.

Srivastava (1989) assessed the constraints faced by agro-based industries. The factors such as age old technology, over utilization of energy, lack of economies of scale in production and increased marketing costs were identified as the major problems faced by agro-processing industries.

Nagesh (1990) found that the major problems faced by the cashew nut processor in Karnataka were existence of large number of processing units, inadequate availability of raw cashew nuts, poor quality of raw cashew nuts, rise in prices of raw cashew nut, non-availability of skilled labour, increase in wage rate and high taxes. All these problems ultimately resulted in under utilization of installed capacity.

Venkatasheshaiah (1992) in his study on groundnut processing units in Andhra Pradesh, had identified that stiff competition among the processors for getting the required raw material, frequent power shedding, high taxation, low product recovery and non-adoption of efficient technology, at an affordable costs as the major problems associated with the groundnut processing.

Vinay Rao (1992) studied economics of rice milling in Shimoga district of Karnataka opined that the rice mills faced the problems of inadequate funds for investment and working capital, lack of availability of quality raw material, restrictions in the supply of electricity and mill point levy system. These problems were found to hamper the milling operations, encourage corruption, and contribute to increase in the price of rice and scope for government officials to harass the millers, resulting in closer of many small mills.

Subramanian and Sudha (1993) studied that the main problem faced by the small scale fruit and vegetable processing units was marketing of their produce. Besides the main constraint of low domestic household demand, these units had to face stiff competition for marketing their produce from well established big manufacturers whose brand names were familiar with common household consumers.

Amrutha (1994) found that the lack of sufficient quantity of raw material, inadequate transport facility, higher marketing charges and fees, irregular supply of power, inadequate supply of fuel and competition for custom milling as the major problems of rice mills in Karnataka.

Brahmprakash and Dineshkumar (1997) studied the infrastructural requirements for the development of agro-processing industry in rural India and concluded that lack of market information, rapid and refrigerated transport system, storage facility, banking institutions, packing and post-harvest technology were the major constraints responsible for the slow growth of agro-processing industry.
Roy (1997) concluded that the low level of processing in India was mainly due to inadequate post-harvest technology, lack of transport and marketing infrastructure, absence of linkages between processing industry and the growers and lack of domestic demand for processed products. Majority of the processing units were in cottage and tiny sector, where research and development efforts were also most non-existent and new products were rare. Lack of sophisticated packing technology further added to these problems. Poor infrastructure was the single biggest problem that affected the Indian agricultural processing sector.
3. METHODOLOGY

“Research is a systematic process with a predesigned and preprogrammed strategy and plan of action”.

This chapter is intended to present the climatic and economic feature of the study area, nature and source of data collected, analytical tools and techniques employed to evaluate the objectives of the present study.

The chapter is presented under the following headings.

3.1 Description of the study area
3.2 Period of the Study
3.3 Nature and sources of data
3.4 Analytical tools and techniques employed
3.5 Definition of terms and concepts used in the study

A well-defined systematic methodology is a pre-requisite for any social science research so as to carry out the analysis in the desired direction with expected precision to fulfill its objectives. Hence, an outline of methodology adopted in the present study is presented in this chapter.

The term methodology conveys a larger meaning to a researcher, right from the identification and crystallization of a problem to be investigated to the conduct of the research study. The utility of the economic investigations and the policy implications rely heavily on the research design and method of extrapolation, hence, the choice of sampling design, the method of data collection and the tools of analysis used in the study are discussed in this chapter.

3.1 Brief description of the study area

3.1.1 Selection of Study Area

To study the behavioural response of tur industry in WTO era, the entire Karnataka state is under consideration. However after due deliberation on the factors like rainfall and soil conditions which decide the growth of any crops, the area for this study was selected based on the maximum area under tur crop, production and productivity. In this study, the supply responses (acreage response) of tur of seven taluks of Gulbarga district which fulfill the above criteria are identified and selected. These seven taluks of Gulbarga district of Karnataka state were selected by using a purposive sampling technique based on the ranking of area, production and productivity of tur. The seven taluks are Afzalpur, Aland, Chittapur, Chincholi, Gulbarga, Jewargi and Sedam. These taluks contribute about 81 percent to the tur production in Karnataka.

3.2 Period of the Study

The period of the study was divided into three, viz.,

- Pre-World Trade Organization (WTO) Period – (1984-85 to 1994-95) and

This stratification was done to compare the growth performance of the tur crop in the Pre-WTO and Post-WTO periods.

For supply response analysis, based on the availability of the data the period considered was, for Pre-WTO (1984-85 to 1994-95) and for, Post – WTO (1995-96 to 2008-09).

3.3 Nature and Sources of data

Taluka wise time series data pertaining to area, production and productivity of tur has been collected for the period of 25 years from 1984-85 to 2008-09 from the Directorate of Economics and Statistics, Bangalore.
Fig. 1: Map of Karnataka showing the study area
The data on wholesale price of tur has been collected for the time period of 1984-85 to 2008-09 from District Agricultural Produce Market Committee, Gulbarga. The taluka wise annual rainfall data has been collected from the Directorate of Economics and Statistics office, Bangalore, and Gulbarga.

The selected tur processors were contacted in person and data was collected with the help of a pre-tested interview schedule (Appendix I). The objectives of the study were explained to the respondents (processors) and were informed about the importance of the study to ensure their co-operation. The data includes general information about the tur processors and their behavioural response on guiding points such as measurement of the level of awareness and knowledge of policy instruments, tur processing technology, raw material quality standards and the attitude of tur processors towards WTO.

3.3.2 Methods of Analysis

The collected data was coded, classified, processed and presented in order to bring out generalization of facts from which meaningful inference could be drawn.

3.4 Tools of Analysis

The choice of the statistical and econometric tools of analyses was decided with reference to the objectives of the study and the nature of data collected.

3.4.1 Compound Growth Rate

To compute average compound growth rate of area, production and productivity, the following form of equation has been used by taking time as the independent variable and the area, production and productivity of the concerned taluks of tur crop as the dependent variable. The compound growth rate has been estimated by using the formula:

\[ Y = A (1 + r)^t \]

Where,

- \( Y \) = Dependent variables like area, production and productivity in the year ‘t’ for which growth rate is estimated
- \( A \) = Constant
- \( r \) = Rate of annual increment
- \( t \) = Time element which takes the value of 1, 2, 3, n

After transforming the model into a linear form by taking logarithms to base ‘e’,

\[ \ln Y = \ln A + t \ln (1 + r) \]

Let, \( \ln A = a \)
\[ \ln (1+r) = b \]
So, \( \ln Y = a + bt. \)

\( (1 + r) = \text{Anti ln of } b \)
\[ r = \frac{\text{Anti ln of } (b-1)}{\ln 100} \]

The semi-log function is linear in parameters (linear relationship between \( Y \) and \( t \)), and hence, it can be fitted by the method of Ordinary Least Squares (OLS) Technique.

The compound growth rate \( (r) \) is obtained by the following formula and generally expressed in terms of percentage.

\[ r = \frac{(\text{Anti ln of } (b-1))}{\ln 100} \]

The compound growth rate has been computed for all the periods viz., the Pre-WTO period (1984-85 to 1994-95) and the Post-WTO period (1995-96 to 2008-09) for the tur crop.

3.4.2 Supply Response Model (Nerlovian Adjustment Lag Model)

Supply response analysis involves solving of distribution lags because the past price will have an influence on current year’s allocation of area.
Fisher says, distributed lags arise in theory when any economic variable produces its effect only after some lag in time, so that this effect is not felt at once at a single point of time but it is distributed over a period of time.

There are quite a good number of methods to solve the distributed lags, among them, Nerlovian lagged adjustment model was found to be suitable and hence has been adopted for the present study.

Based on this Nerlovian lagged adjustment model, area response model was developed separately for area and is presented below.

i) Acreage Response

Output decisions of farmers were approximated in terms of area under the crop rather than its yield, because the area enjoyed by the crops can be considered as a barometer of the farmers’ land allocation decisions. Further, the unit area was considered for this study since the farmers were in the habit of choosing area as basic criteria. It is totally decided by the several endogenous factors and not the yield, as the yield is being influenced by several exogenous factors. Farmers can keep the area constant and increase output by improving yield level, but in case of tur, area had been the main source of growth in output. Hence, area was taken as representing output in case of tur.

The differences in sample period, specification of variables and estimation techniques may partly be responsible for the variations in the regression estimates. Hence, a uniform sample period i.e., from 1984-85 to 2008-09 and log-log functional form were followed in this study.

For evaluating the tur crop acreage response, Afzalpur, Aland, Chittapur, Chincholi, Gulbarga, Jewargi and Sedam taluks of Gulbarga districts were selected. The Nerlovian adjustment lag model of the following type, which depicts the farmer’s behaviour was chosen.

Area response model

Functional Form

\[ Y = f(X_1, X_2, X_3, X_4) \]

Where,

Dependent variable

\[ Y = \text{desired area under tur in current season in ha.} \]

Independent (Deterministic) variables

\[ X_1 = \text{Rainfall (in mm) before one month of sowing time.} \]
\[ X_2 = \text{lagged price (Rs/qtl) of tur crop} \]
\[ X_3 = \text{lagged yield by one year (in qtl or, tonnes/ha)} \]
\[ X_4 = \text{lagged area of the crop under study by one year in ha.} \]

For testing the significance of parameters, ‘t’ test was used and ‘F’ test was employed to test the significance of the equation (R²).

3.4.3 Behavioural Response

In social sciences, the term “behaviour” connotes three distinct components, viz., knowledge, skill and attitude. In the present study, it was considered necessary to probe the behavioral response of the tur processors during post WTO due to the reason that the behavioural response has bearing on planning, decision making and implementation processes. The following behavioural components were taken into account for studying the behavioural response of tur processors.

i. Awareness and knowledge on Policy Instruments

ii. Attitude of tur processors towards WTO
3.4.3.1 Measurement of Behavioural Components

i. Awareness and Knowledge on Policy and Institutional Instruments

The awareness on 48 Policy and Institutional Instruments was assessed in terms of a three point continuum of “Fully Aware”, “Partially Aware” and “Not Aware”. The list of policy instruments are given in Appendix II.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Policy and Institutional Instruments</th>
<th>Response Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fully Aware</td>
</tr>
<tr>
<td>1.</td>
<td>GATT</td>
<td></td>
</tr>
<tr>
<td>48.</td>
<td>Future Market Commission</td>
<td></td>
</tr>
</tbody>
</table>

ii. Tur Processors Attitude towards WTO period

The knowledge and skill component of the tur processors about WTO and its impact have been investigated in the present study since it is an established fact that besides knowledge and skill, attitude of a person, also determines to a greater extent the decision making processes and actions which are crucial in management. Accordingly, it has been decided to assess the attitude of tur processors towards WTO and its impact.

An attitude scale with 11 statements rated on a five point continuum of “Strongly Agree”, “Agree”, “Undecided”, “Disagree” and “Strongly Disagree” was administered to collect the feelings of tur processors towards WTO.

Scale to Measure the Attitude of Tur Processors towards WTO period

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>1.</td>
<td>World Trade Organization (Post-WTO) regime did not open up gateway of opportunities in trade and development to developing countries</td>
</tr>
<tr>
<td>11.</td>
<td>CFTRI, Mysore plays an important role in providing cost effective methods to process tur</td>
</tr>
</tbody>
</table>

Methods of Assessing Attitude towards WTO period

The review of literature indicated that generally there are three methods of assessing attitude:

- Method of Direct Questioning
- Direct Observation Method and
- Psychological Scaling Method.

