CONCLUSION AND STRATEGIES

CONCLUSION:

In first Chapter, the preliminary aspects of the study have been discussed. They are introduction, statement of the problem, the study area review of literature, objectives, methodology, etc. The problem selected for the research is “Spatio-Temporal Variations in Agro-Economic Development – A Case Study of Tumkur District”. The area chosen for the research is Tumkur district, which is one of the 30 districts in Karnataka. The district is located in the southern part of the state through which three major National Highways and Bangalore-Miraj Broadgauge Railway line are criss-crossing through the district. The district consists of ten taluks.

The related literature to the study area and research topic has been reviewed. The information related to topic of investigation has been collected and suitably analysed. There are about ten major objectives covering the focal theme of the study. They have been tested in the study through intensive study of the research. Simple methodology has been adopted in the research, which includes collection of secondary and primary data which has been analysed for thorough understanding of the spatial and temporal variations in agriculture in the district. The indices and percentages have been used and they are presented in the form of maps, graphs and charts. About five hypotheses have been framed and tested. The scope and limitations of the study have been discussed briefly. The thesis has been organized into seven Chapters covering each aspects in detail.
The chapter two deals with Regional Setting of the Study Area. Tumkur district is situated in the east central part of Karnataka. The district spreads over a geographical area of 1064.70 thousand hectares (10596 km\(^2\)). The district has been divided into 10 taluks for administrative purpose. It consists of 50 hoblies and 321 village panchayats with total number of 2708 villages. In terms of geographical area Tumkur district is the second largest district (5.52%) next to Gulbarga district in the state geographical area (2005-06).

Physiographically it is a land located district and forms part of the southern maidan of Karnataka. Except two hill ranges running north-south rest are in the eastern part of the district. There is a major younger granites hill range in the central part of the district. Most of the district area is a undulating. The district is mainly drained by non perennial streams and consists of numerable tanks which are the major sources of irrigation. There are a few small non perennial steams these rise in the hills and feed a number of tanks. The most important rivers of this district are the Shimsha (Cauvery basin) and Jayamangali (Pennaru basin). Red soils are the major part of the district and one can see varying shades of red soils like gravelly soil, sandy soil, loamy soil and clay soils, mainly cover the district. Climatically the study area lies in the semi-arid part of the southern peninsular India and receives an annual average rainfall of 673mm. The rainfall occurs during south west monsoon and also in the north east monsoon season.

As per 2001 census Tumkur district has a population of 2584711 and in 2011 census it has increased to 26,81,449 persons and accounts for 4.4% of the population in Karnataka and ranks fourth in the state next to Bangalore, Belgaum and Mysore. The geographical area of the district was put to different
uses like cultivation (59%), forest (42%), non-cultivated area (15%) etc. of the total geographical area nearly 58.8% of the area was cultivated.

Agriculture is the main occupation of the people of the Tumkur district. The major crops cultivated and their distributions in the whole region have close relationship with the distribution of rainfall and fertility of the soil. The different crops are cultivated among these oil seeds (46.30%) and cereals have (35.20%). But cereals cultivation area in the district has declined in recent years. Tumkur district is basically an agricultural area. It does not have rich minerals of both ferrous and non ferrous. However, the crystalline rocks have lead to the establishment of some granite industries recently. Along with agro-based and other industries in the district it has 29 large and medium scale industries and 21606 small scale industries in district due to good infrastructure facilities in the district.

In the Chapter three, Demographic dimensions and Human Resources in Tumkur District were explained. Agricultural land is the backbone of the economy of the Tumkur district and agriculture is the most important occupation of the district. The demographic aspects are also responsible to some extent in influencing the growth of irrigation and agriculture development. During 1981, the total population was only 19.8 lakhs persons, whereas in 2001 the total population of region has increased to 25.8 lakhs persons with a decadal growth rate of 12.10%. Tumkur district ranks second with 5.96% (2077509 persons) state’s rural population in the year 2001 census. In terms of urban population Tumkur district has tenth rank with 2.82% (507202 persons) of urban population of Karnataka. There are ten taluks in
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Tumkur district where population density and degree of urbanization is rather high in southern taluks.

The density of population is an indicator of human concentration and some measures to be undertaken to reduce the extent of the population pressure considering the district as a whole. The density of population during the year 1981 was 187 persons/km$^2$ and it was increased to 244 persons/km$^2$ during 2001. The distribution of population by sex-ratio was 961 females/1000 males in the year 1981. Whereas in 1991, it decreased by small fraction to 959 females/1000 males, but by the year 2001 it increased to 966 females/1000 males. The highest sex-ratio was recorded in Kunigal (1023/1000 males) and lowest sex ratio was observed in Tumkur taluk (924/1000 males).

