CHAPTER I : INTRODUCTION

1.1 Introduction:

Indian economy is mainly agriculture oriented. It provides significant support for economic growth and social transformation of the country. The share of agriculture in national income has come down considerably since the inception of planning. The contributory share of agriculture sector in India accounted for 14.1 per cent of the Gross Domestic Product (at constant 2004-05 price) in 20012-13 (Government of India, 2012) compared to 18.9 per cent in 2004-05 (Government of India, 2005). Agriculture sector provides employment around to 58 per cent of country’s work force and it is the largest private sector occupation in the country (Government of India, 2012).

The country’s population has almost tripled in the last five decades and its food grain production has more than quadrupled, significantly enhancing the per capita food grain availability (Surabhi, 2007). Especially food availability and food management are importance to the Indian economy for four consecutive years (2005-06 to 2008-09). Food grain production recorded an average annual increase up to 10 million tonnes. The total food grain production in 2012-13 was estimated at 250.14 million tonnes as against 259.32 million tonnes in 2011-12, 244.8 million tonnes in 2010-11 and 218.1 million tonnes in 2009-10 (Government of India, 2012). Agricultural sector provides not only food and employment opportunities but also supply of raw materials to a very large proportion of the major industries such as cotton and jute textile industries, sugar, vanaspati, handloom spinning etc. India’s foreign trade is deeply associated with agriculture sector accounts for about 14.7 per cent of the total export earnings.

In fact during the last decade, the performance of agriculture sector in the Indian economy in recent years has not been quite satisfactory because of declaration in the growth rate of agricultural output (Pradeep, 2009). Also, Indian agriculture has faced a number of severe challenges, superimposed on the long term demographics. Recent trends that have raised concern regarding food security farmer’s income and poverty are: slowdown in growth, widening economic disparities between irrigated and rain-fed areas; increased vulnerability to world commodity price volatility following trade liberalization. This had an adverse effect on agricultural economies of
regions growing crops, uneven and slow development of technology, inefficient use of available technology and inputs, lack of adequate incentives and appropriate institutions, degradation of natural resource base, rapid and widespread decline in ground water table, with particularly adverse impact on small and marginal farmers, increased non-agricultural demand for land and water as a result of the higher overall GDP growth and urbanization, and aggravation in social distress as a cumulative impact of the above reflected in an upsurge in farmer’s suicides, etc. (Government of India, 2007).

All are these reasons; most farmers have made their intention clear about disliking the agriculture sector and hence, given an option, want to quit from agriculture. However, this partial sad state of agriculture, which calls for a change, is supplemented by the structural changes in the economy. The sustained economic growth rising per capita income, changing lifestyles, urbanization, market integration and trade liberalization at global level had caused a shift in the consumption patterns in favour of high-value horticulture crops like fruits and vegetables from staple food crops such as rice, wheat and coarse cereals (Pradeep K. M., 2009). The high value crops (HVCs) generally refer to non-staple horticulture crops which have higher net returns per unit of land than staples (Mahendra & Mathur V.C, 2008).

The potential of horticulture in raising agricultural production, value added farm income and employment in the country has been recognized long ago. The Fourth Five Year Plan (1969-74) recognized the importance of horticultural sector can make significant contribution towards accelerating agricultural growth. Horticultural crops have a strong potential to raise returns to land, labour and capital and are labour intensive and thus are conjectured to be more pro-small farmers who have higher endowment of family labour in relation to land. In a holistic way of horticulture can be promoted as a means of agro-diversification for the second green revolution in India, providing the much needed impetus to the growth of agricultural sector, through increase in trade, income and employment. The Indian agriculture is diversifying towards the production of high value commodities along with the increasing role of smallholding farmers (Mittal, 2009). Diversification towards horticulture got real boost in the early 1990s which coincided with liberalization of economy. Augmenting facilities for processing, marketing and storage, development
of rain fed and irrigated horticulture was one of the objectives of new agricultural policy resolution in 1992 (Ramesh, Raju S.S, & L.M, 2008).

