Chapter – II

Methodology
Agriculture wage rate is the result of the interaction of demand for and supply of agricultural workers. The demand will change with factors that are endogenous and exogenous to agriculture production. The structural patterns of agriculture holdings must be maintained as an important variable among the endogenous factors. In India since independence land reforms have redressed the average acreage. The changed proposition for a smaller farm will affect labour demand. Similarly, innovative practices and the new agricultural than the prevailing traditional ones. Even the availability of irrigation affects the cropping pattern and indirectly the demand for labour, maybe enumerated the uncertainty of the weather, monsoon, quality of soil and the stage of the economy are among the exogenous factors. Therefore, the demand for agriculture labour will be dependent on the quantity and price of the food crops.

The supply to agricultural labours will be enrolled by such factors like, rate of growth of the population, reading of work on the form, the institutional procedures through which labour is forth coming, possible alternative sources of income, and the total ownership pattern. Caste consciousness will also limit labour supply by confining it to those castes that traditionally performs certain tasks on the form. The factors that most directly affect labour supply on the form, however, will be the relative size of the household and the availability of land-less labour and small cultivators for hire. Rural wages are oftenly paid partly in cash and partly in kind and varies according to the crop to implement the Minimum Wage Act of 1948, for agricultural labour, attempts were taken. Each state had its own pattern, since the payment of agricultural wages is still influenced by traditional customs. The wage rates in agriculture are varied from mandal to mandal.
The rural male wage in Anantapur district varies from Rs. 15.00 to Rs. 27.50 for Settur and Anantapur, Kudair mandals. The value of co-efficient of variation is 14.01 percent. In the same way, the female wage rate in Anantapur district varies from Rs. 12.00 to Rs. 22.50 for Rayadurg and Rolla mandals. The value of the co-efficient of variation for the district is 17.17 percent.*

Objectives

The following are objectives of the present study.
1. To study the inter-mandal variation in agricultural labour work participation rate.
2. To study the trends in agricultural wages.
3. To study the major determinants of agricultural wages.

Methodology

To study first objective, labour work participation rate, the co-efficient of variation has been calculated which reflect the variations in labour work participation rate. The inequalities in employment status have been shown by the co-efficient of variation.

\[
C.V. = \frac{\text{Standard deviation}}{\text{Average}} \times 100
\]

To find out the inter-mandal inequalities in employment status of rural labour, the co-efficient of equality was computed. The formula for co-efficient of equality is

a) co-efficient of equality for rural males =

\[
\frac{\text{Percentage share of rural males in rural employment}}{\text{Percentage share of rural male in population}} \times 100
\]

* Unpublished thesis submitted by Dr. Narasimha Reddy to the Department of Economics, S.K.University, Anantapur-515001
b) co-efficient of equality for rural females =

\[ \frac{\text{Percentage share of rural females in rural employment}}{\text{Percentage share of rural female in population}} \times 100 \]

To fulfill the second objective, trends in agricultural wages in three revenue divisions namely Anantapur, Dhravaram and Penukonda of Anantapur district and the district as whole, it is proposed to estimate the linear and compound growth rates. The function, to estimate the linear growth rates is

\[ Y = a + bt \]

where,

\[ Y = \text{Money wage rate} \]
\[ t = \text{Time in years} \]
\[ a, b \text{ are the constants} \]

The linear growth rate is calculated by 

\[ \text{LGR} = \frac{\hat{b}}{Y} \times 100. \]

Similarly the compound growth rate is estimated with the help of the function

\[ Y = a b^t \]

where,

\[ Y = \text{Money wage rate} \]
\[ t = \text{Time in years} \]
\[ a, b \text{ are the constants} \]

The compound growth rate is calculated by the formula.

\[ \text{CGR} = (1-b) \times 100 \]

The linear and compound growth rates are tested by ‘t’ test statistic for its significance.

\[ t = \frac{\text{Estimated regression co-efficient}}{\text{S. E. of regression co-efficient}} \]
i.e., \[ t = \frac{\hat{b}}{\text{S.E}(\hat{b})} \sim t(n-k) \]

Where,

- \( n \) = number of observations
- \( k \) = number of variables.

There are number of factors which are influencing the agricultural wages. Since the quantification of all wage deterrents are not possible, some of the important variables are to be considered in the present study. They are, Percentage of irrigated area, cropping intensity, average size of operational holding, percentage of agricultural households to the rural households, land concentration ratio, availability of labour per hectar.

Division - wise agricultural wage determinants are analyzed with the help of multiple linear regression. The functional relationship is

\[ Y = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7) \]

Where,

- \( Y \) = agricultural wage rate
- \( x_1 \) = availability of male agricultural labour per hectar
- \( x_2 \) = availability of female agricultural labour per hectar
- \( x_3 \) = land concentration ration
- \( x_4 \) = cropping intensity
- \( x_5 \) = percentage of agricultural labour house holds to the rural households.
- \( x_6 \) = percentage of irrigated area
- \( x_7 \) = average size of operational holdings

The specification of the variables is given below.
Agriculture Wage Rate (Y)

The wage rate has been referred in terms of the average wage in rupees per day per labour.

Availability of Male Agricultural Labour per Hectar (x₁)

It is expected that the relationship between the independent variable, availability of male agricultural labour per hectar and agricultural wage rate is negative. Since, the availability of male agricultural labour is high, there wages are low and it leads to low agricultural wage rate.

Availability of Female Agricultural Labour per Hectar (x₂)

The independent variable, availability of female agricultural labour per hectar is high, the wage rate for female labour is low and automatically the dependent variable, agricultural wage rate is low. Therefore, it is expected that there is existing negative relation between x₂ and Y variables.

Land Concentration Ratio (x₃)

The dependent variable agricultural wage rate is expected negative association with the independent variable land concentration ratio. Since, the area where the land concentration ratio is high, the wage rate may be low.

\[ x₃ = \frac{\text{Total land of households}}{\text{Total members in family}} \times 100 \]

Cropping Intensity (x₄)

Availability of irrigation facilities inducing the higher cropping intensity, a higher percentage of cultivable area is leads to higher usage of labour. The labour demand may likely to increase and hence the wage rate. It may be expected that there is positive relation between cropping intensity and the agricultural wage rate.

\[ x₄ = \frac{\text{Gross are sown}}{\text{Net area sown}} \times 100 \]
The Percentage of Agriculture Labour Households to the Rural Households ($x_5$)

As the percentage of agricultural households to the rural household increases the agricultural wage rate may be decreases and vice – versa. So the negative relation is expected between $x_5$ and $Y$ variables.

$$x_5 = \frac{\text{Agricultural labour households}}{\text{Total rural households}} \times 100$$

The Percentage of Irrigated Area ($x_6$)

Labour use per hectar is greater in irrigated area than the unirrigated area. The availability of irrigation in an area is expected to increase the demand for labour and the wage rate may be increased. It is expected that there is positive association between irrigated area and the wage rate.

$$x_6 = \frac{\text{Net area irrigated}}{\text{Net area sown}} \times 100$$

Average Size of Operational Holdings ($x_7$)

It is also one of the factor which is affecting the agriculture wage rate. Larger size of agricultural holdings makes higher demand for labour and higher wage rate. Hence, also expected positive relation between the independent variable, the size of operational holding and dependent variable, agricultural wage rate.

$$x_7 = \frac{\text{Total area of operational holdings}}{\text{Number of households}} \times 100$$

The relation of $Y$ with $x_6$ and $x_7$ variables is common and negative, as the number of agricultural labour is high, the wage level would be low.

The functional relationship between agricultural wage rate and socio-economic variables are established through multiple- linear regression model. The specific model is:

$$Y = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 + a_6x_6 + a_7x_7$$
Where,

\[ a_1, a_2, \ldots, a_7 \] are co-efficient of independent variables,

\[ a_0 \] is the constant or intercept.

To test the significance of each independent variable, t- test statistic is adopted.

\[
t = \frac{\text{Estimated regression co-efficient}}{\text{S.E of regression co-efficient}}
\]

i.e.,

\[
t = \frac{\hat{a}_i}{\text{S.E ( } a_i^\text{)}} \sim t(n-k)
\]

Where,

\[ n = \text{number of observations} \]

\[ k = \text{number of variables} \]

\[ i = \text{refers to the variable} \]

The combined effect of all independent variables on dependent variable is represented by \( R^2 \). It is called as multiple correlation co-efficient, which expressed the collective influence of all explanatory variables on the explained variables. The value of \( R^2 \) is to be calculated by the formula:

\[
R^2 = 1 - \frac{\text{ESS}}{\text{ESS} + \text{RSS}}
\]

For the significance of \( R^2 \), F -test statistics is carried out.

\[
F = \frac{R^2(k-1)}{(1-R)(n-k)} \quad \text{or} \quad F = \frac{\text{ESS} (k-1)}{\text{RSS} (n-k)}
\]

Where,

\[ R^2 = \text{multiple correlation co-efficient} \]

\[ \text{ESS} = \text{Error Sum of Squares} \]
RSS = Residual Sum of Squares

n= Total number of observations(sample size)
k= total number of variables.

Both the linear as well as log-linear models are established. The proposed log-linear models is:

\[ \log Y = a_0 + a_1 \log x_1 + a_2 \log x_2 + a_3 \log x_3 + a_4 \log x_4 + a_5 \log x_5 + a_6 \log x_6 + a_7 \log x_7 \]

It is said that the log-linear model is a best fit since, the estimated values are appropriate. Hence, the entire analysis of agricultural wage determination is in relation to the results of log-linear model.

Data

The present study is fully depended on secondary data. The relevant secondary data all explanatory and explained variables relating to each chapter of the present study are given in the appendix.