The first two methods suffer from non-scientific way of assessing the attitude (Edwards 1969). In order to make the assessment of attitude more scientific, reliable and valid, Thurstone (1927) had established the foundation for the development of attitude scales through his proposition of Law of Comparative Judgment. Such scientific methods of developing attitude scales are called as Psychological Scaling Methods.
iii. Psychological Scaling Methods

Before having a look at different psychological scaling methods, it is essential to know about the meaning of important concepts/terms related to attitude scale development.

Attitude: The term attitude connotes three components viz., cognitive, affective and psychomotor. The cognitive component denotes the beliefs and disbeliefs of a person. The affective component relates to the likes and dislikes (i.e. feelings) of a person and the psychomotor component denotes action (readiness to respond).

In this study, it has been decided to assess the affective component (likes and dislikes) of tur processors related to WTO and its impact. Thus, the term attitude is defined as the degree of positive or negative affect associated with some psychological object (Thurstone, 1946).

The term psychological object indicates any symbol, phrase, slogan, person, institutions, event, phenomenon or ideas etc.

In this study, the degree of positive or negative affect of the tur processors towards the psychological object viz., WTO was analysed. A statement may be defined as anything that is said about a psychological object. The class of all possible statements that could be made about a given psychological object is often called a universe of content or simply a universe. As in construction of standard psychological items, the first step in the construction of an attitude scale is to decide the psychological object and then to obtain items, that is, statements relating to the psychological object by the researcher by consulting experts in the field, reading books, newspaper editorials and magazines and articles dealing with the psychological object.

iv. Steps in constructing attitude scale

The six steps followed in constructing attitude scale are furnished.

1. Deciding the Psychological Object

   The World Trade Organization (WTO) is the psychological object in this study and the interest of the researcher is to study the attitude of tur processors towards WTO.

2. Writing large number of statements

   A total of 37 statements were written by consulting experts in the field. Appendix III.

3. Editing the Statements

   All the 37 statements were edited by considering 14 criteria as suggested by Edwards and Kilpatrick (1948). Their suggestions are summarized in Appendix IV.

4. Selecting a few statements (6-12) based on some norms

   For selection of few statements from a large number of statements, there are different techniques such as the method of paired comparisons, the method of equal appearing intervals, the method of successive intervals, the method of summated ratings, scalogram analysis and scale discrimination technique are available.

   Once a set of attitude statements has been collected and edited, there are two general methods that have been used in the development of attitude scales. One of these methods involves the use of judging group. The judging group was not asked to respond to the statements in terms of their own agreement or disagreement with them, but rather to judge the degree of favourableness or unfavourableness expressed by each statement. These judgments were then used as a basis for determining scale value of the statements upon a psychological continuum. Once the scale values of the statements are known, subjects can then be asked to express their agreement or disagreement with the individual statements. Attitude scores for these subjects can then be obtained based upon the prior knowledge of the scale values of the statements. The judgment methods for constructing attitude scales differ only in the manner in which the judgments and scale values of the statements were obtained. They include the method of paired comparisons, the method of equal-appearing intervals and the method of successive intervals.
A second method of developing attitude scales is based upon direct responses of agreement or disagreement with attitude statements. Since the response methods do not require prior knowledge of the scale values of the statements in any exact sense, a judging group is not necessary. It is sufficient for the response methods if one could assume that the response “agree” to a statement indicates a more favourable attitude than the response “disagree”, or vice versa. The response methods for constructing attitude scale include the method of summated ratings and scalogram analysis.

Another method for constructing an attitude scale that makes use of both judgments and responses was termed as the scale-discrimination technique.

The method of paired comparisons (Thurstones, 1927) used the F matrix, the P matrix and the Z matrix. Use of such complex matrices discouraged using paired comparisons method extensively.

The calculation of Scale and Q values not encouraged the extensive use of Equal – Appearing Interval Method.

The interpretation of an attitude score on a summated rating scale can not be made independently of the distribution of scores of some defined group not encouraged to use this method on large scale.

Scalogram Analysis can be perhaps the most accurately described as a procedure for evaluating sets of statements or existing scales to determine whether or not they meet the requirements of a particular kind of scale known as a Guttman Scale or a Cumulative Scale.

But Guttman opined that there is no need to follow such complicated and cumbersome procedure for selecting a few statements and suggested that five to ten statements among the several possible statements can be selected based on intuition and experience. He also suggested to use Scalogram Analysis. To ensure that the scale is unidimensional and statements are scalable in nature, coefficient of reproducibility test was used.

The coefficient of reproducibility is a measure of the degree of accuracy with which the statement response can be reproduced from knowledge of the total scores alone. It is calculated by using the Cornell technique and good enough technique.

Though several methods are available to develop attitude scales, keeping into consideration, the time constraint and scope in the present study, the method suggested by Guttaman was used to select 11 statements from among the large number of 37 statements based on experience of 27 experts available in University of Agricultural Sciences, Dharwad.

The 11 statements thus selected finally and response categories used are furnished in the following table.
Scale to Measure the Attitude of Tur Processors towards WTO.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Statements</th>
<th>Response categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>1.</td>
<td>World Trade Organization (Post-WTO) Regime did not open up gateway of opportunities in trade and development to developing countries</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Liberalisation of Indian tur sector has led to sickness among tur processing units</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Globalization helped the technology upgradation of Indian tur processing units</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>ISO standards help to increase market share in the global market</td>
<td></td>
</tr>
</tbody>
</table>
5. Good Manufacturing Practices (GMP) help in increasing exports of tur products.


7. Govt. of India’s Export-Import Policy did not simplify the export procedures to boost up exports in global trade.

8. Agricultural and Processed Food Products Export Development Authority (APEDA) did not help tur processing units to gear up competition at global level.

9. Tur Board, Govt. of Karnataka helps tur industry to gear up competition at global level.

10. Dall mill Processors Association did not play a catalyst role in supply chain management.

11. CFTRI, Mysore plays an important role in providing cost effective methods to process tur.

The statement numbers 1, 2, 7, 8 and 10 were unfavorable and remaining were favourable.

5. Assessing reliability and validity

a. Reliability of the Scale

The reliability of the scale was determined by Test–Re-Test method. In test-retest reliability, the single form of the test is administered twice on the same sample, with a reasonable time gap (Singh, 1986). In this way, two administrations of the same test yield two independent sets of scores. The two sets, when correlated, give the value of the reliability coefficient. The reliability coefficient thus obtained is also known as the temporal stability coefficient and indicates to what extent the examinees retain their relative positions as measured in terms of the test score over a given period of time. A high test-retest reliability coefficient indicates that the examinee who obtains a low score on the first administration tends to score low on the second administration and its converse, when the examinee scores high on the first administration, tends to score high on the second administration also. The most appropriate and convenient time gap between two administrations is a fortnight which is considered neither too short nor too long.

The eleven statements were administered twice to the twenty tur processing units which were located in study area with a time interval of 15 days. Scores obtained at the time of the first administration was correlated with those obtained at the second.

Correlation coefficient was calculated to find out the degree of relationship between two administrations of the scale X and Y by using the following formula.

\[
r_{xy} = \frac{\sum (XY) - \left( \frac{\sum X}{N} \right) \left( \frac{\sum Y}{N} \right)}{\sqrt{\sum X^2 - \left( \frac{\sum X^2}{N} \right) \left( \sum Y^2 - \frac{\sum Y^2}{N} \right)}}
\]

Where,

- \( r \) = coefficient of correlation between X and Y
- \( n \) = sample size
ΣX = sum of scores of independent variables
ΣY = sum of scores of dependent variables

The significance of calculated r values (0.86) was tested for 5% and 1% levels of significance.

b. Content Validity of the Scale

It refers to the representativeness or sampling adequacy of the content of a measuring instrument (Kerlinger, 1983). Content validation was carried out by subjecting the selected 11 attitude items and 11 Judges opinion. The responses were obtained on a four point continuum of ‘Extremely unfavourable’, ‘unfavourable’, ‘favourable’ and ‘Extremely favourable’. The scores of 4, 3, 2 and 1 were given for the points on the continuum respectively. The mean score (2.5) was fixed as the basis for deciding the content validity of the scale. If the overall mean score of the attitude items as rated by the judges was above the mean score (2.5), then the scale will be declared as valid or otherwise. In the present study, the overall mean score was worked out as three (most adequately covers) and therefore, the constructed attitude scale was set to be valid and reliable. The scale was then standardized for administration at the field level.

6 Enumerating the procedure for administration of scale

a. Administration of the scale

The 11 attitude items selected were arranged randomly in order to avoid biased responses. A five point continuum of “Strongly Agree”, ‘Agree’, ‘Undecided’, ‘Disagree’ and ‘Strongly Disagree’ was used as response categories and the scoring procedure adopted is as follows.

b. Weightage given to different category of responses were as follows

<table>
<thead>
<tr>
<th>Nature of the statement</th>
<th>Continuum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Favourable</td>
<td>4</td>
</tr>
<tr>
<td>Unfavourable</td>
<td>0</td>
</tr>
</tbody>
</table>

The total score obtainable by respondent can range from 0 (min) to 44 (max). The maximum score revealed a favourable attitude, while a minimum score indicated an unfavourable attitude towards WTO regime.

c. The following method was adopted to categorize the tur processors based on total score obtained.

<table>
<thead>
<tr>
<th>Extremely unfavourable</th>
<th>Unfavourable</th>
<th>Favourable</th>
<th>Extremely favourable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>11-21</td>
<td>22-32</td>
<td>33-44</td>
</tr>
</tbody>
</table>

The scale was administered to obtain tur processor’s responses. The score obtained for each statement was summed up to arrive at the total attitude score based on which each respondent was categorized as “Extremely unfavourable” or “unfavourable” or “favourable” and “Extremely favourable”.

3.5 Definition of terms and concepts used in the study

Traditional tur mills: In the traditional tur mills, the processing of tur is done by following traditional methods which involves the following process: (i). Cleaning, (ii). Pitting, (iii). Pretreatment with oil/ red earth, (iv). Conditioning, (v) Dehusking and Splitting, (vi.) Grading and Polishing. The machineries are less utilized and most of the steps are carried out by manual labour. The cost and time involved is much higher, while the quality of the processed tur is much lesser.

Modern tur mills: Modern tur mills are the units, in which the tur processing is carried out by using rubber roll shellers, a modern technology which is more efficient. Majority of the activities are carried out using machineries like driers, aspirators, graders, polishers etc.
The process is more or less similar to the traditional method. Though these modern mills use less of manual labour and the quality of the processed tur is much higher compared to the traditional mills.

Procurement cost of products: cost is computed as the summation of expenses incurred as labour charges, transportation and handling costs, loading and unloading charges and packaging costs.

Transportation and handling costs: This cost incurred on hiring the transport facilities and loading and unloading of raw materials.

Packaging cost: It was the expenses incurred on packing materials like gunny bags, suti or any such materials.

Raw materials: It means that the products brought by the retailers that were processed but not packed.

Fixed capital: The items included under the fixed capital are the cost of land, building, machinery and equipments and other fixtures.

Working capital: The working capital includes cost of raw materials, utilities (like power, oil and water charges), packaging material, cloth bags, tags, labels cost, wages, salaries, company overheads (repair and maintenance cost) and administrative overheads (stationeries expenses, office communication), interest on working capital, chemical cost, license fee, cost of processing and advertisement expenses.

Investment on building: This included investment on building for processing/value addition, storage, and office and drying yard.

Investment on other fixtures: Included investment on fan, tube lights, furniture and computers in the retail outlets.

Pre cleaning: It referred to the removal of particles such as pieces of trash, stones, clods, removal of foreign materials, other products etc, larger in size than desirable products from threshed products lot.

Grading: It referred to the actual cleaning and grading of products based on the quality preferences.

Treating: It referred to the application of fungicide, insecticide or combination of both, to products so as to disinfect them from seed borne or soil borne pathogenic organisms and storage insects.

Bagging and weighing: It referred to filling of products in bags/ polythene bags to an exact weight.

Labeling and stitching: It referred to attaching labels, certificates, tags on the products bags and sewing the seed bags.

Cost and returns: The total marketing cost incurred by the tur millers were calculated by adding rent, transportation cost, packaging cost, labour charge, loading and unloading charge and miscellaneous charges like repair and maintenance and electricity charge.

Gross return: Gross returns was worked out by deducting the total purchase value from total sale value

\[
\text{Gross returns} = \text{Total Sale Value} - \text{Total Purchase Value}
\]

Net returns: Net returns was arrived at by deducting the total marketing costs from gross returns

\[
\text{Net returns} = \text{Gross returns} - \text{Total marketing cost}
\]
4. RESULTS

The collected primary and secondary data were tabulated and analyzed using appropriate statistical tools. The results of the analysis in relation to the objectives as given below are presented under the following heads in this chapter.

4.1 Growth in area, production and productivity of tur crop in the study region.
4.2 Supply response of tur crop in Karnataka
4.3 Document the policy changes in tur industry
4.4 Tur processors behavioural responses in the post WTO period
4.5 Problems faced by the tur processors and suggest appropriate policy measures.

4.1 Growth in area, production and productivity of tur crop in the study region

4.1.1 The temporal growth of Area, Production and Productivity of tur in Karnataka

Tables 4.1, 4.2 and 4.3 depict the growth rates of Area, Production and Productivity of tur in selected taluks of Gulbarga district

4.1.1.1 Growth rates of Area, Production and Productivity of tur in Afzalpur taluk

In pre-WTO period, area under tur exhibited a compound growth rate of -5.78 per cent, while production represented the growth rate of -6.71 per cent whereas the productivity growth rate of 0.76 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 8.28 per cent, while production represented the growth rate of 11.77 per cent whereas the productivity growth rate of 2.22 per cent.

4.1.1.2 Growth rates of Area, Production and Productivity of tur in Aland taluk

In pre-WTO period, area under tur exhibited a compound growth rate of -0.303 per cent, while production represented the growth rate of 0.91 per cent whereas the productivity growth rate of 6.31 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 6.68 per cent, production exhibited a growth rate of 5.28 per cent whereas the productivity growth rate of 2.70 per cent.

4.1.1.3 Growth rates of Area, Production and Productivity of tur in Chincholi taluk

In pre-WTO period, area under tur exhibited a compound growth rate of 0.95 per cent, while production represented the growth rate of – 1.24 per cent whereas the productivity growth rate of -0.98 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 3.79 per cent, while production represented the growth rate of 13.25 per cent whereas the productivity growth rate of 6.86 per cent.

4.1.1.4 Growth rates of Area, Production and Productivity of tur in Chittapur taluk

In pre-WTO period, area under tur exhibited a compound growth rate of -6.62 per cent, while production represented the growth rate of 3.59 per cent whereas the productivity growth rate of 5.49 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 2.91 per cent, while production represented the growth rate of 8.95 per cent whereas the productivity growth rate of 4.50 per cent.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Afzalpur</td>
<td>-5.7884</td>
<td>8.2800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0288)</td>
<td>(0.0183)</td>
<td></td>
</tr>
<tr>
<td>Aland</td>
<td>-3.0343</td>
<td>6.6782**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0257)</td>
<td>(0.0097)</td>
<td></td>
</tr>
<tr>
<td>Chincholi</td>
<td>0.9474</td>
<td>3.7947**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0079)</td>
<td>(0.0096)</td>
<td></td>
</tr>
<tr>
<td>Chittapur</td>
<td>-6.627*</td>
<td>2.9154**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0248)</td>
<td>(0.0082)'</td>
<td></td>
</tr>
<tr>
<td>Gulburga</td>
<td>-6.9458*</td>
<td>5.4659**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0310)</td>
<td>(0.0111)</td>
<td></td>
</tr>
<tr>
<td>Jewargi</td>
<td>-6.2878</td>
<td>7.9898**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0358)</td>
<td>(0.0106)</td>
<td></td>
</tr>
<tr>
<td>Sedam</td>
<td>-3.5739</td>
<td>1.832</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0208)</td>
<td>(0.0154)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Figures in parenthesis indicate “standard error” values. ** and * indicate significance at 1% and 5% respectively.
Table 4.2: Growth Rates of Tur Production in selected taluks of Gulbarga District

<table>
<thead>
<tr>
<th>Taluks</th>
<th>Compound Growth Rate- (CGR )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afzalpur</td>
<td>-6.7183</td>
</tr>
<tr>
<td></td>
<td>(0.0449)</td>
</tr>
<tr>
<td>Aland</td>
<td>0.9063</td>
</tr>
<tr>
<td></td>
<td>(0.0942)</td>
</tr>
<tr>
<td>Chincholi</td>
<td>-1.2442</td>
</tr>
<tr>
<td></td>
<td>(0.0844)</td>
</tr>
<tr>
<td>Chittapur</td>
<td>-3.5859</td>
</tr>
<tr>
<td></td>
<td>(0.0492)</td>
</tr>
<tr>
<td>Gulburga</td>
<td>-6.5618</td>
</tr>
<tr>
<td></td>
<td>(0.0464)</td>
</tr>
<tr>
<td>Jewargi</td>
<td>-5.3826</td>
</tr>
<tr>
<td></td>
<td>(0.0417)</td>
</tr>
<tr>
<td>Sedam</td>
<td>-2.8294</td>
</tr>
<tr>
<td></td>
<td>(0.0455)</td>
</tr>
</tbody>
</table>

** and * indicate significance at 1% and 5% respectively.

Note: Figures in parenthesis indicate “standard error” values.
### Table 4.3: Growth Rates of Productivity of Tur in selected taluks of Gulbarga District

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Afzalpur</td>
<td></td>
<td>0.761 (0.0381)</td>
<td>2.2219 (0.0396)</td>
</tr>
<tr>
<td>Aland</td>
<td></td>
<td>6.313 (0.0717)</td>
<td>-2.6975 (0.0500)</td>
</tr>
<tr>
<td>Chincholi</td>
<td></td>
<td>-0.9829 (0.0676)</td>
<td>6.8651 (0.0328)</td>
</tr>
<tr>
<td>Chittapur</td>
<td></td>
<td>5.4936 (0.0264)</td>
<td>4.5061 (0.0270)</td>
</tr>
<tr>
<td>Gulburga</td>
<td></td>
<td>2.7646 (0.0413)</td>
<td>1.5309 (0.0304)</td>
</tr>
<tr>
<td>Jewargi</td>
<td></td>
<td>2.7807 (0.0169)</td>
<td>-4.8873 (0.0690)</td>
</tr>
<tr>
<td>Sedam</td>
<td></td>
<td>2.0112 (0.0403)</td>
<td>2.7159 (0.0270)</td>
</tr>
</tbody>
</table>

**Note:** Figures in present thesis indicate “standard error” values.
** and * indicate significance at 1% and 5% respectively.
4.1.1.5 Growth rates of Area, Production and Productivity of tur in Gulbarga taluk

In pre-WTO period, area under tur exhibited a compound growth rate of – 6.94 per cent, while production represented the growth rate of -6.56 per cent whereas the productivity growth rate of 2.76 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 5.46 per cent, while production represented the growth rate of 8.18 per cent whereas the productivity growth rate of 1.53 per cent.

4.1.1.6 Growth rates of Area, Production and Productivity of tur in Jewargi taluk

In pre-WTO period, area under tur exhibited a compound growth rate of – 6.28 per cent, while production represented the growth rate of -5.38 per cent whereas the productivity growth rate of 2.78 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 7.98 per cent, while production represented the growth rate of 3.47 per cent whereas the productivity growth rate of -4.88 per cent.

4.1.1.7 Growth rates of Area, Production and Productivity of tur in Sedam taluk

In pre-WTO period, area under tur exhibited a compound growth rate of – 3.57 per cent, while production represented the growth rate of -2.82 per cent whereas the productivity growth rate of 2.01 per cent.

In post-WTO period, area under tur exhibited a compound growth rate of 1.83 per cent, while production represented the growth rate of 6.41 per cent, whereas the productivity growth rate of 2.71 per cent.

4.2 Supply Response of Tur crop in Karnataka

4.2.1 Supply Response of Tur during pre-WTO, post-WTO and Overall periods

The supply response of tur during pre-WTO period is presented in the Table 4.4. The independent variables included in the present study were namely rainfall, lag price, lag yield and lag area. The area under the tur was regressed on several causal factors. The $R^2$ values varied between 0.37 to 0.85. In case of Afzalpur taluka, the lag area (1.490849) was found to be statistically significant at 5 per cent level, the other included variables were found to be negative and statistically non-significant. In case of Aland taluka, the included variables namely lag yield (0.173578) and lag area (0.972914) were found positive and non-significant while, the variable rainfall (-23.431) and lag price (-64.5902) were found negative and non-significant. A similar situation was observed in Chincholi and Chittapur talukas where the included independent variables failed to exert significant influence on area under tur. In case of Gulburga taluka, the lag price (-60.3445) was found to have negative and significant influence on area under Tur while lag area (-.859731) was found to have positive and significant influence. In case of Jewargi taluka also, the lag price (-43.5206) was found to have negative impact while lag area (1.490394) was found to have positive and significant impact on area under tur. In case of Sedam taluka, the lag yield (-43.5833) was found to be negative and have significant impact on area under Tur.

4.2.2 Supply Response of Tur during post-WTO period

The supply response of tur during post-WTO period is presented in the Table 4.5. The rainfall factor was found to have a negative and significant influence on area under tur in Aland taluka (-37.1159), while, it was positive and had significant influence on area under tur in Gulburga taluka (34.8232). The rainfall factor was found positive in Afzalpur (1.618232), Chincholi (12.38744), Chittapur (0.412195), Jewargi (3.02824) and Sedam (14.34316). The lag price values were found positive in all the talukas but found statistically non-significant. The lag yield factor was found to be negative and exert significant influence on area under tur in Aland (-22.0213), while, it was found to exert a positive and significant influence in case of Gulburga taluka (18.69084). The lag area was found to have positive and significant influence on area under tur in Chincholi (0.65281), Gulburga (1.025394), Jewargi (0.968466) and Sedam (0.089811).
Table 4.4: Supply Response of Tur during pre-WTO period

