CHAPTER - III

HYPOTHESES AND RESEARCH METHODOLOGY
III.1 Introduction

From an account of wage theory in the context of agricultural labour market and the researches undertaken in the context of developing countries in the previous chapters, it can be stated that there is dearth of well developed and coherent theory of wage for agricultural labour market. Agricultural labour market has remained out of the focus of mainstream of economic theory. One possible reason for this may be the existence of several non-economic and institutional forces determining the behaviour of participants in labour market, which are not amenable to exact theoretical formulation. Recently there has been some interest on the part of scholars in the area of agricultural labour market and wages determined therein. However, the emphasis of scholars in this sphere has been on analysing the labour market effects of green revolution and accompanying changes in technology, land distribution and government policies. Some scholars have analysed these problems in the context of hypothesis of immiserisation of rural working force and their proletarianisation. They had concern about capitalist tendencies in Indian agriculture. The role of the state is in the form of helping this tendency by their pro-capitalist policies. These attempts had taken non-operation of market forces as their starting point and developed their research programme to substantiate these claims. In fact, it is a widely held
contention that labour markets are never perfect and highly influenced by non-market institutional forces. This would be more true of agriculture in developing economies which have come out of tradition-bound exploitative feudal economic framework only recently.

The review of earlier studies on agricultural wages shows that while several studies have been undertaken for the green revolution states of the country, for Gujarat there are not enough studies. Only the study made by V.N. Misra has attempted to go into the problem in depth, while studies by Indira Hirway and B.B. Patel have covered some important grounds in agricultural wage determination. In the recent period there have been no studies on Gujarat's labour market. B.D. Parmar's study covers only one part of the state, that is, Saurashtra and that too is now a decade old. Therefore, the present study attempts to analyse the wage behaviour of agricultural sector in Gujarat, in terms of various dimensions covering the period of 1960-61 to 1992-93. An attempt is made to examine the relevance of competitive market forces in explaining wage behaviour characterised by institutional interventions and non-market socio-cultural rigidities.

The main focus of this study is on emphasising the analysis of the behaviour of agricultural wage levels and differentials in Gujarat. The study may help in formulation of an agricultural labour policy for the state for improving the standard of life of the weaker sections of society in the state.
Spatial wage differentials are the result of inequalities of factor endowment. The analysis may help in devising ways to provide answers to the question of spatial wage differentials though some such wage differentials are necessary and are consistent with efficient market functioning.

III.2. Objectives of the study

The principal objectives of the present study are the following:

1. To assess various aspects of agricultural growth performance to provide a background to analyse changes in agricultural wages rates.

2. To examine the temporal behaviour of money and real wage rate of agricultural labourers.

3. To trace the inter district variations in average wage rates and wage rates of different farm operations in Gujarat.

4. To examine in what manner increased agricultural prices and per capita income of farm labour have affected farm wage rates in Gujarat.

5. To analyse the wage differentials and the factors affecting them.
III.3 Frame of Analysis

The analysis in the study basically depends on secondary data. The study attempts to examine the validity of the competitive hypothesis, i.e. to what extent market forces play an important role in determination of wage rates. Generally in rural market of a newly developing economy, wages are influenced among other things by customs, traditions, or institutional norms. Seasonal variations in demand and supply play an important role in determination of employment and wages. We have taken this as one of the factors of our study. Variations in monsoon, repeated drought years also affect the wage rates. Moreover, an increase in productivity of farmers and improved technology to some extent also play a role in determination of agricultural wage rates. This aspect is also taken into account in the study.

In the economy like India the development of agricultural sector brings rise in the real income of the agricultural workers. But the traditional form of agriculture with small size of holdings, traditional technology and the easy availability of agricultural labour limits the possibility of rising real wage rates of agricultural labourers. This condition prevails not only at all India level but also in Gujarat. Though Gujarat on the basis of its macro performance appears to be a developed state, there are disparities in natural and physical endowment like irrigation, monsoon, land fertility, weather conditions among the districts, which create spatial imbalances in the state. As a result the wage rates in agricultural sector in the prevailing condition
differ from district to district. Moreover, increase in agricultural production, the prices of agricultural produce and per capita income of agricultural labour play an important role in wage determination. These aspects are taken in analysis of temporal and spatial variations in wage rates.

III.4 Hypotheses of the study

With a view to study above stated dimensions of wages, the following hypotheses are tested with the help of available data:

1. Wage rates in agriculture have a positive relationship with agricultural product prices and per worker income of agricultural sector.

2. Spatial wage differentials are the result of geographical differences noticed in the natural and physical conditions and availability of agricultural inputs and technology of agricultural production.

3. Seasonal variations exert perceptible influence on agricultural wages of unskilled field labour.

4. Temporal variations in wages are influenced by factors covered by time trend, past wage rates and current and lagged product prices.
The study is based on following secondary sources of data:

1. The principal source of wage data used in this study has been Season and Crop reports prepared by Directorate of Agriculture, Gujarat State, Ahmedabad.

2. Data on irrigation, land utilization and crop-wise area, production and yield per hectare have been taken from published and unpublished Season and Crop reports of Directorate of Agriculture, Gujarat State, Ahmedabad and various reports of Agricultural Census of Gujarat State by Government of Gujarat Revenue Department.

3. Data on input availability such as tractors, pump-sets, fertilizer, and area under high yielding varieties of seeds have been made available by Directorate of Agriculture, Gujarat Government, Ahmedabad.

4. Data on State Domestic product, price indices, and other macro-economic aspects have been made available in Government reports such as State Domestic Product, Socio-Economic Review and Statistical Outline of Gujarat (various years), published by Bureau of Economics and Statistics Government of Gujarat, Gandhinagar, Gujarat State.

5. Data on population, rural and agricultural workers, total workers, S.C. and S.T. population and other relevant data are
III.6 Some Operational Aspects of Statistical Analysis

1. Wage data from as many as 19 districts relate to years 1960-61 to 1992-93 (the agricultural year, starting from the months of July to June).

2. The district has been chosen as the basic unit for the purpose of analysis. The district's wage rates are estimated by taking simple average rate for 12 months for each district.

3. Bulsar and Gandhinagar were originally part of present Surat and Ahmedabad districts. Hence when these districts were separated and their published data were made available, their figures have been taken and considered in the analysis.

4. The wage rates upto 1981-82 referred to the two categories of workers, viz. field labour (FL) and other agricultural labour (OAL). Since 1982-83 field labour wage rates were given for four farm operations: Ploughing, sowing, weeding, harvesting etc. The wage rate was calculated by taking the average of wage rates received by the workers in performing the said four operations. The wage rates studied here include only cash payment received by the labour.
5. To derive real wage rates for agricultural labour, a Consumer Price Index Number of Agricultural Labourers (ALCP) was needed for deflation, but it was not available at district level so we have taken consumers price index number of Agricultural labour of the state for deflating these figures to work out real wage rates for different districts.

6. Census data were largely used for working out estimates of agricultural and rural workers at decadal intervals. For the sake of preparing annual time series on these variables observed between successive censuses were used.

7. For seasonal analysis monthly data on money wages is taken for analysis. For this purpose quinquennial averages are taken to construct the seasonal index, so that short run fluctuations on account of non-seasonal factors may be eliminated.

8. Dangs and Gandhinagar whose data are not available for certain months of the year has not been considered in the study, but the average of wages in particular year has been calculated on the basis of available data of the period.

III.7 Concepts and Methods

Having examined the data sources, we would now make an attempt to present in brief the explanation of different concepts or terms used in the study. It is also essential to present here an
outline of research methodology adopted for analysing the statistical data in order to test various hypotheses, which form the basis of this study.

1. In order to get a better understanding of development in agriculture compound growth rate of area, production and yield per hectare in agriculture for a period of 1960-61 to 1969-70, 1970-71 to 1979-80, 1980-81 to 1991-92 and entire period of 1960-61 to 1991-92 have been calculated by taking indexes of three years moving average of respective variable constructed by taking triennium ending 1969-70 as base and exponential growth curve of the following form has been fitted by the method of least squares

$$\log Y = a + b \times t$$

where \( Y \) refers to three years moving average of indexes of variable such as Area, Production and Yield per hectare and \( t \) reference to time. The growth rate is given by antilog \( b-1 \).

2. The overall output growth was decomposed into area, crop pattern and yield components by using the decomposition scheme developed by Minhas, the details of which are given in Chapter-IV in detail.

3. Trends in money and real wage rates and wages of different farm operations were studies through simple linear regression model. For estimating long term rate of growth (\( g \)), the growth curve \( W=A(1+g)^t \) has been fitted to secondary
data on wages (W). In logarithmic transformation the equation is as under:
\[ \log W = \log A + (\log (1+g))t \]
where \( g \) is annual compound rates of growth of money or real wages (W) and \( t \) refers to time.

4. We have examined the inter-district and operation-wise variations in both money and real wage rates in two main forms viz. extent of wage variations in absolute term (measured by standard deviation) and in relative term (measured by coefficient of variation). Moreover, variations in wage rates are also analysed by studying changes in the pattern of ordering in wage rates. The ranking has been worked out and Spearman's rank correlation is estimated for the periods 1960-61 to 1970-71, 1971-72 to 1981-82, 1982-83 to 1992-93 and all periods combined 1960-61 to 1992-93. Further, in some cases the idea of wage differentials is obtained by calculating relative wage rates by taking ratio of the wage rate of a category to the lowest wage rate paying category.

5. With a view to examining the inter temporal and spatial wage variations various factors on demand and supply side as well as some institutional factors are identified for analysis and their contributions evaluated. Statistically speaking temporal variations in real money and wage rates are based on time series Regression Models, while spatial wage
(district wise) variations are examined by cross sectional regression analysis.

Least Squares Method is used to estimate the parameters of regression models based on the framework of general linear model. A typical equation for estimation is:

\[ y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki} + u_i \]

\[(i = 1, 2, \ldots n)\]

where \( Y \) is dependent variable and \( X_j \) \((j=1,2,\ldots,k)\) is \( j^{th} \) independent explanatory variable, \( U \) is error or disturbance term, \( i \) refers to observations (which in time series regression is denoted as \( t \) for time), \( n \) is number of observations and \( \beta \) are parameters. All standard assumptions of General Linear Model will be applicable for the purpose of interpretation.

The time series analysis study has been undertaken in two parts. In the first part wage variations through time are examined in terms of following factors:

- Per capita income of agricultural worker from agricultural sector \((X_{1t})\). It can be termed as average productivity of agricultural workers.

- Price Index of Agricultural Produce \((X_{2t})\)
Real agricultural prices \((X_{3t})\). It can be termed as an indicator of terms of trade.

Over and above these factors the previous year's prices also have an impact on wage rates of current year. The study has incorporated lagged product price variables and past wage variables into analysis. They are as under:

- lagged product price \((X_{2,t-1})\) - Price prevailing in previous periods.
- lagged wage rates \((\text{MWR}_{t-1}, \text{RWR}_{t-1})\) - previous year's real and money wage rates.

In the second phase, besides above factors, trends in wages are explained by several other demand and supply side variables. These are given as under:

- cropping intensity \(X_{4t}\)
- Irrigation intensity \(X_{5t}\)
- Proportion of hired agricultural labourers in total agricultural workforce \(X_{6t}\)
- Effective size of cultivated holdings \(X_{7t}\)
- Consumption of fertilizer per hectare in kgs. \(X_{8t}\)
- Area covered under high yielding varieties (HYV) of seeds \(X_{9t}\)

Taking various combination of variables we have worked out pairwise zero-order correlations among dependent (money and real wage
rates) and independent variables (demand supply side) and presented in the form of correlation matrix. Further, regression analysis is attempted using relatively significant variables.

The spatial (district-wise) wage variations are analysed in terms of various factors on demand and supply side. To analyse the wage rates variations cross sectional analysis has been used for the four points of time viz. 1961, 1971, 1981, and 1991.

In this analysis also a number of variables reflecting demand and supply side have been taken into consideration. However, the availability of data for cross-sectional analysis is different from time series analysis. The variables used in this analysis are as under:

**Proportion of tribal population** \( (X_1) \) - It is the proportion of tribal population to total population of the district's population.

**Cropping intensity** \( (X_2) \) - It is measured in terms of net area sown to total cropped area.

**Man-land Ratio** \( (X_3) \) - It is measured by the number of persons per hectare of cultivated land in rural areas of the districts.

**Effective Size of Cultivated holdings** \( (X_4) \) - It is indicated by net area sown per agricultural worker. It is measured
by the ratio of net area sown in hectares to total number of agricultural workers.

Extension of irrigated area ($X_5$) - It is the proportion of irrigated area to total cropped area

Proportion of agricultural workers (cultivators and agricultural labourers) to total rural workers ($X_6$) - This is a supply variable.

Availability of tractors ($X_7$) - It is measured in terms of tractors per thousand of hectares of cultivated area.

Availability of pump-sets ($X_8$) - It is measured in terms of pump-sets per thousand hectares of cultivated area.

Consumption of fertilizers ($X_9$) - It is measured in terms of consumption of fertilizer per hectare of cropped area in kgs.

Proportion of non-food crops area ($X_{10}$) - It is the ratio of total non-food cropped area to total cropped area.

Among the above mentioned variables those which have highly significant value of correlation coefficients with wages are taken into consideration for regression analysis. A detailed discussion of variables and their definitions is given in Chapter VI.
III.8 Limitations of Study

As this study is based on secondary data sources, it is constrained by the quality of these data. The dependence on Government reports and other data sources was imminent. In general government agencies are considered reliable from the viewpoint of quality of data collected by them. There are, however, some inadequacies in these data which may also be seen from earlier discussion of concepts and definitions in this chapter. For example, non-existence of some districts in earlier period and absence of detailed farm operation-wise wage data upto 1981-82 and consistently uniform price data from agricultural products and farmers' cost of living at district level have affected the quality of estimates. The present study attempts to undertake wage analysis in the face of these limitations.

III.9 Chapter Scheme

The study is organised into the following seven chapters.

Chapter-I - Wage Theory and Agricultural Labour Market in a Developing Economy

The first chapter deals with a review of wage theories and performance of rural labour markets in a developing country like India. The classical, neo-classical and institutionalist theories have been examined and important issues in relation to agricultural labour markets have been discussed.
Chapter-II - Review of Literature: Agricultural Wages in Indian Context

In this chapter a survey of important studies on agricultural wage determination in different states has been undertaken.

Chapter-III - Hypotheses and Research Methodology

This chapter briefly outlines the design of the present study. It includes a discussion of the sources of data, hypotheses and choice of methods of analysis.

Chapter-IV - Agricultural Performance in Gujarat: An Analysis Over Time

The purpose of this chapter is to present various aspects of performance of agricultural sector in Gujarat. Besides analysis of successive changes in state domestic product, production, productivity, land utilization, cropping pattern, irrigation, this chapter also attempts to provide some implications for agricultural labour market in the state.

Chapter-V - Trends and Differentials in Agricultural Wages

Trends and differentials in money wages and real wages have been estimated for three sub-periods viz. 1960-61 to 1970-71, 1971-72 to 1981-82 and 1982-83 to 1992-93 as well as for the period as a
whole. In this discussion temporal, spatial operationwise and inter district aspects are covered.

Chapter-VI - Temporal and Spatial Variations in Agricultural Wages: Analysis of Determinants

This chapter is devoted to analysis of determinants of wage levels and wage differentials in agricultural sector. Several variables on demand and supply side as well as some institutional factors are identified for analysis and their relative importance examined.

Chapter-VII - Conclusions of the Study and Policy Implications

This is the final chapter of the study. It provides a summary of results and policy implications. It also points out the scope and directions for the further study.