Horticulture assumed importance as an indispensable part of agriculture with the varied agro-climate regions that India has a variety of horticultural crops can be grown offering a wide range of choice to farmers for crops diversification. Agricultural diversification reduces rural poverty and enhances the sustainability of the agricultural system. The rational for focusing on diversification towards horticultural crops for triggering agricultural development is an account of its contribution to poverty reduction through higher employment generation, higher potential for value addition and for generating foreign exchange and provision of food and nutrition security through supply of micro nutrients and roughages (Singh & V.C, 2008).

Horticultural crops is a significant part of total agricultural produce in the country comprising of fruits, vegetables, root and tuber crops, flowers, ornamental plants, medicinal and aromatic plants, spices and plantation crops. New introduction such as mushrooms, bamboo and bee keeping (for improving the crop productivity) has further expanded the scope of horticulture and have become key drivers of economic development in many of the states in the country.

The horticulture sector was contributing around 29.5 per cent of the GDP in agriculture from about 13.08 per cent. It also provides 37 per cent of the total exports of agricultural commodities. The total horticulture production in 2010-11 was estimated at 240.5 million tonnes as against 223.1 million tonnes in 2009-10 (Government of India, 2011). India is the second largest producer of fruits and vegetables. India is next only to China in area and production of vegetables and occupies prime position in the production of cauliflower, second in onion and third in cabbage in the world (Government of India, 2007). During 2010-11, the area and production of vegetables has been estimated at 8.49 million hectares with a production of 146.5 million tonnes and average productivity of 17.3 tonnes per hectares. Total production of fruits has been estimated at 74.8 million tonnes from 6.38 million hectares and average productivity of 11.7 tonnes per hectares. India is the second largest producer of flowers after china. The traditional flower sector registered an impressive growth during the Eighth, Ninth and Tenth Five Year Plan periods. The
total production of flowers was 880 million tones. India is known as the home of spices and produces a wide variety of spices like black pepper, cardamom ginger, garlic, turmeric, chilli and a large variety of tree and seed spices. The area and production of spices has been estimated at 2.94 million hectares with a production of 5.35 million tonnes and average productivity of 1.8 tonnes per hectares. The area, production and productivity of plantation crops have been estimated at 3.30 million hectares, 12 million tonnes and 3.6 tonnes per hectares, respectively (Government of India, 2011).

Karnataka state in India, agriculture is the dominant economic activity. The state has most experienced rapid structural changes in the process of economic development. The demographic changes along with improving infrastructures, have inflated and values and crop prices, a trend which has converted agriculture into a potentially horticulture sectors. The transition in agriculture is also accompanied by globalization of the market place, adoption of technological advances and expansion of government policies designed to support agriculture diversification in the state is highly intensified towards horticulture production (Fruits and vegetables) associated with diversification of diet, meeting the changing domestic market demand and increasing the export potential. Karnataka state is also highly potential for its horticulture production and it ranks second in this aspect in India.

Horticulture has proved to be the best diversification option for agricultural land use, because of assured and the remunerable returns to the farmers. The diverse agro-climatic conditions prevailing in the state are quite congenial for growing different horticultural crops, successfully, almost throughout the year. The usefulness of horticulture has been specially felt in scantly rainfall and drought prone areas of the state, as several perennial horticultural crops provide an effective drought proofing against the odds of the nature and assure the farmers satisfactory returns even during the year of deficit rainfall. This is the reason why horticultural crops are fast replacing agricultural crops in dry tracts of the state. Another important benefit that the farmers can avail is related to value addition of several horticulture produce, which offers very good scope for meeting the needs of different strata of consumers. With the onset of protected cultivation and consequent high quality produce, the horizons of export have greatly been expanded, offering unlimited scope to hi-tech farmers in the state. Of late, in response to the increasing awareness for nutritional security, consumption
of protective foods such as fruits and vegetables has greatly increased and this has helped to hike the production process. With all these developments that are taking place, the horticulture sector in the state has opened new vistas and bright future for the farmers of the state. Karnataka is the first state in the entire country to have a separate horticulture department and many other states, at later years, followed the example of Karnataka. Because of this, the state could achieve remarkable progress in many fronts of horticulture. Thus, through multifarious achievements and feats, the state of Karnataka became the “Horticultural State of India” (Government of Karnataka, 2006).