According to 1981 census average literacy of Tumkur district was about 36.9% of which 48.2% were male and 25.1% were females and during 2001 census report the literacy rate was about 67.0%. The male and female literacy was 76.8% and 56.9% respectively. Occupational structure of Tumkur district in the year 1991 the proportion of workers was 39.73% to the total population of which 78.82% of workers were engaged in primary activity and it was followed by 13.32% by tertiary activity and 8.26% secondary activity. But in the year 2001 out of the total workers 74.20% of population was engaged in primary economic activity followed by tertiary (17.87%) and secondary (7.93%) activity. These statistical figures have shown over the years a considerable decline in primary activities and remarkable rise in tertiary economic activities in the district.
Disparities in Spatial Pattern of Agricultural Landuse discussed in the fourth chapter. Tumkur district in its total geographical area of 1064755 hectares has around 50-55% of the area was net sown area in this district based on both physical and man made factors affecting agricultural practices. But there is always the possibility of slight increase in all the taluks with farmers following better dry land irrigation practices. At any cost farmer must learn and practice dry land irrigation and water management. They must practice water management other than present flooding type. This will yield better returns in these days of rising cost of agriculture and impact of globalization. As the Tumkur district is closer to Bangalore city already one can see its impact particularly on flower like horticulture crops cultivated.

In chapter fifth Aspects of both Land and Water-Disparities in the Utilization of Land and Water Resources of Tumkur District were discussed. Irrigation plays a vital role in the agricultural regeneration of the region. The district predominates in Tanks and Tube well irrigation in 1985-86 which accounts for 51.6% and 47.6% respectively. Off late Tube well are on rise in fact they are about (82.00%). As such great importance has been laid on accelerating the extension of water through various types of irrigation in the dry season within the shortest possible time. Canal and irrigation has been practiced in the Tumkur District after the development of Hemavathi, Maraconahalli, Boranakanive, Mangala, Theetha. Among them except Hemavathi the rest are minor irrigation projects. Out of net irrigated area in the district well irrigation have been occupied an area 47.60% in 1985-86. But it was increased to 82.00% in the year 2005-06. The area under canal irrigation covers about 0.50% during 1985-86 and it was increased to 2.90% with a higher growth rate. Whereas tank irrigation occupied an area of 51.60%
and it was steeply decreased in 2005-06. In the bygone days lift irrigation system was based on the local springs. But they almost non exist now due to falling level of ground water. With the on set of tube wells, both springs and traditional open well have disappeared from the study area. Only sound rain harvesting for agriculture and efficient water management can receive this type irrigation.

Tumkur district having entire district area under Gnessic and Granitic hard rock terrain with a semi arid climatic condition falls under areas yielding an average of 1-5 liters per second are considered as “poor acquifer zones. Except certain narrow valley fills under non perennial stream most of the taluks have dry lands with falling poor ground water conditions in the district.

The intensity of irrigation is not uniform throughout the study period as it was controlled by various factors. The high irrigation intensity (>30%) was noticed in Tumkur, Gubbi and Kunial whereas lower percent of intensity (<20%) was observed in C.N.Halli, Koratagere, Pavagada taluks of the district. It is due to these taluks have located in the upper part of the river basin and canal irrigation cannot be developed and also these areas did not fall in any irrigation projects in the district.

The details of Spatial Dynamics of Agricultural Crops in Tumkur District were discussed in the chapter six. Agricultural land use efficiency is a complex and dynamic concept. Any change in socio-economic and agro-technology input application brings corresponding change in the efficient utilization of the natural quality and availability of arable land. It represents the degree of optimal use and performance of cultivated as well as cultivable land. The study highlights the agriculture landuse efficiency regions by
adopting Kendal’s ranking co-efficient method by taking six variable in Tumkur district. The very high agricultural landuse efficiency was emerged in two taluks during 2005-06 viz., Gubbi and Tumkur. Medium in Sira, Pavagada, Madhugiri, C.N.Halli and Kunigal taluk. Whereas the low agricultural landuse efficiency confined to three taluks namely Turuvekere, Tiptur and Koratagere taluks.

The entire cropping pattern of Tumkur district seems to be governed by agro-climatic conditions. Irrigation plays a prominent role by changing the nature and extent of cropping pattern. Thus the development of irrigation in some areas particularly tube well irrigation have influenced the choice of cropping. This is due to a number of factors like diversity in weather condition, irrigation development, soils, transport development, agriculture markets urbanization, globalization etc., the region has experienced introduction of new horticultural.