<table>
<thead>
<tr>
<th></th>
<th>Afzalpur</th>
<th>Aland</th>
<th>Chincholi</th>
<th>Chittapur</th>
<th>Gulburga</th>
<th>Jewargi</th>
<th>Sedam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>18111.72</td>
<td>27653.05</td>
<td>15613.99</td>
<td>26348.21</td>
<td>-1066.12</td>
<td>-10974.2</td>
<td>69121.62</td>
</tr>
<tr>
<td>Rainfall</td>
<td>-25.1343</td>
<td>-23.431</td>
<td>-0.01681</td>
<td>275.1083</td>
<td>14.76436</td>
<td>18.25791</td>
<td>0.509607</td>
</tr>
<tr>
<td></td>
<td>(-1.33153)</td>
<td>(-0.74449)</td>
<td>(-0.00138)</td>
<td>(1.288136)</td>
<td>(1.239819)</td>
<td>(0.02199)</td>
<td></td>
</tr>
<tr>
<td>Lag Price</td>
<td>-52.2031</td>
<td>-64.5902</td>
<td>-4.55162</td>
<td>-18.3967</td>
<td>-60.3445**</td>
<td>-43.5206*</td>
<td>35.83363</td>
</tr>
<tr>
<td></td>
<td>(-1.63396)</td>
<td>(-1.47412)</td>
<td>(-0.44439)</td>
<td>(-0.66418)</td>
<td>(-2.45033)</td>
<td>(-2.84688)</td>
<td>2.079622</td>
</tr>
<tr>
<td>Lag Yield</td>
<td>-9.92896</td>
<td>0.173578</td>
<td>-5.36932</td>
<td>-37.0741</td>
<td>17.18719</td>
<td>4.592993</td>
<td>-43.5833*</td>
</tr>
<tr>
<td></td>
<td>(-0.26276)</td>
<td>0.005565</td>
<td>(-0.34589)</td>
<td>(-1.08982)</td>
<td>0.535211</td>
<td>0.120417</td>
<td>(-3.7429)</td>
</tr>
<tr>
<td>Lag Area</td>
<td>1.490849*</td>
<td>0.972914</td>
<td>0.510694</td>
<td>0.754667</td>
<td>0.859731**</td>
<td>1.490394*</td>
<td>-0.2691</td>
</tr>
<tr>
<td></td>
<td>(2.609748)</td>
<td>(1.590304)</td>
<td>(0.916159)</td>
<td>(1.426282)</td>
<td>(2.347699)</td>
<td>(2.971265)</td>
<td>(-0.88477)</td>
</tr>
<tr>
<td>F Value</td>
<td>2.524503</td>
<td>0.778182</td>
<td>0.39286</td>
<td>2.515302</td>
<td>3.13962</td>
<td>2.801517</td>
<td>3.888487</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.79</td>
<td>0.54</td>
<td>0.37</td>
<td>0.79</td>
<td>0.82</td>
<td>0.81</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Note: Figures in parenthesis indicate “standard error” values. ** and * indicate significance at 1% and 5% respectively.
### Table 4.5: Supply Response of Tur during post -WTO period

<table>
<thead>
<tr>
<th></th>
<th>Afzalpur</th>
<th>Aland</th>
<th>Chincholi</th>
<th>Chittapur</th>
<th>Gulburga</th>
<th>Jewargi</th>
<th>Sedam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>-9361.72</td>
<td>57275.28</td>
<td>1362.651</td>
<td>10839.54</td>
<td>-49215.2</td>
<td>-13608.2</td>
<td>-8254.64</td>
</tr>
<tr>
<td><strong>Rainfall</strong></td>
<td>1.618232</td>
<td>-37.1159**</td>
<td>12.38744</td>
<td>0.412195</td>
<td>34.82232**</td>
<td>3.02824</td>
<td>14.34316</td>
</tr>
<tr>
<td></td>
<td>(0.051788)</td>
<td>(-3.488)</td>
<td>(1.004151)</td>
<td>(0.038895)</td>
<td>(2.0116)</td>
<td>(0.106056)</td>
<td>(0.865295)</td>
</tr>
<tr>
<td><strong>Lag Price</strong></td>
<td>1.4578</td>
<td>1.32952</td>
<td>7.67227</td>
<td>4.6572</td>
<td><strong>12.2023</strong></td>
<td>0.69059</td>
<td>3.71528</td>
</tr>
<tr>
<td></td>
<td>(0.13747)</td>
<td>(0.45305)</td>
<td>(2.29888)</td>
<td>(1.22126)</td>
<td>(1.40486)</td>
<td>(0.0236)</td>
<td>(0.45921)</td>
</tr>
<tr>
<td><strong>Lag Yield</strong></td>
<td>39.49454</td>
<td>-22.0213*</td>
<td>8.339772</td>
<td>33.51931</td>
<td>18.69084**</td>
<td>5.781817</td>
<td>7.742094</td>
</tr>
<tr>
<td></td>
<td>(2.179734)</td>
<td>(-2.44971)</td>
<td>(1.122984)</td>
<td>(1.84491)</td>
<td>(2.023828)</td>
<td>(0.174229)</td>
<td>(0.638369)</td>
</tr>
<tr>
<td><strong>Lag Area</strong></td>
<td>0.783944</td>
<td>0.232679</td>
<td>0.65281**</td>
<td>0.508257</td>
<td>1.025394**</td>
<td>0.968466**</td>
<td>0.089811**</td>
</tr>
<tr>
<td></td>
<td>(2.837184)</td>
<td>(1.007453)</td>
<td>(2.086356)</td>
<td>(1.594211)</td>
<td>(4.911387)</td>
<td>(4.070585)</td>
<td>(0.143455)</td>
</tr>
<tr>
<td><strong>F Value</strong></td>
<td>3.251189</td>
<td>10.17766</td>
<td>3.205481</td>
<td>2.542571</td>
<td>6.404604</td>
<td>6.499959</td>
<td>1.328115</td>
</tr>
<tr>
<td><strong>R^2</strong></td>
<td>0.76</td>
<td>0.92**</td>
<td>0.76</td>
<td>0.72</td>
<td>0.86**</td>
<td>0.86**</td>
<td>0.57**</td>
</tr>
</tbody>
</table>

**Note:** Figures in parenthesis indicate "standard error" values. ** and * indicate significance at 1% and 5%
### Table 4.6: Supply Response of Tur during Overall period

<table>
<thead>
<tr>
<th>Constant</th>
<th>Afzalpur</th>
<th>Aland</th>
<th>Chincholi</th>
<th>Chittapur</th>
<th>Gulburga</th>
<th>Jewargi</th>
<th>Sedam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2620.141</td>
<td>23598.39</td>
<td>7712.096</td>
<td>7649.786</td>
<td>-992.704</td>
<td>-13.697.9</td>
<td>18862.92</td>
</tr>
</tbody>
</table>

| Rainfall | -4.8547 | -14.4319 | 1.681345 | 17.09345** | 3.591583 | 10.05988 | 3.43608 |
|          | (-0.37901) | (-1.27072) | (0.269986) | (1.810832) | (0.486261) | (0.911199) | (0.334352) |

| Lag Price | -4.333 | 3.152693 | 5.10282* | 0.0931 | 0.50813** | -2.4226 | 0.798413 |
|           | (-0.84783) | (0.705573) | (2.41284) | (0.026336) | (0.08454) | (-0.45514) | (0.186306) |

|           | (1.794224) | (-1.09416) | (-0.901179) | (-0.56265) | (1.212774) | (0.393846) | (-0.65545) |

| Lag Area | 0.736632** | 0.412985 | 0.568834** | 0.608205** | 0.764674** | 0.960588** | 0.335583** |
|          | (4.14359) | (1.681488) | (2.769931) | (3.533717) | (5.010464) | (6.782671) | (1.386882) |

| F Value  | 4.946437 | 3.728058 | 10.50137 | 4.613968 | 7.2492 | 17.81857 | 1.331879 |
| R²       | 0.64**   | 0.57**   | 0.79**   | 0.62**   | 0.72** | 0.86**   | 0.62**   |

**Note:** Figures in parenthesis indicate “standard error” values. ** and * indicate significance at 1% and 5%.
The $R^2$ value varied between 0.57 to 0.92 and was found statistically significant in case of Aland (0.92), Gulburga (0.86), Jewargi (0.86) and Sedam (0.57) respectively.

4.2.3 Supply Response of Tur during overall-WTO period

The supply response of tur during overall-WTO period is presented in the Table 4.6. The independent variable rainfall was found to be positive and significant in Chittapur (17.09345), while, it was positive and non-significant in case of Gulburga (3.591583), Jewargi (10.05988), Sedam (3.43608), while it was negative and non-significant in case of Afzalpur (-4.8547) and Aland (-14.4319). The lag price variable was found to be positive and significant in case of Chincoli (5.10282) and Gulburga (0.50813). The lag area variable failed to exert significant influence in rest of the talukas. The lag yield was found to have a positive and significant influence on area under tur in Afzalpur (26.1131). However, lag area factor exerted positive and significant influence on area under tur in Afzalpur (0.736632) followed by Chincoli (0.568834), Chittapur (0.608205), Gulburga (0.764674), Jewargi (0.960588) and Sedam (0.355583). The $R^2$ value varied between 0.57 to 0.86. The $R^2$ value was found to be statistically significant in all the talukas (namely) viz, Afzalpur (0.64), followed by Aland (0.57), Chincoli (0.79), Chittapur (0.62), Gulburga (0.72), Jewargi (0.86) and Sedam (0.62).

4.3 Document the policy changes in Tur Industry

The study of policy changes in the tur industry, the various policies and institutions reforms passed by the Indian Government were studied with reference to the pre-WTO and post-WTO periods (Table 7). The results of this objective are based on the secondary information of the policies and the related materials.

Since, 1970s the Indian Government introduced policy reforms aimed at making the country self-sufficient in the production of cereals. Various facilities like subsidies on agricultural inputs, irrigation, good minimum support price, promotion of usage of High Yielding Varieties (HYV) and regulation of import of cereals through Public Distribution System (PDS) etc ensured that achieves self sufficiency in the production of cereals. The research of oilseeds and pulses was ignored. Though around 2000, the Indian Government realized the importance of pulses production. Institutions like Indian Institute of Pulses Research, Kanpur, All India Co-ordinated Research Project on Pulses including tur, Tur Board of Karnataka were started working on releasing the high yielding varieties of pulses including tur. Under the Centrally Sponsored Integrated Scheme, mini seed kits, subsidized fertilizers, sprinkler sets, higher minimum support price etc were provided to the farmers to encourage to take up pulses cultivation. NAFED has been actively involved in promoting the export of the pulses and regulating the import of the pulses including tur into India.

The Indian Government followed very protectionist policies like higher tariffs, quotas etc to safeguard the Indian agriculture trade. But in 1990s with the emergence of GATT and then WTO, the Indian Government slowly started to open up the agriculture market for international trade. Few important changes were the reduction of tariffs on the import of agricultural commodities. The increase in the Sanitary and Phyto-Sanitary (SPS) measures were introduced so that the reduction in the tariffs and quotas on import of agricultural product did not have a negative effect on the agriculture trade of India. The export of the pulses was banned except that the branded pulses in packets of 5 Kgs was allowed. Though this didn’t help the pulses’ processors as the cost involved was higher.

4.4 Behavioral Responses of the Tur Processors in the post-WTO period

4.4.1 Awareness and Knowledge on Policy and Institutional Instruments

To study the awareness of tur processors about the policy and institutional instruments, the policy instruments are grouped into international institutions, national policy and institutional instruments, research institutes, regulatory policies, health safety and standard regulations and commercial institutions.
<table>
<thead>
<tr>
<th>Year</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>Crops are also subject to restrictions on domestic trade that are regulated under the Essential Commodities Act 1955</td>
</tr>
<tr>
<td>Since 1970s</td>
<td>India's Protectionist Policies towards Agricultural trade</td>
</tr>
<tr>
<td>1970-1990</td>
<td>Indian Government made various reforms like gave subsidies for irrigation, fertilizers, gave increased importance to the research and release of high yielding varieties of cereals</td>
</tr>
<tr>
<td>1990</td>
<td>Indian government restricted the export of pulses although the import of pulses was free.</td>
</tr>
<tr>
<td>1995-2000</td>
<td>Uruguay Round Agreement on Agriculture (URAA), India essentially lowered tariffs on agricultural imports and replaced most of the quantitative restrictions and non-tariff border measures by tariffs that provided the same level of protection</td>
</tr>
<tr>
<td>1995</td>
<td>The Agreement on Agriculture implemented under WTO</td>
</tr>
<tr>
<td>1996</td>
<td>Tariffs on import of pulses were reduced gradually and finally abolished</td>
</tr>
<tr>
<td>Until 1999</td>
<td>the Indian government retained custom duties and levies on pulse imports and the imposition of levies on pulse imports continued, till the practice was abolished</td>
</tr>
<tr>
<td>1999</td>
<td>Despite the export quotas that the Indian government imposed on pulse exports, it permitted the export of branded pulses in consumer packs not exceeding 5 kilograms in weight</td>
</tr>
<tr>
<td>From 2000</td>
<td>Tariffs for many agricultural and allied products, such as rice, wheat, millet, sugar, milk powder, apple chicken, edible oils, etc, were increased</td>
</tr>
<tr>
<td>2001</td>
<td>Doha Development Agenda (DDA) is the current trade-negotiation round of the World Trade Organization (WTO). Its objective is to lower trade barriers around the world, which will help and facilitate the increase of global trade.</td>
</tr>
<tr>
<td>2002-03</td>
<td>Import duties on pulses were increased from 5% to 10% in the Indian Union Budget of 2002-2003</td>
</tr>
</tbody>
</table>
Table 4.8: Awareness and Knowledge of various Policy & Institutional Instruments

<table>
<thead>
<tr>
<th>Policy and Institutional Instruments</th>
<th>Traditional Tur Processors</th>
<th>Modern Tur Processors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AOA (Agreement on Agriculture)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>GATT (General Agreement on Trade and Tariff)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>Globalization</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>GMP (Good Manufacturing Practices)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>HACCP (Hazard Analysis for Critical Control Point)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>ISO (International Standards Organization)</td>
<td>FA</td>
<td>PA</td>
</tr>
<tr>
<td>SPS (Sanitary and Phyto-Sanitary) measures</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>TBT (Technical Barriers to Trade)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>VAT (Value Added Tax)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>WTO (World Trade Organization)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td><strong>National</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Institute of Pulses Research, Kanpur</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>BIS (Bureau of Indian Standards)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>CACP (Commission for Agricultural Costs and Prices)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>CWC (Central Ware Housing Corporation)</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>FMC (Forward Market Commission)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>NABARD (National Bank for Agriculture and Rural Development)</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>NAFED (National Agricultural Co-operative Marketing Federation Ltd.)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>NCDC (National Co-optive Development Corporation)</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>RBI (Reserve Bank of India)</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>STC (State Trading Corporation)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td><strong>Research Institutions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AICRPO (All India Coordinated Research Project on Tur)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>CFTRI (Central Food Technological Research Institute)</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>Tur Board of Karnataka</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>ICAR (Indian Council of Agricultural Research)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>IIFT (Indian Institute of Foreign Trade)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NARS (National Agricultural Research System)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>SAUs (State Agricultural Universities)</td>
<td>PA</td>
<td>FA</td>
</tr>
</tbody>
</table>

Contd…
<table>
<thead>
<tr>
<th>Policy and Institutional Instruments</th>
<th>Traditional tur Processors</th>
<th>Modern tur Processors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policies related to Export and Import</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEZ (Agricultural Export Zone)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>CCS (Cash Compensatory Support)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>EOU (Export Oriented Units)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>EPZ (Export Promotion Zone)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>EXIM (Export Import) Policy</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>FOB (Free on Board)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>FTZ (Free Trade Zones)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>MEP (Minimum Export Price)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>MIO (Market Intervention Option)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>QR (Quantitative Restrictions)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>SIL (Special Import license)</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td>TRQ (Tariff Rate Quota)</td>
<td>PA</td>
<td>PA</td>
</tr>
<tr>
<td><strong>Regulatory Policies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural Produce (Grading and Marking )Act</td>
<td>FA</td>
<td>FA</td>
</tr>
<tr>
<td>EC Act (The Essential Commodities Act)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>SSIRP (Small Scale Industry Reservation Policy)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td><strong>Health Safety and Standards Regulations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Prevention of Food Adulteration Act</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>The Weights and Measures Act</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>The Packaged Commodities Order</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td><strong>Commercial Institutions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMC (Future Market Commission)</td>
<td>NA</td>
<td>PA</td>
</tr>
<tr>
<td>MCX (Multi-Commodity Exchange Ltd)</td>
<td>NA</td>
<td>FA</td>
</tr>
<tr>
<td>NCDEX (National Commodity Exchange Ltd.)</td>
<td>PA</td>
<td>FA</td>
</tr>
<tr>
<td>Any other (Pl. Specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note FA-Fully aware; PA- Partially aware; NA; Not aware
<table>
<thead>
<tr>
<th>Policy and Institutions</th>
<th>Processors</th>
<th>Fully Aware</th>
<th>Partially Aware</th>
<th>Not Aware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International Policies</strong></td>
<td>Traditional</td>
<td>10%</td>
<td>30%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>10%</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td><strong>National Policies</strong></td>
<td>Traditional</td>
<td>50%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>70%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Research Institutions</strong></td>
<td>Traditional</td>
<td>14%</td>
<td>29%</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>29%</td>
<td>57%</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Policies</strong></td>
<td>Traditional</td>
<td>0%</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Regulatory Policies</strong></td>
<td>Traditional</td>
<td>33%</td>
<td>0%</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Health Safety and Standard Regulations</strong></td>
<td>Traditional</td>
<td>0%</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Commercial Institutions</strong></td>
<td>Traditional</td>
<td>0%</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Modern</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
</tr>
</tbody>
</table>
A holistic picture of “Fully aware”, “Partially aware” and “Not aware” on the Forty Eight policy instruments as reported by tur processors are given in Table 4.8. A critical perusal of the Table 4.9 helps us to summarize the awareness levels of the traditional and modern tur processors with respect to the policy and institutions.

Among the traditional tur mill processors 10% were fully aware, 30% were partially aware and 60% were not aware of the ten international policies and institutional instruments. Among, the modern tur mill processors 10% were fully aware, 50% were partially aware and 40% were not aware of the ten international policies and institutional instruments.

Among the traditional tur mill processors 50% were fully aware, 20% were partially aware and 30% were not aware of the national policy and institutional instruments. Among, the modern tur mill processors, 70% were fully aware, 20% were partially aware and 10% were not aware of national policy and institutional instruments.

Among the traditional tur mill processors 14% were fully aware, 29% were partially aware and 57% were not aware of the research institutes. Among, the modern tur mill processors were 29% fully aware, 57% were partially aware and 14% were not aware of research institutes.

Among the traditional tur mill processors 75% were partially aware and 25% were not aware of the policies. Among, the modern tur mill processors, 50% were fully aware, 25% were partially aware and 25% were not aware about the policies.

Among the traditional tur mill processors 33% were fully aware and 67% were not aware of the Regulatory Policies. Among, the modern tur mill processors, 33% were fully aware, 33% were partially aware and 33% were not aware of the Regulatory Policies.

Among the traditional tur mill processors 33% were partially aware and 67% were not aware of the Health Safety and Standards Regulations. Among, the modern tur mill processors, 33% were fully aware and 67% were partially aware of the Health Safety and Standards Regulations.

Among the traditional tur mill processors 33% were partially aware and 67% were not aware of the Commercial Institutions. Among, the modern tur mill processors, 67% were fully aware and 33% were partially aware of the commercial institutions.

4.4.2 Attitude of tur processors towards WTO

The attitude of the tur processors was studied by administering the processors schedule which contained 11 statements about WTO to ten traditional tur processors and ten modern tur processors. The average total score of the traditional tur mill processors and modern tur mill processors was calculated. According to the Table 4.10, the attitude of the traditional tur mill processors was unfavourable and the attitude of the modern tur mill processors was favourable.

4.5 Problems faced by the tur processors

Opinion of sample processors regarding problems associated with processing of tur was presented in Table 4.11.

Taxation was the major problem faced by the processors in tur processing units. All the processors (100%) expressed that the existing market fee, commission charges and taxation were high and need to be rationalized. Procurement of raw material formed another problem as more than 70 per cent of the tur mill owners viewed it as a problem followed by difficulties in the availability of labor. The lack of suitable system to get the required capital for the tur processing unit coupled with high cost of working capital was also continued as a problem by more than 60 per cent of the tur processing units. Inadequate supply of power is one of the major problem faced by the tur processors. Majority of the processors (60.00%) including both conventional and modern units have complained about the poor supply of power. This has resulted in under utilization of the capacity in the tur processing units.

The problems regarding high processing cost were reported by 65 per cent. This was followed by problems regarding the repairs and maintenance. The respondents felt that the problem of repairs and maintenance was very high (70.00%) in conventional units in comparison with the modern processors. (30.00%)
Table 4.10: Attitude of Tur Processors towards WTO period

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Statements</th>
<th>Strongly Agree (4)</th>
<th>Agree (3)</th>
<th>Undecided (2)</th>
<th>Disagree (1)</th>
<th>Strongly Disagree (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TTP</td>
<td>MTP</td>
<td>TTP</td>
<td>MTP</td>
<td>TTP</td>
<td>MTP</td>
</tr>
<tr>
<td>1</td>
<td>World Trade Organization (Post-WTO) regime did not open up gateway of opportunities in trade and development to developing countries</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Liberalisation of Indian tur sector has led to sickness among tur processing units</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Globalization helped the technology up-gradation of Indian tur processing units</td>
<td></td>
<td>3</td>
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<td>4</td>
<td>ISO standards help to increase market share in the global market</td>
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<td>5</td>
<td>Good Manufacturing Practices (GMP) help in increasing exports of tur products</td>
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<td>6</td>
<td>Hazard Analysis Critical Control Point (HACCP) ensures quality of products</td>
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<td>3</td>
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<td>7</td>
<td>Govt. of India’s Export- Import Policy did not simplify the export procedures to boost up exports in global trade</td>
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<tr>
<td>8</td>
<td>Agricultural and Processed Food Products Export Development Authority (APEDA) helps tur processing units to gear up competition at global level</td>
<td></td>
<td>3</td>
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<tr>
<td>9</td>
<td>Tur Board, Govt. of Karnataka helps tur industry to gear up competition at global level</td>
<td></td>
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<tr>
<td>10</td>
<td>Dall mill Processors Association did not play a catalyst role in supply chain management</td>
<td></td>
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<tr>
<td>11</td>
<td>CFTRI, Mysore plays an important role in providing cost effective methods to process tur</td>
<td></td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Average Total Score</strong></td>
<td></td>
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<td></td>
<td>Traditional Tur Processors (TTP)</td>
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<td></td>
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<tr>
<td></td>
<td>Traditional</td>
<td>18</td>
<td></td>
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<tr>
<td></td>
<td>Modern Tur Processors (MTP)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Modern</td>
<td>26</td>
<td></td>
<td></td>
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</tbody>
</table>

**Traditional Tur Processors (TTP)** | **Modern Tur Processors (MTP)**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tur Mills</th>
<th>Total Score</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Traditional</td>
<td>18</td>
<td>Unfavourable</td>
</tr>
<tr>
<td>2</td>
<td>Modern</td>
<td>26</td>
<td>Favourable</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Particulars</td>
<td>Conventional units (n=10)</td>
<td>Modern units (n=10)</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>1</td>
<td>Problems regarding taxation</td>
<td>10 (100)</td>
<td>10 (100)</td>
</tr>
<tr>
<td>2</td>
<td>Interruption in power supply</td>
<td>8 (80.00)</td>
<td>6 (60.00)</td>
</tr>
<tr>
<td>3</td>
<td>Difficulties in labour availability</td>
<td>8 (80.00)</td>
<td>5 (50.00)</td>
</tr>
<tr>
<td>4</td>
<td>High costs of tur procurement</td>
<td>7 (70.00)</td>
<td>6 (60.00)</td>
</tr>
<tr>
<td>5</td>
<td>Transportation problems</td>
<td>7 (70.00)</td>
<td>4 (30.00)</td>
</tr>
<tr>
<td>6</td>
<td>High cost of working capital</td>
<td>8 (80.00)</td>
<td>5 (50.00)</td>
</tr>
<tr>
<td>7</td>
<td>High processing cost</td>
<td>8 (80.00)</td>
<td>5 (50.00)</td>
</tr>
<tr>
<td>8</td>
<td>Problems regarding repairs and maintenance</td>
<td>7 (70.00)</td>
<td>3 (30.00)</td>
</tr>
</tbody>
</table>

Table 4.11: Problems faced by the Tur Processors in Gulbarga District
5. DISCUSSION

5.1 Growth in area, production and productivity of tur crop in the study region

A comparison of growth rates in area, production and productivity in the seven study taluks was made between the two periods viz., pre-WTO period (1984-85 to 1994-95) and post-WTO period (1995-96 to 2008-09).