The diverse agro-ecological conditions prevailing in Karnataka has made it possible to grow different types of horticultural crops such as fruits, vegetables, root and tuber crops, flowers, ornamental plants, medicinal and aromatic plants, spices and plantation crops etc. A significant shift towards horticulture is evident in the state with the increase in area and therefore production. Horticulture provides higher unit productivity and greater scope for value addition and this enterprise is spreading throughout the length and breadth of the State (Government of Karnataka, 2006).

In Karnataka, the area under horticultural crops has increased from 18.99 lakh hectares in 2009-10 to 19.02 lakh hectares in 2010-11. The production under horticultural crops has increased from 147.80 lakh tonnes in 2009-10 to 152.13 lakh tonnes in 2010-11. The total cultivable area under horticulture in Karnataka is only 15 per cent. The total income generated from the sector accounts to over 40 per cent of the total income derived from the combined agriculture sector and that is 17 per cent of the GSDP (Gross State Domestic Product) of the state. During 2010-11 the area and production of vegetables has been estimated at 4.38 lakh hectares with a production of 73.8 lakh tonnes and average productivity of 16.85 tonnes per hectares. Total production of fruits has been estimated at 61.33 lakh tonnes from 3.54 lakh hectares and average productivity of 17.34 tonnes per hectares. Spices cover an area of 2.57 lakh hectares with a production of about 9.99 lakh tonnes and average productivity of 3.88 tonnes per hectares. The area and production of plantation crops has been estimated at 8.21 lakh hectares with a production of 4.82 lakh tonnes and average productivity of 0.59 tonnes per hectares. The total production of flowers has been estimated at 1.96 lakh tonnes from 0.28 lakh hectares and average productivity of 7.02 tonnes per hectares. The area and production of medicinal plants has been
estimated at 0.02 lakh hectares with a production of 0.05 lakh tonnes and average productivity of 2.28 tonnes per hectares. The area and production of aromatic plants has been estimated at 0.02 lakh hectares with a production of 0.18 lakh tonnes (Government of Karnataka, 2011).

As a result, the position of Karnataka in the country in respect of horticultural crops is the third largest producer of fruits and stands fifth position in area and production of vegetable crops. State stands first position in area and third in production of flower crops and hi-tech flower stands first position in area and production. The second and third position in area and production of plantation crops respectively. Karnataka is the largest producer of spices, aromatic and medicinal crops (Government of Karnataka, 2006). The focus of horticulture sector development is on area expansion, dissemination of new technology, production and supply of planting materials, credit effective plant protection, post-harvest management and hi-tech horticulture (Government of Karnataka, 2012).

Finally, the government identified horticultural crops as a means of diversification for making agriculture more profitable through land use, optimum utilization of natural resource and creating skilled employment for rural masses, especially women folk with the past efforts rewarding. The changing scenario encourages private investment to go for hi-tech horticulture with micro propagation, protected cultivation, drip irrigation and integrated nutrient and pest management, besides making use of latest post-harvest measures, particularly in the case of perishable commodities. As a result, horticultural crops production has moved from rural confines to commercial ventures.

1.2 Statement of the Problem:

Agriculture sector plays an important role in the Indian economy. The share of agriculture in national income has been declined over the period of time. Agriculture was contributed 57 per cent to national income in 1950-51. In the same period, 69 percent of people were depended on agriculture. Accordingly, agriculture had forgone 17.39 per cent of the income in order to have equal distribution of national income. During 2012-13 agriculture contribution to national income was 14.1 per cent and 58 percent of people were depended on agriculture. Therefore, agriculture had forgone 27.54 per cent of the income in order to have equal distribution in national income.
These facts indicate the increasing over dependency on agriculture. Therefore, it is the immediate need to find alternatives to agriculture as additional income generating activities like animal husbandry, dairy development, fisheries, forestry and wildlife, plantations, honey bee and horticulture which are the near potential alternatives and supplements to agriculture. Hence, adequate research has been done in order to understand the feature, problems, and prospects, potential along with production, productivity and marketability of horticultural crops. Given the background the present study has been focused on the issues related to production, productivity and marketability of horticulture in general and selected vegetables in particular, with special reference to Karnataka. Hence the present research work entitled “Production, Productivity and Marketability of Horticulture Crops in Karnataka” has been a sincere attempt.