In this study period Tumkur district experienced about 18 crops in different parts of the district. Out of the total cropped area in Tumkur district, the proportion of area under cereals was about 42.4% during 1985-86 and it has decreased to 35.2% in the year 2005-06. The net decrease in the area under cereals during period was about 7.2%. The proportion of area under pulses crops was about 17.7% in 1985-86 whereas it was decreased to 8.1% during 2005-06. Oil seeds (Ground nut, coconut and caster seeds) are the most predominant crops grown in the district. The proportion of area under this during 1985-86 was about 30.9% whereas it increased to 46.3%, the net increase in the area under oil seeds was about 15.4%. This increase in the area under oil seeds was due to growth in extension of tube well irrigation in the
recent decades. Their cropped area has increased substantially and also helped in the development of agro-based industries like oil mills in the taluk headquarters.

The area occupied by the spices was about 0.8% in 1985-86 whereas its percentage remained same even 0.8% in 2005-06. The percentage of species area during the study period has not seen much change in the district. The area under other cash crops was about 8.1% in the year 1985-86. Whereas it has in increased to 9.2% at 2005-06. This increase in the area mainly is due to the extension of irrigational facilities in the district.

In Tumkur district out of eighteen crops, selected few crops occupied a large area. Ragi 30.69% of area during 1985-86 and it was decreased to 26.21% in the year 2005-06 followed by groundnut 19.49% increased to 24.75%, coconut 9.91% increased to 18.73%, paddy 5.21% increased to 5.93%, horse gram 12.71% decreased to 3.83%, maize 0.88% increased to 2.14%, horticulture crops like fruits, vegetables flowers 1.33% increased to 3.18% etc., during the study period i.e., 1985-86 to 2005-06.

After covering conventional agricultural scenario in the previous chapters, looks into recent developments in agriculture in the Tumkur District were given in the chapter seven. The district is adjacent to Bangalore metropolis, which is also a drought prone with erratic seasonal mansoons, but development of tube wells has helped certain limited number of rich farmers taking up Greenhouse farming in the district. In Karnataka, Tumkur district ranks 8th in number of greenhouses (5.25%) next to Bangalore Rural, Hassan, Haveri, Mysore, and Chickmagalore, Bangalore Urban, Chikkaballapur. In terms of area and investment under greenhouses, the Tumkur taluk
predominates. It has 30% of greenhouses, 18.70% of area and 71% of the Capital invested in the region. Moderate to low beginning as greenhouses can be seen in taluks like Madhugiri, C.N. Halli, Turuvekere, Gubbi taluks. The dry taluk like Pavagada and Sira are yet to begin greenhouse farming. Surprisingly Kunigal taluk due to predominance of rice and areca cultivation it is yet to make a mark in greenhouse farming.

The industrial activity in Tumkur district is relatively higher level which is also true particularly in the case of agro based industries of the district. About 34% of industrial units belong to agro-products. At the same time these agro-based industries command about over 27% of the capital investment and 30% of industrial employment in the district. Agro based industries include the manufacture of food products, cotton textiles, production of silk and cotton yarn, coir products, gramflour, groundnut oil, rice mills, coconut shell power, coconut oil, caster oil groundnut kernel industries accounted for more than 50% of the Tumkur district during 1985-86 to 2005-06.

There are nearly 33 agro-based industrial categories in the district out of these top ten agro-based industries in Tumkur district by 1985-86 there were 1601 agro industrial units under operation. They increased to 2334 units by 2005-06.

The urban population and its growth trends have been examined from 1981 to 2011. The growth trends of urban population of Tumkur district in the year 1981 there was 2.7 lakhs. By 1991 it was increased to 3.8 lakh with a growth rate of 40.4% of decennial growth. It increased to 5 lakh with a decennial growth rate of almost 19%. In the study period urban population has increased by three fold in the district. The growth of urban population
increased demand for agricultural products from cereals to horticultural crops like fruits, vegetables and flowers. The farmers have started growing horticultural crops under the impact of urbanization and globalization for bigger markets like Bangalore.

STRATEGIES:

1. The Tumkur district is still under the grip of south-west monsoons, there is a need to extend canal irrigation particularly under the method of filling up of existing tanks. In fact it has already proved to be successful in Sira taluk. This must be extended to very dry belts of Pavagada, Madhugiri and Koratagere taluks which have such potential.