5.1.1 Growth Rate of Area

During Pre-WTO period except Chincholi (0.9474), all other taluks were having negative figures, whereas during post-WTO period all the taluks were having positive figures, which imply WTO policies influenced the growth in area of tur in these taluks. Because of WTO policies, there was a pressure to increase area under tur, both for domestic consumption and for balancing the agriculture trade relationships with the other member countries for smooth trade.

5.1.2 Growth Rate of Production

Aland was the lone taluk which showed positive figures for growth rate in production while other taluks were having negative values during pre-WTO period. In post-WTO period all taluks were having positive figures which are the result of promotional activities to increase the area under tur cultivation because of policies of WTO. Afzalpur and Chincholi were the top taluks which are having highest growth rates for production with 11.77 and 13.25 per cent respectively. Difference in Research and Developmental activities during pre-WTO period and post-WTO period is also a reason for the high growth rates.

5.1.3 Growth Rate of Productivity

During analysis it was found that only Chincholi taluk had negative growth rate, while rest of the taluks showed positive growth rate during pre-WTO period. In post-WTO period Aland and Jewargi showed the negative growth rates while other taluks showed the positive growth rates. The positive growth rate for area in Chincholi taluk might have influenced the productivity growth rate i.e. on taking the average productivity in whole area may have reduced the productivity growth rate in Chincholi taluk to negative.

5.2 Supply Response of Tur crop in Karnataka

The significant and very high $R^2$ values were indicative of the fact that the variables included in the area response model were capable of explaining more than 90 per cent of variation in the dependent variable in all the taluks.

The co-efficients of the expected price turned out to be highly significant in all the taluks. They were positive and significant at five per cent level of probability.

It was observed that for every one unit increase in the lagged yield would increase 26.11 units area under tur in Afzalpur taluk It was also observed that for every one unit increase in the lagged area would increase 73.66, 41.30, 56.88, 60.82, 76.47, 96.06, and 33.56 units area under cultivation of tur in Afzalpur, Aland Chincholi , Chittapur Gulburga Jewargi and Sedam taluks respectively . This shows that the farmers were responsive to prices in terms of lagged area. Hence lagged area was found to significantly influence the farmers decision regarding area allocation to tur in all taluks of Jewargi, Afzalpur, Gulburga, Aland, Chittapur Chincholi and Sedam

It was found that rainfall, used as a proxy for weather, was significant variable influencing the producer’s behaviour regarding land allocation to tur. Co-efficients of rainfall variable was significant at one per-cent level of probability only in Chittapur taluk. It is true to some extent that the rainfall would influence the yield and production but not the acreage. Acreage allocation depends to a larger extent on the prices and other economic factors.
5.3  Document the policy changes in Tur Industry

India's agricultural research system has stood several tests successfully in the past and has helped the country to tide over formidable food crises and other challenges. The objective of the Agreement on Agriculture (AOA) is to reform trade in the sector and to make policies more market-oriented.

Since 1970, the Indian government has actively pursued policy aimed at improving Wheat and Rice yields with little attention to pulse production. Given that pulses are grown on marginal lands, the assistance provided in the form of subsidies for fertiliser and water and for the development of high yielding cereal varieties biased the allocation of resources in favour of cereals and oilseed production and against pulse production. Consequently, India achieved near self-sufficiency in cereal production while pulse production generally stalled or declined in some years.

In 1994, following the commitment to the Uruguay Round Agreement on Agriculture (URAA), India essentially lowered tariffs on agricultural imports and replaced most of the quantitative restrictions and non-tariff border measures by tariffs that provided the same level of protection. But the combination of the introduction of Sanitary and Phyto-Sanitary measures from time to time, the licensing requirements and the lack of transparency and consistency in regulations in India has made the trade in agricultural products, including pulses, very complex.

By removing import restrictions on agricultural goods, tariffs on several agricultural products arose. Tariffs on pulses were reduced gradually and by 1996, all tariffs on pulses were abolished. Imports of most agricultural produce, with almost the single exception of pulses, are canalized, i.e. imported only through Government agencies. Agricultural products are also subject to restrictions on domestic trade that are regulated under the Essential Commodities Act of 1955.

In 1991, the Indian government restricted the export of pulses although the importation of pulses was free. Trade in other agricultural products was generally restricted or canalized, i.e. traded under the Public Distribution System. However, during this time, the Indian government retained custom duties and levies on pulse imports and the imposition of levies on pulse imports continued until 1999 when the practice was abolished. Despite the export quotas that the Indian government imposed on pulse exports, it permitted the export of branded pulses in consumer packs not exceeding 5 kilograms in weight. The challenge facing pulse exporters in India is the cost incurred in exporting branded pulse products. Pulse traders have indicated the desire to export pulses but expressed frustration with the obstacles whereby pulse exports are restricted. The survey revealed that the removal of restrictions on pulse exports could stimulate increased demand for imported pulses into India.

Over the years, the Indian government's policy has been to protect consumers. This was achieved through the setting of a Minimum Support Price (MSP) for most agricultural products, including pulses. The Indian government also reduced import duties on capital goods used in agriculture and made credit available for exports. The assistance led to an expansion of the area of land under irrigation and actively encouraged research to improve yields of cereals and oilseeds varieties. Research on pulses received little attention. The effect has been to bias resource allocation towards cereals and oilseeds and away from pulses.

Some of the steps initiated by the Indian Government in this respect in association with Agricultural Institutions, National Conference on pulses and Centrally Sponsored Scheme are as follows:

a. Increasing area under cultivation of pulses
b. Intensifying research by the major research bodies like IARI, Indian Institute of Pulses Research for finding high yielding varieties for cultivating of pulses crops
c. Grant of subsidy to the farmers in the form of inputs and availability of easy credits,
d. Providing facility of crop insurance and
e. Assuring of reasonable minimum support price to the farmers
5.4 Tur processors behavioural responses in the post WTO period

The results from this investigation indicated that majority of the respondents had formed medium awareness on various policy and institutional instruments. There were no previous studies reported on the awareness of tur processors about various policy and institutional instruments. The present findings indicate that majority of traditional tur processors had medium awareness and modern tur processors had high awareness. It may be explained on the following basis.

Awareness is a psychological trait which prepares an individual for further action. Further, awareness is developed on the basis of the experiences the individuals undergo in their course of day to day activities.

The probable reason for medium awareness of the traditional tur processors on the above said policy and institutional instruments might be due to the following reasons. During the pre-WTO era, the Indian Government tried to promote agricultural diversification to meet the target of self-sufficiency. This goal was achieved through the provision of subsidies for fertilizers and water to encourage production of grains and oilseeds rather than through increasing investment in irrigation, power and rural infrastructure. The Indian government also reduced import duties on capital goods used in agriculture and made credit available for exports. The assistance led to an expansion of the area of land under irrigation and actively encouraged research to improve yields of cereals and oilseeds varieties. Research on pulses received little attention. Also, the pulses were grown on marginal lands; hence the productivity was very low. Majority of the traditional tur processors are yet to take off towards the modern packages of agricultural technologies, post harvest technologies, processing, trading and various policy and institutional instruments. Thus, the traditional tur processors had an unfavourable attitude towards the growth of pulses.

On the other hand, the modern tur processors showed higher awareness on the WTO policies and institutional instruments. This can be explained due to the following reasons. The modern tur processors have kept themselves updated about the policies and reforms the Indian Government is taking to boost the pulses (tur) industry. The research institutes like Indian Institute of Pulses Research (IIPR) Kanpur, Indian Council of Agricultural Research (ICAR) New Delhi, Tur Board of Karnataka have developed a host of high yielding varieties in respect of these crops.

In the recent past the Indian Government has taken several measures like conducting National Conference on Pulses, Centrally Sponsored Scheme, Introduction of special seed kits for increasing the productivity of the pulses (tur) and provision of a good Minimum Support Price (MSP).

NAFED, set up under the Ministry of Agriculture, Government of India, is another cooperative agency engaged in promoting direct export/import and procurement of pulses in the country. Its International Trade Division is involved in constant research and exploration work for this purpose. Regular efforts are made by the Division to identify new markets and new commodities. The Division has also been engaged to promote direct export business of pulses like lentils, gram, etc. besides, it undertakes import of pulses.

CFTRI, Mysore is working to release technologies and machineries for improved processing of tur. The modern tur processors have started working towards enhanced and improved post harvest techniques and storage of tur. The modern tur processors are working to increase the exports of the branded pulses by trying to reduce the cost incurred.

The modern tur processors are being benefitted by the progressive farmers who are growing high yielding varieties tur on fertile lands and increasing the area under the crop. The farmers are getting support from the Government in the form of distribution of certified seeds, seed mini-kits, micronutrients, sprinkler sets, improved farm implements, plant protection equipment, availability of easy credits, providing facility of crop insurance, assuring of reasonable minimum support price to the farmers.
All these reasons have led to increased area under tur production and productivity of tur, thereby creating a favourable atmosphere for the tur processors. Thus, the modern tur processors showed a higher and favourable awareness to the WTO policies and institutional instruments.

The results in Table 4.9 indicated that responses of the traditional and modern tur processors towards the WTO policies and institutional instruments. There are no previous studies reported on the attitude of tur processors towards post WTO.

5.5 Problems faced by the tur processors and suggest appropriate policy measures

The tur processors are mainly located in the Guburga district as it is the district headquarters. The tur processors have formed various associations like Dall Mill Association, Guburga, Chamber of Commerce, Guburga etc to discuss and address various concerns faced by the tur processors in terms of technology, processing techniques, marketing, branding, export etc.

Table 4.11 indicated the opinion of sample processors regarding problems associated with processing of tur in Gulbarga district. Taxation was the major problem faced by the processors in tur processing units. All the processors (100 %) expressed that the existing market fee, commission charges and taxation were high and need to be rationalized. Procurement of raw material formed another problem as more than 70 per cent of the tur mill owners viewed it as a problem followed by difficulties in the availability of labor. The lack of suitable system to get the required capital for the tur processing unit coupled with high cost of working capital was also continued as a problem by more than 60 per cent of the tur processing units. Inadequate supply of power is one of the major problem faced by the tur processors. Majority of the processors (60.00 %) including both conventional and modern units have complained about the poor supply of power. This has resulted in under utilization of the capacity in the tur processing units.

The problems regarding high processing cost were reported by 65 per cent. This was followed by problems regarding the repairs and maintenance. The respondents felt that the problem of repairs and maintenance was very high (70.00 %) in conventional units in comparison with the modern processors (30.00 %).

The analysis of the response of the traditional and modern tur processors to the processors schedule revealed that the tur processors face a set of problems associated with the WTO regime. Some of the major problems are as follows:

i. The post WTO regime saw unprecedented price fall in all the agricultural products including tur worldwide.

ii. The developing countries like India were not able to safeguard the farmers and processors against the volatile prices in the post WTO regime unlike the developed countries in EU and America.

iii. There is no restriction on the import of the pulses in India leading to price distortions.

iv. Compulsory levies like limit on stocking limit for private traders, prohibition of future trading.

v. Lack of infrastructure like post harvest technologies, storage and packaging limits etc.