1.3 Objectives of the Study:

For the present study researcher has set the following objectives;

- To analyze the land utilization pattern for horticultural crops in India and Karnataka.
- To examine the pattern of market arrivals and price behaviour of selected vegetable crops in selected markets in India.
- To analyse the cost of production of vegetable crops in Mysore and Mandya districts.
- To analyse the production and productivity of vegetable crops in Mysore and Mandya districts.
- To examine the problems and prospects of growing vegetable and marketing.

1.4 Hypotheses:

For the present study the following hypotheses have been set;

- Area of horticulture has been significantly increased in India.
- The use of land for vegetable crops is significantly high compared to other horticultural crops.
Arrivals of Cauliflower is significantly low in Bangalore compared to all other Indian vegetable markets.

Price of Cauliflower is significantly low in Bangalore compared to all other Indian vegetable markets.

Arrival does significantly causes price of cabbage in Bangalore market.

Price was significantly causes arrival of cabbage in Kolkata market.

The cost of production of cucumber is lower than other vegetable crops.

Net productivity of ridge gourd is higher than other vegetable crops.

1.5 Methodology:

To make the study scientific and realistic researcher has used the following methodology. For the present study researcher has collected both primary and secondary data.

Secondary Data:


Primary Data:

The primary data and information on crop production, productivity, inputs used and prices have been collected from the field survey. For the purpose collecting primary data the following method was used.

1.6 Sample Design:

For the present study to collect the first hand information the following sample design has been used. The present research was conducted in Karnataka State. Karnataka is the first state established separate horticulture department in India. The State has been purposefully selected due to the availability of data base relating to Vegetables cultivators. Within Karnataka, Mysore and Mandya are the most promising districts in terms of horticulture expansion and development. Hence these districts are selected for the field study. The information have been collected with the
structured questionnaire schedule regarding inputs, production, prices, problems and other aspects.

1.7 Sample Size and Sample Selection:

To fix the sample size and to select the sample units, researcher used the stratified random sampling method. Stratified in the sense, each districts was considered as separate entity and each vegetable crops has considered separately. Seven vegetables have been taken for field survey and 40 farmer, have been surveyed under each crop. Accordingly, totally, 280 sample farmers have been surveyed in the field study. Samples and sample design of field study has given below;

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KARNATAKA
(280)

MYSORE                           MANDYA
(140)                                               (140)
(20)         Tomato  (20)             Cucumber (20) (20)
(20)        Beans  (20)    Cabbage (20) (20)
(20)        Ladies Finger (20) (20)
(20)        Cauliflower (20) (20)
(20)        Ridge Gourd (20) (20)
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Note: Numbers in brackets represents numbers of samples.

1.8 Variables and Parameters:

The present study has considered the following variables for the purpose of analysis:
Production: Production of various horticulture and vegetable crops in India and Karnataka over the period of time.

Area of Production: Trends in area of horticulture and vegetable production in India and Karnataka over the period of time.

Productivity: This is the ratio of horticultural output and area of production; this was worked out separately at India and Karnataka for each horticulture crops.

Prices: Prices of each horticultural crop in India and Karnataka.

Labour: Number of labour units deployed for per hectare of production, with respect to each crop.

Labour Cost: Estimated cost for number of labour units used in each vegetable crop.

Cost of Capital: interest on borrowed money was treated as cost of capital.

Revenue: Income earned by selling vegetables.

Profit: Total revenue minus total cost. Net income from selling of vegetables.

1.9 Method of Analysis:

The present study has been used comparative analytical method.

In the third chapter secondary data have been used for the analysis and interpretation. Secondary data have collected from Government of India Reports such as Agricultural Statistics at a Glance 2012, Indian Horticulture Database 2012 and Horticulture Statistics of Karnataka State at a Glance 2010-11. Statistical results are worked out with the help of SPSS.

The aim of the chapter was to compare the land utilization pattern between India and Karnataka. Hence, t-test, F-test, ANOVA and Duncan multiple range tests have used for comparisons. Inferences have drawn based on the test results and significant differences have accepted at five percent level.