2. Taluks like Turuvekere, Gubbi, Kunigal have enormous potential of micro irrigation (sprinkler, drip irrigation). Because of present source of the major tanks of these taluks have been filled by Hemavathi (North Cauvery Basin) canal waters. Either to these tanks are seasonal or non-perennial since 10 years they have become perennial under Hemavathi canal water. However formers are still used traditional irrigation rather than water efficient micro irrigation methods. These taluks can bring the change in irrigation methods from conventional to micro irrigation methods, which appears to be the need of the hors of declining food security.

3. The taluks like C.N.Halli, Koratagere, Mdhugiri, Pavagada, Sira, Tiptur and Tumkur which have least irrigation families. But they have good number of dry tanks which need networking of canal water pipes to tanks. Then compulsorily need to micro irrigation introduced system
rather than ongoing conventional flooding type of irrigation which is not efficient.

4. There is a distributing trend of declining cereals production like ragi, rice and minor millets. This is happening under the impact of rise in the cultivation of commercial crops like mulberry, urban market oriented and fruits (mango). People must raise draft animals while growing some of them which provides biomenure and enhance fertility of the soil. By growing cereals people once again get food grains and fodder, which are not available at present like earlier days. Now farmers depends PDS and market sources for essentials! Which is a dangerous development.

5. Cultivation of pulses needs attention and farmers must reintroduce the former type of their inter tillage. This provides protein food security along with even fodder security, which is fast eroding in the study region.

6. Though at the outset, cropped area under oil seeds has shown substantial rise in the cropped area but there is a loss of caster and niger seeds growing area which are also important must be grown by farming community. There is a need to introduce their cultivation for healthy food habits and protection of agricultural plant bio-diversity.

7. Due to early urban market there is some rise in the cultivation of species like chillies and coriander. But in the earlier days most of the farmers used to grow a variety of vegetables, oil seeds and species in a small piece of land under substantial way. This need to be reintroduced as it has nutritional value but at present people or
depending on weekly markets round the years. The decline of sustainable species on one hand has eroded agricultural sustainability and biodiversity and overall physical health of people.

8. Due to some recent socio-economic factors other commercial cropped area is in rise at the cost of food crops. At present rural youths are migrating leaving agriculture thereby the artificial shortage of agricultural labourers. This trend must be reversed to make not only better living but also overall sustainable growth of Indian agriculture. It requires not only ‘PURA’ like rural development, but also rural youth must fallow sustainable dairy come agriculture with value addition to their agricultural products at rural level.

9. There is a rising trend in all the major oil seeds like coconut, groundnut and sunflower in the study area in the twenty years of study. As their cultivation is still under the grip of south west monsoons, there is a need to extend canal irrigation particularly under the method of filling up of existing tanks. In fact, it has proved successful in Sira taluk, this must be extended to very dry belts of Pavagada, Madhugiri and Koratagere taluks which have such potential.

10. Technology mission in oil seeds is yet to be fully utilized by these major oil seeds, medium and marginal farms are dominated Tumkur district which is unable to utilize the benefits as assured irrigation and land holding sizes are worrying factors. There must be insulation by policy measures to help these farmers thereby commercial crops like these will be grown adding to other side of food security of India.
11. The farmer should be encouraged to adopt new agricultural tools and techniques in the extension facilities through banks co-operative societies etc.

12. Adequate suitable prices for agriculture products well developed market system and provision of other infrastructure facilities are to be provided in the region.

13. There is a considerable agro-industrial base in the study region for any additional crop production. Particularly solvent plants and also handling of byproducts (oil cakes and the like) have right industrial base. This potential must be fully tapped for the benefit of both oil seed growing and keeping agricultural bio-diversity in the region.

14. Under the declining ground water conditions and low erratic rainfall conditions in Tumkur district as greenhouses have inbuilt of utilizing rain harvested water for crop cultivation and they must be encouraged.

15. Though greenhouses are capital intensive they are at present are adopting organic manure that is organic farming with good yields. It has potential of sustainable agriculture.

16. Right now, it is fallowed by educated and relatively well to do farmers. Even some private and small scale farmers are practicing under shade net greenhouse, even though they are small in size but engaged in the production of high quality vegetables (capsicum, colour capsicum, tomato, beans etc.). They must be encouraged with proper subsidy and other technical support to the farming community.
17. Karnataka Industrial Area Development Board may develop industrial areas particularly agro-based industries at all the taluks for providing developed land to prospective entrepreneurs.

18. Transport facilities are essential for the development of agro-based industries and other industries in the district. There is a need for surfacing all the roads connecting district headquarter with other taluk headquarters in the district.