Apart from all these the tur processors also face a series of other problems like:

1. Procurement of raw material formed another problem as majority of the tur mill owners as the production and productivity of tur is low compared to cereals.

2. Difficulties in the availability of labor to work in the processing units

3. The lack of suitable system to get the required capital for the tur processing unit coupled with high cost of working capital was also continued as a problem of the tur processing units.

4. Inadequate supply of power is one of the major problems faced by the tur processors.
Some of the policies and institutional reforms of the WTO which had a negative impact on the Indian agriculture trade are as follows:

1. Post WTO, the emergence of highly volatile price regime set off unprecedented and unforeseen decline in international agricultural prices for the pulses.

2. Exports were badly hit and several countries like India were taken aback by import influx of commodities.

3. During this period, the developed countries like EU and USA in particular, provided much higher level of subsidies to their farmers and developing countries like India were not able to protect their farmers. More than 60 per cent of this support was in trade distorting market price support.

4. The Agreement on Agriculture is said to be ably manipulated by the developed countries to benefit their agriculture at the cost of developing countries.

5. Imports of most crops, with almost the single exception of pulses, are canalised, *i.e.* imported only through government agencies as a result there is no restriction on the import of the pulses, hence there are price distortions in the pulse market.

6. Crops are also subject to restrictions on domestic trade that are regulated under the Essential Commodities Act of 1955. These include compulsory levies on millers, stocking limits for private traders, milling reserved for only small sector industries, occasional restrictions of interstate movement and, for most crops, prohibition of trading futures. All these restrictions are further distorting the prices of the pulses.

7. Despite the export quotas that the Indian government imposed on pulse exports, it permitted the export of branded pulses in consumer packs not exceeding 5 kilograms in weight. The challenge facing pulse exporters in India is the cost incurred in exporting branded pulse products. Pulse traders have indicated the desire to export pulses but expressed frustration with the obstacles whereby pulse exports are restricted.

8. MSP for pulses is generally less than the market price and it is fixed by CACP.

9. Continuing lack of adequate infrastructure for exports, including post harvest infrastructure such as storage and packaging facilities, poor quality, low productivity as the pulses are grown on marginal lands are all adding to the woes of tur processors.

India grows a variety of pulse crops under a wide range of agro-climate conditions and is recognized globally as a major player in pulses contributing around 25 per cent of the global production. The Government of India has set up a plethora of bodies to look after development and marketing of pulses. Some of the major ones include: Indian Institute of Pulses Research (Kanpur), Indian Agriculture Research Institute, New Delhi which over the years has been acting as a national centre for basic and applied research on pulse crops such as chickpea, pigeon pea, mung bean, urad bean, lentil, etc. NAFED, set up under the Ministry of Agriculture, Government of India, is another co-operative agency engaged in promoting direct export/import and procurement of pulses in the country. The division of NAFED has also been engaged to promote direct export business of pulses like lentils, gram, etc. Besides, it undertakes import of pulses.

The Government of India embarked on a series of policy reforms, namely, the reduction in import tariffs, the liberalization of agricultural trade and the removal of production controls in the agricultural sector. Apart from these, few more steps which can be implemented to reduce the problems faced by the tur processors are as follows:

1. To improve competitive attributes of our tur produce, involving production, processing, marketing, trading practices and other processes, post harvest infrastructure, technology from the farm to the final destination.

2. To boost production of pulses, development of host of high yielding varieties by major research bodies like IARI, Institute of pulses Crops and increase in area under cultivation of pulses.
3. The survey revealed that the removal of restrictions on pulse exports could stimulate increased demand for imported pulses into India.

4. Incentives for farmers for production e.g. distribution of certified seeds, seed mini-kits, micronutrients, sprinkler sets, improved farm implements, plant protection equipment, etc. so as to motivate them to take up cultivation of pulses on a large scale. Besides this, for effective transfer of improved pulse production technology, field demonstrations on farmers' fields and farmers' training are also organized under the scheme.

5. Encourage farmers to increase the area under tur by grant of subsidy to the farmers in the form of inputs and availability of easy credits, providing facility of crop insurance, assuring of reasonable minimum support price to the farmers.

6. Prioritization, enhancing production and processing efficiency, marketing and transport infrastructure, maintaining quality, stable supply etc. need immediate attention.

7. Enforcement of Model APMC Act which encourages direct marketing and contract farming should be implemented in true spirit.

8. A special campaign is required to create awareness for appreciating quality aspects of farm produce among the farming community, traders, consumers and exporters.

9. There is necessity to establish Export Processing Zones and Commodity Boards for targeted commodities.
6. SUMMARY AND POLICY IMPLICATIONS

India is the largest producer and consumer of pulses in the world accounting for 33 per cent of world area and 22 per cent of world production of pulses. Pulses occupy an important place in Indian agricultural economy, as they are rich sources of protein and constitute 10 to 15 per cent of the food diet of Indians. Major portion of Indian population belong to vegetarian group and every person on an average is required to consume 70-80 gms of pulses per day in order to maintain good health.

About a dozen varieties of pulses are grown in India. The more popular being bengal gram, pigeon pea, green gram, black gram and lentil. Bengal gram dominates with over 40 per cent share of total pulse production, followed by pigeon pea (20%). Among these pulses, pigeon pea and urad are mainly cultivated in kharif and bengal gram in rabi season as mixed crop with coarse cereals.

Pigeon Pea (*Cajanus cajana*) also known as tur, is one of the major pulse crops of tropical and sub-tropical regions of the world. It ranks second among pulse crops next to bengal gram. Pigeon pea is considered to be native of peninsular India. It is a perennial shrub and a short annual crop in India and as a perennial crop in many other countries, where the pods are harvested at a regular intervals.

More than 350 vernacular names of pigeon pea have been recorded. However, it is commonly known as *tur*. The name pigeon pea was first reported from Barbados, where the seeds once were considered to be very useful as feed for pigeons.

Pigeon pea is one of the major pulse crops, endowed with several unique characteristics. It finds an important place in the farming systems adopted by small holding peasants in a large number of developing countries. In India, it is mainly used as ‘dal’ which is a processed product. Its green seeds are used as vegetable and are of dietary importance with a seed protein content of about 21 per cent that compares well with that of other important grain legumes. Besides the human diet, the green leaves and dry seeds of pigeon pea are used as fodder for animals.

India accounts for 90 per cent of world’s production of pigeon pea with an area of 3738 thousand ha and production of 3090 thousand tons; and in Karnataka, it is grown on an area of 600 ha with production of 280 thousand tons with the productivity of 467 kg/ha. Karnataka occupies second position and third position with respect to area and production of pigeon pea, respectively.

Pigeon pea is a dry land crop and hence it is largely grown in Northern parts of the state like Gulbarga, Bellary, Raichur, Bidar and Yadgiri. Gulbarga is major pigeon pea growing area in the state and hence is called as “Pigeon Pea or Tur Bowl of Karnataka” next to it is Bidar, followed by Raichur.

The lower productivity of pigeon pea is due to many factors, among which the loss due to severe incidence of pests is predominant in recent years. In India, pigeon pea is prone to attack more than 200 species of insect pests, among which pod borer causes enormous loss. The loss has been estimated to vary from 46.6 to 63.6 per cent. Thus, cultivation of pigeon pea mainly depends upon the management of pest which accounts for a major share in the total cost of cultivation.

Against this background the present study is an attempt to analyze the competitiveness of Karnataka agriculture in the wake of trade liberalization. The specific objectives of the present study are:

1. To analyze the growth in area, production and productivity of tur crop in the study region.
2. To estimate the supply response of tur crop in Karnataka
3. To document the policy changes in tur industry
4. To analyze the tur processors behavioural responses in the post WTO period
5. To identify the problems faced by the tur processors and suggest appropriate policy measures.
In order to estimate the growth rates of area, yield and production, the entire period was divided into three sub-periods namely:-

1. Pre-WTO period
2. Post-WTO period
3. Aggregate period

The primary objective of estimating the growth rates on area, production and yield was attempted by computing the compound growth rate of these variables for all the three periods separately by using the semi-logarithmic function of the form $y = ab^t$, where ‘$y$’ is the dependent variable and ‘$t$’ is the time trend. $b = (1+r)$ and ‘$r$’ is the compound growth rate.

The second objective of estimating the supply response were achieved by the use of modified Nerlovian adjustment lag model that incorporated the lagged dependent variable as one of the explanatory variables.

Area response functions were estimated separately for each of the selected districts. The data on area, production and yield were collected from the records maintained at the Directorate of Economics and Statistics, Bangalore. The rainfall data for the selected districts was abstracted from the rainfall records maintained at the Directorate of Economics and Statistics (DES).

Prices of tur of different varieties were collected from the Agricultural Produce Market Committees of the seven taluks of Gulburga district.

The third objective of documenting the policy changes in the pulse industry of India was done through a detailed study and analysis of various policies, reforms, schemes implemented by Indian Government and various Agricultural Research Institutions. The pre WTO and post WTO reforms were also studied and the following observations were made:

In the pre WTO period, from 1970s to 1990s, the Indian Government made various reforms like subsidies for irrigation, fertilizers, gave increased importance to the research and release of high yielding varieties of cereals. As a result, India achieved self sufficiency in the production of cereals. But the pulses were totally ignored. The production of the pulses was very low as the area under pulses was reducing and the productivity was lower as the pulses were grown on marginal lands. Also, the import of most of the crops except pulses was canalized i.e. through Public Distribution System (PDS). The minimum support price for pulses was much lesser than the market prices unlike other crops. There were lot of restrictions on export of pulses; hence even if the tur processors wanted to export pulses they were frustrated.

In the post WTO period, there was a sudden decline in the prices of the agricultural products including pulses. The developed countries guarded their farmers and processors by giving them higher subsidies but developing countries like India were not equipped to do so. Hence, the farmers and processors suffered. But there were a few positive reforms introduced by the Indian Government like Centrally Sponsored Integrated Scheme which provided for free seed kits, field demonstrations etc. Also, IARI, New Delhi & IIPR, Kanpur were involved in research work to release high yielding varieties of pulses. But even after these few steps, the pulses industry received very less attention compared to cereals hence, the production, productivity, post harvest technology; export of pulses in India took a back seat. Due to all the above reasons, the policies and reforms were not very suitable to pulses industry.

The fourth objective to analyze the tur processors behavioural response in the post WTO period was achieved through analysis of the results of the survey of the feedback from the traditional and modern tur processors.

The behaviour response of the modern tur processors in the post WTO period is much favourable when compared to the traditional tur processors. This kind of positive behavioural response of the modern tur processors can be explained due to the following reasons. The Government and various Research Institutions have taken reform measures to promote pulses production. Various high yielding varieties (HYV) of pulses have been released by IARI, New Delhi and IIPR, Kanpur. The Government has increased the Minimum Support Price (MSP) when compared to the pre WTO period.
Under the “Centrally Sponsored Integrated Scheme”, the Government is providing incentives to farmers like mini seed kits, micro nutrients, sprinklers, fertilizers, field demos etc. NAFED, set up under the Ministry of Agriculture, Government of India, is another co-operative agency engaged in promoting direct export/import and procurement of pulses in the country. The Division of NAFED has also been engaged to promote direct export business of pulses like lentils, gram, etc. Besides, it undertakes import of pulses.

Due to various reforms undertaken by the Government and the Research Institutions, the behaviour response of the modern tur processors is much favourable. Whereas the behavior response of the traditional tur processors was unfavorable as they are yet to take off towards the modern packages of agricultural technologies, post harvest technologies, processing techniques and are not very much aware of the institutions like NAFED which are promoting the export and import of the pulses.

The fifth and the final objective was studied based on the findings of a survey of tur processors of Gulbarga district. The problems faced by the traditional and modern tur processors are explained as follows:

100% of the traditional tur processors had problems with taxation i.e. crops are also subject to restrictions on domestic trade that are regulated under the Essential Commodities Act of 1955. These include compulsory levies on millers, stocking limits for private traders, milling reserved for only small sector industries, occasional restrictions of interstate movement and, for most crops, prohibition of trading futures.

This was followed by problems like interruption of power supply, difficulties in labour availability, high cost of working capital and high processing cost with 80% of the traditional tur processors facing these problems. Also, 70% of the traditional tur processors faced problems like high cost of tur procurement, transportation problems and problems regarding repairs and maintenance.

On the other hand, 100% of the modern tur processors had problems with taxation. This was followed by interruption of power supply and high cost of tur procurement with about 60% of modern tur processors facing these problems. Some other problems like difficulty in labour availability, high cost of working capital and high processing cost were faced by 50% of the modern tur processors. About 30% of the modern tur processors faced problems with transportation and repair and maintenance.

On the whole, the major problems faced by the tur processors are taxation, labour availability, high cost of tur procurement, processing cost and interruption of power supply. Few other problems are cost of working capital, transportation problems, repair and maintenance.

The main findings of the study are summarized as under:

1. In all the taluks a positive and significant growth in area was observed in all the three periods namely pre-WTO period, post-WTO period and Overall period.
2. Because of the negative and in some cases stagnant growth in productivity during the pre-WTO period, a negative and a more or less stagnant growth in production was witnessed during pre-WTO period. A positive and significant growth in production was observed during the post WTO period and this was found to be the case of ‘area led output growth’. In conclusion it can be said that the growth rate in output was more or less the consequence of the growth rate in area and this resulted in what is called ‘area led output growth’.
3. Area allocation decision of all taluks were determined by the lagged area.
4. The rainfall was the significant variable affecting the yield and production of tur in Karnataka.
5. The tur processors have favourable attitude towards WTO regime.
Policy implications

On the basis of the findings of the present investigation certain policy measures could be suggested which would help the tur processors. They are as follows:

1. A positive and significant growth observed in the area of tur during the pre- and post-WTO, area signifies the importance of tur in the Gulbarga agricultural economy. The figures indicate that there is still ample opportunity to increase the area and production in Gulbarga through development of new high yielding varieties (HYV) and quality tur production. The potential of tur demand as evidenced by many of the studies reveal that the present trade policies are in favour of increased area and production of tur. This can be achieved through innovative initiatives to promote tur production in the selected area.

2. The productivity of tur analysis revealed a negative direction, indicating need to promote high yielding and high quality tur varieties coupled with adequate nutrient management which can go a long way in improving the yield levels of tur in the region.

3. The lagged production function revealing the response of supply indicate that the previous year’s price has more impact on decision making with respect to allocation of area under tur, thus, indicating the importance of lagged prices to determine the prospective years area in the region. Therefore, in order to have a sustainable area and production, there is a need to stabilize the prices through incentive policies of the government at gross root level to boost tur production in the district.

4. The study on the behaviour of processors to study the attitudes regarding existing scientific know how about production technology, information on WTO reforms, quality standard, export opportunities etc, reveal unfavorable values in the pre-WTO regime (traditional tur processors) compared to the favorable during the post-WTO regime,( modern tur processors) which calls for exploring the present potential towards domestic sustainance and export promotion.

5. The study on problems faced by the tur processors indicated that majority of them faced state taxation on tur marketing, which has resulted in the movement of tur to border states where the taxes are relatively low compared to Karnataka. Hence, in order to prevent tur moving to adjacent states suitable policies to administer taxes without impairing the market situation may be suggested and implemented to make favorable situation in the marketing process. Subsequently the other problems such as lack of adequate power supply, lack of adequate working capital and labour management seem to be more alarming for which the government may come out with policies aiming at efficient and adequate supply of power, transportation and soft advance by the local bank to meet immediate working capital needs can go a long way in ushering tur in the state.

6. All the traditional and modern tur processors should be educated about government policies and progammes and current events at national and global level through proper training facilities.
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Appendix I: Interview Schedule

“BEHAVIOURAL RESPONSE OF TUR INDUSTRY DURING WTO ERA – A MANAGEMENT APPRAISAL”

A. General Information

1. Name of the red gram (tur) processors :

2. Taluk :

3. District : Gulbarga

B. Profile of respondent

1. Age :

2. Education :

3. Family size :

C. Nature of Organization :

D. Commencement of proprietor business:
   - Himself/ Guidance of father/ Ancestor/ Friends/ Other/ Successful Processors

E. Nature of business: processing/others

The following aspects will be the guiding factors for collecting data from the red gram (tur) processors

i. Measuring the level of Awareness and Knowledge

   a. Are you aware of the following?

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## Appendix III: The Scale to Measure the Attitude of tur Processors towards WTO

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<td>Globalisation meets goals of majority of firms in India</td>
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<td>2.</td>
<td>Globalization helps technology upgradation of Indian pulse processing units</td>
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<td>3.</td>
<td>Hazard Analysis Critical Control Point (HACCP) ensures quality of products</td>
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<td>4.</td>
<td>Liberalisation of Indian pulse economy has led to pulses (tur) processing units becoming sicker</td>
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<td>5.</td>
<td>Privatisation encourages maximization of capacity utilization of pulse (tur) mills</td>
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<td>6.</td>
<td>Globalization helped the technology up-gradation of Indian Tur processing units</td>
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<td>General Agreement on Trade and Tariff (Pre-WTO) regime only favoured the developed countries</td>
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<td>8.</td>
<td>World Trade Organisation (Post-WTO) Regime does not open up gateway of opportunities in trade and development to developing countries</td>
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<td>9.</td>
<td>Govt. of India’s Export- Import Policy simplifies the export procedures to boost up exports in global trade</td>
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<td>10.</td>
<td>Government of India’s EXIM Policy liberalises import procedure to surge imports in domestic market</td>
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<td>Govt. of India’s Export- Import Policy did not simplify the export procedures to boost up exports in global trade</td>
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<td>12.</td>
<td>Pulse processing units working under Special Economic Zone (SEZ) are not able to minimise their cost of production</td>
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<td>13.</td>
<td>Dall mill Processors Association did not play a catalyst role in supply chain management</td>
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<td>14.</td>
<td>AGMARK standards should be made mandatory for selling all pulse products domestically</td>
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<td>15.</td>
<td>AGMARK labelled products should be given tax rebate</td>
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<td>16.</td>
<td>Pulse processing units should possess only ISI branded plant &amp; machinery</td>
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<td>17.</td>
<td>CFTRI, Mysore plays an important role in providing cost effective methods to process Tur</td>
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<td>18.</td>
<td>Consumers are more attracted towards small sachets of pulse products</td>
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<td>19.</td>
<td>Intellectual Property Rights under WTO regime is more comprehensive than Indian Patent Act</td>
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<td>20.</td>
<td>Getting Geographical Indication (GI) increases volume of business</td>
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<td>21.</td>
<td>ISO standards help to increase market share in the global market</td>
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<tr>
<td>Statement</td>
<td>Answer</td>
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<tr>
<td>22. Agricultural and Processed Products Export Development Authority (APEDA) promotes pulse processing units to gear up competition at global level</td>
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<td>23. Linkages between University, Farmers &amp; pulse mill owners promote Agri-business management</td>
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<td>24. Agricultural and Processed Food Products Export Development Authority (APEDA) helps Tur processing units to gear up competition at global level</td>
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<td>25. National Agricultural Co-operative Marketing Federation of India Ltd. (NAFED) ensures timely availability of raw materials to processing units</td>
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<td>26. National Dairy Development Board (NDDB) promotes vegetable, pulse industry in India</td>
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<td>27. Good Manufacturing Practices (GMP) help in exporting of pulse products at international level</td>
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<td>28. Technology Mission on pulses has not helped to attain self-sufficiency in pulse production in India</td>
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<td>29. World Trade Organization (Post-WTO) Regime did not open gateway of opportunities in trade and development to developing countries</td>
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<td>30. In the post-WTO era, skilled manpower in pulse processing industries is essential for becoming competitive in the world market</td>
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<td>31. Liberalisation of Indian Tur sector has led to sickness among Tur processing units</td>
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<td>32. Pulse Processors Association does not play a catalytical role in supply chain management business model</td>
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<td>33. Sound Financial Management in processing units is the pivotal part of agribusiness management units</td>
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<tr>
<td>34. Good Manufacturing Practices (GMP) help in increasing exports of Tur products</td>
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<tr>
<td>35. Human Resource Management plays dominant role in profitability of processing units</td>
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<tr>
<td>36. Tur Board, Govt. of Karnataka helps Tur industry to gear up competition at global level</td>
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<td>37. Supply chain management business model is the need of the hour</td>
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*SA- Strongly Agree, A- Agree, UD- Undecided, D- Disagree, SD- Strongly disagree

The statement numbers 4, 6, 8, 11, 12, 13, 17, 28, 29, 32 and 34 were unfavourable and remaining were favourable.
Appendix IV: Criteria for Editing the Statements

1. Avoid statements that refer to the past rather than the present.
2. Avoid statements that are factual or capable of being interpreted as factual.
3. Avoid statements that may be interpreted in more than one way.
4. Avoid statements that are irrelevant to the psychological object under consideration.
5. Avoid statements that are likely to be endorsed by almost everyone or by almost no one.
6. Select statements that are believed to cover the entire range of the affective scale of interest.
7. Keep the language of the statements simple, clear and direct.
8. Statements should be short, rarely exceeding 20 words.
9. Each statement should contain only one complete thought.
10. Statements containing universals such as *all*, *always*, *none* and *never* that would often introduce ambiguity should be avoided.
11. Words such as *only*, *just*, *merely* and others of a similar nature should be used with care and moderation in writing statements.
12. Wherever possible, statements should be in the form of simple sentences rather than in the form of compound or complex sentences.
13. Avoid the use of words that may not be understood by those who are to be given the completed scale and
14. Avoid the use of double negatives.
ABSTRACT

Pigeon Pea (Cajanus cajana), is a major pulse crop of tropical and sub-tropical regions of the world. Hence, the present study was planned to analyze the global competitiveness of tur crop in Karnataka. Seven taluks of Gulbarga district of Karnataka state were selected by using a purposive sampling technique based on the ranking of area, production and productivity of tur. The selected tur processors for the behavioural response analysis were contacted in person and data was collected with the help of a pre-tested interview schedule. Secondary data were collected from the annual reports of FAO, Directorate of Economics and Statistics and Tur Board.

In pre-WTO era, the compound growth rate for area and production of tur was negative, while productivity was slightly positive. In the post- WTO era, area, the production and productivity of tur is positive. The supply response of tur is dependent on the rainfall, lagged price, lagged yield and lagged area. Since, 2000 the Indian Government introduced facilities like subsidies on agricultural inputs, irrigation, good minimum support price, promotion of high yielding varieties (HYV) etc. The awareness of tur processors about the policy and institutional instruments was studied by administering a questionnaire. The modern tur processors showed higher awareness compared to the traditional tur processors. The attitude of the tur processors was studied by administering the scale to measure the attitude of tur processors towards WTO era. The attitude of the traditional tur mill processors was unfavourable and the attitude of the modern tur mill processors was favourable.

High cost of working capital, taxation, procurement of raw materials, processing and poor power supply were the major production constraints. Fluctuations in market prices were major marketing constraint while non-availability of quality testing laboratories and limitations on export were the major export constraints.