In the fourth chapter, an attempt has made to analyze the market behaviour of vegetables. The pattern of market arrivals and prices of selected vegetable crops such as cabbage, cauliflower and tomato in selected markets namely Bangalore, Chennai, Delhi, Kolkata and Mumbai. The pattern of market arrivals and price behavior of the selected vegetable crops have been analysed for the period 2001 to 2013. Since the
time series data has been used in the analysis, the necessary checks were taken to the test of the stationarity of data. The ADF tests were conducted to find the stationarity of data.

The dummy variable ANOVA regression model with four dummies was constructed to find significant difference in average arrival and price of vegetables. Even-though, there were five markets, four dummies (N - 1) were used in order to avoid the dummy variable trap. The Bangalore was considered as bench mark for the analysis. The sample model has been given in the following section. The same method and models have been used for difference analysis.

\[ C_A = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + e \]

Where \( C_A \) = Arrivals of cabbage

- \( \beta_0 \) = Value of bench mark
- \( \beta_1 \) = Difference between bench mark and Chennai
- \( \beta_2 \) = Difference between bench mark and Delhi
- \( \beta_3 \) = Difference between bench mark and Kolkata
- \( \beta_4 \) = Difference between bench mark and Mumbai
- \( D_1 \) = One if Chennai, zero is not Chennai
- \( D_2 \) = One if Delhi, zero is not Delhi
- \( D_3 \) = One if Kolkata, zero is not Kolkata
- \( D_4 \) = One if Mumbai, zero is not Mumbai

The Granger causality tests have been used to identify the independent and dependent variables. The simple econometric models have been used for impact analysis. The sample model has been given below;

The following econometric model explains the impact of cabbage arrival on cabbage price in Bangalore market.

\[ CPB = \alpha + \beta CAB + e \]

Where,

- \( CPB \) : Cabbage price in Bangalore (Dependent variable)
- \( CAB \) : Cabbage Arrival in Bangalore (Independent variable)
- \( \alpha \) : Constant (Value of dependent variable, when value of independent is zero)
\(\beta\) : Slope parameter (explains the level of impact of independent on dependent)
\(e\) : the error term

The same model used for other variables.

In the fifth chapter an attempt has been made to analyse the field survey data. The survey was conducted in Mysore and Mandya Districts. The major objectives of this chapter is to identify the impact of production and marketing of vegetable growers and efficiency of vegetable growers. The major dimensions, namely, Districts, age of farmers, education of farmers, irrigation facility, sizes of farmers and types of vegetable crops have been used for perception analysis.

F and t-test have been used when there were only two groups within the each dimensions (Districts and Age of farmers). ANOVA and Duncan tests were used when there were more than two groups within the each dimension (Size of farmers, education of farmers, Irrigation facility and types of crops).

The binary probit model was used to analyse the perception of vegetable growers. The sample model has been given below;

\[ Y = \beta_0 + \beta_1 D_t + \beta_2 A_g + \beta_3 E_d + \beta_4 I_f + \beta_5 C_r + \beta_6 S_g + e \]

Where,

\(Y\) = Perception of farmers.
\(\beta\)’s are co-efficient of each dimension.

\(D_t\) = Districts (1 for Mysore and 2 for Mandya)
\(A_g\) = Age of farmers (1 for Below 35 Years and 2 for Above 35 years)
\(E_d\) = Education of farmers (1 for Illiterate, 2 for School Education and 3 for College Education)
\(I_f\) = Irrigation facility (1 for Drip Irrigation, 2 for Bore well and 3 for Canal)
\(C_r\) = Crops (1 for Tomato, 2 for Cucumber, 3 for Beans, 4 for Cabbage, 5 for Ladies Finger, 6 for Cauliflower and 7 for Ridge Gourd)
\(S_g\) = Size of Growers (1 for Large, 2 for Medium and 3 for Small Vegetable Growers)
\(e\) = error term.
1.10 Other Tools and Techniques:

To make the study realistic and scientific the following tools and techniques are used:

- **Average**: It has been used to compute the average of production, price, cost and others.

- **Cohort Analysis**: The aggregation of sample responds based on the size of vegetable growing land the Cohort analysis has been used.
  
  i. Average plus standard deviation of land size has been considered as large farmers (Average + Standard Deviation < Large farmers).
  
  ii. Average minus standard deviation of land size has been considered as small farmers (Average - Standard Deviation > small farmers).
  
  iii. Between the two considered as medium farmers.

- **Production and Productivity Techniques**: The different productivity techniques were used in order to analyze the secondary and primary data.

  a) The first general productivity analysis adopted by many Indian writers on the growth of agricultural production. The index of productivity is thus defined as the value of agricultural output is constant prices per hectare of gross cropped area (K.N, Amartya, & Hanumantha, 1989).

  The index of agricultural production being \( \frac{\sum A_{it} Y_{it} P_{io}}{\sum A_{io} Y_{io} P_{io}} \)

  That of area being \( \frac{\sum A_{it}}{\sum A_{io}} \)

  The index of productivity being \( \frac{\sum C_{it} Y_{it} P_{io}}{\sum C_{io} Y_{io} P_{io}} \)

  \( A_{it} = \) area under the \( i^{th} \) crop in the base period

  \( A_{io} = \) area under the \( i^{th} \) crop in the \( t^{th} \) year

  \( Y_{it} = \) yield of the \( i^{th} \) crop in the base period

  \( Y_{io} = \) yield of the \( i^{th} \) crop in the \( t^{th} \) year

  \( P_{io} = \) price per unit of the \( i^{th} \) crop in the base period
\[
C_{io} = \frac{A_{io}}{\sum_i A_{io}} = \text{area under the crop as proportion of total cropped area in the base period}
\]

\[
C_{io} = \frac{A_{it}}{\sum_i A_{it}} = \text{area under the crop as proportion of total cropped area in the } t^{th} \text{ year}
\]

Since \( Y_{it} = \frac{O_{it}}{A_{it}} \) where \( O_{it} = \text{All-India production of the } i^{th} \text{ crop in the } t^{th} \text{ year} \) and \( A_{it} = \text{All-India area under the } i^{th} \text{ crop in the } t^{th} \text{ year} \)

\[
Y_{it} = \frac{\sum_{s} Y_{ist} A_{ist}}{\sum_{s} A_{ist}} \quad \text{Where } Y_{ist} = \text{Yield of the } i^{th} \text{ crop in the } s^{th} \text{ state in the } t^{th} \text{ year} \text{ and } A_{ist} = \text{area under the } i^{th} \text{ crop in the } s^{th} \text{ state in the } t^{th} \text{ year}
\]

b) The second technique is the Stochastic Production Frontier analysis will be used for primary data analysis. This model can be expressed in the following form:

\[
Y_i = x_i \beta + (V_i - U_i), \quad i = 1, \ldots, N
\]

\( Y_i = \text{the production of the } i^{th} \text{ firm} \)

\( x_i = a \text{k*1 factor of input quantities of the } i^{th} \text{ firm} \)

\( V_i = \text{random variables which are assumed to be iid. No.}(0, \sigma_v^2) \)

\( U_i = \text{non-negative random variables which are assumed to account for technical inefficiency in production} \)

### 1.11 Chapter Scheme:

For the present study researcher has designed the following chapter scheme.

Chapter I was introductory in nature and it includes importance of horticulture sector, prospects and potential of horticulture crops, statement of the problem, objectives, hypotheses, methodology of the study, sample design, and also include the chapter scheme.

Chapter II, an attempt has been made to develop a conceptual framework based on the review of literature, theoretical framework, concepts and research gap.
Chapter III, an attempt has been made to compare the land utilization pattern between India and Karnataka.

Chapter IV, an attempt has made to analyze the market behaviour of vegetables in India by using ADF test, dummy variable ANOVA regression model and Granger Causality tests.

Chapter V, an attempt has been made to analyse the field survey data. The survey was conducted in Mysore and Mandya Districts. It also analyzed the impact of production and marketing of vegetable growers and efficiency of vegetable growers and perception of vegetable growers.

Chapter VI, presents major findings of the study; it also includes testing of hypotheses and policy imperatives.
1.12 References:


