

FEMALE WORK PARTICIPATION WITH SPECIAL REFERENCE TO WAGE LABOUR IN AGRICULTURE

By
R. RAMATHILAGAM



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Contents

CONTENTS

CHAPTER	PAGE
LIST OF TABLES	
LIST OF FIGURES	
LIST OF APPENDICES	
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	13
A. Female Participation Rates.	
B. Female Employment, Wage Rates and Earnings in Agriculture.	
C. Rural Labour Market Behaviour.	
D. Employment Intervention Policies.	
III. METHODOLOGY	44
A. The Locale of the Study.	
B. Sources of Data and Methods of Data Collection.	
C. Specification and Estimation of the Labour Market Model.	
D. Other Methods of Analysis.	
E. Definition of Terms and Concepts.	
F. Limitations of the Study.	
IV. RESULTS AND DISCUSSION	86
A. Structural Changes in Women's Employment.	
B. Factors Influencing Rural Female Participation Rates.	

CHAPTER

PAGE

C. Rural Female Work Participation Rates in
Agriculture.

D. Empirical Evidence on the Market for Hired
Labour in Agriculture.

E. Movements in Money and Real Wage Rates.

F. Impact of NREP on Rural Employment and Earnings.

V. SUMMARY AND CONCLUSION

220

BIBLIOGRAPHY

APPENDICES

LIST OF TABLES

TABLE	TITLE	PAGE
I.	DISTRIBUTION OF WOMEN WORKERS BY MAIN AND MARGINAL CATEGORIES AND DISTRIBUTION OF RURAL WORKERS IN AGRICULTURE - INDIA 1981.	2
II.	BLOCKS SELECTED FOR THE STUDY AND THE PERIOD OF STUDY (NREP).	51
III.	SECTORAL DISTRIBUTION OF TOTAL WORKING POPULATION - INDIA AND TAMIL NADU 1961 AND 1981.	87
IV.	TRENDS IN DISTRIBUTION OF WOMEN WORKERS - ALL INDIA (1911 - 1981).	89
V.	TRENDS IN DISTRIBUTION OF WOMEN WORKERS - TAMIL NADU 1961 - 1981.	91
VI.	CHANGES IN RURAL FEMALE WORK PARTICIPATION RATES - DECOMPOSITION ANALYSIS-DISTRICT WISE - TAMIL NADU 1961 - 1981.	115
VII.	DISTRIBUTION OF WORKERS BY MAIN AND MARGINAL CATEGORIES AND DISTRIBUTION OF RURAL WORKERS IN AGRICULTURE - TAMIL NADU 1981.	118
VIII.	STATUS DISTRIBUTION OF AGRICULTURAL WORK FORCE IN RURAL TAMIL NADU 1981.	120
IX.	DISTRICT WISE AND SEX WISE DISTRIBUTION OF MAIN AGRICULTURAL LABOURERS IN TAMIL NADU - 1981.	122

TABLE	TITLE	PAGE
X.	DISTRICT WISE AND SEX WISE DISTRIBUTION OF MARGINAL AGRICULTURAL LABOURERS IN TAMIL NADU 1981.	123
XI.	DISTRICT WISE TRENDS IN AGRICULTURAL LABOUR IN RURAL TAMIL NADU 1961 - 1981.	126
XII.	DISTRICT WISE AGRICULTURAL EFFICIENCY INDICES AND LABOUR INTENSITY INDICES IN TAMIL NADU 1981.	129
XIII.	VARIABLES USED IN THE LABOUR SUPPLY AND DEMAND MODEL WITH THEIR MEANS AND STANDARD DEVIATIONS - DISTRICTS OF TAMIL NADU 1961 - 1981.	134
XIV.	THE UNRESTRICTED REDUCED FORM OLS ESTIMATES OF THE LABOUR SUPPLY - DEMAND EQUATIONS - DISTRICT LEVEL TAMIL NADU 1961 - 1981.	135
XV.	THE STRUCTURAL COEFFICIENT ESTIMATES OF THE LABOUR SUPPLY AND DEMAND MODEL - DISTRICTS OF TAMIL NADU 1961 - 1981.	139
XVI.	ELASTICITY COEFFICIENTS OF LABOUR SUPPLY AND LABOUR DEMAND DISTRICT LEVEL TAMIL NADU.	144
XVII.	DISTRIBUTION OF FEMALE AGRICULTURAL LABOUR BY AGE.	149
XVIII.	DISTRIBUTION OF FEMALE AGRICULTURAL LABOUR ACCORDING TO HOUSEHOLD INCOME.	151

TABLE	TITLE	PAGE
XXX.	MONEY WAGE RATES FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1960 - 61 to 1984 - 85.	178
XXXI.	THREE YEAR MOVING AVERAGE MONEY WAGE RATES FOR MALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1960 - 61 to 1984 - 85.	179
XXXII.	THREE YEAR MOVING AVERAGE MONEY WAGE RATES FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1960 - 61 to 1984 - 85.	180
XXXIII.	REAL WAGE RATES FOR MALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1964 - 65 to 1984 - 85.	181
XXXIV.	REAL WAGE RATES FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1964 - 65 to 1984 - 85.	182
XXXV.	THREE YEAR AVERAGE REAL WAGE RATE MALE FIELD LABOUR IN DISTRICTS OF TAMIL NADU 1964 - 65 to 1984 - 85.	183
XXXVI.	THREE YEAR AVERAGE REAL WAGE RATE FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1964 - 65 to 1984 - 85.	184
XXXVII.	GROWTH TRENDS IN REAL WAGE RATE (THREE YEAR MOVING AVERAGE) OF MALE AND FEMALE FIELD LABOUR TAMIL NADU 1964 - 65 to 1984 - 85.	189

TABLE	TITLE	PAGE
XXXVIII.	INSTABILITY IN REAL WAGE RATES (THREE YEAR MOVING AVERAGE) OF MALE AND FEMALE FIELD LABOUR - TAMIL NADU 1964 - 65 to 1984 - 85.	193
XXXIX.	REAL WAGE DIFFERENTIALS (THREE YEAR MOVING AVERAGE) BETWEEN MALE AND FEMALE FIELD LABOUR IN TAMIL NADU 1964 - 65 to 1984 - 85.	195
XL.	INTER DISTRICT VARIATIONS IN REAL WAGE RATES/DIFFERENTIALS (THREE YEAR MOVING AVERAGE) OF MALE AND FEMALE FIELD LABOUR IN TAMIL NADU 1964 - 65 to 1984 - 85.	198
XLI.	DISTRIBUTION OF ALL NREP HOUSEHOLDS BY HOUSEHOLD SIZE, LABOUR FORCE PARTICIPATION RATE, EMPLOYMENT, EARNINGS AND PER CAPITA INCOME.	202
XLII.	DISTRIBUTION OF NREP SC/ST HOUSEHOLDS BY HOUSEHOLD SIZE, LABOUR FORCE PARTICIPATION RATE, EMPLOYMENT, EARNINGS AND PER CAPITA INCOME.	203
XLIII.	DISTRIBUTION OF NREP NON SC/ST RURAL LABOUR HOUSEHOLDS BY HOUSEHOLD SIZE, LABOUR FORCE PARTICIPATION RATE, EMPLOYMENT, EARNINGS AND PER CAPITA INCOME.	204
XLIV.	DISTRIBUTION OF LABOUR FORCE BY SEX IN THE SC/ST AND NON SC/ST HOUSEHOLDS.	207
XLV.	EMPLOYMENT AND UNEMPLOYMENT AMONG WORKERS IN NREP BENEFICIARY HOUSEHOLDS.	209

TABLE	TITLE	PAGE
XLVI.	DISTRIBUTION OF WORKERS BY THEIR MEAN EMPLOYMENT, DAILY AND MONTHLY EARNINGS AND CONTRIBUTION TO HOUSEHOLD PER CAPITA INCOME.	212
XLVII.	DISTRIBUTION OF WORKERS BY EXTENT OF EMPLOYMENT GAP, MAXIMUM POTENTIAL EARNINGS AND CONTRIBUTION TO HOUSEHOLD INCOME PER CAPITA AT FULL EMPLOYMENT.	215
XLVIII.	RESULTS OF STATISTICAL TESTS OF DIFFERECCE (Z TEST) BETWEEN NREP AND NON NREP WORKERS IN THEIR LEVELS OF EMPLOYMENT, DAILY AND MONTHLY EARNINGS.	218

LIST OF FIGURES

FIGURE	TITLE	PAGE
1.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , TOTAL - TAMILNADU - 1961	94
2.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , TOTAL - TAMILNADU - 1971	95
3.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , TOTAL - TAMILNADU - 1981	96
4.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , RURAL - TAMILNADU - 1961	97
5.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , RURAL - TAMILNADU - 1971	98
6.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , RURAL - TAMILNADU - 1981	99
7.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , URBAN - TAMILNADU - 1961	100
8.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , URBAN - TAMILNADU - 1971	101
9.	DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS , URBAN - TAMILNADU - 1981	102
10.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , TOTAL - TAMILNADU - 1961	103
11.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , TOTAL - TAMILNADU - 1971	104

FIGURE	TITLE	PAGE
12.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , TOTAL - TAMILNADU - 1981	105
13.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , RURAL - TAMILNADU - 1961	106
14.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , RURAL - TAMILNADU - 1971	107
15.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , RURAL - TAMILNADU - 1981	108
16.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , URBAN - TAMILNADU - 1961	109
17.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , URBAN - TAMILNADU - 1971	110
18.	DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS , URBAN - TAMILNADU - 1981	111

LIST OF APPENDICES

APPENDIX

ITEM

- I a. AN INTERVIEW SCHEDULE TO ELICIT INFORMATION ON THE LABOUR SUPPLY CONDITION OF FEMALE AGRICULTURAL LABOURERS.
- b. AN INTERVIEW SCHEDULE TO ELICIT INFORMATION ON LABOUR USE AT THE FARM LEVEL.
- II. AN INTERVIEW SCHEDULE TO ELICIT INFORMATION ON THE EMPLOYMENT AND EARNINGS OF WORKERS IN RURAL HOUSEHOLDS WHERE AT LEAST ONE PERSON WAS EMPLOYED IN AN NREP PROJECT.
- III. MATHEMATICAL DERIVATION OF THE LABOUR FORCE PARTICIPATION MODEL.
- IV. DATA SET USED IN THE EMPIRICAL ESTIMATION OF LABOUR MARKET MODEL.
- V a. DATA SET USED IN THE DECOMPOSITION MODEL FOR IDENTIFYING THE FACTORS INFLUENCING RURAL FEMALE WORK PARTICIPATION RATES.
- b. ILLUSTRATIVE COMPUTATION OF THE DECOMPOSITION EQUATION.
- VI. DATA SET ON SECTORAL DISTRIBUTION OF WORK FORCE USED AS THE BASIS FOR THE TRIANGULAR GRAPHS.

APPENDIX

ITEM

- VII. DATA SET USED IN THE DERIVATION OF AGRICULTURAL EFFICIENCY INDEX AND LABOUR INTENSITY INDEX IN THE DISTRICT LEVEL OF TAMIL NADU - 1980-81.
- VIII. CONSUMER PRICE INDEX NUMBERS FOR AGRICULTURAL LABOURERS IN TAMIL NADU 1964 - 65 to 1984 - 85.
- IX. ILLUSTRATIVE CALCULATION OF Z TEST OF DIFFERENCE.

Introduction

I. INTRODUCTION

Employment and its concomitant a fair wage are the basic needs of human existence. They are the very foundation for improving the quality of life and for sustaining democracy. The third world countries, however, have been experiencing population and work force explosion since 1950's resulting in unemployment and under - employment explosion (Narayana 1980). Most of these countries conceived increasing growth as a panacea for solving the problems of poverty, low levels of living, unemployment and under employment. Their national plans presumed that if economic planning could take care of GNP, poverty would take care of itself and a high growth rate of GNP is the best means of eliminating unemployment and under employment. But the "trickle down" theory of economic development has not been realised in spite of fairly respectable rates of growth in GNP (Streeten 1980).

There is a growing gap between the entrants to the labour force and the creation of jobs. This has been further aggravated by the increase in the numbers of women seeking employment in rural areas, where women have been working since times immemorial. The strain on the agricultural sector has further worsened the situation in terms of working conditions and real wages of agricultural labourers, especially, women labourers. A look at Table I brings out the sorry state of affairs among Indian rural women workers.

TABLE I

DISTRIBUTION OF WOMEN WORKERS BY MAIN AND MARGINAL CATEGORIES
AND DISTRIBUTION OF RURAL WORKERS IN AGRICULTURE - INDIA 1981

(Figures in millions)

Category	Women workers			Rural workers in Agriculture*		
	Total	Urban	Rural	Female	Male	Total
Main workers	44.97	5.37	39.60	34.56	88.31	122.87
In Percentage	100	11.9	88.1	68.6*	97.2*	87.0*
Marginal workers	18.55	0.77	17.78	15.80	2.55	18.35
In Percentage	100	4.1	95.9	31.4*	2.8*	13.0*
Main and Marginal workers	63.52	6.14	57.38	50.36	90.86	141.22
In Percentage	100	9.7	90.3	100	100	100

Note: * These percentages are for the column totals.

Source : 1. India, Registrar General and Census Commissioner (1984) Census of India 1981, Series 1, India Part III A. General Economic Tables (Tables B-1 to B-5) Table B-3 pp.238-241.

2. India, Registrar General and Census Commissioner (1987), Census of India 1981, Series I, India Part III B(ii) General Economic Tables (Tables B13-B17), Table B-17, p.794.

A critical look at the table indicates that -

1. Women workers are concentrated in rural areas in agriculture.
2. Within agriculture one out of every three of them are marginal workers.
3. The process of their marginalisation is further reinforced by the fact that for every single male worker who is considered a marginal worker in agriculture, there are six such female workers. Though the official Census of 1981 describes them as marginal workers, they are not and never had been 'marginal' or supplementary earners for their families. They have always been integral and essential members of the family households and in many cases the sole supporters of their families (Majumdar - 1975, Mencher - 1987).

Female agricultural labourers (21.6 million main workers in 1981) form the single largest category of workers among the female labour force, yet they constitute the most neglected class in the Indian rural structure. Their income is low and employment irregular. Their problems centre around the basic problems of rural economy which are low income, low productivity and lack of continuous employment (Tyagi 1986). Since they possess no skill or training, they have no alternate employment opportunities either. Socially a large number of agricultural workers belong to the Scheduled Castes and Scheduled Tribes. They are not organised and can not fight for their rights. Therefore their economic lot

has failed to improve even after four decades of planning. The planning process has bypassed them, observe, Misra and Puri (1985). The late Prime Minister, Lal Bahadur Shastri, pointed out that though "there has been tremendous progress in India since Independence, landless agricultural labour is one section which has really a very hard time and which is deserving of a very special consideration".

The labour market in agriculture, as elsewhere in other sectors is dualistic and segmented and works against the interests of women workers (Mahajan, 1981). Women do planting, weeding and harvesting - back breaking jobs which fetch them lower wages. Krishnamurti (1988) points out that women workers in agricultural labour households irrespective of their caste or region are at a disadvantage vis-a-vis their male counterparts in terms of relative wages in all agricultural operations. The average daily wage earned by women is lower than that earned by men in every operation including transplanting and weeding which are largely female tasks. The study by Krishnamurti (1988) shows that at the all India level, male/female wage differentials have decreased in 1974-75 as compared to 1964-65. However, in the case of Scheduled Caste women in three agricultural operations and in the case of Scheduled Tribe women in two agricultural operations, wage differentials have increased in 1974-75 as compared to 1964-65. Yet, the main stream economists have long ignored differences in economic behaviour and reward as between men and women, points out

Shanmugasundaram (1987). They either neglected women as workers altogether or considered work in the abstract totality and not as man's work or woman's work. For all purposes, labour is treated as a homogenous factor of production. Technological change is indicated in terms of changes in K/L ratio; all that matters for analysis is the total quantum of labour and not the type of labour, (Sen 1989).

Mitra (1973) lamented that next to no work has been done in the field of women's employment, with women as a separate category. Gender as an analytic category of social relations has not yet been incorporated in either the neo-classical or the Marxist paradigm and the range of issues related to gender and work either remains at the level of empirical observation or insufficiently integrated into the theoretical frameworks (Kalpagam 1986). Mitra (1981) believed that introducing gender as an analytic category, with the condition of women and various types of inequality characterising their participation and earnings would indeed provide a new paradigm, could lead to the development of new analytical frames and new theories in economics. He says that they could be built up only on a trial and error basis, as none or very little exists, and wonders whether the concept of market, in the neo-classical sense in terms of the intersection of supply and demand schedules relating to the labour power, exists in respect of women and children in our economies that are complicated by enormous segments of subsistence and the immobilities and large frictional areas created by

religion, caste, class, occupations and traditional social, cultural and economic mores determined by encrusted division of labour.

Interest in women's studies in India has gained momentum since the report of the National Committee on the Status of Women 'Towards Equality' in 1975. In the U.N. Women's Decade 1975-1985 and thereafter, several studies on women's work have been reported. They focussed on the aspects of duration of employment, wage differentials, division of labour in agriculture, sex typing of tasks among different agrarian classes, impact of changes in cropping pattern, and irrigation on women's employment and income, female labour absorption in agriculture with technological changes including mechanisation and green revolution, the extent and nature of off-farm activities, migration of rural women, impact of land reforms on women's work and control over land and income (Kalpagam 1986). However, such situation analysis of rural women agricultural labourers in terms of basic indicators like employment and wages (Mallik and Giri 1976, Khatkar and Hadija 1981, Jayaraman 1982, and Santra and Paul 1986) have not been followed up by detailed studies on explanatory factors and processes.

Harris and Morris (1986) emphasise the need for making a distinction between an individual's employment position and his labour market position. A person may be unemployed at a point of time (or at the time of observation) but may have a high probability of finding work, while another person may be employed

and have a high probability of losing it and little chance of obtaining further employment once he or she is back in the labour market. Thus employment position and labour market position do not mean the same thing. Segmentation of the population in terms of types of occupation and patterns of recruitment does not make for labour market analysis, according to them, because it gives the appearance of incorporating the market into the analysis without actually doing so. Labour market is characterised by a plurality of buyers who are actual or potential buyers of the commodity (labour power) offered for sale by a plurality of sellers and vice versa. It is necessary to investigate the institutions, practices and relationships by which these pluralities come together to constitute a market, and their relation to one another.

The term market position refers to the typical probability of obtaining rewards. The immediate reward in the labour market is employment. In the labour market, sellers are differentiated in terms of their chances of obtaining different types of employment. Employment is differentiated in terms of its degree of permanency and hence in respect of the frequency with which the holders of such employment will come on to the market. According to Harris and Morris (1986), labour market position as well as labour market processes occurring within the work place are crucial determinants of worker biography, occupational mobility and hence of consciousness (worker attitudes and behaviour) and action.

Women's distinctive economic attribute is that they constitute a negatively privileged category within the labour market. It is the inferiority of their labour market position vis-a-vis men, that is the immediate source of their relative disadvantage. In order to explore the causes of that disadvantage, an understanding of their location in the labour market or their location in local social structure is required. The 'model' of the social structure of the labour market, which Harris and Morris (1986) have adopted is of households the participation of whose members in paid work is determined by their position within the household and the character of their local social networks, which link households with one another and their members with different types of employment opportunity. The inferior position of women in the labour market is the immediate source of her relatively disadvantaged position in paid work.

Persons of whatever gender, who are unable for whatever reasons, to obtain employment in response to public, formal methods of requirement - are able and willing to work for exceptionally low wages, in adverse working conditions. The social norm that the man/husband is the primary earner and that he is responsible for meeting the better part of the family's subsistence needs and that the woman, when she works is a secondary worker, allows the employer to recruit women at fairly low levels of wages and generally unfavourable conditions. Their contracts of employment are adventitious- the exploitation of a chance opportunity arising out of their routine every day

activities in a common social location. Therefore in societies, where the traditional sex - based division of labour and the existence of family - household have become the given historical conditions of the operation of both labour market and economic production, women because of their position in the household, become a form of cheap intermittent labour required informally. They have a low market position i.e., have chances only of obtaining low paid insecure employment, and being recruited by informal means.

Hence, labour market models are needed to identify the determinants of the female labour force participation rates, to understand why women decide to work; to understand the influence of changes in the economic environment on the labour market outcomes for women (Kneisner and Goldsmith 1987). According to Rosenzweig (1978), the issue of the determination of wages and of labour supply in the agricultural sector of less developed countries has been somewhat neglected particularly in the context of a heterogeneous labour force.

From another point of view also, an understanding of the labour participation decision of women is of particular interest. Any fluctuations in total labour supply to the market place comes primarily from fluctuations in the participation of women in the labour force, remark Joll et al (1983). In India also, the male participation rates have been observed to be constant and, Papola and Misra (1980) call it as one of the 'great ratios' in economics. Variations in the labour force primarily arise from

variations in female participation rates.

Developing countries have by now realised that a development policy aimed at building up the fixed capital of a country mostly through the use of a wage fund or circulating capital to employ surplus labour, as one of the most appropriate ways of solving the problems of worsening poverty and unemployment. The standard theory of development that expounds the supply of capital to the modern sector as a critical constraint in the process of development has given way to this new theory. Jackson and Turner (1973) argued in the early 70's that development efforts based on the capital supply constraint approach should be supplemented by methods of development which directly tackle the 'demand constraints' on the employment of labour itself. They contended that direct budgetary employment creation or employment intervention programmes can contribute much towards solving the unemployment problem. In India, such programmes as the National Rural Employment Programme (NREP) have been in operation. The impact of these programmes in improving the labour market position of the different categories of rural workers particularly women workers needs to be investigated.

In the light of the above discussion the study sought to:

1. identify the structural changes in women's employment;
2. assess the factors influencing the changes in rural female participation rates (FPRs);
3. construct and empirically test a labour market model to identify their labour market position;

4. estimate the trends and variability in their wage rates, which primarily reflects their levels of living; and
5. evaluate the contribution of NREP programme in improving their employment and wages.

The study relates to Tamil Nadu, as the literature showed that there were very few studies focussing on female employment or female agricultural workers in the State. The reference period of the study ranges from 1960-61 to 1984-85. It has used both secondary and primary data. Data from Census Reports, Season and Crop Reports of Tamil Nadu and Reserve Bank of India Bulletins have been collated and compiled for the study. In addition to the secondary data, primary data were collected from rural female labour households, farm households and NREP beneficiary households for getting a profile of these labourers; finding out the pattern of labour demand facing them and for finding out the outcomes of employment intervention on their labour market position. A comparative analysis of both male and female labour has been made to highlight the labour market behaviour of women and the specific factors having a bearing on them.

The specific hypotheses tested in the study are:

1. There has been no structural diversification in women's employment since 1961.
2. The FPRs have changed because of the increasing displacement of female workers by male workers, slow growth of employment opportunities and the declining sex ratio in the population.

3. The labour supply decision of individual members in a household is the outcome of the household's attempts at utility maximisation subject to budget and time constraints.
4. The labour market is either equally stable or unstable for both male and female agricultural labour.
5. There is no difference in the rates of growth or extent of instability characterising the wage rates of male and female agricultural labourers.
6. There is no difference in the employment and mean earnings of workers participating or not participating in NREP programme.

Methods of triangular graph, decomposition analysis, simple and multiple regression analysis, test of difference, besides ratios, means and percentages have been used to evaluate these hypotheses.

The study, it is hoped, will fill a vital gap in the area of women and work relating to the determinants of female participation rates and give methodological insights which could be of use in designing studies on the economics of female labour force participation. The conclusions emanating from the study are expected to be of use to the policy makers in designing employment strategies, for the productive utilisation of the nation's greatest resource, namely the skills of its people.

Review of Literature

II. REVIEW OF LITERATURE

The literature pertaining to the study on the female work participation, with special reference to wage labour in agriculture is reviewed under the following heads:

- A. Female Participation Rates
- B. Female Employment, Wage Rates and Earnings in Agriculture
- C. Rural Labour Market Behaviour and
- D. Employment Intervention Policies

A. Female Participation Rates

Gan (1988) views the process of industrialisation as having brought about reallocation of the relative importance of three types of economic roles women perform. They produce goods and services for family's own consumption; they are engaged in household production for sale and exchange on the market; and they work for pay outside the home. The relative importance of these roles is determined by the stages of the life cycle, as also by economic need. Sen and Sen (1985) point out that even in poorer households, married women in the principal child bearing age group are disproportionately engaged only in domestic duties. NSS results (1977-78 32nd round) show that in India women participate in the traditionally defined labour force in response to economic need. However, when women withdraw from such work, they tend to substitute it with a range of economic activities in and around the home. Pure involvement in domestic work is the

preserve of mainly well to do rural women. Only in households with land holding of more than 10 acres or monthly per capita consumer expenditure over Rs.150, does the number of non-working women become greater than the number involved in some economic activity.

Variations in female work participation rates (FPRs) have been primarily responsible for variations in the overall participation rates. This is because the male participation rates have shown a tendency towards constancy across geographical areas and periods (Papola and Misra, 1980, Kaul et al, 1980). This constancy of male participation rates have been considered as one of the great ratios in economics.

Why do the female participation rates vary regionally and temporally? The women's decision to work for gain/pay outside home is governed by a number of considerations, unlike men who have been universally acknowledged to be breadwinners and therefore work, they must, as a routine. The issue of why and how they decide to work does not arise with men. For women, on the other hand, who shoulder the responsibility of raising and rearing the families and on whom the household responsibilities have been thrust for generations, the decision to work is made after weighing several factors. Hence the economics of labour force participation of women has emerged as a new area of labour economics. With women's movement gaining momentum, women's studies researchers have also evinced interest in this area of

women and work. The work of both these groups have thrown up new hypotheses regarding women's work participation decision and regarding the differentials in female participation rates.

FPRs are low in the early stages of economic development. According to Dholakia (1985) because of the transformation taking place in the technological and occupational structure of the economy and increasing productivity, women and children who constitute the marginal working force tend to withdraw due to priorities for other household duties and children's development. Moreover, as the employment pattern shifts in favour of more manufacturing and service sectors, the exacting nature of new jobs drives the marginal categories of workers out of the working force. Ghosh and Mukhopadhyay (1984) call this tendency where men workers, with superior training and skills replace women workers, with structural change in the economy as the displacement effect.

Due to the poor rate of economic growth, employment also grows only at a tardy rate and the economy is unable to absorb the backlog of unemployed workers, as also the new additions to the labour force due to the growth of population. This growing unemployment and sluggishness in the economy keeps more women out of work, affecting their participation rates (Ghosh and Mukhopadhyay 1984). Papola and Misra (1980) also agree that the first opportunity to participate in economic activity gets allotted to men.

Yet another factor that would have affected FPRs according to Ghosh and Mukhopadhyay (1984) is the proportionately smaller

growth of the female population itself, reflected in the adverse sex ratio, which they call the demographic effect. Their component element analysis, however, which assessed the relative strength of these three effects - the displacement effect, the employment effect and the demographic effect - carried out on the state level data of 1961, 1971 and 1981 showed that displacement effect was the strongest of the three and it had been primarily responsible for changing the FPRs in India.

The other factors which make the FPRs low are relatively high family incomes arising from higher wages and earnings of male workers (Hill 1978, Sinha 1978, Sawant and Dewan, 1979, Papola and Misra 1980, and Bardhan, 1987). Hill (1984) found that in Japan FPR was a negative function of the family incomes. Sinha (1978) in his study based on NSS data 1972-73 has shown that FPRs decline sharply in prosperous states which are characterised by high male earnings. Sawant and Dewan (1979) noted that the developed villages in Maharashtra had lower MPRs, as compared to the backward ones. Bardhan (1987) in his study of urban households of West Bengal found that FPR was lower among better off households. FPRs were also low in districts with urban opportunities where manufacturing jobs and more job opportunities were available (Bardhan 1987, Papola and Misra 1980).

On the other hand, FPRs tend to be high in such areas and such periods where the male labour supply had reached the saturation point (Papola and Misra 1980); where the activity pattern is such that a significant element of work could be

performed by women more easily and efficiently as in rice farming systems (Booth and Sundrum (1984), Burton and White (1984), Papola and Misra 1980); where there are no social inhibitions about women working outside (Papola and Misra 1980) and amongst SC/ST households (Bardhan 1979, 1987). FPR was also the highest amongst the poorest households (Sen and Sen 1985), landless households (Papola and Misra 1980), in backward villages (Sawant and Dewan 1979); low productivity districts (Papola and Misra 1980) and amongst households with migrant heads (Bardhan 1987).

Papola and Misra (1980) postulate an inverted U-shaped curve for FPRs in developing countries, as against an upward sloping curve relevant for developed countries. Low wages and incomes force more women to enter the labour market, thereby increasing their household incomes and after reaching a reasonable level of income to maintain their customary standard of living, they might withdraw from the labour force. Withdrawal might get expedited with greater rate of increase in the wage rates of male workers and in the general productivity levels. Many studies have been undertaken to understand the behaviour and determinants of FPRs. But they have not been successful in identifying the variables influencing FPRs (Gulati 1975, Dholakia and Dholakia 1978 and Nayyar 1987).

Gulati (1975) in her analysis of the factors underlying interstate variations in FPRs used simple correlation technique to see if there was any significant association between the FPR on the one hand and percapita income, cropping pattern, literacy, MPR

and sex ratio on the other. However, she did not find any satisfactory explanation for the difference in FPRs between the states.

Likewise Dholakia and Dholakia (1978) undertook a multiple regression analysis using the explanatory variables of per capita income, assets per household, structure of employment, sex ratio, average size of households and literacy levels, but that also did not yield a good fit.

Nayyar (1987) tried to identify the possible factors influencing FPRs, using the following set of explanatory variables taking two of them at a time: incidence of rural poverty; literacy rates; co-efficient of variation in the distribution of landholdings; proportion of total agricultural labourers in the rural work force; price of cereals; per capita income; per capita production of food grains and SDP from agriculture at constant prices. However, none of these variables emerged as significant in explaining inter state differences in FPRs, the value of R^2 was less than 0.1 in each case.

Nonetheless, studies on FPRs or female labour supply in peasant households or agricultural labour households had shown some consistent results. In Bardhan's (1979) study of the peasant households of West Bengal, the SC/ST variable emerged as the most important factor in explaining variations in female labour supply, indicating that low caste and tribal women participated more as labourers than higher caste women. The wage response was negative. FPR was negatively associated with the number of

dependents, the number of adult males in the household, with village unemployment rate and the family standard of living. He also found that women participated more in agriculturally developed areas and in the busy season possibly due to increased opportunities.

B. Female Employment, Wage Rates and Earnings in Agriculture

A major change associated with development is the movement of resources away from agricultural to non-agricultural activities. Eapen (1984) points out that India, however, had a trend very different from that of other countries. From 1901 upto 1951, the proportion of workers engaged in agriculture had remained virtually the same.

Even during the first decade of planned industrialisation, 1951-61, there was no noticeable change in the industrial distribution of the workforce. The 1981 census reveals the proportion of the workforce engaged in non-agricultural activities showing a 3 percent increase over the previous censuses, 33.3 percent in 1981 as compared to 30.5 percent in 1961. A three percent increase over a twenty year period is a marginal increase. Hence, we could infer that the long term stagnancy of the proportion of workers in non-agricultural activities continues.

The NSS data on work force obtained from 27th and 32nd rounds (1972-73 and 1982-83) also indicated the absence of change in the sectoral distribution of workers during this period. Hence Eapen (1984) concludes that throughout the period 1901-1981, the share of agriculture in the total workforce has remained around 70

percent, and of non-agricultural activities 30 percent, within which manufacturing has accounted for 9 to 10 percent. Roy (1989) also points out that the sex ratio among workers in non-agricultural sectors had declined from 446 in 1911 to 231 in 1961, in Bihar. She states that the relatively larger percentage of women agricultural labour and its increasing rate have been largely due to the displacement of women workers from other sources of non-agricultural employment in the rural areas.

Omvedt's study of decennial censuses 1901 to 1981 and of the data from Rural Labour Enquiries show that an increase in agricultural labourers in general and female agricultural labour in particular had taken place during this period (Pai 1987). Subramaniam (1984) in his study of 428 landless agricultural households in the Achampatti complex of villages in Madurai district in Tamil Nadu found that female labour population outstripped the male labour population in the landless agricultural labour category.

Jose (1988) points out the regional imbalance in the distribution of agricultural work force. Andhra Pradesh, Bihar, Maharashtra and Tamil Nadu together accounted for more than 50 percent of the total agricultural labour force in India. On the other hand, the agriculturally prosperous State of Punjab accounted for only less than two percent of the total wage labour force in agriculture. All the states of North Western India viz. Rajasthan, Himachal Pradesh, Punjab and Haryana put together held only less than 5 percent of the total labour force in the country.

Sen's (1985) study on the incidence and employment of women agricultural labourers showed that incidence of women agricultural labour varied directly with inequality in land ownership and with the proportion of gross cropped area under coarse grains. The co-efficient of agricultural productivity was not significant in explaining the regional variations in the incidence of women agricultural labourers. She also found that those states with a high incidence of women agricultural labourers and daily status unemployment rate among rural women had a high proportion of casual women agricultural labourers who wanted more gainful work.

Kumbhare, Gupta and Patel (1983) in their Haryana study found that the average employment in farm and non-farm jobs for male and female casual labourers was 120 and 82 man days per annum respectively. About 70 percent of the employment of male casual labour and about 90 percent of the employment of female casual labour was during the months of April, June, July, October and November, the months during which the sowing/transplanting and harvesting/threshing operations are in full swing. During the remaining months of the year, the employment was very meagre. For as many as 27 weeks spread over different months in a year, the male casual labourers got employment for less than two days in a week. During the entire month of September, they remained totally unemployed. Ninety percent of the total earnings flowed through wages from farm employment. Kumbhare et al (1983) estimated the total earning per labour household at Rs.2747 per annum. Applying the Planning Commission's norm of the poverty line for VI plan

(viz. Rs.76 per capita expenditure per month at 1979-80 prices, raised to Rs.92.65 per capita per month at 1981 prices or Rs.1,112 per capita per annum), they found that 94.2 percent of the households and 98.6 percent of the labour population were below the poverty line.

The two important elements determining their living conditions are (1) wages and (2) employment. Of these two elements, data on trends in employment of agricultural labour for a long period of time are not available on a continuous basis. Census provides a snapshot of workers at 10 yearly intervals. The NSSO data on employment and unemployment give a little more detailed information on the employment and unemployment characteristics, using various criteria - the usual status, weekly status, daily status approaches. Such data are available only at five yearly intervals. Statistical series on wages, however, are available at the district level and state level over a long period continuously on monthly basis (Parthasarathy and Adisesu 1982). These are published in Season and Crop Reports by the Commissioner of Statistics of the respective States and are brought out as Agricultural Wages in India by the Ministry of Rural Development, Government of India. Hence, a number of studies on wage trends and wage structure have been carried out to study the living conditions of agricultural labourers.

Myer and Paul's (1983) study of trend and structure of cash wages of casual male agricultural labourers in Punjab (1965-66 to 1978-79) showed that there had been only a marginal improvement in

the general economic condition of labourers over a span of 14 years because money wages rose by 190 percent as against a rise of 136 percent in prices of essential goods consumed by agricultural labourers (Consumer Price Index numbers of Agricultural Labourers). They also found that high wage districts were relatively low productivity districts and vice versa; and also districts with relatively less inter-operation wage differentials had relatively low productivity and vice-versa.

Kumar and Sharma (1983) in their study on the growth rates of agricultural wages in Haryana during the period 1960-61 to 1979-80 found that the real wages of agricultural labourers engaged in different agricultural operations have registered a very low growth rate but not significant over the years and that these had remained almost constant. They also found that real wages had become distinctly higher after the green revolution.

Kaul et al (1986) studied the agricultural wages of male labour in Orissa over the period 1960-61 to 1980-81. They observed a tendency towards equalisation of male and female wages in agriculture. They found that the relative ranking of the districts in terms of wage payment to male labourers and male participation rates had not significantly altered during the period. The most important factor affecting the male wage rates was cropping intensity.

Jose (1988) found that agricultural operations like ploughing and post harvest operations which carry higher rewards are generally performed by male workers. On the other hand,

operations such as sowing, transplanting and weeding with relatively lower wages are predominantly performed by women workers. Upto 1984-85, the female wages had stayed at less than 80 percent of the male wage rates in some ten states. States like Maharashtra, Rajasthan and Tamil Nadu maintained a high order of gender disparity in wages. In these states female wages rarely exceeded 65 to 70 percent of the male wages.

Jose (1988) also found that wage rates vary directly with agricultural productivity in each state. Regression equations that related the growth in money wage rates to growth in product per worker in agriculture explained 62 to 78 percent of the variation in female wage rate and 77 to 87 percent of the variations in male wage rate. In Gujarat, Orissa and Rajasthan, higher rates of growth of wages occurred along with higher rates of growth of output. Likewise in West Bengal, Himachal Pradesh, and Karnataka, lower rates of growth of wage co-existed with lower rates of growth of output. However, Andhra Pradesh, Madhya Pradesh, Bihar, Maharashtra, Tamil Nadu and Punjab did not fit into this pattern. The author surmises that in Maharashtra, Bihar, Madhya Pradesh and Tamil Nadu, the employment generation programme could have contributed to the increase in real wages, a hypothesis which had been substantiated in respect of Maharashtra. In Punjab and Haryana, wage rates could have shown a stagnancy in spite of the highest rates of growth of agricultural output due to the cumulative effect of two factors viz., the circular migration

of agricultural labour into the region and the use of labour saving technology.

Parthasarathy and Adishesu (1982) found that improvement in productivity of labour per se does not contribute to improvement in real wages, unless they bring down the prices paid by agricultural labourers. They also found that growth trends in real wages was not statistically significant thus supporting the stagnation inference. Their findings support the inference that real wages of agricultural labour had been stagnating during the past two decades.

According to Pai (1987), the study of female agricultural labourers is a study of women at a level where class and gender inequalities coincide. Female agricultural labourers in terms of class together with male agricultural labourers are placed very low in the agrarian hierarchy; in terms of gender, they feel the burden of poverty and exploitation more heavily than male agricultural labour. Hence, she maintains that a new theoretical framework in which both class and gender inequality and their interaction is taken into consideration is necessary.

Pandey, Kaul and Ashok Kumar (1985) point out that though women are engaged on various types of jobs in farms along with male workers, their wages are relatively low. This is true in almost all regions of the country. They contend that the payment of low wages to women will affect their participation and welfare. In looking at the relationship between wages and agricultural productivity, they had divided the productivity figure by two i.e.

presumed that exactly half of the contribution to productivity comes for women labour. However, the productivity co-efficient had a negative sign, inconsistent with theoretical considerations. They found the change in female wages to be moderate in real terms in Orissa and that in some districts, the wages had fallen in 1980-81 as compared to 1960-61. Cropping intensity was the major factor that affected the wages.

Regarding earning differentials, Sen (1985) found that relative to other agricultural labourers, the average daily earnings for women agricultural labourers tend to be higher in harvesting and transplanting (peak season activities) and lower in weeding and others (off peak season activities) in the majority of states. The differential between men and women was also higher in the off peak activity (weeding) than in the peak activities, (harvesting and transplanting). Bharadwaj and Mishra (1986) in their Madhya Pradesh study covering the period 1953-54 to 1977-78 found that after 1975-76, there was no wage differential on the basis of sex.

Pai (1987) notes that new technology in agriculture had resulted in some re-arrangement of jobs and that in this process, women's status within the agricultural labour force had suffered. That is, women have remained with their traditional jobs and have not gone into newer and better paid jobs which have gone to men, leading to increasing concentration of women in low skilled labourious jobs, thereby leading to a process of marginalisation

within agriculture. The traditional sex based division of labour and values had got entrenched with new technology development.

Citing the data from Agricultural Labour and Rural Labour Enquiries, Pai (1987) shows how women have not gained as much as men in terms of man days of employment in the operations of weeding and harvesting. This was because of the use of weedicides and pesticides and mechanical devices for harvesting which have spread in some areas and these are occupations now performed by men. With the introduction of HYVS, the change of crops had changed the division of labour between men and women and had led to an increase in the demand for male agricultural labour. Hence women had been left behind with the entire responsibility for the cultivation of the village drylands, with men moving over to the main stream of the new technology. Pai (1987) therefore maintains that green revolution had rendered the access of women to the labour market more difficult.

There is an inverse association between the degree of development and the extent of female employment. In areas where HYVs and mechanisation had penetrated less, employment opportunities for both male and female labour have increased. In areas, where both biochemical and mechanical changes have been introduced, female agricultural labourers are fast disappearing. They are used only in non-mechanical and less important activities such as cotton picking, corn decabbing, cane stripping, fodder cutting, rice transplanting etc. All these show that women have been transformed into a seasonal labour force in many areas. A

fall in total employment with a rise in the harvesting management or in transplanting indicates a shift towards an increased seasonal concentration of female employment.

The work available to male agricultural labour is spread out over the whole year while female agricultural labourers are unemployed for many months in a year. Further while male labour is employed on a permanent basis, female labour has been casualised as daily, seasonal labour and reduced to the category of helpers. Their primary source of income today is seasonal wage employment. They form the majority of the reserve labour force. Their lives are one of continuous insecurity of employment within the village in the primary sector i.e. in agriculture, says Pai (1987).

The findings of Pai (1987) are corroborated by the findings of Sinha (1989). Sinha (1989) who took the per capita income and irrigation as the two indicators of technological change in agriculture and assessed their impact on the participation of the rural female population in agricultural operations, also found an inverse and significant correlation between per capita income and female participation in both the peasantry and poor peasantry classes. Irrigation, proxying the level of agricultural development had also influenced inversely the female participation in agriculture.

Das (1989) in his study of technological change and labour displacement in Indian agriculture found that the degree of dependence of agriculture on labour had been decreasing.

Tewari (1989) in his study of factor productivity and irrigation in Indian agriculture found that there was a sharp reduction in the elasticity of value of agricultural produce per hectare of net area sown in respect of agricultural workers during the reference periods 70-71 (.2633) and 80-81 (.1532). On the other hand, there was a significant rise in the strength of agricultural workers, leading to a deterioration in their living conditions.

The major conclusions from these studies indicate that the status of female agricultural labourers has been eroded; the new technology has bypassed them, it has not offered anything to them either in terms of increase in employment opportunities, better jobs, higher wages or standards of living. In fact, it has relegated them to a secondary position in the labour market and the rural economy. It has pushed them out of the usual jobs they performed earlier, thus increasing the number of women seeking work. As long as women remain in unskilled and unimportant jobs, wage differentials will be difficult to remove.

C. Rural Labour Market Behaviour

According to Bardhan (1979), very few systematic empirical studies of labour supply and labour market behaviour of peasant households are available in the Indian context. Some sporadic attempts at the estimation of labour supply functions had been made with the use of FMS data. But these data exclude the

landless households which contribute a substantial part of the agricultural labour supply.

Papola and Misra (1980) observe that labour markets in general tend to have a slower adjustment mechanism than other markets. The imperfections and rigidities are, however, found to a much greater degree in the rural labour markets. Hence, these markets sometimes look qualitatively different from other markets. Though some studies (Rosenszweig 1978) have found the labour markets as fairly competitive and responsive to variations in demand and supply, a number of others have found the structural rigidities of the labour market rendering the demand and supply of labour rather inelastic to the wage rates (Misra 1970).

Papola and Misra (1980) have identified some of the factors making for a qualitatively different pattern of functioning of the rural labour markets. The most important factor is the household - based organisation of agricultural production. The supply of family labour, which accounts for the major part of labour employed in agriculture, is not subject to changes in the wage rates as such, but is determined by the size of active age group population and social attitudes to work. The latter is particularly significant in the case of supply of female labour which is the major factor accounting for differences in worker population ratio among regions and periods. Another social institution introducing rigidity in the functioning of the labour market is the widely prevalent practice of attached labour, under which workers are not able to effect inter-employer mobility, nor

are their wage rates easily flexible. The large extent and peculiar nature of unemployment among agricultural workers makes its own contribution in diffusing the demand, supply and wage interrelationships in the rural labour markets. The existence of sizable surplus labour which is not actually redundant as most of it is required in certain peak periods in the year, adds to labour stock which can be converted into labour demand at any wage during the lean seasons of the year. Moreover, while all labour markets have regional and local character as they deal in human beings, the rural labour markets tend to assume this characteristic more significantly. The institutions of family and community have stronger force in tying a worker to his home in the rural areas. Consequently, labour supply also becomes more localised and competitive forces leading to equalising tendency in wages through inter-area movements of labour are rather weak. Misra (1970) also found that the supply of labour in the rural sector is demographically and institutionally determined and fixed and does not vary with the wage rates. He also believed that the prevalence of excess supply situation precludes the possibility of supply behaving as a function of wages. Agarwal et al (1970) also state that in most parts of the country, but for the critical periods of sowing and harvesting there is generally an over supply of rural labour in agriculture and that it is the demand side which is crucial and hence studied the demand for labour function in agriculture. Bardhan (1979) also concluded that labour supply

Roy (1989) in her Bihar study also found that as land endowment increased, the supply of female labourers decreased and landlessness increased the incidence of female labourers. Irrigation increased the incidence of female agricultural labour. It increased the cropping intensity which in turn required more labourers and females to supply them.

The specification of demand for labour also poses certain problems in the analysis of rural labour markets, observe Papola and Misra (1980). First, the employment of workers in agricultural operations, most of whom work on family farms, get extended to the extent of supply, rather than being fixed at the point of equality between wage rates and the marginal product. Hence, the number of workers engaged in agriculture is not a reliable indicator of the demand for labour and most of it is invariant in relation to the wage rates. In fact, the intensity of their employment is found to be less than even half of the potential labour time at their disposal in the case of Uttar Pradesh. Variations in the number of workers engaged in agriculture thus mainly reflect the differences in the supply of such workers in the rural areas rather than the demand for their labour in agriculture. To the extent, employment opportunities are available in the non-agricultural occupations in the rural areas, employment figures may indicate the demand for labour with

a greater degree of reliability and the labour market behaviour would show a greater responsiveness of supply, demand and wages to each other. Non-agricultural employment, however, exists only to a small degree in most of the rural areas.

Second, even the demand for hired labour which is expected to be influenced by the wage rates, may actually be invariant and may not vary inversely with wage rates, particularly in peak seasons when certain agricultural operations have to be completed in a given period of time. High wage rates or more often inelasticity of labour supply may, however, lead to substitution of labour by machines for these operations.

Misra's (1970) study also concluded that the wage rates in agriculture vary independently of the demand and supply situation. In order that the supply at a point of time is flexible and responsive to wage rates and that the allocation and pricing of labour proceeds on the basis of market forces, the necessary condition lies in the availability of alternative employment opportunities. Gheng (1977) confirmed that the quantity of labour available depended on alternative income opportunities. It is the lack of this condition which makes the rural labour markets indifferent to economic logic.

According to Verma (1989) days of agricultural labour employment per agricultural labourer in a particular year is the net result of changes in the demand for and supply of labour.

Papola and Misra's (1980) study concluded that the male wage rate variations among districts were predominantly influenced by the supply condition in the market; the extent of labour surplus punctuated by employment opportunities in the non-agricultural sector and the relative bargaining position determined by the pattern of land distribution explained the major part of wage rate variations. In the given supply situation, demand variables had only marginal influence. Even if the demand for labour increases, the existence of surplus labour, non-availability of adequate employment opportunities outside agriculture and lack of bargaining power among workers do not allow a rise in wages.

Papola and Misra (1980) found that variations in female wage rates were predominantly explained by factors affecting labour supply. The two variables that were highly significant in this connection were (1) the number of female workers per 100 hectares and (2) alternative employment opportunities. Supply conditions in the labour market came up more sharply as determinants of wage rates for women workers, with demand variables showing no influence whatsoever.

Hill (1983) in her analysis of the determinants of female labour supply in Japan found that the female wage rate and non-wage income had the expected effects, but the sign of the male wage rate became positive. The author explains this in terms of the substitution effect of the male wage rate rather than its income effect. This positive sign indicates that male and female

time spent in activities other than working as an employee are complements to each other.

Rosenzweig (1978) in his estimates of the market supply and demand equations using the FIML method on the data of 159 Indian districts in 1961, found that wages were sensitive to shift in the supply of labourers for hire i.e. increases in the number of people participating in the agricultural labour market from any age-sex group reduced all agricultural wage rates. The strongest supply impact on wages came from shifts in female participation.

Bal et al (1987) in their Punjab study hypothesized that effective demand for labour in agriculture is related with to its productivity and its rate of substitution with other factors, such as type and level of technology, level of mechanisation etc. They used the production function analysis to estimate the demand for labour on the primary data relating to three crops namely wheat, paddy and cotton. Production elasticity of human labour was not significant for paddy and wheat because most of the farm operations for these crops are mechanised. In cotton crop, not all farm operations are mechanised. Hence its human labour elasticity was positive and significant as against the elasticity for the mechanisation variable which was not significant.

Verma (1989) hypothesized that the process of technological change in agriculture, in the context of the already prevailing inequity had increased the monopsony power of the land owner over labour with the result that wages were lower than what would otherwise be the case. He postulated, therefore, a negative

relationship between growth of agricultural output and wages.

Acharya (1989), however, in his study of regional wages found that wages responded positively to changes in agricultural productivity. His findings showed that wages were depressed because of the general immobility of people and resources.

D. Employment Intervention Policies

Booth and Sundrum's (1984) analysis suggests that certain policies, such as land reform, technical progress, capital investment and interventions in factor and product markets, can lead to the more intensive utilisation of labour within agriculture. The results of Kumbhare et al (1983) study showed that the economic condition of the landless agricultural labourers was far from satisfactory even in an agriculturally prosperous area where the farm wage rates were one of the highest in the country, the reason being the under - employment and unemployment for a large part of the year. They suggested that more avenues of employment must be provided at the village level, if these labourers were to cross the poverty line. Sen (1985) also indicated that more employment for rural women is a particularly urgent need in precisely those states that have a high incidence of women agricultural labourers, although female unemployment is a pressing problem in almost all the states.

Bal et al (1987) found that there was surplus labour in Punjab agriculture. The demand for farm labour was estimated as 4950 lakh adult man days in 1984-85 as against the total

availability of 9937 lakh man days of farm labour (calculated on the basis of 1971 census figures), assuming that each farm worker is available for work for 300 days in a year when fully employed. The authors, therefore, recommended the expansion of irrigation projects and allied sectors such as dairying, poultry, fisheries and forestry to provide supplementary employment.

Papola and Misra (1980) stress that if labour market in agriculture were to stabilise at higher levels of employment and wage rate, increase in cropping intensity and use of labour intensive techniques of production were indicated. But this could happen only in the long run and therefore they suggest that employment opportunities in the non-agricultural sector may prove a potent factor in reducing labour surplus and in ensuring that wage earners have a higher share in the productivity gains in agriculture.

The major task of rural development lies in the removal of all hurdles which impede the efforts of the poor and the unemployed to be self reliant and earn their livelihood through their own work and merit, observes Dantwala (1988). This task is yet to be accomplished and hence the incidence of poverty continues to be very high. According to the Parliamentary Consultative Committee attached to the Union Ministry of Labour (Vinayak, 1988) the ranks of agricultural labour are growing at a disturbing annual rate of 2.5 percent. Lack of job opportunities in the industrial sector, the preponderance of mono-crop pattern in most states and the tardy growth of agro industries and

irrigation facilities have been responsible for their unemployment and under employment. Hence special employment schemes have been initiated since 1980's as NREP and RLEGP. In March 1989, all the ongoing wage employment programmes were merged into one programme viz. the Jawahar Rozgar Yojana.

According to Hirway (1988), these wage employment schemes have vast potentialities:

1. They can eradicate poverty if they could provide continuous employment (and not scattered and uncertain employment) on minimum wages, when the wages are paid regularly without undue delays, more so when such employment is provided to women;
2. The productive assets created through the programme will raise the rate of growth and thereby improve the labour absorbing capacity of the economy in the main stream.
3. They can improve the quality of life of the poor, particularly when works like housing, wells for drinking water, approach roads, village sanitation, school buildings, gober gas plants etc. are taken up.
4. They can have a significant and positive impact on the labour market in a number of ways;(a) generation of large scale employment opportunities at minimum wage rates can raise the general wage rate for the workers in the economy,

(b) Equal wage payments to all the workers in these programmes can reduce the male female wage differentials and
(c) They can reduce the seasonal fluctuations in wage rates and thereby protect the incomes of the poor in the lean season;

5. They increase the possibility of workers coming under formal and informal trade union organisations.

6. If these wage employment programmes are backed by suitable skill training for rural workers, their productivity as well as scope for employment can increase considerably.

In Tamil Nadu, NREP was introduced in 378 blocks during February 1981 as a centrally sponsored scheme on a 50:50 expenditure sharing basis between the Centre and States. The basic objective of this programme was to generate additional employment opportunities for the rural unemployed and under employed and to create durable community assets for strengthening the rural infrastructure. This was expected to result in a rapid growth of the rural economy, besides providing supplementary employment opportunity to work seekers during the lean period, a steady rise in income levels of the rural poor, thereby improving their nutritional status and living standards. The programme operated in close conjunction with the ongoing developmental works, ensuring that employment and development became catalysts of each other and the benefits to the community maximised. The cumulative

coverage of the villages under NREP since its inception worked out to 93.42 percent of the total villages, according to the Report of Concurrent Evaluation of NREP brought out by the Department of Rural Development, Ministry of Agriculture, Government of India (1989). Thirty four out of 36 villages per sample block had received the benefit of NREP works so far.

The official evaluation (Op cit 1989) also shows that 85 percent of the NREP households were living below the poverty line, with an income of less than Rs.6,400 per annum. About 57 percent of these labourers were drawn from SC/STs. The coverage of women amounted to 37 percent. The average man days of employment per NREP worker was 16.31 of which 11 days were generated by the NREP projects and 5 days in other works. The other members of the NREP households were employed on an average for 17.21 days in a month, out of which 14.35 days were on other works and 2.86 days were on NREP projects. Seventy four percent of the man days generated had gone to landless labourers, 37.5 percent to women and 72 percent to SC/ST labourers.

Against the notified minimum wage rate of Rs.11 per day in Tamil Nadu, the NREP workers received an average wage of Rs.17.50 per day of which Rs.13.78 were received in cash, Rs.1.34 in terms of wheat and Rs.2.39 in terms of rice. An evaluation study of NREP in Andhra Pradesh (1985) also showed, that the average daily wages paid to workers under NREP was significantly higher than the usual average wage rate. The review of NREP programme in VI plan

revealed that it had a substantial impact in terms of stabilisation of wages in rural areas.

However, the overall impact of the programme on employment generation had been very minimal according to some sources. An NIRD (1988) study of NREP in Tamil Nadu indicated that the magnitude of employment generation under NREP at the village and family level was very insignificant and could not make much impact on the beneficiaries. Against their requirement of 130 days of employment in the lean period April to June, NREP works fulfilled only 11 percent. Hirway (1988) estimated that at the all India level, NREP and RLEGP efforts could not meet even 2 percent of the requirements for employment in the economy. According to the Parliamentary Consultative Committee attached to the Union Ministry of Labour (Vinayak, 1988) agricultural labourers are able to get employment under the anti poverty programmes only for 15 to 20 days in a year. They have not made the desired impact on account of the meagre allocation of funds. As the population below the poverty line is close to 22.15 crores (according to NSS estimates), if one member per household comprising 5 members is to be provided with employment for 100 days in a year, the total employment requirement will be close to 443 crore man days. Against this, the employment which could be generated from resources provided under the employment schemes is only 55 crore man days a year.

Dantwala (1988), however, cautions that public works programmes and special employment schemes must not become the main

planks of employment programme and thus divert attention of the planners from the major task of rural development. The planners, he says, should aim to integrate the poor and the unemployed within the main stream of economic activity and not segregate them into a foot loose class of camp followers or retinues perpetually dependent on the benevolence of Government sponsored employment programmes. In his view, the success of the scheme should be judged by the progressive reduction of reliance on them. In other words, the development of the area should be such in quality and scale that it provides income and employment to all its labour force and fewer and fewer persons find it necessary to work under special employment schemes.

Clear cut conclusive studies, however, on the impact of the programme in stabilising the employment and earnings of the sex groups of rural workers, are lacking. Spatial distribution of resources and benefits under the scheme have been studied in Tamil Nadu by Namasivayam et al (1987). Other state level studies have concentrated on the nature of beneficiaries, on the outcomes of the scheme to the individual beneficiaries or their families (NIRD 1988).

Methodology

III. METHODOLOGY

The methodology adopted for the study is discussed under the following sections:

- A. The Locale of the Study
- B. Sources of Data and Methods of Data Collection
- C. Specification and Estimation of the Labour Market Model
- D. Other Methods of Analysis
- E. Definition of Terms and Concepts ; and
- F. Limitations of the Study.

A. The Locale of the Study

The study relates to the State of Tamil Nadu. The selection of this State was done with two specific reasons:

1. The perusal of literature on rural employment in general and female employment in particular showed that there were very few studies focussing on female employment or female agricultural workers. A few studies at the all India level (Acharya, 1989) and at the State level for Karnataka (Satyapriya 1979) and Kerala (Jose, 1980), were available. No such indepth study of agricultural labourers, particularly female agricultural labourers had been reported for Tamil Nadu. According to 1981 Census about 11 percent of all agricultural labourers and 14 percent of female agricultural labourers are localised in Tamil Nadu making it one among the four states (the other three are Andhra Pradesh, Bihar and Maharashtra), maintaining more than 50

percent of the total agricultural labour force. There was therefore a need for documenting the working of rural labour market in Tamil Nadu, particularly with regard to its outcomes for women agricultural labour.

2. Tamil Nadu is noted for its dependence on agricultural economy, despite the progress registered on the industrial front. Though the share of agriculture in the Net State Domestic Product tended to decline, the occupational structure of the working population has not undergone any significant transformation. Sixty five percent of the workers still depend on agriculture (63.3% in 1961, 61.8% in 1971 and 65% in 1981). Agriculture has remained the major source of employment and income although the declining share of agriculture in NSDP with virtual constancy in the proportion of working population dependent on agriculture, had meant a decline in income per worker relative to other sectors (MIDS, 1989).

On the basis of agro-climatic conditions i.e. irrigation, rainfall distribution, soil characteristics and cropping pattern, the State is divided into three broad zones. They provide the basis for further development of agriculture in the State. The first zone is the delta areas of Thanjavur, Trichirapalli and South Arcot distinguished by the Cauvery system where paddy is the dominant crop. Next is the zone where the source of irrigation is mainly wells, comprising of the districts of Coimbatore (including

Periyar), North Arcot, parts of South Arcot and Salem. This is the zone where irrigated commercial crops such as sugarcane and groundnut are grown. The third is the predominantly dry zone where rainfall varies from 700-850 m.m. and the irrigated area is 20 to 30 percent comprising of Dharmapuri, Madurai, Tirunelveli, Ramanathapuram and parts of Coimbatore, Salem and Tiruchirapalli. Coarse grains (cereals) and cotton are the principal crops in this zone.

While agricultural technology has made a breakthrough in irrigated areas, particularly in the production of rice, no such development has taken place in the arid zones. Further there has been a discernible tendency for increased production of high value crops such as rice, groundnut and sugarcane at the expense of low value cereals such as cholam (jowar), cumbu (bajra) and ragi. Farm management studies have shown that even under rainfed conditions, groundnut has been more profitable than cholam and cumbu which are its substitutes. The tendency therefore under favourable monsoon conditions has been to put more area under groundnut and less under bajra and jowar.

With relatively smaller levels of agricultural incomes, characterised by greater levels of instability, larger proportion of the working population dependent on agriculture, a cropping pattern weighted in favour of high value crops at least in regions with assured irrigation where the seed fertiliser technology could be applied to the detriment of production of low value cereal crops largely consumed by the rural poor, agricultural labour in

Tamil Nadu is in an unenviable position. Nugent et al (1987) had shown that in years of bad weather, workers from cultivating households crowd out the agricultural labourers from employment further eroding their economic security. Within the agricultural labour category, the female agricultural labour is more susceptible to the crowding out phenomenon. The working of the labour market in such a context is bound to be fairly representative of the working of labour markets elsewhere, facing similar environment.

B. Sources of Data and Methods of Data Collection

The study had used both secondary and primary data. Data on the occupational distribution of the labour force and on levels of employment particularly of those dependent on the unorganised agricultural sector are not available on a continuous year to year basis. The Census gives the distribution of workers by economic activity at ten yearly intervals. The National Sample Survey data on employment - unemployment available at five yearly intervals does not provide disaggregated data at the district level. The data on the characteristics of employment/workforce, therefore, were compiled from the various issues of the Census of Tamil Nadu - the Economic Tables, Social and Cultural Tables and the Census of India, 1961, 1971 and 1981.

The data on agricultural wages for the reference period 1960-61 to 1984-85 were obtained and compiled from the Season and Crop Reports of Tamil Nadu published annually by the Commissioner

of Statistics of the Government of Tamil Nadu. Rao (1972) who studied the issue of reliability of agricultural wage data as reported by AWI and NSS had stated that the AWI data are reliable and good proxies for the NSS data on wages. Since the AWI data are available at the district level, as against the NSS wage data, the former were preferred.

The other secondary sources of data were the National Sample Survey on Employment and Unemployment - 28th round and 32nd rounds, the various issues of the Reserve Bank of India Bulletin and the Agricultural Situation in India (for information on the consumer price index of agricultural labourers); and the various issues of the Economic Appraisal of Tamil Nadu.

Primary data from the field were collected for the village study which supplemented the district level studies, as a test case. This village study was conducted with two specific purposes: (1) to find out the socio-economic profile of female agricultural labourers at a local level ; and (2) to ascertain the pattern of labour use in different cropping systems at that level. Singarampalayam, a village of Kinathukadavu Panchayat Union in Pollachi Taluk of Coimbatore district was chosen for the study. All the eighty women agricultural labourers of the village were selected for the study to assess the labour supply conditions. The demand conditions were studied on the basis of labour utilisation pattern furnished by a random sample of 120 farmers of the village as also the neighbouring village, Vadaputhur. They constituted about sixty percentage of the total farm households in

these villages . Since there was some amount of labour mobility between the two villages, the demand pattern was analysed in respect of both the villages.

The reference period of the study was July 1988 to January 1989. This period of seven months was chosen because it covered the busy agricultural season, starting from the sowing period in July to the harvesting period in January. The information was collected by personal interview method using structured schedules (Appendix I.a. and I.b.), which were finalised after pretesting.

Employment in agriculture is not evenly spread over the twelve months of the year. In lean seasons when agricultural labourers are out of work, they seek employment elsewhere. The budgetary employment creation programmes like NREP and RLEGP take care of this need. They are operated with the twin objectives of ensuring employment in lean seasons and strengthening rural infrastructure (Dandekar, 1986).

As per the guidelines of the National Rural Employment Programme (NREP), preference is given to landless labour for employment in all works of NREP (Government of India Manual 1986). To find out the impact of this programme on employment and earnings of agricultural labourers, the primary data were collected from the workers who participated in NREP programmes in twelve randomly selected blocks of six districts, which were contiguously located around Coimbatore district. From each of these twelve blocks, five ongoing works were again randomly selected from out of the list of ongoing projects furnished by the

block development functionaries and from each of these five ongoing projects, five workers, who were actually in employment on the day of the visit, were randomly selected for the study. In some sites, however, when only less than five workers were available, all of them were studied, bringing the overall total to 279 labourers. The information collected from the workers, related to the month preceding the date of the survey. The period of the survey was November 1987 to May 1988. A pre-tested interview schedule was used to collect the data (vide Appendix II). The districts and blocks covered together with the months of the survey are given in Table II.

TABLE II

BLOCKS SELECTED FOR THE STUDY AND THE PERIOD OF STUDY (NREP)

S.No.	District/Block	Month of the survey
1.	Nilgiris	
	Cooncor	November 1987
	Kothagiri	November 1987
2.	Periyar	
	Bhavani	December 1987
	Thalavadi	December 1987
3.	Dharmapuri	
	Harur	February 1988
	Mathur	February 1988
4.	Salem	
	Edappadi	March 1988
	Rasipuram	March 1988
5.	Anna	
	Dindigul	April 1988
	Palani	April 1988
6.	Coimbatore	
	Annur	May 1988
	Pongalur	May 1988

C. Specification and Estimation of the Labour Market Model

A critical review of the methodologies employed in the previous studies on determinants of female participation rates, labour supply and wage determination in the agricultural sector had shown that four broad approaches have been followed:

a. Largely literature surveys, throwing up relevant hypotheses for subsequent testing (Nayyar 1987, Pai 1987, Duvvury 1989).

b. Trend studies on the behaviour of wage rates using linear growth trend equations, index number analysis and factors affecting wages, drawing inferences on the issues of stagnation and stability of wage rates (Pandey et al 1985, Bharadwaj and Mishra 1986, Myer and Paul 1983, Parthasarathy and Adisesu 1982, Singh, 1987, Jose 1988).

c. Empirical estimations involving the relevant variables, using the technique of multi-variate regression analysis (Misra 1970, Dholakia and Dholakia 1978, Bardhan 1979, Papola and Misra 1980, Pandey et al 1985, 1986, Sen 1985, Rajaraman 1987, Bardhan 1987, Nayyar 1987, Verma 1989, Das 1989). Some of these studies (Sinha 1989, Roy 1989), have also used the correlation techniques to infer causation without building up further. These studies lack the necessary theoretical support regarding the labour supply decisions of the groups under study.

d. Empirical specification and estimation of the determinants of participation decision and the wage rates, deriving from and based on the theories governing such decisions (Gheng 1977, Rosenzweig 1978, Hill 1983, 1984).

A study of labour supply theories with specific reference to women was made on the question of why women choose to work, or take up paid employment. The theoretical explanations can be classified as (a) neo-classical, (b) institutional, (c) Marxian and (d) radical, Uma Devi (1987).

a. The neo-classical approach rests heavily on the effect of income and prices on the behaviour of women and on their choices between market work and leisure. This approach laid down that when income of the family increases, women prefer more leisure that is, the substitution effect is greater than the negative income effect. This approach rested upon the hypothesis of household utility maximisation subject to budget and time constraints. Gary Becker (1965) in his theory of the allocation of time and later Gronau (1977) extended this approach to explain the allocation of time between market work, home production and leisure and showed that the labour supply decisions of the male and female members were consistent with this principle of utility maximisation.

This neo-classical explanation visualised the role of women as that of adjusting to the market forces, without passing any value judgement about the position of women.

b. The institutional school starts from the side of the family rather than from the side of the individual, and then tries to look at the connection between women's non-market and market work. It associates the higher entry of women in the market with the growing availability of women's work. It tries to show that women have no choice, it is the market which decides what job they would do.

c. The Marxist approach is historical and women's labour force participation is seen in a historical perspective. Although Marxists also say that woman's labour force participation outside the household is very much related to the family's budget requirement, yet they place greater emphasis on the changing nature of the family. The old familial values have been replaced by new individualistic ones. With the gradual transformation of the family, after the Second World War, the number of women offering themselves for paid jobs has increased.

d. The radical approach focusses on the material and political benefits which capitalists derive from the family. The radical economists consider that family survives because it serves the interests of the capitalists and show that sex-inequality in the market is based on sex inequality at home. For the radicals, the over throw of capitalism is a necessary pre-condition to the

liberation of women, the sufficient condition being the over throw of patriarchal family structure.

In the light of these approaches, the neo-classical theory of household utility maximisation subject to time and income constraints was taken as the starting point (following Joll et al 1987, Singh et al 1986, Hill 1984, Ballante and Jackson 1979, Rosenzweig 1978), to arrive at equations of participation functions and to indicate the relevant operational concepts.

The various steps followed in the current study for the construction and verification of the labour market model are described under the following heads:

1. Construction of the theoretical model;
2. Transmission of theoretical equations into econometric equations;
3. Data and estimation procedure; and
4. Derivation of elasticity coefficients.

1. Construction of the theoretical model:

In subsistence rural households, it is rational to assume that the decision making unit in regard to labour supply decisions is the household, and not the individual. It is the economic pressure, not so much the volition of the individual member which decides whether or not he/she will offer his/her labour in the market.

In order to formally derive the household labour supply model, the following assumptions are made about a representative

household consisting of two individuals of working age, the husband and the wife:

1. The household wants to maximise its utility function, subject to its income and time constraints.
2. The marginal utility which the household derives from the consumption of leisure by each member (U_{LM} and U_{LF}) declines i.e.

$$\frac{\partial^2 U}{\partial L_M^2}, \frac{\partial^2 U}{\partial L_F^2} < 0$$

3. The utility that the household derives from its total consumption of leisure varies with the distribution of leisure across members of the household i.e., in equilibrium the relative marginal utilities of leisure between household members will reflect relative foregone earnings i.e.

$$\frac{U_{LM}}{U_{LF}} = \frac{W_M}{W_F}$$

Therefore, every change in relative wages simultaneously affects the labour supply outcome for all members.

4. The husband's market wage rate W_M exceeds that of the wife, W_F , so that the wife is the secondary worker.
5. The jobs available are all offered at fixed hours H^* so that H_M and H_F can only equal zero or H^* .

Under such assumptions, the household utility function is

$$U = f(G, L_M, L_F) \quad (1)$$

where

U - household's level of utility

G - Goods

L_M - husband's leisure

L_F - wife's leisure

The household's income constraint is

$$P_G G = W_M H_M + W_F H_F + B \quad (2)$$

where

P_G - the price of the goods

W_M - the husband's wage rate

W_F - the wife's wage rate

H_M - the number of hours supplied to the market place
by the husband

H_F - the number of hours supplied to the market place
by wife

B - the non-labour income of the household

Given that both members have T available time units, the household's time constraint or resources constraint is expressed as

$$2T = L_M + L_F + H_M + H_F \quad (3)$$

Solving for optimal hours, H_M^e and H_F^e and imposing linearity, the hours equations (vide Appendix III for derivation) are of the form

$$H_M^e = H_M^e = a_1 + b_1 W_M + C_1 W_F + d_1 B \text{ for } H_M^e \geq H_M^* \quad (4)$$

$$H_F^e = H_F^e = a_2 + b_2 W_F + C_2 W_M + d_2 B \text{ for } H_F^e \geq H_F^* \quad (5)$$

$$\text{When } H_M^e < H_M^*, \text{ then } H_M = 0. \text{ When } H_F^e < H_F^*, \text{ then } H_F = 0.$$

Two relationships can be derived for the participation decision by the husband and the wife, P_M and P_F . The higher H_M^e , ceteris paribus, the more likely is participation.

Therefore,

$$P_M = a_3 + b_3 W_M + C_3 W_F + d_3 B \quad (6)$$

$$P_F = a_4 + b_4 W_F + C_4 W_M + d_4 B \quad (7)$$

Thus the participation decision of the husband and wife are determined inside the household labour decision. The independent variables acting upon the household decision enter each of the equations (4) to (7). Any change in one or more of these variables will affect all four outcomes. Household member's supply decisions are interdependent in that the parameters of (4) to (7) are all determined by the same things; the household's constraints, and the marginal utilities of L_M , L_F and G in the household utility function.

The following predictions are made relating to these equations:

- i. First, assuming leisure is a normal good, an increase in the household's non-labour income, ceteris paribus, always has a

pure income effect and reduces labour supply and increases the probability of non-participation. The coefficients of d_i , in each equation will therefore be negative.

ii. Second, an increase in each household member's own wage, *ceteris paribus*, induces both income and substitution effects on his/her own labour supply. As always, the substitution effect will be positive, but since the income effects involved are negative, each of the parameters b_i in the four equations is of unknown sign *apriori*.

iii. An increase in the other member's wage similarly produces both income and substitution effects for each member's labour supply. The so called cross substitution effects can be of either sign, but a common restriction imposed upon the utility function is that these effects should be equal, so that an income compensated change in the husband's wage always has the same effect on the wife's labour supply, as an income compensated equal change in the wife's wage has upon the husband's labour supply. The income effects will be negative, but the sign of each of the parameters c_i above will again be unknown *apriori*.

Thus, the signs on the coefficients b_i and c_i are *apriori* indeterminate. However, Joll et al (1983) remark that conventionally the own wage substitution effect is assumed to outweigh the related income effect so that the coefficient b_i in the wife's participation/labour supply equations is positive. The income effect on the wife's labour supply arising from a change in the husband's wage is conventionally assumed to be negative, since

leisure is treated as a normal good.

2. Transmission of theoretical equations into econometric equations :

In converting the theoretical equations of participation (6) and (7) into econometric equations (8) & (9), the steps involved were:

- i. specifying the variables and standardising them, in the light of the previous research.
- ii. identifying those variables which could proxy the non-labour income of the rural households.

The participation equations (6) and (7) had within them four variables : one dependent variable, namely the participation rate and three explanatory variables; the husband's wage rate; the wife's wage rate and the non-labour income of the rural household.

Male/female participation rates or incidence of male/female agricultural labourers can be specified in four alternative ways:

- a. percentage of male/female agricultural labourers in total male/female rural population;
- b. percentage of male/female agricultural labour in total male/female agricultural workers (comprising both cultivators and agricultural labourers).
- c. percentage of male/female agricultural labourers among total male/female rural workers.
- d. percentage of male/female agricultural labourers in the age eligible group (15+) per rural household.

Roy (1989) had used the third specification of female participation rates namely, percentage of female agricultural labourers among total female rural workers in her study of Bihar. Rosenzweig (1978) had used the fourth specification namely percentage of male/female agricultural labourers in the age-eligible group per rural household as the empirical referent of participation rates. Since the labour supply theory aimed at understanding the labour supply decisions of members within the household, in this study it was decided to define participation rates empirically as the percentage of male/female agricultural labour 15 + per rural household (λ_M, λ_F).

Empirically, the wage rate of the male and female agricultural labour were taken to correspond to husband's and wife's wage rate in the rural household. Specifically the wage rates for male and female labour W_M, W_F were defined as the annual average of the daily wages for field agricultural labourers, male and female.

The empirical specification of the variable non-labour income caused some problem. No single variable could be taken to proxy it. Therefore in clarifying the non-labour income, a number of variables were used. The non-labour income of the household was divided into two components; the farm income and the off-farm income. The probability of farm income was proxied by a set of variables: area per cultivating household (X_1); percentage of households without land (X_2); percentage of area irrigated (X_3); and normal rainfall per annum in centimetres (X_4). Such a set of

variables proxying the probability of farm income for the rural households had also been used in earlier research (Rosenzweig 1978, Papola and Misra 1980).

The probability of off-farm income was proxied by a set of two variables: percentage of males/females with at least primary education (X_5 , X_6) and the percentage of population in non-agricultural activities (X_7), as these two variables together determined the opportunities of finding employment in the off-farm or in non-agricultural sector and thereby earning income.

In addition to these variables which corresponded to the arguments in the theoretical equations, two other variables viz, the percentage of SC/ST population (X_8) and the structural variable (X_9) entered the estimation equations. The percentage of SC/ST population was introduced to capture the social characteristics of the population in the rural areas. The structural dummy variable (X_9) was introduced to help in pooling together the cross sectional data at three points of time namely 1961, 1971 and 1981. This dummy variable which was assigned the value of zero in 1961, 1 in 1971 and 2 in 1981, helped in isolating the impact of the structural changes in the economy, particularly in the agricultural sector and the demographic changes, following Gheng (1977).

Table XIII in the Chapter on Results and Discussion gives the definition of the variables used in the estimating equations, with their means and standard deviations.

The labour supply or participation functions were specified as under:

$$\lambda_M = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_5 + a_4 X_7 + a_5 X_8 + a_6 X_9 + a_7 W_M + a_8 W_F + u \quad (8)$$

$$\lambda_F = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_6 + b_4 X_7 + b_5 X_8 + b_6 X_9 + b_7 W_M + b_8 W_F + u \quad (9)$$

where

λ_M - percentage of male agricultural labour 15+ per rural household

λ_F - percentage of female agricultural labour 15+ per rural household.

W_M - daily wages in Rupees for field agricultural labour male

W_F - daily wages in Rupees for field agricultural labour female

X_1 - area per cultivating household (hectare)

X_2 - percentage of households without land

X_5 - percentage of males with at least primary education

X_6 - percentage of females with at least primary education

X_7 - percentage of population in non-agricultural activities

X_8 - percentage of SC/ST population

X_9 - structural variable

a_0, b_0 - constants
 $[a_1, \dots, a_n, b_1, \dots, b_n]$ - the coefficients of the variables.

U - the random error term.

The labour demand functions or wage functions were also specified in terms of the wage rates as dependent variables. This type of formulation enabled the direct testing of the influence of labour supply changes on wage rates. The labour demand functions are as follows:

$$\begin{aligned}
 W_M = & c_0 + c_1 X_1 + c_2 X_2 + c_3 X_3 + c_4 X_4 + c_5 X_5 + c_6 X_8 + \\
 & c_7 X_9 + c_8 \lambda_M + c_9 \lambda_F + u \quad (10)
 \end{aligned}$$

$$\begin{aligned}
 W_F = & d_0 + d_1 X_1 + d_2 X_2 + d_3 X_3 + d_4 X_4 + d_5 X_5 + d_6 X_8 + \\
 & d_7 X_9 + d_8 \lambda_M + d_9 \lambda_F + u \quad (11)
 \end{aligned}$$

where,

W_M - daily wages in Rupees for field agricultural labour male

W_F - daily wages in Rupees for field agricultural labour female

λ_M - percentage of male agricultural labour 15+ per rural household

λ_F - percentage of female agricultural labour 15+ per rural household.

- X_1 - area per cultivating household (in hectare)
 X_2 - percentage of households without land
 X_3 - percentage of area irrigated
 X_4 - normal rainfall in centimetres
 X_5 - percentage of males with at least primary education
 X_6 - percentage of females with at least primary education
 X_7 - percentage of population in non-agricultural activities
 X_8 - percentage of SC/ST population
 X_9 - structural variable
 c_0, d_0 - constants
 $[c_1, \dots, c_n, d_1, \dots, d_n]$ - are the coefficients of the variables
 U - the random error term

In the labour supply or participation decision equations, the own wage effect was indeterminate a priori and therefore had an ambiguous sign. With an increase in own wage rates, two types of effects arise namely the substitution effect and the income effect. A rise in wages makes leisure costly in terms of wages or income. Hence one wants less of leisure and substitutes it for more hours of work. Therefore the substitution effect tends to be positive. With an increase in income via the rise in the wage rates, there is also the income effect i.e., the individual wants to have more of leisure (leisure being a normal good) and tends to reduce hours worked or the probability of participation.

Hence income effect resulting from a rise in own wage rate tends to be negative. The wage rate coefficient therefore cannot be predicted apriori because the final outcome is indeterminate. Depending on whether the substitution effect outweighs the related income effect or not, the own wage coefficient could be either positive or negative. Conventionally however, it is presumed to be positive for both male and female workers.

The effects of a rise in the wage rate of the other person in the family, either the husband's or the wife's, becomes indeterminate again for the same reasons mentioned above. Cross substitution effects can be of either sign (it is negative if the husbands and wife's time are substitutes); income effect will be negative. Therefore, the sign of parameters is unknown apriori. An increase in wife's wage may lead to the probability of the husband's participation unchanged or if the husband is the secondary worker or becomes the secondary worker because of a significant increase in the wife's wage rate, any wage increase paid to the wife reduces the likelihood of the husband's participation. The general result of an increase in the husband's wage is a reduction in the probability of the wife's participation, the exact outcome depending on the shape of the preference map and the extent of the wage change. Conventionally, however, the income effect on the wife's labour supply arising from a change in the husband's wage is assumed to be negative, since leisure is treated as a normal good. Further, if the husband's and wife's time are substitutes, the cross substitution

effect is negative. Hence the other wage effect i.e., the effect of husband's wage on wife's labour supply is negative.

In the labour demand equations with wage rates as a dependent variable, an inverse relationship between participation rate and wage rate was expected. In line with the profit maximising behaviour of labour hiring farm households and the law of diminishing returns, it was expected that these households would hire labourers upto the point at which their marginal productivity is equal to the wages paid to them and that the marginal product of labour will decline as more workers are hired. Hence, if the level of employment were to increase, the wage rate should fall. Therefore, the participation coefficients were expected to have a negative sign.

The increase in the mean size of land holdings and the land augmenting factors increased the probability of farm income and therefore were expected to reduce the participation rates as agricultural labour and increase the wage rates. The variable indicating the extent of landlessness among the households was presumed to have a positive coefficient with reference to participation rate and a negative coefficient in the wage rate equations. The larger the proportion of population with at least primary education and the proportion of population engaged in non-agricultural activities, the less would be the participation rate and the higher would be the wage rates. The larger the proportion, of SC/ST population, the higher the participation rate

and the lower the wage rates. The structural variable was ambiguous in its sign.

3. Data and estimation procedure:

Since the data on the labour force at the district level were available only for the censal years, the empirical testing was based on this type of panel data.

The data regarding participation rates, percentage of households without land, percentage of population with at least primary education, percentage of population in non-agricultural activities and percentage of SC/ST population were collected and compiled from the various issues of the Census of Tamil Nadu - Economic Tables and Social and Cultural Tables. The data on daily wages for field agricultural labour, male/female, area per cultivating household, percentage of area irrigated, normal rainfall per annum in centimetres, were collected from the Season and Crop Reports of Tamil Nadu. The data set used in empirical estimation is given in Appendix (IV).

This estimation at the district level assumes that the inter-district mobility of agricultural workers is very limited (Rosenzweig, 1978).

The method of two stage least squares was used for estimating the structural coefficients of labour supply and wage rate equations in view of the large number of exogeneous variables involved which necessarily made the model over-identified (Turkington 1985). Koutsoyiannis (1985) commended the two stage least squares estimation as one which could be applied to one

equation of the system at a time and that it provided satisfactory results for the estimates of the structural parameters in over-identified models.

In the first stage of estimation, participation rates and wage rates of male and female field labour were expressed as functions of all the predetermined variables as follows:

$$\lambda_M = a_0 + a_1 X_1 + a_2 X_2 + \dots + a_9 X_9 + u_1 \quad (12)$$

$$\lambda_F = b_0 + b_1 X_1 + b_2 X_2 + \dots + b_9 X_9 + u_2 \quad (13)$$

$$W_M = c_0 + c_1 X_1 + c_2 X_2 + \dots + c_9 X_9 + u_3 \quad (14)$$

$$W_F = d_0 + d_1 X_1 + d_2 X_2 + \dots + d_9 X_9 + u_4 \quad (15)$$

The parameters of these reduced form equations were estimated using the OLS method. In the structural form of the equations, the transformed values of λ_M , λ_F , W_M , W_F were used as arguments, along with the selected predetermined variables. The use of the transformed values of these endogenous values in the second stage helped in eliminating the simultaneous equation bias. The structural equations estimated in the second stage were as follows:

$$\begin{aligned} \lambda_M = & a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 + a_6 X_6 + a_7 X_7 + a_8 X_8 + a_9 X_9 + \\ & a_7 W_M + a_8 W_F + u_1 \end{aligned} \quad (16)$$

$$\begin{aligned} \lambda_F = & b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_9 X_9 + \\ & b_7 W_M + b_8 W_F + u_2 \end{aligned} \quad (17)$$

$$\begin{aligned}
 W_M = & c_0 + c_1 X_1 + c_2 X_2 + c_3 X_3 + c_4 X_4 + c_5 X_5 + c_6 X_8 + \\
 & c_7 X_9 + c_8 \lambda_M + c_9 \lambda_F + u_3
 \end{aligned} \quad (18)$$

$$\begin{aligned}
 W_F = & d_0 + d_1 X_1 + d_2 X_2 + d_3 X_3 + d_4 X_4 + d_5 X_6 + d_6 X_8 + \\
 & d_7 X_9 + d_8 \lambda_M + d_9 \lambda_F + u_4
 \end{aligned} \quad (19)$$

The ordinary least squares method was applied to obtain the estimates of the parameters in the transformed structural equations.

4. Derivation of elasticity co-efficients:

The labour supply and demand elasticities with respect to own wage rates and other wage rates for male and female labour were evaluated at mean level using the point estimation technique given by Koutsyiannis (1985). According to this author, the regression coefficient b is the derivative of Y with respect to X .

$$b = \frac{\frac{d\hat{Y}}{dX}}{1}$$

which shows the rate of change in $\hat{Y}$ as X changes by a very small amount. It constitutes one component of the elasticity namely

$$\frac{\bar{X}}{\bar{Y}} \cdot \frac{dY}{dX}$$

To obtain an estimate of average elasticity, b is multiplied by the ratio of $\bar{X}$ to $\bar{Y}$.

$$\text{i.e. } \eta = \hat{b} \frac{\bar{X}}{\bar{Y}}$$

where $\bar{X}$ is the average value of the independent variable

$\bar{Y}$ is the average value of the dependent variable.

This method could be extended as well to multiple regression coefficients, as Snedecor and Cochran (1967) have stated that the multiple regression coefficient b_1 measures the average or expected change in Y when X_1 increases by one unit, the other X 's remaining unchanged. Hence following this procedure, own wage and other wage elasticities of labour supply and demand were estimated separately for the two categories of male and female labour.

D. Other Methods of Analysis:

The remaining methods of analysis used are given under the following headings:

1. Component Element Analysis
2. Technique of Triangular Graph
3. Linear Regression Analysis
4. Instability Analysis and
5. Test of Difference

1. Component element analysis

To identify and explain the factors that led to changes in female work participation rate, the additive scheme of decomposition was used. In the additive scheme of decomposition, absolute increase and hence linear growth rate of the variable is

decomposed into its component elements. The component elements are so chosen that their contribution to the growth of the variable are determined more or less by independent set of factors. This scheme adds to the interpretative significance of growth pattern vis-a-vis their factors and interaction. It helps in establishing certain general hypothesis on growth pattern vis-a-vis its components and their interaction. Besides providing estimates of growth contributed by these components, the analysis helps in deducing hypothesis on causes and effects of a specific growth pattern (George, 1988).

There is also the multiplicative scheme of decomposition which explains the compound rate of growth in a variable in terms of its component growth rate. The index numbers of the variables and its components are used, exponential time-trend equations are fitted to each series of index numbers resulting in additive scheme for growth. On a priori grounds, it seems more appropriate to analyse the movement of a variable in terms of compound rather than linear rate of growth. However, to use this scheme, time series data is needed. The data on work participation rates are not available on a continuous basis. Hence, the decadal census data, were used under the additive scheme of decomposition to identify the contribution of the component elements in changing the rural female work participation rates, following Ghosh and Mukhopadhyay (1984), Dholakia (1985), Mitra and Mukhopadhyay (1989).

Following Ghosh and Mukhopadhyay (1984) it was hypothesised that the fall in the female work participation rates was due to

the degeneration of occupations specific to women with economic change, i.e. that economic development had transformed the technological and occupational structure of the economy in favour of the male worker such that there had been a smaller expansion of the sectors where the female intensity of employment was relatively higher. The second hypothesis was that with the growing rates of unemployment, there was a higher rate of withdrawal from the labour force by the females rather than males. Third was the effect of change in the sex ratio in population on female work participation rates. The female work participation rates $\frac{W_F}{P_F}$ were assumed to be simultaneously influenced by these three factors:

1. Female share in total work force $(\frac{W_F}{W})$
2. Level of employment in the economy $(\frac{W}{P})$
3. Proportion of females in the population $(\frac{P_F}{P})$

Using an identity it can be shown that

$$\frac{W_F}{P_F} = \frac{W_F}{W} \cdot \frac{W}{P} \cdot \frac{P}{P_F}$$

Rewriting,

$$Y_0 = [\bar{X}_{1.0}] \cdot [\bar{X}_{2.0}] \cdot [\bar{X}_{3.0}]$$

$$Y_t = [\bar{X}_{1.t}] \cdot [\bar{X}_{2.t}] \cdot [\bar{X}_{3.t}]$$

where

0 - stands for the base year

t - stands for the terminal year

Since,

$$Y_t = Y_0 + \Delta Y$$

$$X_{1.t} = X_{1.0} + \Delta X_1$$

$$X_{2.t} = X_{2.0} + \Delta X_2$$

$$X_{3.t} = X_{3.0} + \Delta X_3$$

Substitution of these values in the identity above gives the decomposition terms of the base year values and changes in the identity.

$$\begin{aligned} \Delta Y = & \left[\Delta X_1 \cdot X_{2.0} \cdot X_{3.0} \right] + \left[\Delta X_2 \cdot X_{1.0} \cdot X_{3.0} \right] + \\ & \left[\Delta X_3 \cdot X_{1.0} \cdot X_{2.0} \right] + \left[\Delta X_1 \cdot \Delta X_2 \cdot X_{3.0} + \right. \\ & \left. \Delta X_1 \cdot \Delta X_3 \cdot X_{2.0} + \Delta X_2 \cdot \Delta X_3 \cdot X_{1.0} + \Delta X_1 \cdot \Delta X_2 \cdot \right. \\ & \left. \Delta X_3 \right] \end{aligned}$$

where

Y_0 - the participation rates for the females in the base year 0,

Y_t - the participation rates for the females in the terminal year t.

$X_{1.0}$ - female/male ratio in the work force in the base year.

$X_{1.t}$ - female/male ratio in the work force in the terminal year.

$X_{2.0}$ - total workers/total population in the base year

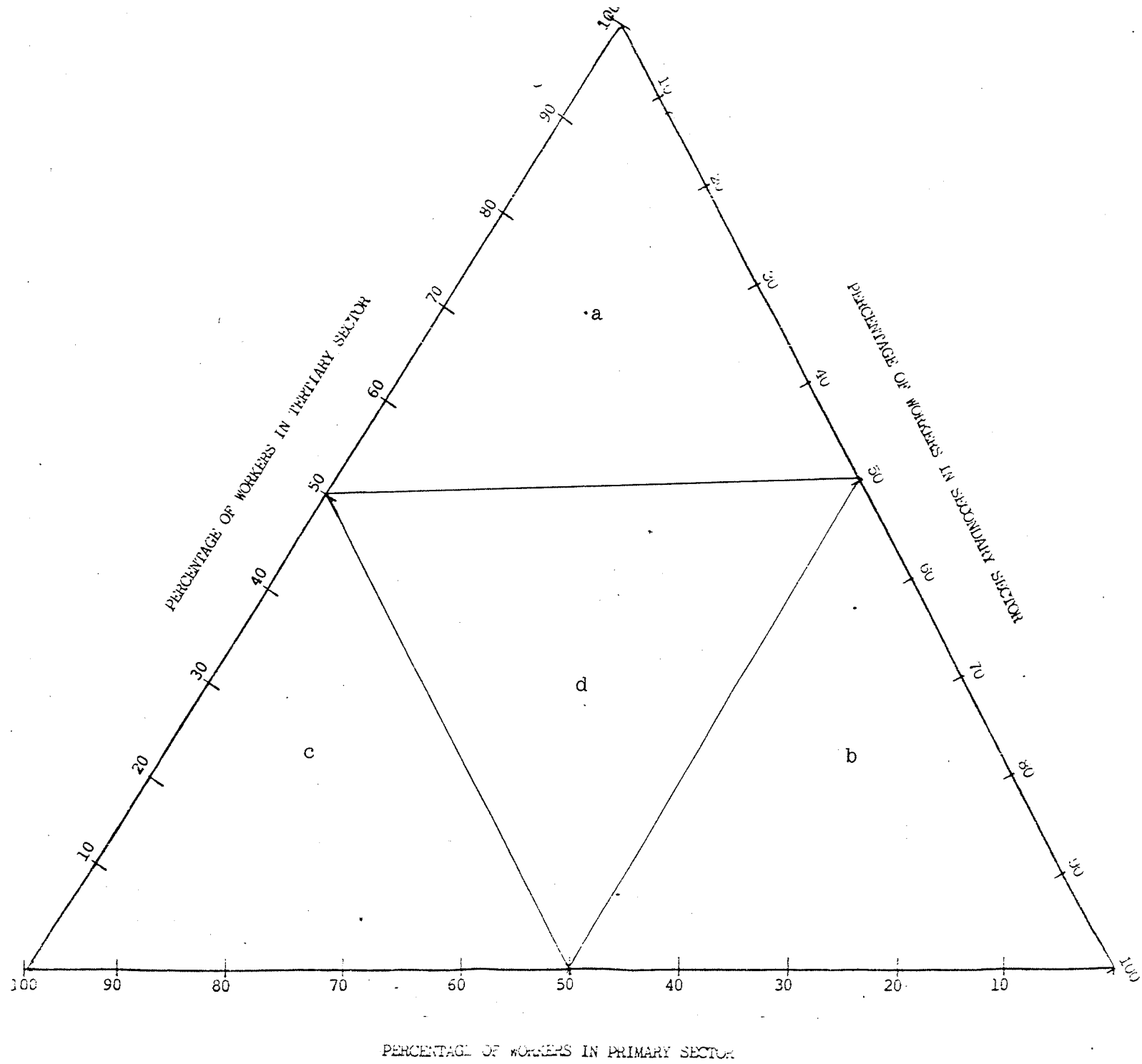
$X_{2.t}$ - total workers/total population in the terminal year

- X
3.0 - Inverse of female population/total population in the base year.
- X
3.t - Inverse of female populaton/total population in the terminal year.

According to this expression, change in female participation ratio can be decomposed into the four components on the right side:

- i. the effect of change in the ratio of female to total workers, other things remaining the same; an index of sex substitution in work force called displacement effect;
- ii. effect of change in the employment level within the economy; an index of economic activity called employment effect;
- iii. the effect of change in the sex ratio in the population called demographic effect;
- iv. the fourth interaction term plays a balancing role in the identity. The sign of the interaction component provides the vital explanation. A positive interaction term implies a shift in favour of women's work participation and a negative co-efficient implies a shift against their interest.

This decomposition model was applied to evaluate the impact of the factors mentioned in changing the rural female work participation rates in the districts of Tamil Nadu during the period 1961-1981 (vide Appendix V.a. for the data set and V.b. for the illustration on computation).



The clustering of the points close to one of the vertices indicates that one component is very large, whereas location close to the side of the triangle indicates that one component is very small. In order to find out which component is large or small, the graph is divided into four zones (a, b, c, d) by joining the mid points of the triangle. In zone a, the tertiary component contribution is more than 50 percent of the total employment of the units plotted therein. In 'b' the same is true for the secondary component, while in 'c', it is true for the primary component. In 'd' the points are not dominated by any single component, but there is combination of the three with each contributing less than 50 percent to the total employment.

This technique of triangular graph was used to ascertain the district-wise structural changes in rural female employment as against those of others during the censal decades 1961, 1971 and 1981 (vide Appendix VI for the data set).

3. Linear regression analysis:

a. Linear regression analysis was used to discover the relationship between agricultural development and labour intensity. Agricultural development was measured in terms of 'agricultural efficiency' following Das (1989). Agricultural efficiency represents the effectiveness of different factors of production which contribute to the production process such as land, labour, management and capital input factors. It is measured by a composite index based on the total vector of five indicators namely cropping intensity, irrigation intensity,

availability of net area sown per agricultural worker, cropping pattern i.e., percentage of gross cropped area under commercial crops and per hectare productivity in food crops. The agricultural efficiency index was computed using the formula:

$$E_{id} = \frac{1}{5} \left[\frac{C_{id} \cdot .100}{C_s} + \frac{I_{id} \cdot .100}{I_s} + \frac{L_{id} \cdot .100}{L_s} + \left[\frac{C_{mid} \cdot .100}{C_{ms}} + \frac{P_{id} \cdot .100}{P_s} \right] \right]$$

where

- E_{id} - Efficiency index for the i th district in the given year
- C_{id} - Cropping intensity of the i th district
- C_s - Cropping intensity of the state
- I_{id} - Irrigation intensity of the i th district
- I_s - Irrigation intensity of the state
- L_{id} - Per agricultural worker availability of net area sown in the i th district
- L_s - Per agricultural worker availability of net area sown in the state
- C_{mid} - Per cent share of commercial crops in gross cropped area in the i th district.
- C_{ms} - Per cent share of commercial crops in gross cropped area in the state.
- P_{id} - Per hectare productivity of food crops in the i th district.
- P_s - Per hectare productivity of food crops in the state.

Labour intensity of agriculture in a district/state was found out by dividing the number of agricultural workers (agricultural labourers + cultivators) by net area sown. Further the index of labour intensity was computed by expressing the district figure as a percent of state figure (vide Appendix VII for the data set).

The relationship of agricultural efficiency with labour intensity was studied by using the simple linear regression analysis.

The linear equation used was of the form:

$$Y = a + b X + u$$

where

Y - agricultural efficiency

X - labour intensity

a & b - regression coefficients

u - the random error term

The reverse regression equation was also fitted to find out the increase in labour absorption in response to agricultural development.

b. To compute the annual rate of growth in the different wage series, a time trend equation of the form:

$$W_t = AB^t$$

where

W - the wage rate

A - the constant term

B - 1+r

r - the compound growth rate

t - the time period

was used. This equation when translated into linear terms becomes a semilogarithmic equation of type:

$$\log W_t = a + bt$$

where a and b are the parameters. The antilog of ' b ' -1 gives the compound growth rate.

4. Instability analysis:

The extent of instability characterising the real wage series over the period 1964-65 to 1984-85 was estimated using the coefficient of variation of the detrended wage series. Reutlinger (1987) had stated that the standard deviation of the difference between observed and trend values of a variable indicates the variability or instability of the variable. Hence, the coefficient of variation of the detrended series was used to estimate the levels of instability in the wage rates.

5. Test of difference:

The Z - test of difference, the test for large samples (Elhance 1984) was used to test the significance of difference between the means of employment, and earnings in the case of NREP and non-NREP workers. The formula used was

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{\sigma_{X_1}^2}{n_1} \right) + \left(\frac{\sigma_{X_2}^2}{n_2} \right)}}$$

for $n_1 + n_2 - 2$ degrees of freedom

where $\bar{X}_1, \bar{X}_2$ - means of the variable

$\sigma_{X_1}, \sigma_{X_2}$ - standard deviation of the variables.

n_1, n_2 - number of observations

Appendix IX gives an illustrative computation of the Z - value.

E. Definition of Terms and Concepts

a. Wage rates:

Wage rates used in the study are those of male and female workers hired for field labour operations such as ploughing, sowing, weeding and harvesting. The Season and Crop Reports report wage data corresponding to one or more centres from each district chosen for the concentration of agricultural labour population. The monthly data for the field labour - men and women - are averaged to obtain the annual figure. The monthly data for the state is a simple average of the monthly wage rates

noted for each district and is not weighted either by the share of labour in each of the districts or by the share of employment in each month. This concept of average wage rate for field labour covering all major agricultural operations is more comprehensive than that used by Jose (1988), who considered only the wages in ploughing operation for male field labour and wages in sowing operations for female field labour.

b. Moving average wage series:

Three year moving average wage series for different categories of wages were constructed to isolate the long term trends in wage rates, as distinct from the short term factors which could have resulted in fluctuations in the annual average wage rates.

c. Male female wage differentials:

The disparity in male-female wage rates was expressed as a ratio of female wage rate to male wage rate, expressed in percentage terms. If no differential existed between male and female wage rates, this differential index would tend to be 100. If differential existed, then this ratio would be less than 100. In terms of the formula

$$\left. \begin{array}{l} \text{Male-female wage} \\ \text{differential index} \end{array} \right\} = \frac{\frac{W}{F}}{\frac{W}{M}} \times 100$$

where

W_M = wage rate for the male field labour

W_F = wage rate for the female field labour

Thus, the absence of discrimination between male and female labour in terms of wage rates was indicated by an index of 100. Otherwise the index was less than 100.

d. Poverty line:

In the Seventh Five Year Plan, poverty line in rural areas was defined as per capita monthly expenditure of Rs. 76 per month at 1980-81 prices. This figure, when revised to 1987-88 prices, based on the Consumer Price Index of Agricultural Labourers became Rs.124 per capita per month. Hence this was used as the cut-off point for identifying the households below the poverty line.

e. Employment:

The concepts of employment used in the study were:

Full employment : 25 days and more of employment per month

(i.e., 100 percent)

Moderate unemployment : 20 to 25 days of employment per month (i.e., 80 - 100 percent)

Severe unemployment : 15 to 20 days of employment per month (i.e., 60 - 80 percent)

Very severe unemployment: 10 to 15 days of employment per month (i.e., 40 - 60 percent)

Chronic unemployment : less than 10 days of employment per month (i.e., less than 40 percent).

f. Employment Gap:

Employment gap was estimated as the difference between the full employment level of 25 days per worker per month and current mean level of employment.

g. Household income per capita:

The concept of household income per capita rather than household income per se was used for comparing the economic welfare of the rural labour households under study, as also for evaluating the effectiveness of the employment intervention programme, namely, the NREP. This concept corrected for household size was deemed to be better than household income per se.

F. Limitations of the Study

1. The study had used the participation rates as available in the Census. The flow data on employment could have provided still more reliable estimates of the labour market equations.
2. As proxies for farm incomes, the study had used the land and land related variables, in the absence of information on farm incomes.
3. The study relates only to the hired field labour in agriculture. The family labour provided on the farms had not been taken into consideration.

4. • The labour market model developed in the study had been empirically evaluated on the aggregate data at the district level. The hypotheses and conclusions need to be confirmed, with micro level data too.

5. Longitudinal micro level studies - field level and household level - are needed to assess the impact of technological change on the labour market outcomes for male and female agricultural labour.

6. The study had evaluated only the NREP programme for its effects on rural employment and earnings. The other wage employment and self-employment programmes had not been specifically considered.

7. In the construction of wage series the data on agricultural wages as made available for the different districts in the Season and Crop Reports of Tamil Nadu had been used. Over the period, several districts of Tamil Nadu have been bifurcated and new ones have been created. The variations in sampling, arising from the new districts, limits the reliability of the wage data.

8. The scope of the definition used for 'worker' changes from one Census to another. This leads to variations in the enumeration of workers, particularly women workers. Hence the results of the study particularly those relating to structural changes in women's employment need replication, based on more reliable primary data, perhaps done at district level.

Results and Discussion

IV. RESULTS AND DISCUSSION

The results of the study on 'Female Work Participation with Reference to Wage Labour in Agriculture' are presented and discussed under the following heads:

- A. Structural Changes in Women's Employment;
- B. Factors Influencing Rural Female Work Participation Rates;
- C. Female Work Participation in Agriculture;
- D. Empirical Evidence on the Agricultural Labour Market;
- E. Movements in Money and Real Wage Rates; and
- F. Impact of NREP on Rural Employment and Earnings.

A. Structural Changes in Women's Employment

Economic development is associated with shifts in the sectoral allocation of the work force which in turn is related to shifts in the production structure. Development is accompanied by a progressive diversification of employment structure, reflected in a fall in the share of the primary sector and a rise in the shares of the secondary and tertiary sectors. The sectoral distribution of total working population at the all-India level and in Tamil Nadu are given in Table III.

TABLE III
SECTORAL DISTRIBUTION OF TOTAL WORKING POPULATION - INDIA AND
TAMIL NADU: 1961 and 1981 (in percentages)

Country/state	Primary	Secondary	Tertiary	Total
India				
1961	72.3	11.7	16.0	100.0
1981	71.1	12.4	16.5	100.0
Tamil Nadu				
1961	63.3	14.7	21.9	100.0
1981	65.0	16.5	18.5	100.0

Source: Madras Institute of Development Studies (1988), Tamil Nadu Economy; Performance and Issues, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, p.60 (Based on 1961 and 1981 Census).

Altogether the three fold classification of workers into the primary, secondary and tertiary sector gives a picture of relative stability (with only marginal changes) in the sectoral distribution of employment during the twenty year period 1961-1981. In Tamil Nadu, the share of the primary sector in employment had increased by about 2 percentage points as against the fall by 1 percent at the national level. This disparity highlights the increasing dependence of the Tamil Nadu economy on agriculture.

The sectoral distribution of the women work force at the All-India level during the period 1911-1981 is presented in Table IV.

TABLE IV

TRENDS IN DISTRIBUTION OF WOMEN WORKERS - ALL INDIA (1911-81)
(in thousands)

Year	Total female population	Cultivators	Agricultural labourers*	Industry	Service	Total female workers	Percentage of female workers to total female population	Percentage of female workers to total labourers
1911	1,23,898	18,090 (43.3)	12,808 (30.6)	6,137 (14.7)	4,767 (11.4)	41,802 (100)	33.73	34.44
1921	1,22,749	20,276 (50.6)	10,003 (24.9)	5,409 (13.5)	4,407 (11.0)	40,095 (100)	33.73	34.02
1931	1,36,075	12,180 (32.4)	14,997 (39.9)	5,147 (13.7)	5,276 (14.0)	37,600 (100)	27.63	31.17
1951	1,73,549	18,368 (45.3)	12,694 (31.3)	4,554 (11.2)	4,923 (12.1)	40,539 (100)	23.30	28.98
1961	2,12,467	33,103 (55.7)	14,171 (23.9)	6,884 (11.6)	5,244 (8.8)	59,402 (100)	27.96	31.53
1971	2,63,900	9,266 (29.6)	15,794 (50.5)	3,307 (10.5)	2,931 (9.4)	31,298 (100)	11.86	17.35
1981+	3,21,357	14,932 (33.2)	21,595 (48.0)	4,231 (9.41)	4,215 (9.37)	44,973 (100)	13.99	20.21

Note: 1. 1941 figures are omitted as they are based on 2 percent population on sample basis.
 2. + 1981 figures relate to main workers only.
 3. * includes the female population engaged in livestock, fishing, forestry and allied activities.

Source: Government of India, (1974), Towards Equality, Report of the National Committee on the Status of Women, Ministry of Education and Social Welfare, pp.153-158.

Registrar General and Census Commissioner, India (1984)
 Census of India 1981 Series I, India, Part III A
 General Economic Tables (Tables B1 to B5), Table B.3, pp.238-241.

The data on the sectoral distribution of women workers during the period 1911-1981 reveal certain interesting conclusions. With development and diversification of the economy, one would expect the share of the industry and service sector in employment to steadily increase with a corresponding diminution in the share of primary sector. The reality regarding women workers, however, is totally different. The proportion of women workers in the secondary and tertiary sectors had steadily fallen both in absolute terms and in proportionate terms over the period 1911-1981, from 26.1 percent to 18.8 percent. During the same period, the proportion of women cultivators had fallen by 10 percentage points. These two together have pushed up the percentage of women agricultural labourers from 30.6 percent to 48.0 percent, making their economic status more vulnerable. These tendencies have not in the least been reversed by the process of planned development since 1951. Thus development has not contributed towards improving the structure of employment of women workers. They had progressively lost their status as cultivators in agriculture and had been squeezed out of the industry and the service sectors in both absolute as well as relative terms. Singh (1989) and earlier Mathew and Nair (1986) observed that the secondary and tertiary sectors have provided very little employment opportunities to the women workers, and that their concentration in agriculture and traditional industries has been increasing over time.

Table V gives the sectoral distribution of women workers in Tamil Nadu for the period 1961 - 1981.

TABLE V

TRENDS IN DISTRIBUTION OF WOMEN WORKERS - TAMIL NADU 1961-1981

(Figures in thousands)

Year	Total female population	Cultivators	Agricultural labourers ^a	Industry	Services	Total female workers	Percentage of female workers to total female population	Percentage of female workers to total female workers
1961	16,775	2,227 (42.45)	1,488 (28.36)	652 (12.44)	879 (16.75)	5,248 (100)	31.28	34.19
1971	20,371	581 (18.90)	1,778 (57.82)	357 (11.61)	358 (11.67)	3,074 (100)	15.09	20.86
1981*	23,920	1,217 (22.76)	2,985 (55.81)	665 (12.44)	481 (8.99)	5,349 (100)	22.36	28.12
Annual growth rate in percent	2.13	-2.3	5.03	0.1	-2.3	0.1	—	—

Note: ^a includes the female population engaged in livestock, fishing, forestry and allied activities.

* 1981 figures relate to main workers only.
Percentage based on absolute figures.

Source: Madras, Superintendent of Census Operations (1964) Census of India 1961, Vol. IX, Madras, Part II B(1) General Economic Tables BI-BIV, Table BI, pp.30-57.

Tamil Nadu and Pondicherry, Director of Census Operations (1977). Census of India 1971, Series 19, Tamil Nadu BI part A & B II, General Economic Tables (Table BI-Part A), pp.8-11.

Tamil Nadu, Director of Census Operations (1987), Census of India 1981, Series 20, Tamil Nadu Part III - A, General Economic Tables (Table BI-E5), Table B.3, pp.330-333.

The opportunities for women workers in Tamil Nadu reflect the pattern at the all-India level. In absolute as well as relative terms, their share in the industry and service sectors together had been reduced. As against 1,531 thousands of women workers (29.19 percent) who were working in these sectors in 1961, only 1,146 thousand women (21.43 percent) were working in them in 1981. As a natural corollary women workers were forced into agriculture with a further erosion in their status within the agricultural sector. As contrasted with 2,227 thousand women cultivators in 1961, there were only 1,217 thousand of them in 1981. Because of these reasons, the number of agricultural labourers has increased from 28.36 percent in 1961 to 55.81 percent in 1981. It could be observed that even with the prevalence of the problem of under enumeration because of the restrictive definition of workers in 1971 Census, the number of agricultural labourers recorded did not show any decline, though in other categories a distinct fall could be observed.

The aggregate number of female workers during the two decades had increased by one tenths of one percent per annum whereas the number of agricultural labourers among them had increased at the rate of 5.03 percent per annum. The rate of growth of agricultural labourers is equivalent to 50 times the rate of growth in the aggregate female workers.

To identify and understand the broad trends in the sectoral distribution of women work force in particular and set it against those of male work force and the total work force, the technique

of triangular graph was used, following Datta (1984), on the district level data for Tamil Nadu during 1961, 1971 and 1981 (vide Appendix V.a. for the data sets). The graphs are presented in Figures 1 to 18.

The abbreviations used for the districts for the Figures are detailed as below:

CH	-	Chengleput
NA	-	North Arcot
SA	-	South Arcot
S	-	Salem
CB	-	Coimbatore
N	-	Nilgiris
M	-	Madurai
TR	-	Trichirapalli
TH	-	Thanjavur
R	-	Ramanathapuram
T	-	Tirunelveli
K	-	Kanyakumari
MS	-	Madras
D	-	Dharmapuri
P	-	Pudukottai
PE	-	Periyar

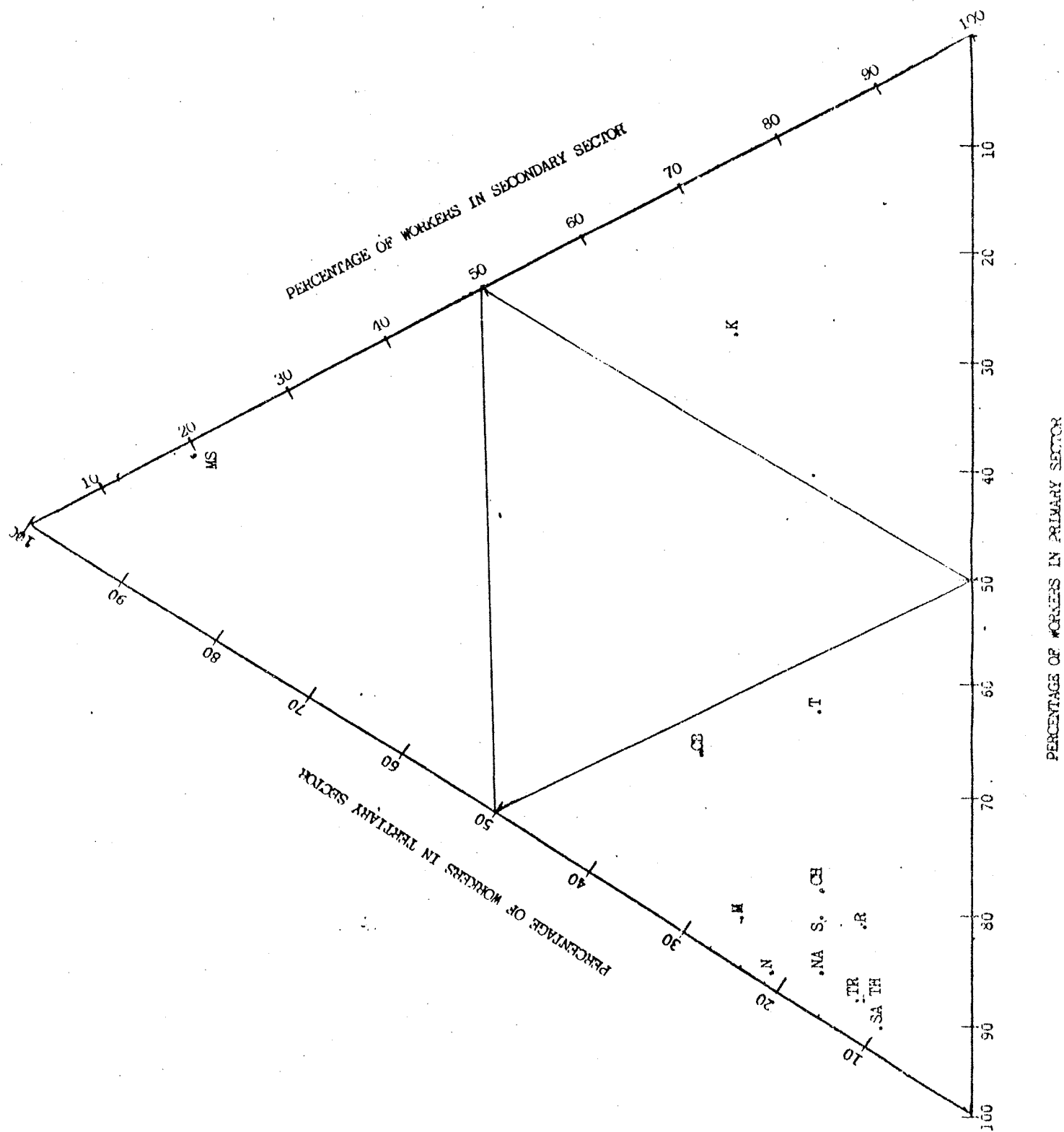


FIG.1. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, TOTAL - TAMILNADU - 1961

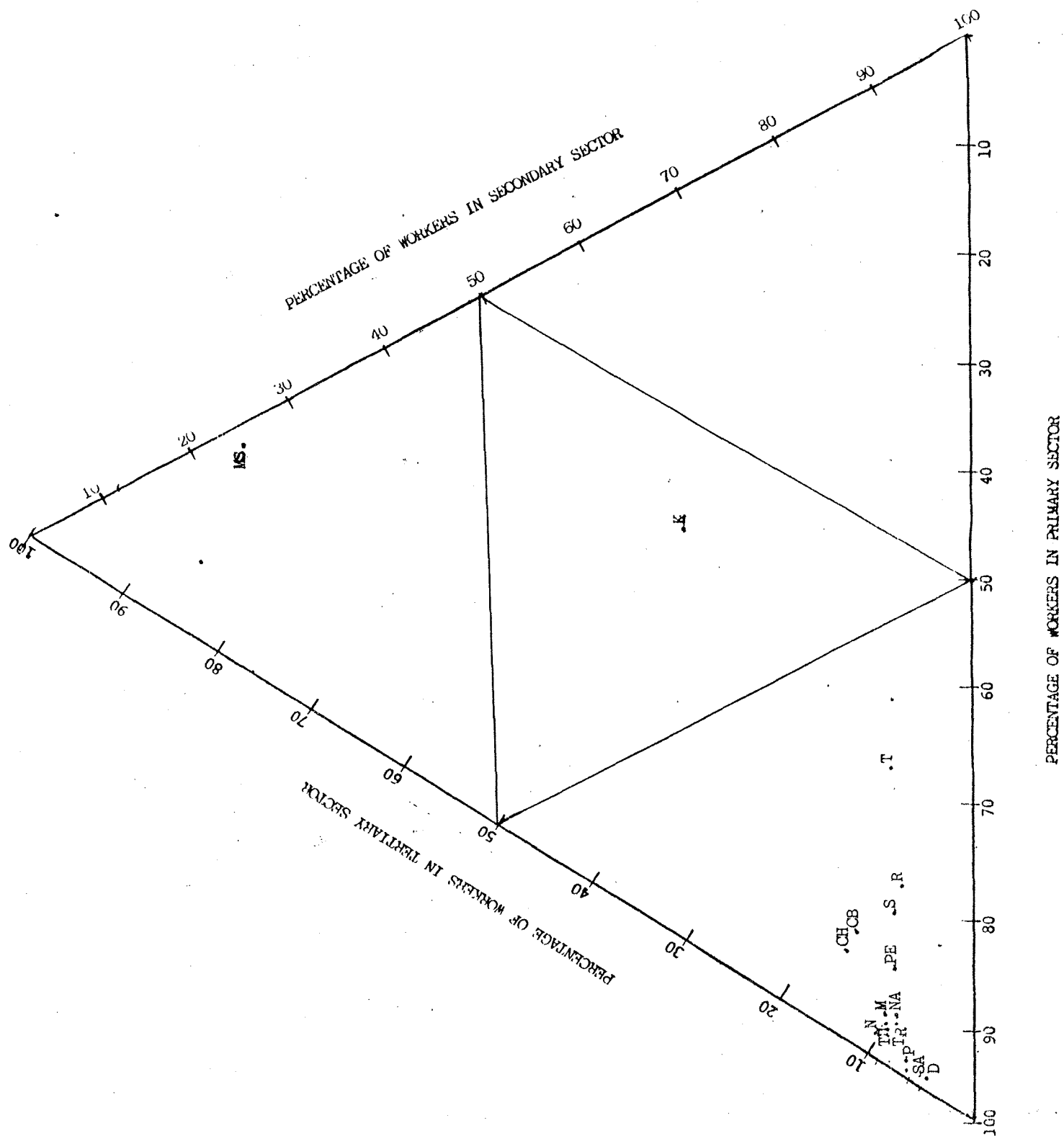


FIG.3. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, TOTAL - TAMILNADU - 1981

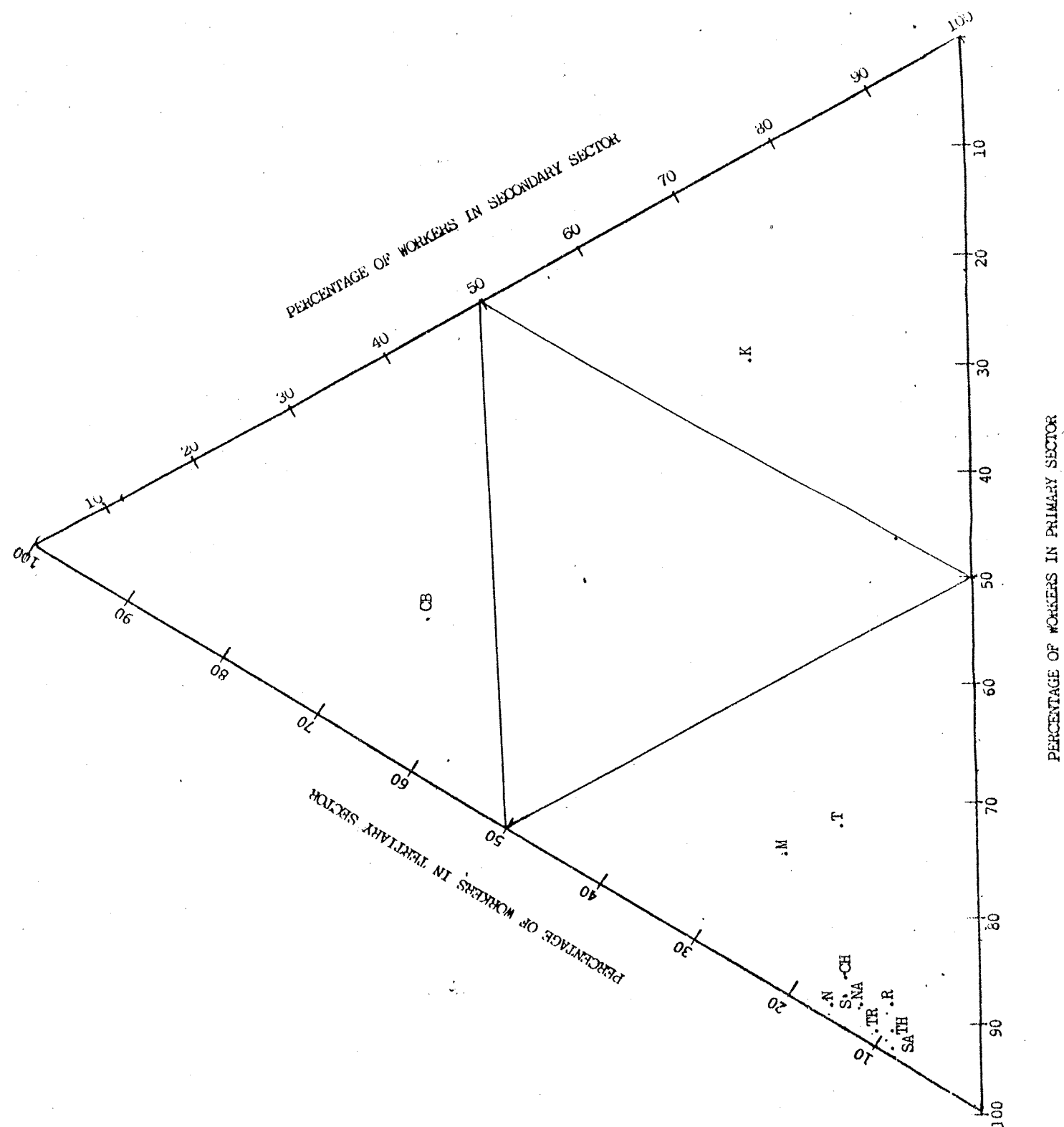


FIG.4. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, RURAL - TAMILNADU - 1961

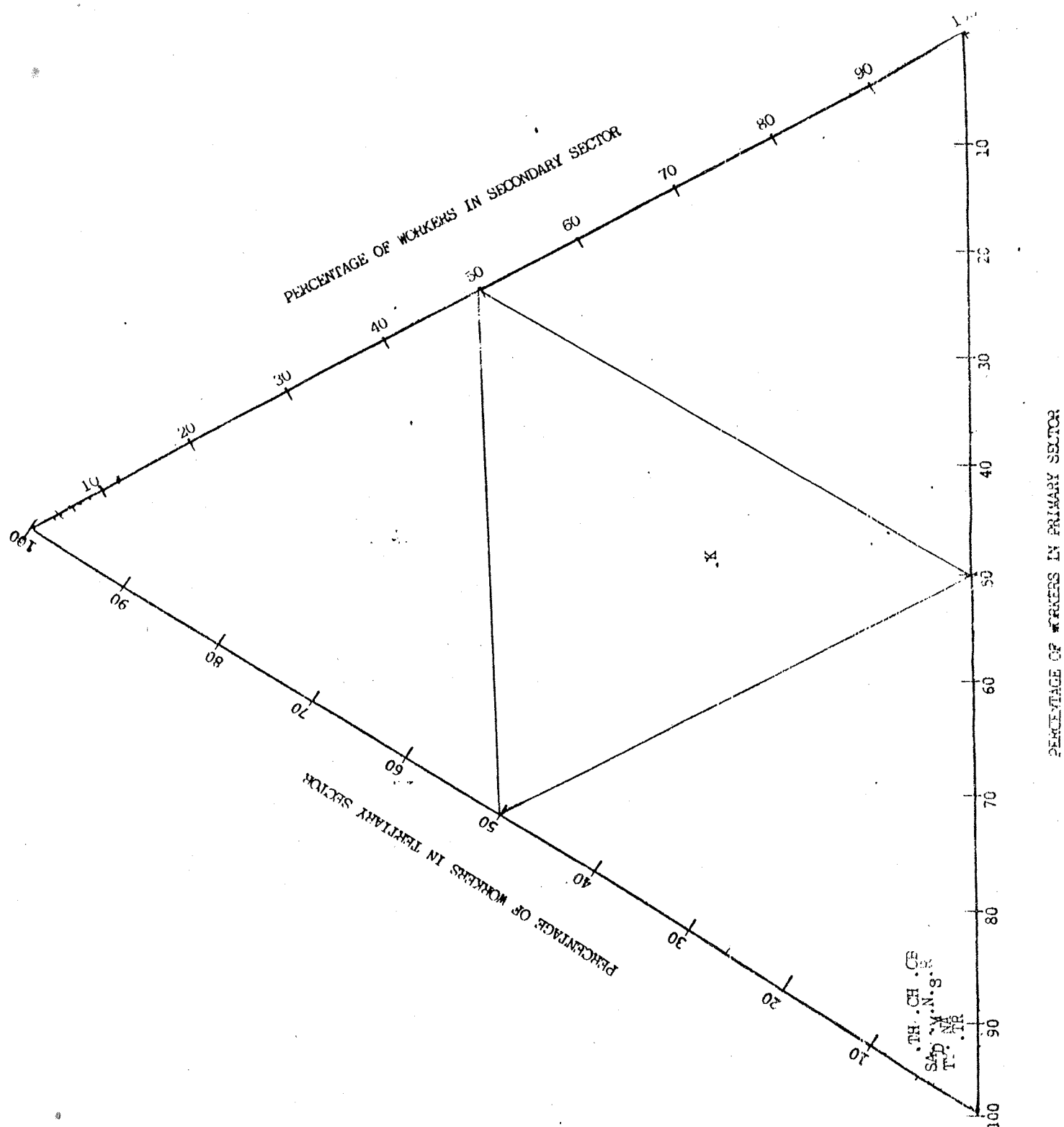


FIG.5. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, RURAL - TAMILNADU - 1971

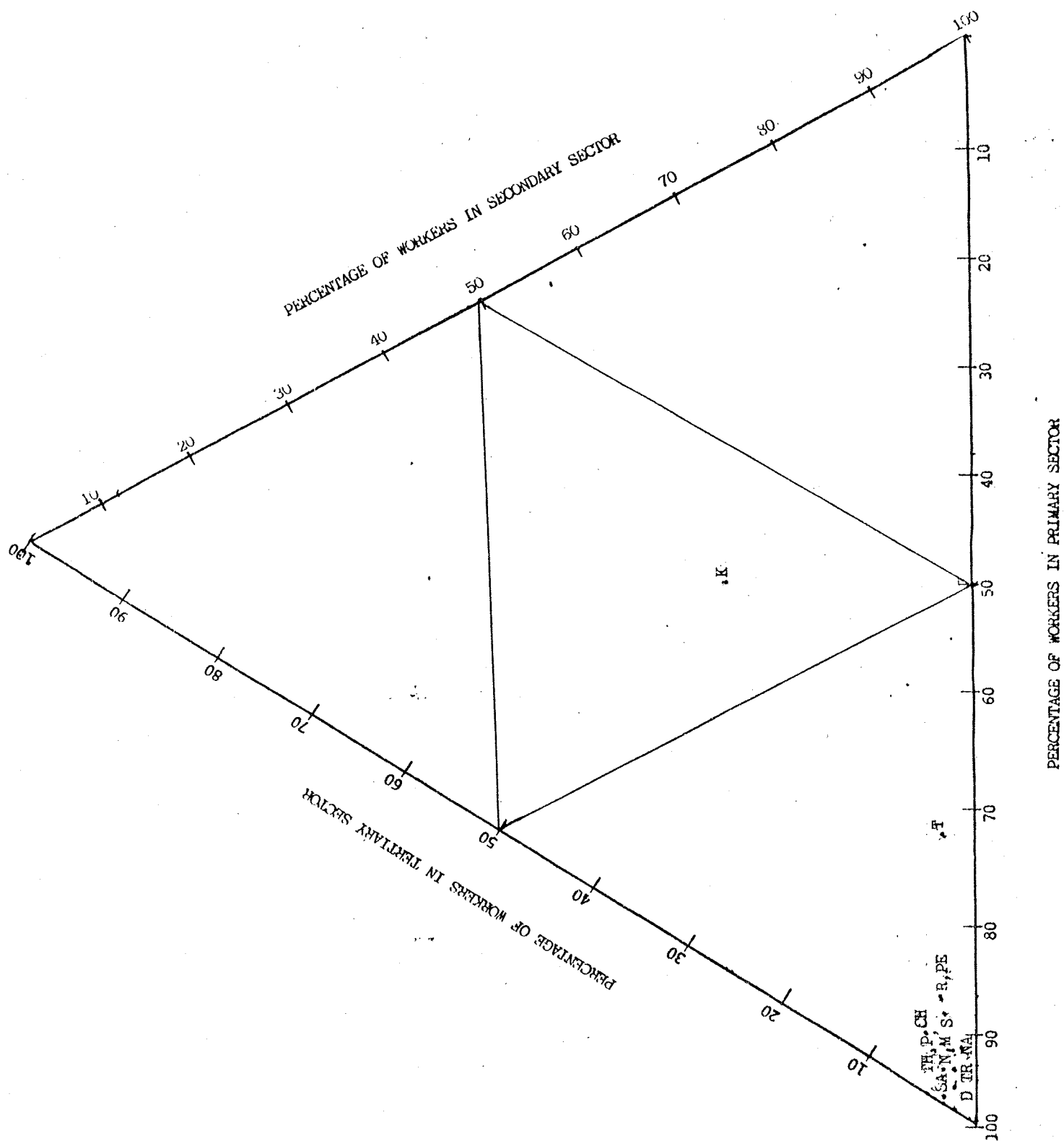


FIG.6. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, RURAL - TAMILNADU - 1981

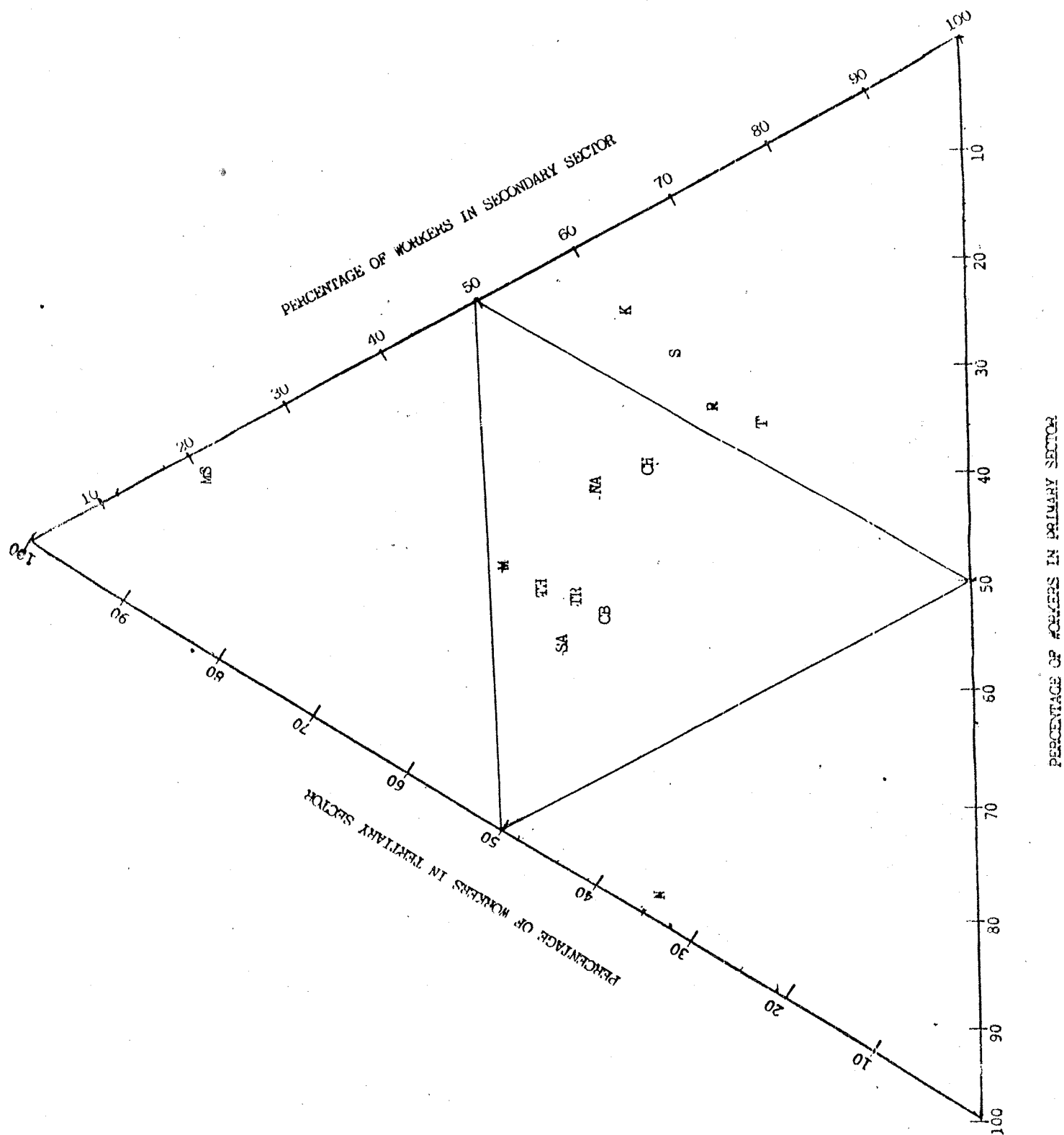


FIG.7. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, URBAN - TAMILNADU - 1961

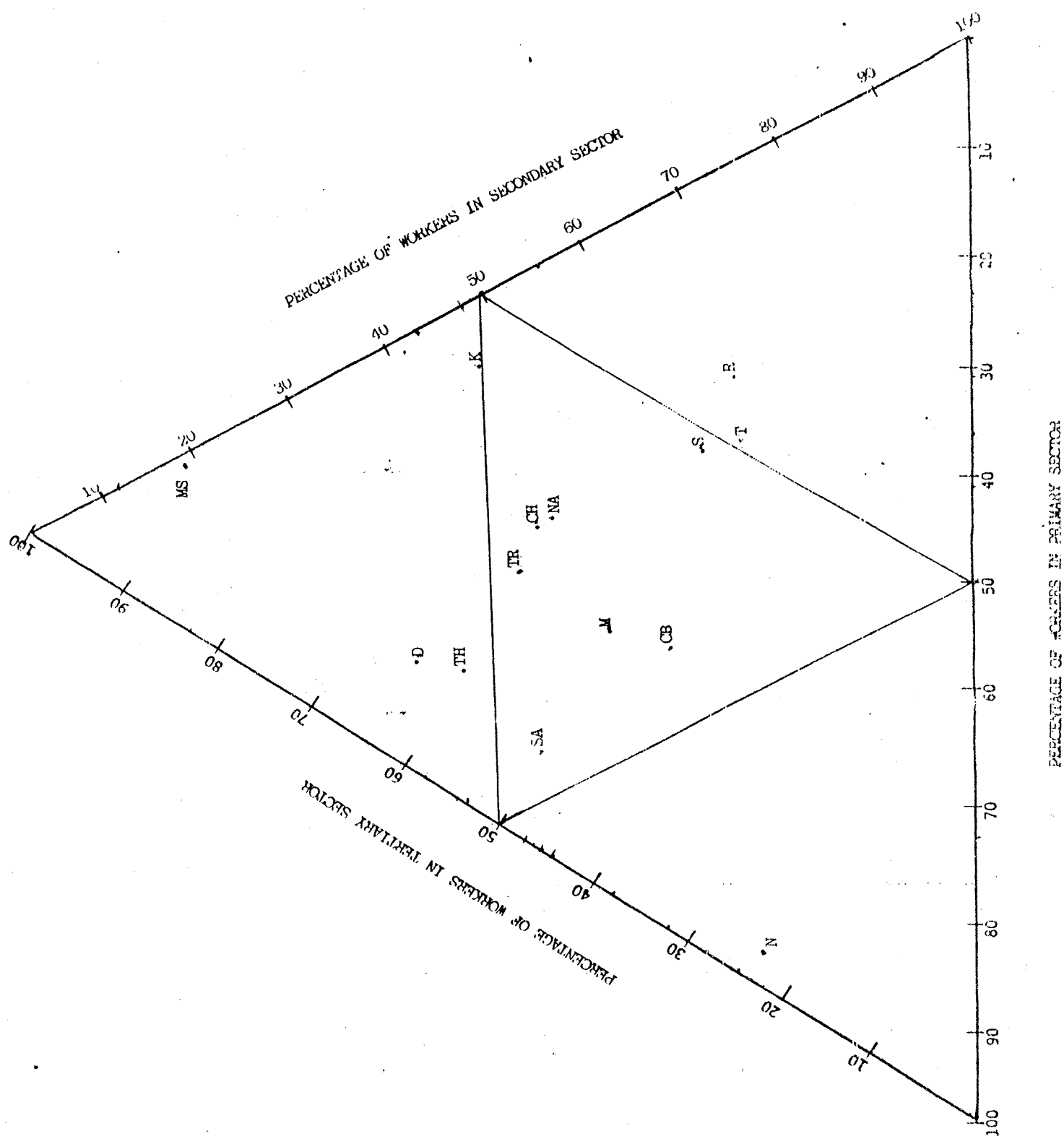


FIG.8. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, URBAN - TAMILNADU - 1971

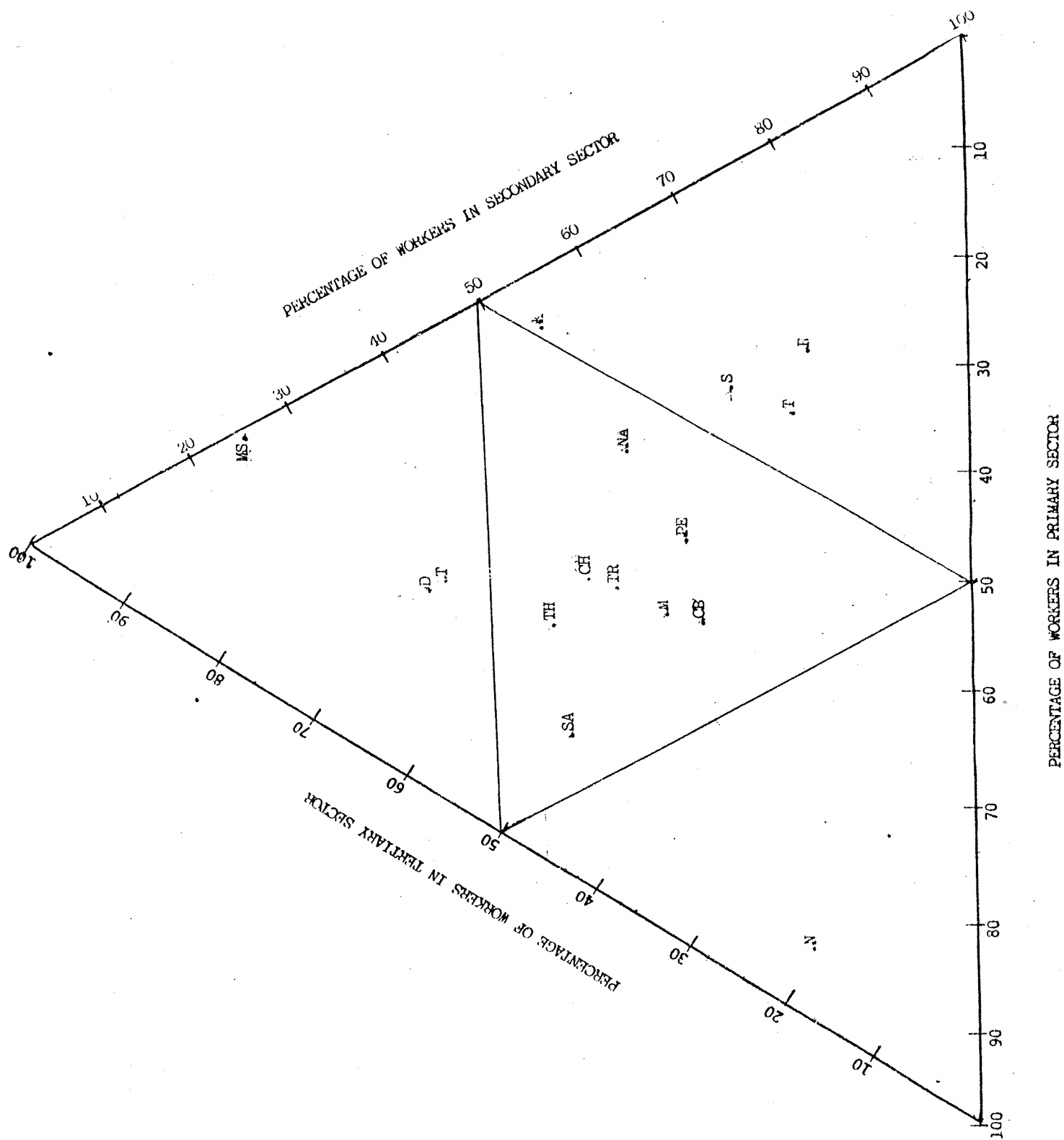


FIG.9. DISTRICT-WISE SECTORAL DISTRIBUTION OF FEMALE WORKERS, URBAN - TAMILNADU - 1981

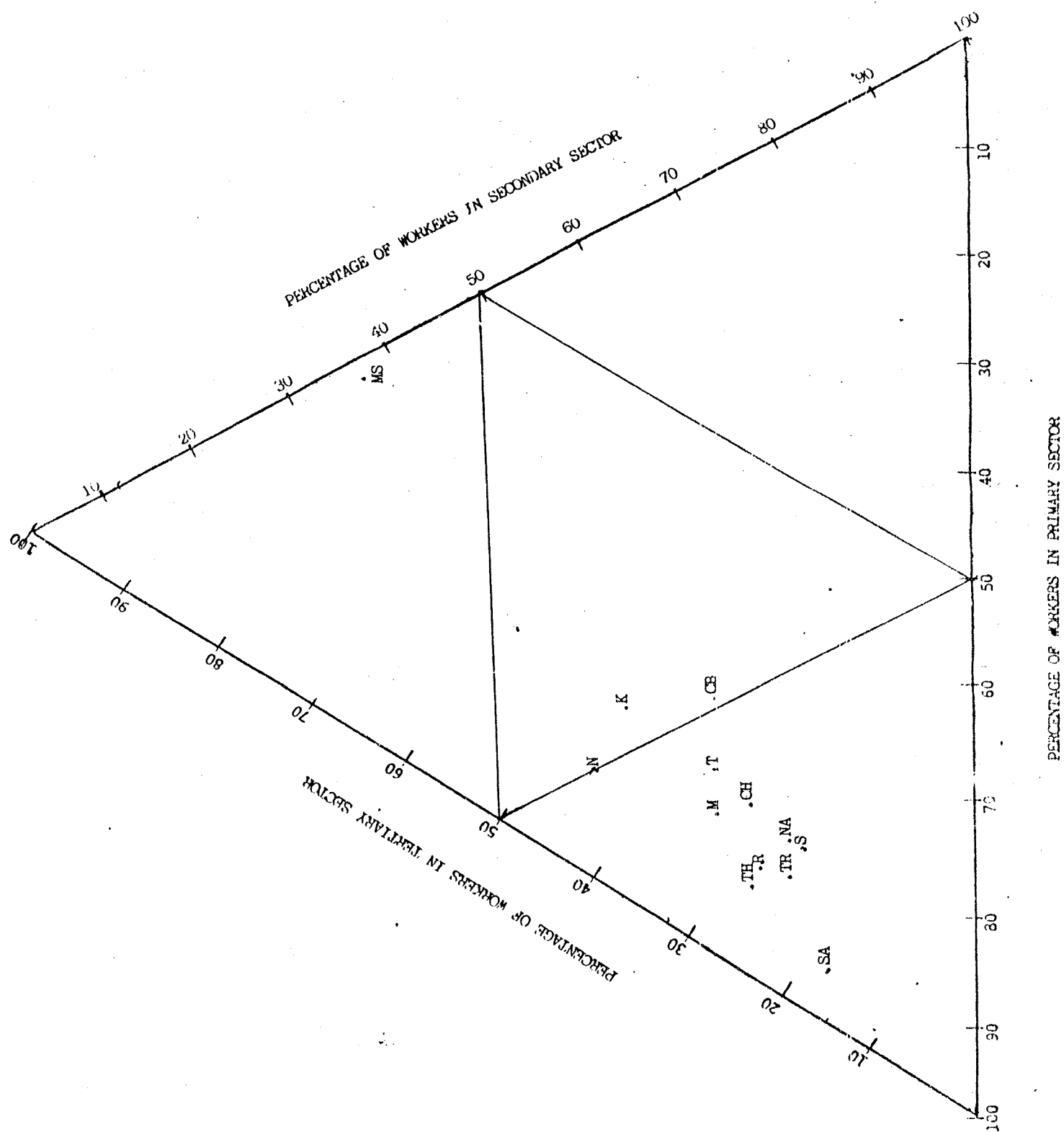


FIG.10. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, TOTAL - TAMILNADU - 1961

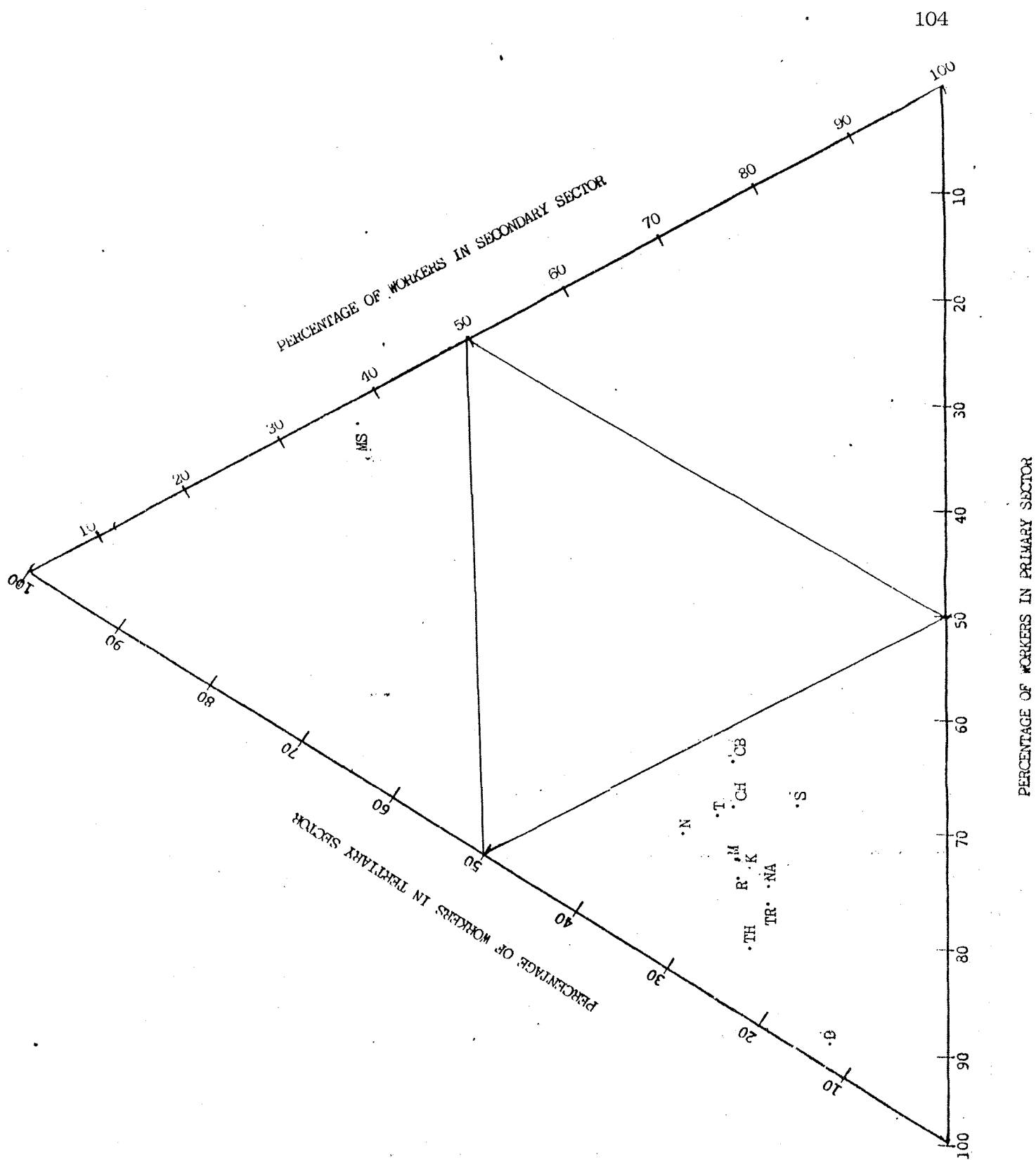


FIG.11. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, TOTAL - TAMILNADU - 1971

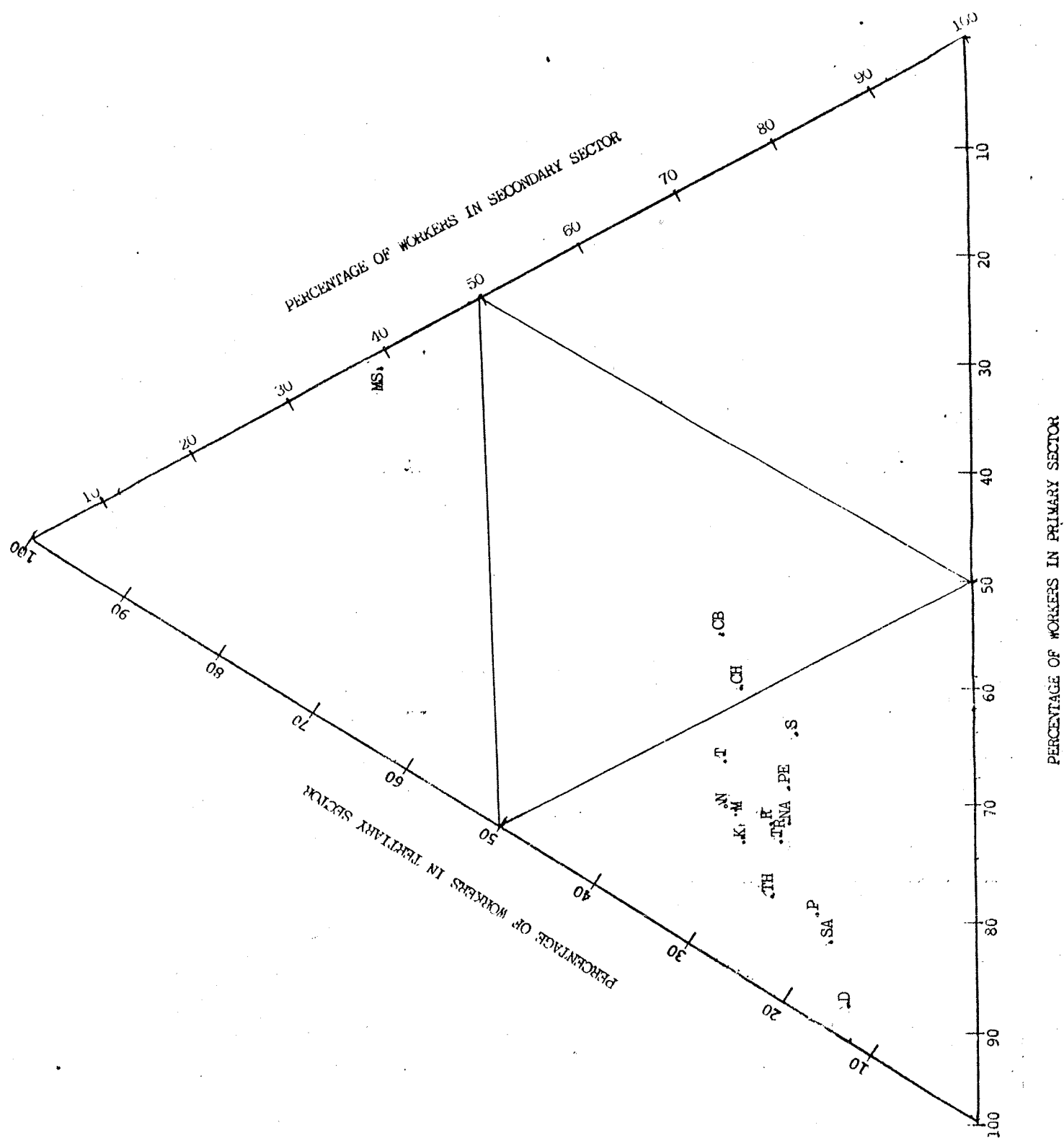


FIG.12. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, TOTAL - TAMILNADU - 1981

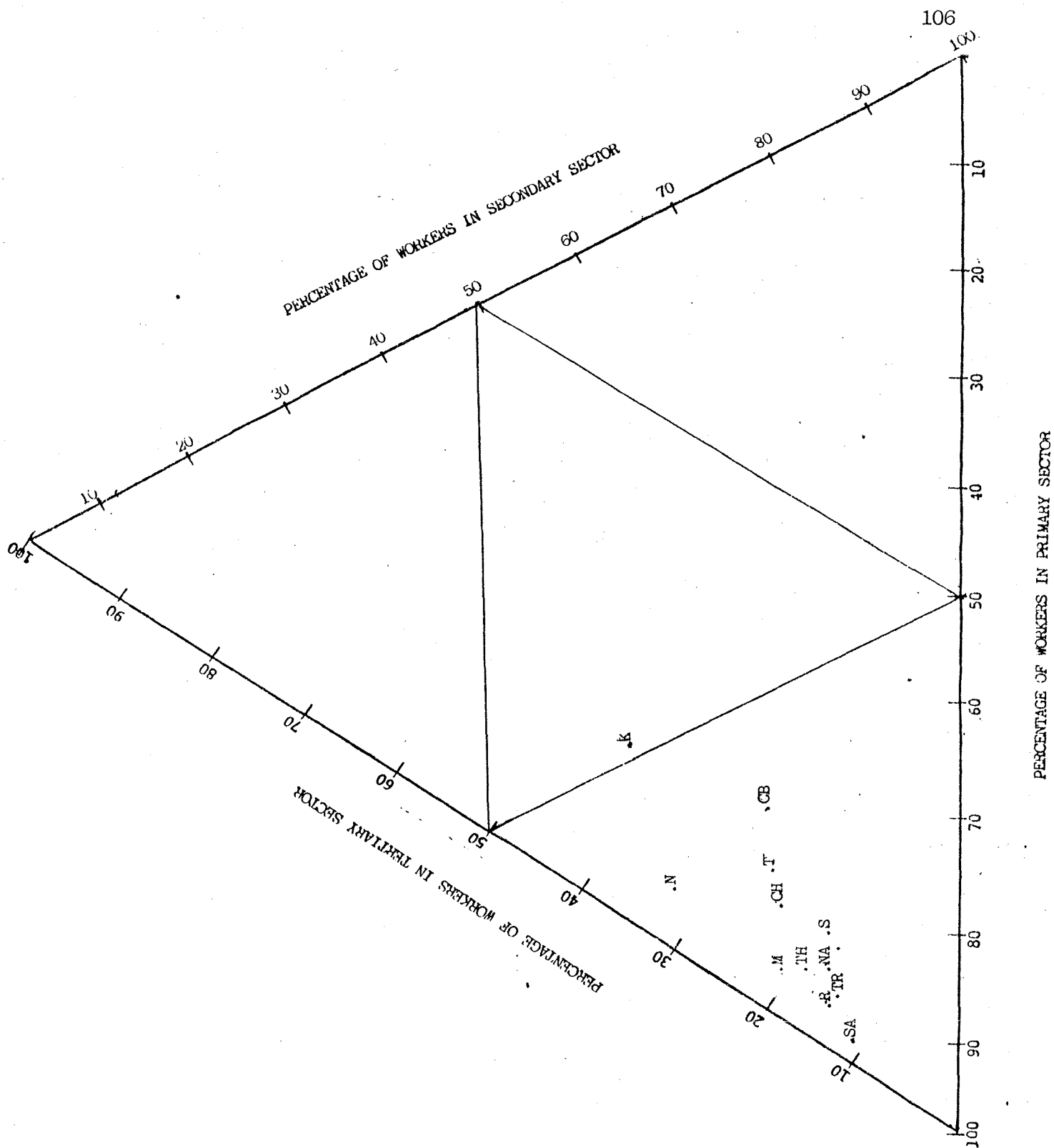


FIG.13. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, RURAL - TAMILNADU - 1961

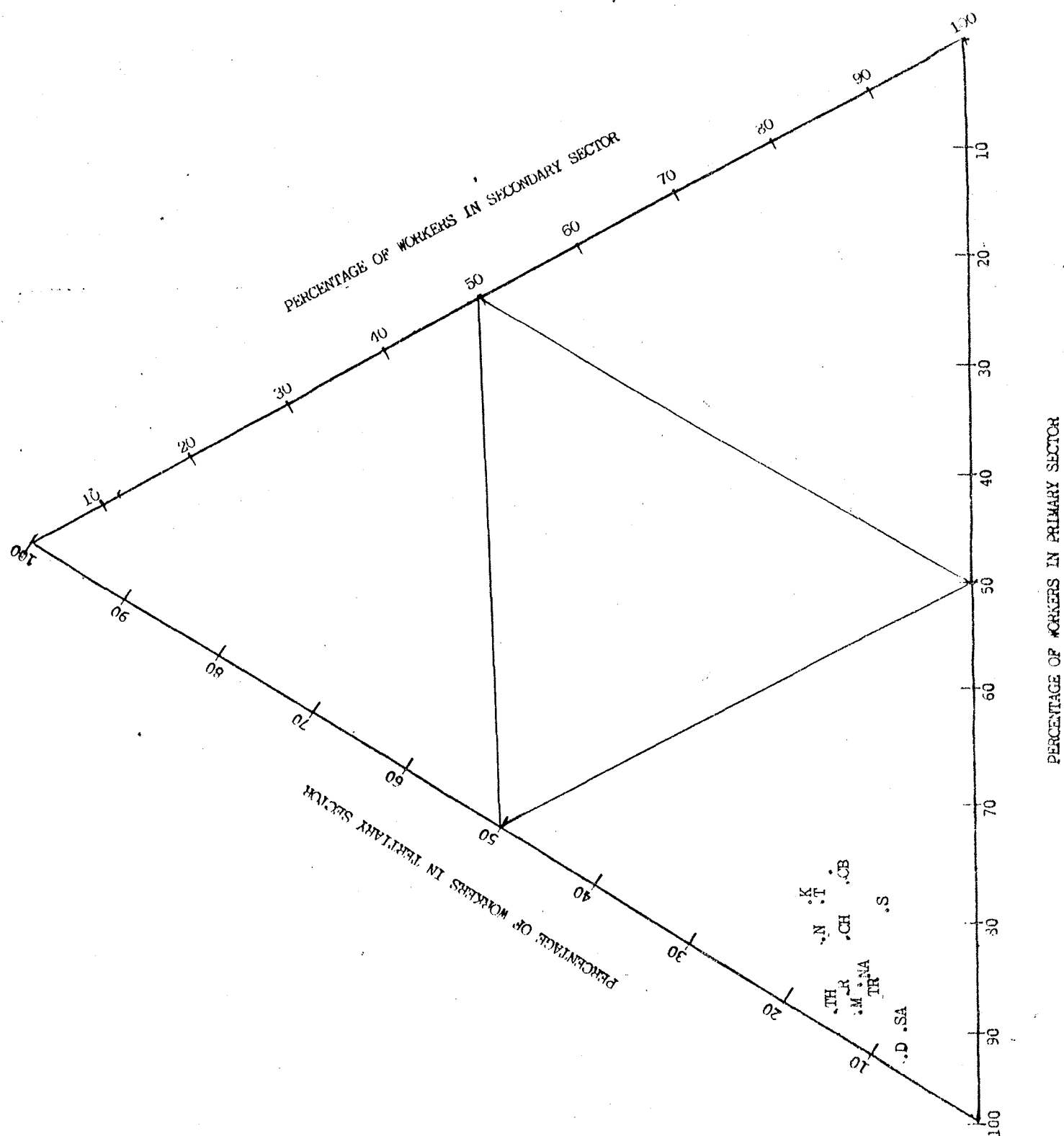


FIG.14. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, RURAL - TAMILNADU - 1971

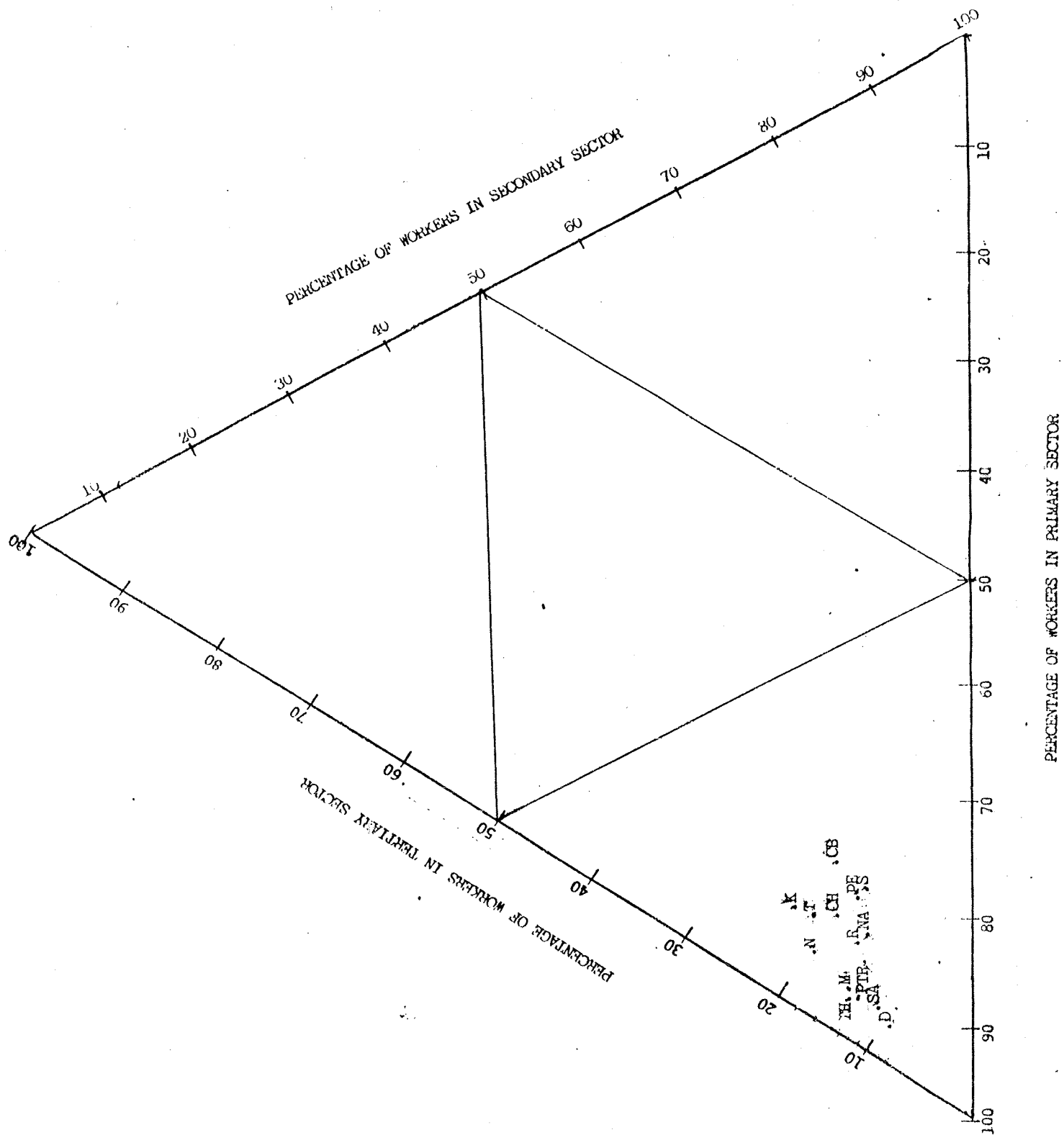


FIG.15. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, RURAL - TAMILNADU - 1981

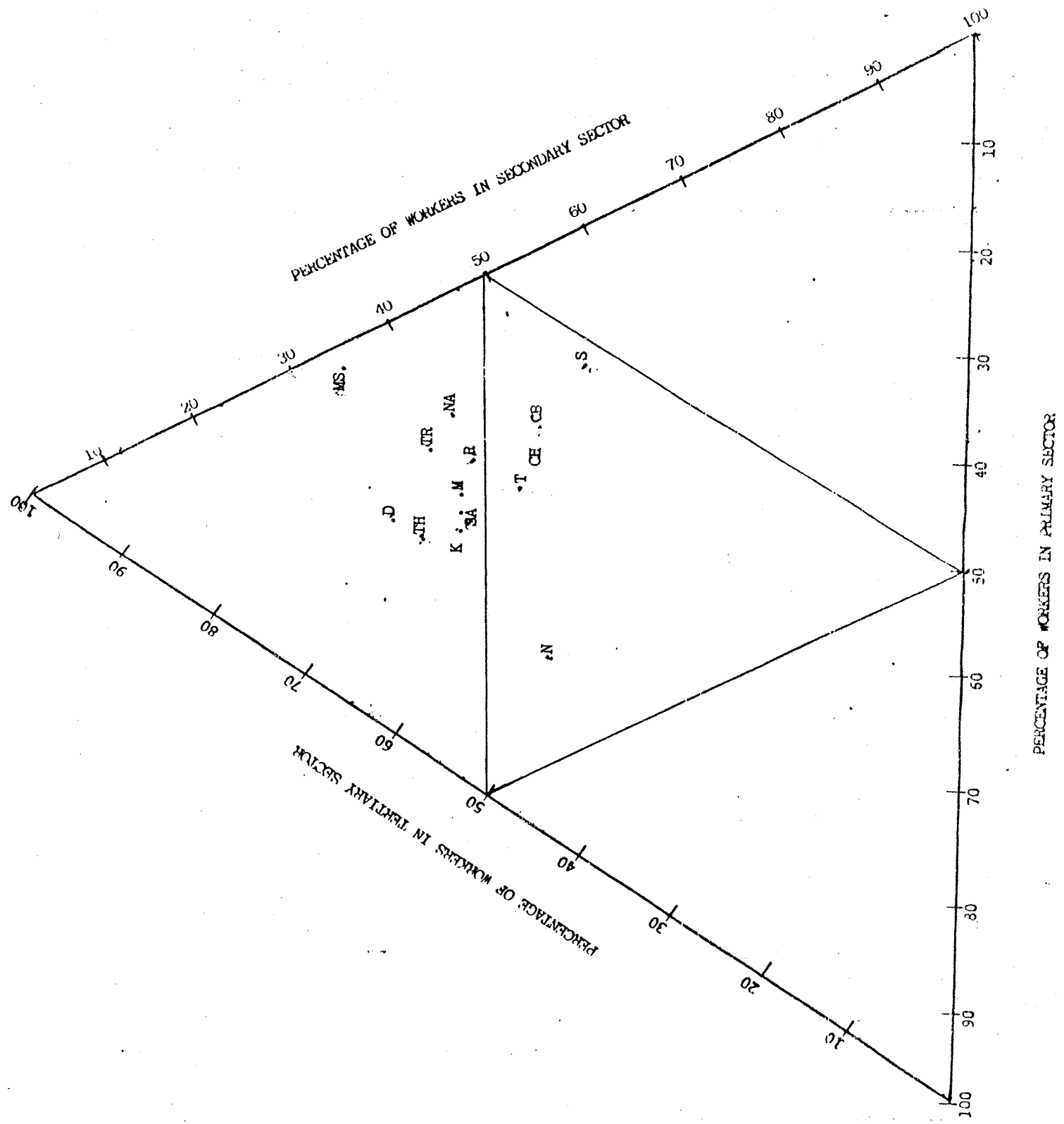


FIG.17. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, URBAN - TAMILNADU - 1971

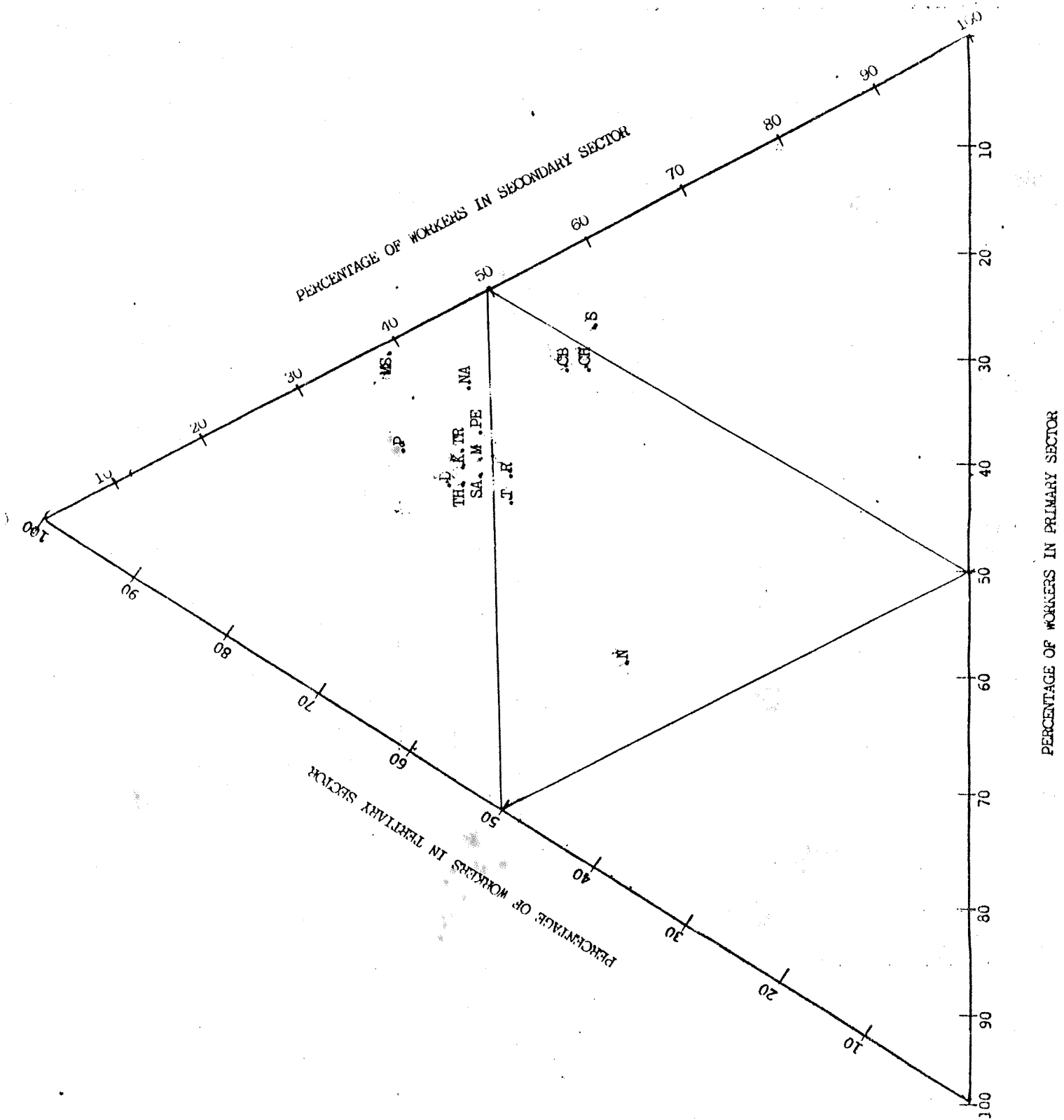


FIG.18. DISTRICT-WISE SECTORAL DISTRIBUTION OF MALE WORKERS, URBAN - TAMILNADU - 1981

The changing structure of employment for the male population during the period 1961-1981 indicates that the districts have been slowly moving towards a balanced distribution of work force among the different sectors. In the rural areas however, one does not find any significant change in the concentration of male working population in the primary sector. The spread of districts in respect of incidence of urban male employment in secondary and tertiary sectors was almost even at 50 percent level in 1961. In 1971, the secondary sector was the predominant source of employment, while in 1981 this position was taken by the tertiary sector, showing a gradual improvement in the male employment status.

Unlike the employment opportunities of male workers which exhibited ^a tendency towards diversification in overall, rural and urban areas, the female employment structure was rather disturbing. The tendency towards their marginalisation was very much evident. As against a fairly dispersed employment structure in 1961, they tended to concentrate heavily in the primary sector in 1981. Districts like Coimbatore and Tirunelveli, where the female population was more or less evenly distributed in 1961, had been pushed into the company of other districts where the female employment in the primary sector was overwhelmingly high by 1981. In Kanyakumari where the incidence of female employment in the primary sector was very low in 1961, the dependence on primary sector had been steadily increasing. This tendency could perhaps

be attributed to the degeneration of household industries in the district over this period.

An examination of the employment structure of rural females over the period 1961-81 indicates that what little diversified employment opportunities they were having in 1961 had been slowly wiped out and by 1981 the process of their marginalisation into the primary sector had been almost complete. One or two districts which exhibited a pro-women tendency in employment had fallen in line with others.

Urban areas had also been affected by the process of marginalisation. In 1961 women workers were either evenly distributed among the sectors or they were concentrated in the secondary sector. By 1981 their dependence on the primary sector had phenomenally increased at least in seven districts out of the sixteen. Others also were found moving in this direction. In conclusion the evidence is clear that women as a class of workers had been definitely marginalised by the development process unlike men workers.

The sectoral distribution of women workers at the national, state and district levels indicates that women workers have been marginalised more into the agricultural sector as labourers, than men workers.

B. Factors Influencing Rural Female Participation Rates

Ghosh and Mukhopadhyay (1984) hypothesised that the transformation taking place in the technological and occupational structure of the economy had worked adversely on female employment, and hence women workers had been losing out to men workers. They also maintained that growing unemployment and sluggishness in the economy had impelled more women to stay away from work rather than men which again affected adversely their participation rates. Third, a part of the change in female participation rates was attributed to the change in the sex ratio in the population. These three factors were characterised as the displacement effect, employment effect and demographic effect respectively and their magnitudes were assessed through a 'component element analysis'. This framework of analysis was applied to the Tamil Nadu experience in regard to rural female participation rates. The decadal changes in these rates and their contributory factors are given in Table VI.

TABLE VI
CHANGES IN RURAL FEMALE WORK PARTICIPATION RATES: DECOMPOSITION
ANALYSIS - DISTRICT WISE - TAMIL NADU 1961-1981

District	Period	Percentage change in FWPR	Percentage change in FWPR due to change in			
			Proportion of females in total workers	Proportion of working force in total population	Proportion of female to total population	Interaction effect
1. Chengleput	1961-71	-14.00	72.7	42.5	-0.1	-15.1
	1971-81	7.36	79.6	15.6	-1.0	5.8
2. North Arcot	1961-71	-21.99	75.0	44.9	-1.6	-18.3
	1971-81	9.17	72.6	20.6	-0.7	7.5
3. South Arcot	1961-71	-20.20	79.7	40.7	-1.2	-19.2
	1971-81	10.89	76.2	14.5	-0.1	9.4
4. Salem/ Salem+ Dharmapuri*	1961-71	-25.04	74.9	53.2	-12.7	-15.4
	1971-81	7.94	63.3	24.3	1.1	11.3
5. Coimbatore/ Coimbatore+ Periyar*	1961-71	-15.04	71.8	39.6	-1.0	-10.4
	1971-81	13.24	56.9	31.8	0.9	10.4
6. Nilgiris	1961-71	-11.84	37.2	64.2	7.2	-8.6
	1971-81	0.99	152.5	-12.1	-38.4	-2.4
7. Madurai	1961-71	-16.76	68.4	46.2	-1.5	13.1
	1971-81	15.26	59.0	27.9	0.9	12.2
8. Tiruchir- apalli	1961-71	-24.72	74.1	46.3	-1.6	-18.8
	1971-81	11.32	66.8	23.0	0.5	9.7
9. Thanjavur	1961-71	-15.88	79.0	43.1	-7.4	-14.6
	1971-81	17.39	73.6	18.0	0.4	8.0
10. Ramanatha puram	1961-71	-24.64	70.3	50.0	-1.1	-19.2
	1971-81	10.95	61.0	27.3	1.3	10.4
11. Tirunelveli	1961-71	-16.53	65.6	48.2	-0.8	-13.0
	1971-81	1.03	64.8	27.7	-0.8	8.3
12. Kanyakumari	1961-71	-12.34	89.1	28.2	-0.7	-16.6
	1971-81	1.10	142.7	-30.0	-4.0	-8.7
State	1961-71	-19.49	73.6	43.9	-1.2	-16.3
	1971-81	9.35	74.5	24.7	0.3	0.5

Note:* The districts of Salem and Coimbatore had been bifurcated since 1961 and hence they were clubbed together

The relative magnitudes of the three effects - displacement, employment and demographic - were remarkably similar in the two time periods and in almost all the districts of the State except in the mountainous district of Nilgiris and in Kanyakumari where women do not participate in agricultural operations in large numbers. This indicates that the forces operating within the districts and the state were generally stable regardless of the direction in which the rural female participation rates had changed. Of the three factors, the displacement of the female by the male in the total work force was by far the most dominant factor. The existence of displacement effect on a sizable scale was documented earlier by Dholakia (1985) and Ghosh and Mukhopadhyay (1984). The employment effect namely the sluggish growth of employment opportunities in the economy had also played a substantive role in explaining the variations in female work participation rates. Ghosh and Mukhopadhyay (1984) and Papola and Misra (1980) found that sluggishness in the growth of employment opportunities made more women to stay away from work and that the first opportunity to work always gets allotted to men. By and large the demographic factor played only a marginal role in determining the rural female participation rates.

In theory, a positive interaction co-efficient implies a shift in favour of female work participation and a negative shift implies a shift against their interest. However, not much could be read into the sign of the interaction terms in view of the changing concept of workers adopted in different Censuses,

particularly of the very restrictive definition of workers adopted in the 1971 Census, which left much of the female work force unenumerated.

C. Female Work Participation Rates in Agriculture

In this section the results are presented and discussed under the following heads:

1. Dimensions of women workers in agriculture;
2. Trends in women agricultural labour; and
3. Agricultural development and labour intensity.

1. Dimensions of women workers in agriculture:

As elsewhere the agricultural sector in Tamil Nadu had remained a 'residual sector' in respect of labour absorption. Those who could not find employment in the manufacturing and service sectors, got themselves confined to the agricultural sector, as is evident from the largest proportion of marginal workers dependent on agriculture. Table VII gives the distribution of women workers by main and marginal categories and distribution of rural workers in the agricultural sector in Tamil Nadu in 1981.

TABLE VII
DISTRIBUTION OF WOMEN WORKERS BY MAIN AND MARGINAL CATEGORIES
AND DISTRIBUTION OF RURAL WORKERS
IN AGRICULTURE - TAMIL NADU 1981

(in lakhs)

S.No. Category	Women workers			Rural workers in Agriculture*		
	Total	Urban	Rural	Female	Male	Total
1. Main workers	53.49	8.59	44.90	38.88	71.27	110.15
in Percentage	100.00	16.05	83.95	32.29	98.37	92.03
2. Marginal workers	9.94	0.75	9.19	8.37	1.18	9.54
in Percentage	100.00	7.54	92.46	17.71	1.63	7.97
3. Main and Marginal workers	63.43	9.34	54.09	47.24	72.45	119.69
in Percentage	100.00	14.72	85.28	100.00	100.00	100.00

Note: * These percentages are for the column totals.

Source: Tamil Nadu, Director of Census Operations (1987)
 Census of India 1981, Series 20, Tamil Nadu
 General Economic Tables Part III A & B (I)
 Table B1, pp.107-108; Table B.3 p.154;
 Table B7, part B, p.630-631.

In Tamil Nadu, out of 63.43 lakhs of female labour force in 1981, 54.09 lakhs are in rural areas, of whom 47.24 lakhs are engaged in agriculture.

As a proportion of female marginal workers, however, 91 percent of female marginal workers are dependent on agriculture. The relatively heavier incidence of women marginal workers in agriculture indicates that women participate in the labour force, mainly in response to survival needs (National Commission on Labour, 1969). Sinha (1983) endorses that among the poorer classes, men and women, both are driven to work.

Work force status concerns primarily with the distinction between self employment and wage employment. Cultivators are those who work on family holdings and who get remunerated in terms of surplus agricultural income over cost of crop cultivation. Agricultural labourers work on others land holdings and are compensated for their labour in terms of wage payments. The larger the proportion of workers in the latter category, the greater the degree of proletarianisation (Mathew and Nair, 1986). In common parlance it means more number of people having less security and entitlement (Sen, 1977, 1983). Table VIII gives the status distribution of agricultural workers in rural Tamil Nadu in 1981.

TABLE VIII

STATUS DISTRIBUTION OF AGRICULTURAL WORK FORCE IN RURAL TAMIL NADU 1981

(Figures in lakhs)

S.No.	Category	Male	Female	All persons
1.	Main workers			
	a. Cultivators	41.77 (77.83) (99.1)	11.90 (22.17) (84.82)	53.67
	b. Agricultural labourers	29.50 (52.23) (97.35)	26.97 (47.76) (81.22)	56.47
2.	Marginal workers			
	a. Cultivators	0.37 (14.97) (0.89)	2.13 (85.03) (15.18)	2.50
	b. Agricultural labourers	0.80 (11.41) (2.65)	6.24 (88.59) (18.78)	7.04
3.	Main and marginal workers			
	a. Cultivators	42.14 (75.02)	14.03 (24.98)	56.17
	b. Agricultural labourers	30.30 (47.71)	33.21 (52.29)	63.51

Note: Figures in brackets alongside the entries give the percentages of the row totals. Figures in brackets below the entries give the percentages of the column totals.

Source: Tamil Nadu, Director of Census Operations (1987)
Census of India 1981 Series 20, Tamil Nadu
General Economic Tables Part III A & B (I), Table B-1 pp.154-155, Table B-7, pp.630-631.

That fewer women have a stake in the major agricultural asset, viz., land, in comparison to men is indicated by the relatively smaller proportion of women cultivators among main workers (22.2 percent), and their remarkably higher share among marginal workers (85.03 percent). The poor asset base of this group is further evident from the fact that nearly half (48 percent) of the main agricultural labourers and nearly 90 percent of the marginal agricultural labourers are drawn from among the women workers. Thus between male and female labourers in agriculture, female labour is more proletarianised than male labour.

Among 33.21 lakh female agricultural labourers, 26.97 lakhs were in the main workers category and 6.24 lakhs in the marginal workers category. The district wise and sex wise distribution of main and marginal agricultural labourers across the different districts of Tamil Nadu in 1981 are given in Tables IX and X.

TABLE IX
DISTRICT - WISE AND SEX - WISE DISTRIBUTION OF MAIN AGRICULTURAL LABOURERS IN TAMIL NADU - 1981.

S.No. District	Main Workers			Main Agricultural labourers			Main Agricultural labourers as percentage of main workers			Percentage distribution of main agricultural labourers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1. Chengleput	6,22,576	2,37,735	8,60,361	2,12,200	1,67,082	3,79,282	34.08	70.26	44.08	7.19	6.19	6.72
2. North Arcot	9,83,614	4,26,541	14,10,155	2,52,972	2,85,836	5,38,808	25.72	67.01	38.21	8.58	10.60	9.54
3. South Arcot	10,21,115	4,12,028	14,47,656	3,25,107	2,83,752	6,08,859	31.84	68.87	42.05	11.02	10.52	10.78
4. Dharmapuri	5,47,461	2,27,264	7,74,725	1,13,103	1,16,505	2,29,608	20.66	51.26	29.64	3.83	4.32	4.07
5. Salem	7,85,183	4,10,218	11,95,401	2,21,508	2,25,800	4,47,308	28.21	55.04	37.42	7.50	8.37	7.92
6. Periyar	5,57,658	2,93,372	8,51,030	1,90,354	1,78,972	3,69,326	34.13	61.01	43.40	6.45	6.63	6.54
7. Coimbatore	5,06,914	2,82,786	7,89,700	1,90,451	1,92,127	3,82,578	37.57	67.94	48.46	6.46	7.12	6.77
8. Nilgiris	81,140	50,398	1,31,538	5,070	3,889	8,959	6.25	7.72	6.81	0.17	0.14	0.16
9. Madurai	8,66,956	5,31,588	13,98,544	3,35,236	3,43,403	6,78,639	38.67	64.60	48.52	11.36	12.73	12.02
10. Tiruchirappalli	8,05,338	3,94,249	11,99,587	2,07,642	2,30,597	4,38,239	25.78	58.49	36.53	7.04	8.55	7.76
11. Thanjavur	8,98,926	3,12,826	12,11,752	3,99,492	2,49,879	6,49,371	44.44	79.88	53.59	13.54	9.26	11.50
12. Pudukottai	2,78,626	99,441	3,78,067	43,323	42,643	85,966	15.55	42.88	22.74	1.47	1.58	1.52
13. Ramanathapuram	6,63,011	3,66,730	10,29,741	1,39,702	1,67,984	3,07,686	21.07	45.80	29.88	4.74	6.23	5.45
14. Tirunelveli	6,31,746	4,04,623	10,36,369	1,87,442	1,95,751	3,83,193	29.67	48.38	36.97	6.35	7.26	6.79
15. Kanyakumari	2,81,368	40,794	3,22,162	1,26,423	13,278	1,39,701	44.93	32.55	43.36	4.29	0.49	2.47
Tamil Nadu	95,31,632	44,90,643	1,40,22,275	29,50,025	26,97,498	56,47,523	30.95	60.07	40.28	100	100	100

Source: Tamil Nadu, Director of Census Operations (1987), Census of India 1981, Series 20 Tamil Nadu, General Economic Tables Part III A & B(1) Table B-3, pp.154 - 273.

TABLE X

DISTRICT - WISE AND SEX-WISE DISTRIBUTION OF MARGINAL AGRICULTURAL LABOURERS IN TAMIL NADU - 1981.

S.No.	District	Marginal Workers			Marginal Agricultural labourers			Marginal Agricultural labourers as percentage of marginal workers			Percentage distribution of marginal agricultural labourers		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1.	Chengleput	16,620	64,583	81,203	11,161	50,218	61,379	67.15	77.76	75.59	13.89	8.05	8.72
2.	North Arcot	17,781	1,15,927	1,33,708	11,686	85,572	97,258	65.72	73.82	72.74	14.54	13.72	13.81
3.	South Arcot	19,315	1,16,638	1,35,953	11,132	90,310	1,01,442	57.63	77.43	74.62	13.85	14.48	14.40
4.	Dharmapuri	5,645	49,415	55,060	2,736	30,299	33,035	48.47	61.32	59.99	3.40	4.86	4.69
5.	Salem	6,707	69,122	75,829	3,168	41,409	44,577	47.23	59.91	58.79	3.94	6.64	6.33
6.	Periyar	2,976	37,209	40,185	1,441	23,969	25,410	48.42	64.42	63.23	1.79	3.84	3.60
7.	Coimbatore	2,711	22,575	25,286	1,331	12,987	14,318	49.09	57.53	56.62	1.66	2.08	2.03
8.	Nilgiris	872	1,296	2,168	24	282	306	2.75	21.76	14.11	0.03	0.05	0.04
9.	Madurai	8,820	57,917	66,737	5,089	40,446	45,535	57.70	69.83	68.23	6.33	6.48	6.47
10.	Tiruchirappalli	10,050	85,548	95,598	5,678	60,433	66,111	56.50	70.64	69.16	7.07	9.69	9.39
11.	Thanjavur	17,386	81,357	98,743	9,808	68,773	78,581	56.41	84.53	79.58	12.20	11.02	11.16
12.	Pudukottai	6,545	48,929	55,474	2,554	23,992	26,546	39.02	49.03	47.85	3.18	3.84	3.77
13.	Ramanathapuram	12,843	1,00,346	1,13,189	6,298	57,663	63,961	49.04	57.46	56.50	7.84	9.25	9.09
14.	Tirunelveli	9,964	56,277	66,241	4,202	32,004	36,206	42.17	56.87	54.66	5.23	5.13	5.14
15.	Kanyakumari	6,884	11,681	18,565	4,045	5,304	9,349	58.76	45.40	50.36	5.03	0.85	1.33
	Tamil Nadu	1,45,119	9,18,820	10,63,939	80,353	6,23,661	7,04,014	55.37	67.88	66.17	100	100	100

Source: Tamil Nadu, Director of Census Operations (1987), Census of India 1981, Series 20 Tamil Nadu, General Economic Tables Part III A & B(i) Table B-7, pp.630 - 697.

The highest incidence of main agricultural labourers of both the sexes was in the district of Thanjavur with 54 percent. In the case of male main agricultural labour, the highest incidence was in Kanyakumari (45 percent). Female main agricultural labourers were the highest in Thanjavur (80 percent). Thanjavur, lying in the Cauvery delta region and cultivating the female labour intensive crop of paddy, naturally had the highest proportion of women agricultural labourers in the State. Excluding the mountainous district of Nilgiris, the lowest incidence of main agricultural labour was found in Pudukottai, among the total workers, as also among the male workers.

Regarding the district wise distribution of main female agricultural labourers, 43 percent of them were localised in the four districts of Madurai, Thanjavur, North Arcot and South Arcot. Pudukottai and Kanyakumari had the lowest share in the main agricultural labour force viz., 1.52 percent and 2.5 percent respectively.

Among the marginal agricultural labourers in respect of total workers and female workers, the highest incidence was again in Thanjavur (79.58%, 84.53%) followed by Chengleput (75.59%, 77.76%), South Arcot (74.62%, 77.43%) and North Arcot (72.74%, 73.82%). The largest proportion of male marginal agricultural workers was recorded in Chengleput (67.15%) followed by North Arcot (65.72%).

About 40 percent of the marginal agricultural labourers were localised in the districts of South Arcot, North Arcot and Thanjavur, which were endowed with good irrigation facilities. These districts were either river irrigated (South Arcot and Thanjavur) or irrigated by ground water sources (North Arcot). The five districts of Kanyakumari, Coimbatore, Periyar, Pudukottai and Dharmapuri which were relatively less endowed with irrigation and which were dominated by the cultivation of coarse grains and cotton had the least proportion of the marginal agricultural labour force (15%).

2. Trends in women agricultural labour:

District wise trends in male and female agricultural labour across the Census years of 1961, 1971 and 1981 are given in Table XI.

TABLE XI
DISTRICT - WISE TRENDS IN AGRICULTURAL LABOUR IN RURAL TAMIL NADU
1961-1981
(as percentage of total workers)

S.No.	District	Male agricultural labour			Female agricultural labour		
		1961	1971	1981	1961	1971	1981
1.	Chengleput	15.69	29.48	24.66	13.58	14.69	19.42
2.	North Arcot	8.13	20.54	17.94	10.87	15.66	20.27
3.	South Arcot	15.62	26.99	22.68	14.87	13.05	19.80
4.	Dharmapuri	---	17.63	14.60	---	10.09	15.04
5.	Salem	7.25	20.53	18.53	7.00	13.46	18.89
6.	Periyar	---	---	22.37	---	---	21.03
7.	Coimbatore	10.79	24.44	24.12	8.12	17.25	24.33
8.	Nilgiris	7.63	5.55	3.85	6.84	3.75	2.96
9.	Madurai	12.43	26.63	23.97	11.80	17.72	24.55
10.	Trichirapalli	8.50	16.81	17.31	9.65	12.95	19.22
11.	Thanjavur	20.59	34.20	32.97	16.43	14.06	20.62
12.	Pudukottai	---	---	11.46	---	---	11.28
13.	Ramanathapuram	7.19	18.33	13.57	9.32	13.83	16.31
14.	Tirunelveli	8.57	21.48	18.09	10.56	16.52	18.89
15.	Kanyakumari	7.34	28.11	39.24	2.42	3.11	4.12
	State	11.10	23.82	21.04	10.70	14.28	19.24

Between 1961 and 1981, the percentage of male agricultural labour, at the state level as well as in the districts, had peaked in 1971, before registering a marginal decline in 1981, except in the districts of Trichy and Kanyakumari where it had consistently increased. Still the proportion of male agricultural labour in the total male labour force was considerably higher in 1981 than in 1961.

Increase in the incidence of female agricultural labour in 1981 may indicate:

- a. better agricultural technology reaching the beneficiaries though better extension techniques could have resulted in more employment in the agricultural sector.
- b. not much of industrialisation has taken place since 1971 to siphon out workers into alternative employment.

Female agricultural labour had consistently increased from one decade to the other since 1961, both at the state level as well as the districts, with the exception of South Arcot and Thanjavur (leaving out the mountainous district of Nilgiris). The consistent tendency of female agricultural labour to increase over time as against the tendency of male agricultural labour to decline in relative terms, at least since 1971, indicates that while male labour finds increasingly more opportunities for employment in the non-agricultural sector in all districts (except Trichy and Kanyakumari), the rural female labour does not have any such opportunities, that could wean it away from agriculture.

Rather its opportunities for employment in the non-agricultural sector are not expanding rapidly enough to reduce its dependence on agriculture in relative terms and not just in absolute terms. Dholakia (1985) and Roy (1989) confirmed that the increasing rate of the already large percentage of women agricultural labourers is due to the displacement of women workers from other sources of non-agricultural employment in the rural areas.

3. Agricultural development and labour intensity:

Agricultural development can be measured in terms of agricultural efficiency indices indicating the effectiveness of different factors of production which contribute to the production process. Das (1989) showed that agricultural efficiency could be measured by a composite index based on the total vector of five indicators namely cropping intensity, irrigation intensity, availability of net area sown per agricultural worker, cropping pattern i.e. the percentage of gross cropped area under commercial crops and per hectare productivity in food crops. Labour intensity could be found out by dividing the number of agricultural workers (agricultural labourers + cultivators) by net area sown in the given district or state. The index of the relevant variable was obtained by dividing the district figure by the state figure and expressing the ratio in percentage terms.

The district-wise distribution of agricultural efficiency index and labour intensity index in Tamil Nadu in 1981 are given in Table XII.

TABLE XII

DISTRICT-WISE AGRICULTURAL EFFICIENCY INDICES AND LABOUR INTENSITY
INDEX IN TAMIL NADU - 1981

S.No.	District	Cropping intensity	Irrigation intensity	Commercial crops index	Productivity index	Land availability index	Agricultural development index	Labour intensity index
1.	Chengleput	110.58	155.99	75.21	133.56	85.76	112.22	116.61
2.	South Arcot	105.41	106.09	114.05	108.36	88.10	104.40	113.50
3.	North Arcot	97.58	94.30	174.79	103.70	79.49	109.97	125.81
4.	Salem	92.53	66.80	144.63	69.39	78.52	90.37	127.37
5.	Dharmapuri	98.43	50.69	65.70	62.31	99.35	75.30	100.66
6.	Coimbatore	92.46	95.48	95.04	69.06	119.73	94.35	83.53
7.	Periyar	101.30	123.58	137.19	99.59	94.87	111.31	105.39
8.	Trichy	92.94	76.62	55.37	76.77	103.68	81.08	96.46
9.	Pudukkottai	88.28	105.89	97.52	64.05	96.43	90.43	103.71
10.	Thanjavur	133.49	141.45	42.98	156.25	114.63	117.76	87.24
11.	Madurai	93.41	100.20	103.31	113.03	88.77	99.74	112.66
12.	Ramanathapuram	84.96	78.59	96.69	41.03	138.64	87.98	72.13
13.	Tirunelveli	98.33	93.71	114.46	110.48	119.69	107.33	83.56
14.	The Nilgiris	84.47	1.57	283.88	30.28	579.42	195.92	17.26
15.	Kanyakumari	105.82	90.57	124.38	116.92	90.65	105.67	110.32
	State	98.66	92.10	115.01	90.32	131.85	105.59	97.08

Source: 1. Compiled and computed from the data in Government of Tamil Nadu, Department of Statistics (1985), Season and Crop Report of Tamil Nadu for the Agricultural year 1980-81. pp.32-33, p.38, 77, 78, 90.

2. Tamil Nadu, Director of Census Operations (1987), Census of India 1981, Series 20 Tamil Nadu, General Economic Tables Part III A & B(i) Table B-3, pp.154-273.

The estimates of agricultural efficiency index show that with the exception of Nilgiris (where the efficiency index is the highest due to the very different agro - climatic and cropping pattern, heavily weighted in favour of commercial and plantation crops), the other districts which show a relatively higher agricultural efficiency index were Thanjavur, Chengleput Periyar, North Arcot, Tirunelveli, Kanyakumari and South Arcot. In terms of labour intensity in agriculture, however, the top ranking districts were Salem, North Arcot, Chengleput, South Arcot, Madurai, Kanyakumari, Periyar and Pudukottai.

The relationship between labour intensity and agricultural efficiency was evaluated using the linear regression equation. The regression equation obtained was

$$Y = 167.3183^* - 0.6652^* X$$

$$(2.0424) \quad (0.1990)$$

$$(81.9224) \quad (-3.3427) \quad R^2 = 0.4622$$

where Y stands for labour intensity

X stands for agricultural efficiency

* Significant at 5 percent level

The negative co-efficient of agricultural efficiency at 0.66 indicates that labour use in agriculture had been decreasing with an increase in agricultural efficiency. The hypothesis of labour displacement with agricultural development (Das 1989, Verma 1989, and Sen 1985) had been confirmed by these results.

The reverse relationship between agricultural efficiency and labour intensity which indicates the relative contribution of

labour to agricultural growth is given in the regression equation below:

$$Y = 173.0501^* - 0.6949^* X$$

$$(20.9095) \quad (0.2079)$$

$$(8.2761) \quad (-3.3425) \quad R^2 = 0.4622$$

where Y - agricultural efficiency

X - labour intensity

* - Significant at 5 percent level

This regression equation showed an inverse relationship between agricultural efficiency and labour intensity in Tamil Nadu. The negative regression co-efficient at 0.6949 indicated that the degree of dependence of agriculture on labour was decreasing. Working with the state level data for the year 1961-62 and 1972-73, Das (1989) had also reported a similar relationship. But then, the magnitude of this co-efficient had been considerably lower at -.1471 and -.2439. The co-efficient in respect of Tamil Nadu for the year 1980-81 was quantitatively much higher at -.6949. It implies that the labour displacement in 1980's here had been faster than at the All-India level in 1960's and 1970's. Varadan (1990) observes that modernisation of agriculture will call for less labour inputs releasing others for further processing the produce and thus adding value.

Summing up, the analysis in this section on female agricultural labourers revealed that among 33.21 lakh, female agricultural labourers, 28.97 lakhs were in the main workers category and 6.24 lakhs in the marginal workers category. Nearly

half (48 percent) of the main agricultural labourers and 90 percent of the marginal agricultural labourers were drawn from among the women workers. Thus between male and female labourers, female labour was more proletarianised - prone to more of insecurity and less of entitlement.

By and large female agricultural labourers had increased consistently over time. In general, in those districts where paddy was the dominant crop which required more intermittent labour, incidence of marginal female agricultural labour was high (Thanjavur, Chengleput, South Arcot, North Arcot). They also had higher incidence of main female agricultural labourers. However, agricultural development and labour intensity are inversely related. Hence, with an increase in agricultural development in future, the scope for labour absorption will be less, making the position of the female agricultural labourers, all the more insecure.

D. Empirical Evidence On The Agriculrural Labour Market

The empirical verification of the labour market model was done at two levels - district level and village level. The village level study was more of a descriptive type. The results are discussed under two major headings:

1. Labour Market model district level in Tamil Nadu
2. The village study
 - a. Socio-economic profile of female agricultural labourers
 - b. Pattern of labour use in different cropping systems

1. Labour market model: district level in Tamil Nadu

Table XIII gives the definitions of the variables used in the estimation of the labour market model at the district level in Tamil Nadu with their means and standard deviations.

The Ordinary Least Squares (OLS) reduced form parameter estimates are presented in Table XIV.

TABLE XIII
VARIABLES USED IN THE LABOUR SUPPLY - DEMAND MODEL WITH THEIR MEANS AND
STANDARD DEVIATIONS - DISTRICTS OF TAMIL NADU: 1961-1981

N = 40

S.No.	Description of the variable	Mean	Standard deviation
1.	λ_M - Percentage of male agricultural labour 15+ per rural household	31.8500	12.1337
2.	λ_F - Percentage of female agricultural labour 15+ per rural household	24.9500	10.3052
3.	W_M - Daily wages in Rupees for field agricultural labour-male	3.7217	2.3732
4.	W_F - Daily wages in Rupees for field agricultural labour-female	2.6893	1.9557
5.	X_1 - Mean size of holdings (in hectares)	1.9488	1.3860
6.	X_2 - Percentage of households without land	44.8123	14.8740
7.	X_3 - Percentage of area irrigated	44.0675	19.0928
8.	X_4 - Normal rainfall in centimetres)	103.8500	39.9269
9.	X_5 - Percentage of males with atleast primary education	33.4703	18.4292
10.	X_6 - Percentage of females with atleast primary education	12.6470	9.9238
11.	X_7 - Percentage of population in non-agricultural activities	28.3748	17.6986
12.	X_8 - Percentage of SC/ST population	21.3530	6.7286
13.	X_9 - Structural dummy variable	1.0750	

TABLE XIV
THE UNRESTRICTED REDUCED FORM OLS ESTIMATES OF THE LABOUR SUPPLY -
DEMAND EQUATIONS - DISTRICT LEVEL TAMIL NADU 1961-1981

N = 40

S.No.	Variable	λ_M	λ_F	W_M	W_F
1.	X ₁ - Mean land holding (in hectares)	-0.3539 (0.9466) (-0.3739)	-2.1562* (0.6748) (-3.1954)	0.1839** (0.1199) (1.5326)	0.2541* (0.1061) (2.3954)
2.	X ₂ - Percentage of households without land	0.3653* (0.0888) (4.1141)	0.4659* (0.0633) (7.3621)	0.0298* (0.0113) (2.6013)	0.0129 (0.0009) (1.3002)
3.	X ₃ - Percentage of area irrigated	0.1666* (0.0598) (2.7853)	-0.0596* (0.0427) (-1.3977)	0.0098 (0.0076) (1.2910)	0.0082 (0.0067) (1.2198)
4.	X ₄ - Normal Rainfall (in centimetres)	0.0476 (0.0381) (1.2488)	-0.1642* (0.0272) (-6.0397)	0.0047 (0.0048) (0.9803)	0.0079* (0.0043) (1.8588)
5.	X ₅ - Percentage of males with atleast primary education	0.0366 (0.1120) (0.3266)	0.0284 (0.0798) (0.3555)	-0.0268* (0.0142) (-1.8923)	-0.0269* (0.0126) (-2.1459)
6.	X ₆ - Percentage of females with atleast primary education	0.6713* (0.2129) (3.1530)	-0.3507* (0.1518) (-2.3110)	-0.0012 (0.0270) (-0.0434)	0.0474* (0.0239) (1.9856)
7.	X ₇ - Percentage of population in non-agricultural activities	-0.6167* (0.0736) (-8.3858)	-0.2119* (0.0524) (-4.0415)	-0.0001 (0.0093) (-0.0110)	-0.0017* (0.0082) (-2.1172)
8.	X ₈ - Percentage of SC/ST population	0.1335 (0.1696) (0.7873)	0.7368* (0.1209) (6.0962)	-0.0650* (0.0215) (-3.0248)	-0.0136 (0.0190) (-0.7171)
9.	X ₉ - Structural dummy variable	-4.8909* (1.3460) (-3.6337)	3.9358* (0.9595) (4.1012)	3.0325* (0.1706) (17.7763)	2.0785* (0.1508) (13.7796)
	Constant	14.0784	17.4819	0.1728	-1.1628
	R ²	0.7551	0.8278	0.8973	0.8818

Note : Figures underneath the co-efficients in the first parantheses indicate standard errors and in the second indicate t-values.

* - significant at 5 percent level

** - significant at 10 percent level.

The set of exogeneous variables included in the model explained 76 percent to 83 percent of the inter-district variations in male, female participation rates as agricultural labour and 88 to 90 percent of the variations in their wage rates. The land variables namely mean size of holdings and the percentage of households without land had the expected negative and positive co-efficients respectively both with respect to male participation rate and female participation rate. The land augmenting factors increased male participation rates but decreased female participation rates. That is, an increase in the probability of farm income led to the withdrawal of the female labour from the work force which was in agreement with Sinha's (1989) finding. The male education co-efficient was not statistically significant in explaining the variations in male as well as female participation rates. The female education co-efficient alone, of the four had the expected statistically significant co-efficient implying that the more the level of education, the less the women worked as agricultural labourers. The co-efficient of the proportion of population in non-agricultural activities, indicating the probability of off-farm income for the rural households carried the expected negative sign in explaining both male and female participation rates. The social background of the rural population namely the percentage of SC/ST population also had positive co-efficient though only the co-efficient relating to the female participation rate was statistically significant. The structural changes that had been taking place in the rural sector

had significantly decreased the male participation rates but the same changes had been responsible for raising the female participation rates. As more and more men had moved into the non-agricultural sector of the economy, it appears that their place had been taken up more and more by women in the agricultural sectors especially in terms of providing the labour services. This is corroborated by the earlier finding (Section B) that more and more women workers perforce depend on the agricultural sector.

The land and land augmenting variables had positive co-efficients with respect to male and female wage rates, though only three out of the six co-efficients were statistically significant at 10 percent level. The co-efficients of landlessness did not have the expected negative impact on wage rate. The proxy variables of off-farm income opportunities namely education and employment in the non-agricultural sectors did not have the expected positive significant co-efficients with respect to female wage rate. The presence of SC/ST population and the consequent crowding in labour market, depressed the male wage rate significantly though not the female wage rate. The structural changes had significantly raised both the wage rates.

Since 19 co-efficients out of the 36 conformed to the theoretical restrictions enforced on them, and another three co-efficients could be explained by the findings of earlier research, and since the set of regressors explained more than 75 percent of the variations in participation and wage rates, the choice and

specification of the variables in the model were considered satisfactory. The structural parameters of the participation and wage rate equations were estimated using the two stage least squares estimation. Table XV gives the structural co-efficient estimates of the labour supply and demand equations.

TABLE XV
THE STRUCTURAL COEFFICIENT ESTIMATES OF THE LABOUR SUPPLY AND DEMAND

MODEL - DISTRICTS OF TAMIL NADU 1961 - 1981

N = 40

S.No.	Variable	M	F	W M	W F
1.	M - Percentage of male agricultural labour 15+ per rural household			-0.0006 (0.0168) (-0.0352)	0.5878* (0.0149) (39.4931)
2.	F - Percentage of female agricultural labour 15+ per rural household			0.0022 (0.0174) (0.1266)	-1.7024* (0.0154) (-110.3708)
3.	W - Daily wages in Rupees for field agricultural labour-male	4.0382* (0.5273) (7.6590)	35.0492* (0.3863) (90.7321)		
4.	W - Daily wages in Rupees for field agricultural labour-female	10.8850* (0.2026) (53.7169)	-37.8677* (0.1484) (-255.1797)		
5.	X ₁ - Mean land holding (in hectares)	-4.0336* (0.9593) (-4.2048)	1.1673* (0.7850) (2.0603)	0.1884** (0.1199) (1.5706)	-3.2087* (0.1061) (-30.2459)
6.	X ₂ - Percentage of households without land	0.1610* (0.0916) (1.7568)	-0.0923 (0.0897) (-1.0283)	0.0285* (0.0113) (2.5293)	0.5915 (0.0099) (59.4472)
7.	X ₃ - Percentage of area irrigated			0.0100** (0.0076) (1.3258)	-0.1913* (0.0067) (-28.5323)
8.	X ₄ - Normal Rainfall (in centimetres)			0.0051 (0.0046) (1.1187)	-0.2995* (0.0043) (-70.3941)
9.	X ₅ - Percentage of males with atleast primary education	0.4537* (0.0623) (7.2887)		-0.0269* (0.0077) (-3.4834)	
10.	X ₆ - Percentage of females with atleast primary education		1.2935* (0.1180) (10.9593)		-0.9443* (0.0138) (-68.4202)
11.	X ₇ - Percentage of population in non-agricultural activities	-0.6947* (0.0643) (-10.8051)	-0.2635* (0.0511) (-5.1562)		
12.	X ₈ - Percentage of SC/ST population	0.4433* (0.1681) (2.6408)	2.3126* (0.1230) (18.6932)	-0.0665* (0.0208) (-3.2040)	1.1624* (0.0192) (60.6740)
13.	X ₉ - Structural dummy variable	-38.8514* (0.2858) (-135.9187)	-22.9334* (0.2094) (-100.5016)	3.0209* (0.1904) (15.8663)	11.6504* (0.1685) (69.1519)
	Constant	25.0064	-36.2870	0.1425	20.3229
	R	0.7447	0.8101	0.8973	0.8818

Note : Figures underneath the co-efficients in the first parantheses indicate standard errors and in the second indicate t-values.
* - significant at 5 percent level, ** - significant at 10 percent level.

The estimates of the structural co-efficients in the labour supply equations explained 74 to 81 percent of the variations in male and female participation rates. In the case of the demand equations, the structural estimates were successful in capturing 88 to 90 percent of the variations in wage rates of the two categories of agricultural labourers. The wage co-efficients in the labour supply equations were all statistically significant at 5 percent level. The own wage effect for male labour was positive indicating that the positive substitution effect outweighed the negative income effect for these workers. Their response to changes in their wage rate was on conventional lines. The effect of a change in the female wage rate on male participation rates was, however, also positive. It implied that the cross substitution effect was positive and overwhelmed the negative income effect. In the case of female labour supply in agriculture, the own wage effect was negative, that is, the negative income effect dominated the positive substitution effect with them. Bardhan (1979) found a similar response in respect of rural West Bengal households. The other wage effect was positive as in the case of male labour.

In the wage rate equation, the structural relation between participation rates and wage rates were of the inverse form and consistent with the model. However, the co-efficient of participation rates of male labour with respect to wage rate was not statistically strong. The structural co-efficient pertaining to male labour participation and female wage rates was positive

and significant indicating that the more the level of male employment, the less the female labour was supplied, pushing up their wage rates. This finding was in agreement with that of Hill (1978), Sinha (1978), Sawant and Dewan (1979), Papola and Misra (1980) and Bardhan (1987) who found that FPRs were low among better off households, with high family incomes following higher wages and earnings of male members.

An increase in the size of mean land holdings gives rise to two alternative developments with respect to male and female labour and their wage rates. As the size of land holdings increases, relatively more rural households become labour importing than exporting households, as far as male labour is concerned, decreasing their supply of hired labour and increasing their wages. An increase in the size of land holdings also implies that the self sufficiency in respect of labour characterising the subsistence households is destroyed and more of the rural households tend to export their female labour, increasing their supply and depressing their wages. These tendencies where the position of the male labourers in the labour market is strengthened vis-a-vis the female labour in relation to changes in the size of land holdings are brought out by the statistically strong structural co-efficients.

An increase in the incidence of landlessness via an increase in the number of labour exporting households increases the male labour participation significantly. Its co-efficients with respect to female labour participation, however, were not

statistically significant. Contrary to the apriori negative sign the co-efficient of landlessness with respect to both the wage rates turned out to be positive, indicating that the causation is via better organisation and bargaining strength among the workers.

The structural estimates of the land augmenting variables turned up as negative and statistically significant with respect to female wage rate, throwing up an interesting proposition that when there is an increase in land augmenting factors namely more irrigation and water availability, there is a demand for additional labour which is by and large met by male labour shown as an increase in their wage rates rather than increasing the demand for female labour. In effect there is a fall in the demand for female labour resulting in a fall in their wage rates. Thus the labour displacement hypothesis appears to be in operation displacing women labour, as agriculture advances.

The level of education by itself did not influence the extent of male or female participation as agricultural labour or their wage rates in the desired direction. It is only when it is operationalised through a larger proportion of educated population in employment in the non-agricultural sector that the male and female participation rates were reduced significantly. Thus an increase in the actual opportunities for getting into the non-farm sectors reduced participation rates as hypothesised in the labour supply theory. The presence of SC/ST population had been responsible for raising the participation rates of both male and female agricultural labour as expected. The structural co-

efficient in respect of male wage rates carried the expected negative and significant sign but not in respect of female wage rates. The structural dummy had negatively influenced the participation rates of both the categories of workers and raised both their wages again on the expected lines.

By and large, more than three-fourths of the co-efficients in the structural equations had carried the expected signs indicating that the variables used in the model had explained well the behaviour of the labour supply as well as demand forces in the agricultural sector in respect of both male and female labour.

Table XVI states the co-efficients of own wage and other wage elasticities of labour supply and demand for the two categories of male and female field labour.

TABLE XVI
ELASTICITY COEFFICIENTS OF LABOUR SUPPLY AND LABOUR DEMAND DISTRICT
LEVEL, TAMIL NADU

S.No.	Category of Labour	Own wage elasticity of supply	Other wage elasticity of supply	Own wage elasticity of demand	Other wage elasticity of demand
1.	Male Field Labour	0.4719	0.9191	-0.0051	6.9615
2.	Female Field Labour	-4.0817	5.2282	-15.7940	0.0148

Note: Elasticity co-efficients evaluated at mean levels.

The own wage labour supply elasticity for male workers was 0.47 which was higher than the estimates of Bardhan (1979) who in his study of the rural households of West Bengal using the NSS data found it to be in the range of 0.20 to 0.29. The current estimate also showed the male supply of labour to be relatively inelastic, though not highly inelastic and refuted the possibility of the existence of an infinite elasticity of labour supply presumed in the horizontal supply curve of farm labour in development literature. The own wage elasticity of demand for male labour was -0.0051. In other words, the demand for male labour was perfectly inelastic with respect to its own wage rate. The relative inelasticity of supply combined with the perfect inelasticity of demand brought about such adjustments in their labour market as to keep their equilibrium wages at relatively higher level and to ensure fairly stable levels of employment for them.

The own wage elasticity of supply of female field labour was found to be high and negative. It was -4.0817. This negative own wage elasticity of supply with respect to female labour showed that the negative income effect outweighed the positive substitution effect with them. Hence, as wage rate increased, they tended to withdraw from the labour market. However, the own wage elasticity co-efficient of demand for their labour was extremely high -15.7940. This very high elasticity of demand for their labour together with their tendency to withdraw from the labour market made the outcomes for them very unstable. The

market adjusted in such a way as to keep their equilibrium wages and employment at rather low levels.

The study of cross elasticity of demand for labour coefficients led to some startling findings. The cross elasticity of demand for male labour with respect to female wage rate was very high and positive at 6.9615. This high cross elasticity coefficient indicates that when female wage rate increases, the male labour is easily substituted for female labour. The cross elasticity of demand for female labour with respect to male wage rates, however, was nearly zero (0.0148). It showed that when male wage rate rises, the female labour is not demanded in the place of male labour. In sum, male labour is accepted or functions as a close substitute for female labour but female labour does not replace male labour. These findings lend credibility to the Marxian proposition that the female labour constitutes a vital part of the labour reserves. They are hired last, but fired first. Female labour is displaced by male labour at the earliest instance. This explains why female labour is more prone to insecurity.

The own wage elasticity of supply of female labour was much less than that of male labour, confirming the predictions of Joan Robinson that the employer has greater monopsony power over women than over men (Gan 1988). This greater degree of monopsony power is caused by women's relative immobility - a lack of mobility caused by the fixity of the women's place of residence (a supply side problem)

and by a lack of demand for women in alternative occupations or by the prevalence of occupational segregation.

2. The Village study:

The household level village study conducted at Singarampalayam had two objectives:

- a. to find out the socio-economic profile of female agricultural labourers; and
- b. to ascertain the pattern of labour use in different cropping systems.

The sample for the study of female agricultural labourers consisted of 80 rural labour households where at least one female worker was available. The data from 120 farm households formed the basis for studying the labour intensity of different crops.

a. Socio-economic profile of female agricultural labourers:

The following aspects of the labourers's status are dealt with:

- i. Literacy,
- ii. Caste and nature of contract,
- iii. Age distribution,
- iv. Household income distribution,
- v. Contribution to household income,
- vi. Composition of labour force in the sample households,
- vii. Employment,
- viii. Operation - wise employment and
- ix. Wage rates and earnings.

i. Literacy:

Only 12.5 percent of the female agricultural labourers were literate (i.e. seven out of every eight workers were illiterate). Literacy level among the scheduled caste workers was even more deplorable. Out of 36 Scheduled Caste workers only two were found to be literate (0.06%).

ii. Caste and nature of contract:

Forty five percent of the workers belonged to the Scheduled Caste population. Eighty four percent of them were casual labourers, the remaining 11 (16 percent) were attached labourers. Within the casual labour category 41 percent belonged to the Scheduled Caste group and 59 percent belonged to the non-Scheduled Caste group. Within the attached labour category, 55 percent were from Scheduled Caste group and 45 percent from non-Scheduled Caste group. Lebra et al (1984) observed that the Scheduled Castes accounted for one-third of the agricultural labourers. In the village sample, however, the proportion of SC labourers was even higher at 45 percent in the aggregate, 41 percent in the casual labour category and 55 percent in the attached labour category.

iii. Age distribution:

The age distribution of the female agricultural labour is given in Table XVII.

TABLE XVII
DISTRIBUTION OF FEMALE AGRICULTURAL LABOUR BY AGE

S.No.	Age group	Frequency	Percentage
1.	Upto 19	7	8.75
2.	20 - 29	17	21.25
3.	30 - 39	24	30.00
4.	40 - 49	20	25.00
5.	50 - 59	11	13.75
6.	60 +	1	1.25
		80	100.00

The maximum number (76 percent) of the labourers were in the prime age group of 20 to 49 years.

iv. Household income distribution:

The female agricultural labourers were catagorised according to their household income as given in Table XVIII.

TABLE XVIII
DISTRIBUTION OF FEMALE AGRICULTURAL LABOUR ACCORDING TO HOUSEHOLD
INCOME

S.No.	Monthly household income (in Rs.)	Frequency	Percentage
1.	Upto 300	28	35.00
2.	300 - 400	24	30.00
3.	400 - 500	14	17.50
4.	500 - 600	8	10.00
5.	600 - 700	1	1.25
6.	700 - 800	3	3.75
7.	800 - 900	0	0.00
8.	> 900	2	2.50
Total		80	100.00

At the seventh Five Year Plan poverty line of Rs. 4,800 per household (Singh ,1988) 65 percent or two thirds of these women labourers were from households below the poverty line. Another 29 percent of these labourers belonged to the economically vulnerable group , with their household income less than Rs. 8,400 per annum or Rs. 700 per month (The Hindu , 1990).

vii. Contribution to household income:

The contribution of the female agricultural labourers to their household income is given in Table XIX.

TABLE XIX
CONTRIBUTION OF FEMALE AGRICULTURAL LABOUR TO HOUSEHOLD INCOME
(in Rupees per month)

S.No.	Household income range	Mean house-hold income	Mean earning of the female labour	Mean female earnings as a percentage of mean house-hold income
1.	Upto 300	253.57	124.82	49.23
2.	300 - 400	386.25	153.75	39.81
3.	400 - 500	469.35	182.14	38.80
4.	500 - 600	664.35	171.42	25.80
5.	600 - 700	700.00	150.00	21.42
6.	700 - 800	783.33	25.00	31.91
7.	800 - 900	—	—	—
8.	> 900	1,125.00	225.00	20.00

In the households below the poverty line, as much as 40 to 50 percent of the household income was contributed by female agricultural labour. This proportion declined relatively in the higher income ranges except in the income bracket of Rs.700-800. As household income goes up, the income contribution by male members increases both in absolute and proportional terms.

viii. Composition of labour force in the sample households:

The distribution of the labour force in the households by sex and type of labour is given in Table XX.

TABLE XX
DISTRIBUTION OF LABOUR FORCE BY SEX AND TYPE OF LABOUR

S.No.	Type of Labour	Labour*			Total
		Male	Female	Child	
1.	Agricultural	56 (65.88)	100 (93.46)	2 (50.00)	158 (80.61)
2.	Non-Agricultural manual	20 (23.53)	7 (6.54)	2 (50.00)	29 (14.80)
3.	Non-Agricultural skilled	9 (10.59)	0 (0.00)	0 (0.00)	9 (4.59)
	Aggregate	85 (43.46)	107 (54.61)	4 (2.04)	196 (100.00)

Note : * Figures in brackets indicate percentages to the column total, except the last row, where they are percentages of the row total.

The incidence of female labour in the sample households was proportionately higher than that of male labour. About 55 percent were women labour as against 43 percent of men labour and two percent of child labour. Subramaniam (1984) also found that the female labour outstripped the male labour population among the landless labour households. The women labour was by and large agricultural labour with only about 7 percent working as non-agricultural manual labourers. Among the men labour, however, only two-thirds were working as agricultural labourers, the remaining one-third was distributed between the other two categories. Skilled labour was totally absent in the female category indicating the lack of skill training among them.

ix. Employment:

The sample was observed over the period July 1988 to January 1989 comprising seven months. This period coinciding with the beginning of the agricultural year to the harvesting of the crops in December/January constituted the busy season of agricultural operations, the potential of employment being relatively high. Mean percentage of employment and unemployment were computed for the casual and attached female labour categories and they are given in Table XXI.

TABLE XXI
DISTRIBUTION OF FEMALE AGRICULTURAL LABOUR BY DURATION OF EMPLOYMENT
AND UNEMPLOYMENT

S.No.	Type of labour	Mean person days avail- able for employment	Mean person days emplo- yed	Mean person days unem- ployed
1.	Casual labour	210	142 (67.6)	68 (32.4)
2.	Attached labour	210	204 (97.1)	6 (2.9)
	Aggregate	210	150 (71.4)	60 (28.6)

Note : Figures in brackets indicate percent days to total.

The labourers reported that they were available for work on all days in the month implying that if work were available, they were prepared to work on all days. On an average, they had been employed for 150 out of 210 days (71 percent). Kumbhare et al (1983) found the extent of employment among females to be still less. In their Haryana study, they found that the female labourer had an average employment of 82 person days in farm and non-farm jobs, as compared to the male worker who was employed for 120 days per annum. The differential reflects the differences in the levels of technology application and the socio-cultural norms obtaining in the two areas.

The extent of unemployment was more among the casual labourers with their mean person days of unemployment amounting to 32.4 percent. The level of unemployment among the attached labourers was very negligible. The sample was employed for 21 days on an average. If one were to consider 25 days of employment per month as full employment, the sample is yet to reach the goal of full employment.

x. Operation-wise employment:

The operation-wise distribution of employment is indicated in Table XXII.

TABLE XXII

OPERATION-WISE DISTRIBUTION OF EMPLOYMENT AMONG FEMALE AGRICULTURAL
LABOUR

S.No.	Operation	Mean No. of days employed	Percentage
1.	Sowing	30	20.0
2.	Weeding	34	22.7
3.	Manuring	12	8.0
4.	Harvesting	32	21.3
5.	Others	42	28.0
Total		150	100.0

The break-up of female employment in agriculture revealed that they were employed in an equal measure in the activities of sowing, weeding and harvesting. They were the least preferred for manuring in that only 8 percent of their person days of employment was devoted to manuring. The differential employment of women in different agricultural operations has been documented (Mallik and Giri, 1986).

xi. Wage rates and earnings:

For comparison purposes, the mean monthly earnings of the groups with their standard deviations are given in Table XXIII.

TABLE XXIII

MEAN MONTHLY EARNINGS OF FEMALE AGRICULTURAL LABOURERS

(in Rupees)

S.No.	Type	Mean earnings	Standard deviation
1.	Casual labour	156.61	28.61
2.	Attached labour	183.12	28.33
	Aggregate	159.62	29.80

The mean earnings of the female agricultural labourer was estimated at Rs. 159.62 per month with the standard deviation of $\pm$ Rs. 29.80 i.e. the mean earnings varied between Rs.139.82 and Rs.189.42. The attached labourers were earning more than the casual labourers, partly deriving from the greater regularity of their employment.

The actual wage rate reported, however, was uniform for all the workers. It varied only with the type of operation. For weeding the maize crop, the wage rate was Rs.8 whereas for all other operations it was reported as Rs.10. However, their mean weighted wage rate was low. It varied from Rs.9.20 to Rs.10 per day.

Out of the workers studied, 15 of them reported the existence of a secondary source of employment in the form of basket making during days of unemployment. The wages they earned in basket making ranged from Rs.8 to Rs.10/- per day.

b. Pattern of labour use in different cropping systems:

The labour use in different cropping systems is discussed under two heads:

- i. Cropping pattern; and
- ii. Crop-wise labour utilisation pattern

i. Cropping pattern:

The type of crop grown and the type of operation decide the absorption of female labour in agricultural activities. Hence the cropping pattern of the farm sample was studied. The farmers included in the study belonged to the small, medium and large

farmer categories. Following the National Commission on Agriculture (1976), farmers with less than two hectares of land holdings were classified as small farmers, those holding between 2 to 4 hectares as medium farmers and those with more than four hectares of land as large farmers.

The details of the number of farmers in each category cultivating the various crops against the area under these crops are given in Table XXIV.

TABLE XXIV

DISTRIBUTION OF FARMS BY FARM SIZE AND CROPS

(Area in hectares)

Farm size	No.	Groundnut	No.	Maize	No.	Turmeric	No.	Total area
Small	59	41.56(90.03) (37.84)	1	0.73(1.58) (6.23)	10	3.87(8.38) (5.62)	59	46.16 (29.69)
Medium	39	41.14(69.26) (37.46)	6	3.87(6.52) (33.07)	19	14.39(24.22) (20.90)	39	59.40 (38.21)
Large	22	27.12(54.35) (24.70)	9	7.10(14.23) (60.68)	15	15.68(31.42) (22.78)	22	49.90 (32.09)
Aggre gate	120	109.82 (70.64)	16	11.70 (7.53)	44	33.94 (21.83)	120	155.46 (100)

Note : Figures in brackets alongside the entries are percentages to the row total. Figures in brackets down the entries are percentages to the column total.

The post stratification of farmers in the study by the size of their land holdings showed that 59 (49.2 percent) were small farmers; 39 (32.5 percent) were medium farmers and the rest 22 (18.3 percent) were large farmers. Among them, they had 29.7 percent, 38.2 percent and 32.1 percent of the cultivated area respectively.

The cropping pattern followed by them indicated that groundnut cultivated as a dry crop was the dominant crop (70.64%) of the area, which was interspersed with small area under maize and turmeric.

As the size of holdings increased, the proportion of the area under groundnut steadily decreased whereas the area under turmeric and maize steadily increased.

ii. Crop-wise labour utilisation pattern:

The pattern of labour utilisation in the dominant crop of groundnut is discussed separately for the different farm size groups. This was done because the major part of the cultivated area was under groundnut.

Table XXV gives the operation-wise and holding-wise labour use per hectare in groundnut cultivation.

TABLE XXV

OPERATION-WISE AND HOLDING-WISE LABOUR USE PER HECTARE IN GROUNDNUT CULTIVATION

S.No. Season/ Operation	SMALL HOLDING									MEDIUM HOLDING									LARGE HOLDING								
	Family Labour			Hired Labour			All Labour			Family Labour			Hired Labour			All Labour			Family Labour			Hired Labour			All Labour		
	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l	W o n	M m e l n	A n l
I. Sowing																											
1. Ploughing	10	-	10	10	2	12	20	2	22	2	-	2	11	2	13	13	2	15	-	-	-	9	2	11	9	2	11
2. Manuring	4	-	4	4	-	4	8	-	8	2	-	2	7	-	7	9	-	9	-	-	-	7	-	7	7	-	7
3. Sowing	8	8	16	7	7	14	15	15	30	2	2	4	8	8	16	10	10	20	-	-	-	8	8	16	8	8	16
4. Supervision	1	1	2	-	-	-	1	1	2	6	6	12	-	-	-	6	6	12	8	8	16	-	-	-	8	8	16
Total	23	9	32	21	9	30	44	18	62	12	8	20	26	10	36	38	18	56	8	8	16	24	10	34	32	18	50
II. Tending																											
1. Applying fertilizer	2	-	2	2	-	2	4	-	4	1	-	1	2	-	2	3	-	3	-	-	-	3	-	3	3	-	3
2. Weeding	-	18	18	-	48	48	-	66	66	-	7	7	-	48	48	-	55	55	-	-	-	-	44	44	-	44	44
3. Supervision	1	1	2	-	-	-	1	1	2	10	10	20	-	-	-	10	10	20	14	14	28	-	-	-	14	14	28
Total	3	19	22	2	48	50	5	67	72	11	17	28	2	48	50	13	65	78	14	14	28	3	44	47	17	58	75
III. Harvesting																											
1. Picking Groundnut	6	5	11	6	47	53	12	52	64	2	3	5	5	39	44	7	42	49	-	-	-	4	4	45	4	4	45
2. Packing	-	-	-	5	-	5	5	-	5	-	-	-	4	-	4	4	-	4	-	-	-	3	-	3	3	-	3
3. Stocking for animal feed	5	-	5	5	-	5	10	-	10	2	-	2	4	-	4	6	-	6	-	-	-	3	-	3	3	-	3
4. Supervision	-	-	-	-	-	-	-	-	-	5	2	7	-	-	-	5	2	7	4	3	7	-	-	-	4	3	7
Total	11	5	16	16	47	63	27	52	79	9	5	14	13	39	52	22	44	66	4	3	7	10	4	51	14	7	58
Grand Total	37	33	70	39	104	143	76	137	213	32	30	62	41	97	138	73	127	200	26	25	51	37	95	132	63	120	183

Groundnut emerged as the most female labour intensive crop in all size holdings [137:76 (64.32%); 127:73 (63.50%); 120:63 (65.57%) in small, medium and large holdings respectively.] Proportionately more employment had been created for female labour than male labour in all size holdings. Harvesting was the most labour intensive activity in small farms; while tending was the most labour intensive activity in the other two groups. Operation wise women labour dominated in harvesting and tending in small holdings and only in tending in the medium and large holdings. The more tedious and laborious jobs had been entrusted to women. Women family labour in large farms perform in an equal measure the supervisory roles, along with their menfolk. Unlike women family labour in the small and medium holdings who also work on their farms along with hired labour, women from large farms do not participate in any field operations.

Thus where cultivators are endowed with more land, women become equal partners with men in supervision and withdraw from active field labour. Their relatively high family incomes facilitate their withdrawal from field work, because they can afford to pay for hired labour for the performance of arduous physical tasks.

Table XXVI gives a summary statement of the sex-wise and holding-wise labour absorption in groundnut cultivation.

TABLE XXVI

SEX-WISE AND HOLDING-WISE LABOUR ABSORPTION IN GROUNDNUT CULTIVATION
(in person days per hectare)

Category	Small holding	Medium holding	Large holding
Male labour			
Hired	39 (18.31)	41 (20.50)	37 (20.22)
Family	37 (17.37)	32 (16.00)	26 (14.21)
Female labour			
Hired	104 (48.83)	97 (48.50)	95 (51.91)
Family	33 (15.49)	30 (15.00)	25 (13.66)
Aggregate	213 (100.00)	200 (100.00)	183 (100.00)

As against male hired labour, in proportionate as well as absolute terms, more of female hired labour was used in groundnut cultivation.

The pattern of labour utilisation in turmeric crop cultivation is given in Table XXVII.

TABLE XXVII

LABOUR USE PER HECTARE IN TURMERIC CULTIVATION - ALL FARMS

(in person days)

S.No.	Season/ Operation	Family Labour			Hired Labour			All Labour		
		Men	Women	All	Men	Women	All	Men	Women	All
I.	Sowing									
1.	Ploughing	3	---	3	20	3	23	23	3	26
2.	Manuring	2	---	2	15	---	15	17	---	17
3.	Sowing	2	2	4	15	15	30	17	17	34
4.	Supervision	8	5	13	---	---	---	8	5	13
	Total	15	7	22	50	18	68	62	25	90
II.	Tending									
1.	Applying pesticide	---	---	---	2	---	2	2	---	2
2.	Weeding	1	4	5	23	80	103	24	84	108
3.	Watering	14	---	14	60	---	60	74	---	74
4.	Supervision	7	18	25	---	---	---	7	18	25
	Total	22	22	44	85	80	165	107	102	209
III.	Harvesting									
1.	Harvesting	1	2	3	32	82	114	33	84	117
2.	Processing	1	---	1	24	---	24	25	---	25
3.	Supervision	6	4	10	---	---	---	6	4	10
	Total	8	6	14	56	82	138	64	86	150
	Grand Total	45	35	80	191	182	373	236	217	453

Turmeric crop required 453 man days of labour per hectare of which about 20 percent of labour was used during the sowing season; 47 percent during the tending season and 33 percent during the harvesting season. Hired labour constituted 82 percent of the total labour used in turmeric cultivation. Forty eight percent of the labourers were women. As in the groundnut crop women workers were predominantly employed for weeding and harvesting the crop.

The pattern of labour utilisation in maize cultivation is given in Table XXVIII.

TABLE XXVIII

LABOUR USE PER HECTARE IN MAIZE CULTIVATION - ALL FARMS

(in person days)

S.No.	Season/ Operation	Family Labour			Hired Labour			All Labour		
		Men	Women	All	Men	Women	All	Men	Women	All
I.	Sowing									
1.	Ploughing	6	—	6	16	—	16	22	—	22
2.	Sowing	4	1	5	15	27	42	19	28	47
3.	Supervision	7	4	11	—	—	—	7	4	11
	Total	17	5	22	31	27	58	48	32	80
II.	Tending									
1.	Watering	12	—	12	18	—	18	30	—	30
2.	Weeding	—	2	2	—	70	70	—	72	72
3.	Applying fertilizer	—	1	1	—	4	4	—	5	5
4.	Supervision	7	4	11	—	—	—	7	4	11
	Total	19	7	26	18	74	92	37	81	118
III.	Harvesting									
1.	Picking	1	1	2	4	18	22	5	19	24
2.	Removing petals	—	1	1	—	19	19	—	20	20
3.	Cutting	—	1	1	—	20	20	—	21	21
4.	Threshing	1	1	2	4	7	11	5	8	13
5.	Packaging	1	—	1	1	—	1	2	—	2
6.	Storing for feed	1	—	1	7	—	7	8	—	8
7.	Supervision	5	4	9	—	—	—	5	4	9
	Total	9	8	17	16	64	80	25	72	97
	Grand Total	45	20	65	65	165	230	110	185	295

Maize cultivation required 295 man days of labour per hectare of which 27 percent was used during the sowing season; 40 percent in the tending season; and 33 percent in the harvesting season. Hired labour as a fraction of the total labour requirement was 78 percent. Women labour constituted 63 percent of the total labour used. By and large they were used in weeding.

Crop-wise, turmeric was the most labour intensive crop absorbing 453 person days of labour per hectare, the next in order was maize with 295 days of labour and the last was groundnut using 195 person days of labour per hectare of cultivation.

The amount of labour use was inversely related with the size of the land holdings, as was exemplified in groundnut cultivation. The extent of labour utilisation in groundnut cultivation was 213 person days per hectare in small farms; 200 days in medium farms and 183 days in large farms. In terms of hired labour utilisation, in groundnut and maize cultivation over 70 percent of the hired labour was drawn from women workers, with turmeric absorbing women only to the extent of 49 percent of the total hired labour.

The findings of this micro study on utilisation of hired female labour (proportionately more of hired female labour as against hired male labour used in groundnut and maize cultivation and proportionately less of hired female labour as against hired male labour in turmeric cultivation) were in agreement with the macro analysis at the district level. In the latter, the demand for female labour declined significantly with an increase in

irrigation potential. So also in the micro level study, the irrigated crop produced proportionately less employment for hired female labour.

The key findings that emanated from this section on the forces operating in the labour market and consequently the outcomes for male and female labour were:

The land augmenting factors or agricultural development decreased female labour participation. This type of female labour displacement with agricultural development was supported by evidence from crop level labour use.

Changes in the size of land holdings strengthened the position of male labour vis-a-vis the female labour.

Landlessness and wage rates were positively related, showing that the causation was via better organisation and bargaining strength among the workers.

The presence of SC/ST population led to a rise in participation rates as agricultural labour, also confirmed by the village case study.

Female wage response was negative i.e., with an increase in female wage rates, less of female labour was supplied. Again, the more the level of male employment, the less female labour was supplied.

The own wage elasticity of supply of female labour was less than that of male labour, showing that employers had greater monopsony power over women, which enabled them to pay them much

less than the value of their marginal product and which made the female labourers worse off.

The labour market outcomes for female agricultural labour were adverse. It was highly unstable resulting in low levels of employment and wages for them. The labour market position of male agricultural labourers, however, was relatively better as it stabilised for them at relatively high levels of employment and wages.

The village case study confirmed that a larger proportion of female agricultural labourers were drawn from SC/STs; a majority of them were below the poverty line; even in the busy season, they were employed only for about 70 percent of the person days; they were employed in the tedious and back breaking jobs of sowing, weeding and harvesting; their mean earnings ranged between Rs.140 and 190 per month.

E. Movement in Money and Real Wage Rates

The trends in money wages and real wages of agricultural labour together with the trends in employment, provide the basic information to judge whether conditions are being created for the improvement of incomes of the poorest sections of rural society (Parthasarathy, 1987).

The analysis of wage rates of female agricultural labour vis-a-vis male agricultural labour was carried out in five stages:-

1. Constructing the money and real wage series for the period 1960-61 to 1984-85 district-wise and studying the patterns therefrom;

2. Estimating the trend growth rates in real wages;
 3. Assessing the extent of instability in the real wage series;
 4. Assessing the gender gap in wage rates; and
 5. Finding out the spatial variations in real wages and wage differentials.
1. Construction of money and real wage series :

The annual average wage rates were worked out for male and female agricultural labour district-wise over the period 1960-61 to 1984-85. The three year moving average series of these wage rates were also computed to isolate the long term movements in the wage series. Real wage rates using the Consumer Price Index Number for Agricultural Labourers (vide Appendix VIII) as the deflator were worked out for the actual and moving average wage series.

Table XXIX to XXXVI present the various categories of wage series.

TABLE XXIX

MONEY WAGE RATES FOR MALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1960-61 to 1984-85
(in Rupees per day)

Year	Cheng- leput	South Arcot	North Arcot	Salem	Dharma- puri	Coimb- atore	Trichy	Thanj- avur	Madu- rai	Ramana- thapuram	Tirunel- veli	Nilgi- ris	Kanya- kumari	State
1960-61	1.17	1.14	1.25	1.92	-	1.27	1.71	1.46	1.11	1.32	1.12	1.39	1.76	1.38
1961-62	1.36	1.24	1.25	2.53	-	1.33	1.47	1.53	1.06	1.50	1.06	1.83	1.97	1.46
1962-63	1.41	1.24	1.33	2.41	-	1.25	1.54	1.84	1.08	1.50	1.15	1.88	1.58	1.52
1963-64	1.41	1.25	1.32	1.64	-	1.24	1.59	1.62	1.07	1.82	1.18	1.82	1.72	1.48
1964-65	1.63	1.36	1.47	2.12	-	1.25	1.96	2.71	1.47	2.06	1.40	2.18	2.13	1.76
1965-66	2.06	1.53	2.21	2.29	-	1.47	2.09	1.81	1.54	1.92	1.68	2.65	2.22	1.95
1966-67	2.18	1.82	2.08	2.72	-	1.79	2.30	2.02	2.02	2.07	2.14	2.89	3.00	2.23
1967-68	2.29	1.95	2.72	2.69	-	2.00	2.70	2.59	2.24	1.87	2.38	2.99	3.61	2.41
1968-69	2.47	2.04	2.33	2.84	-	2.36	2.67	2.83	2.33	2.00	2.26	3.42	4.09	2.61
1969-70	2.49	2.21	3.43	2.24	2.70	2.50	2.70	2.72	2.11	2.07	2.24	3.67	4.25	2.72
1970-71	2.55	1.95	3.67	2.00	3.85	2.56	1.83	2.56	2.09	2.14	2.03	3.67	4.08	2.73
1971-72	2.55	2.42	3.09	2.11	3.13	2.92	2.54	3.53	2.14	2.40	2.03	3.67	4.03	2.76
1972-73	2.61	2.50	3.35	2.00	3.05	3.17	2.57	3.17	2.36	2.49	2.23	3.67	4.76	2.96
1973-74	3.06	2.78	3.97	2.71	3.40	3.67	3.22	3.74	3.40	3.19	2.85	3.73	5.65	3.50
1974-75	6.61	4.70	5.14	4.34	4.48	4.60	6.26	5.85	4.99	3.89	6.41	4.87	7.09	5.33
1975-76	4.81	4.15	3.45	5.29	4.18	4.98	5.03	5.65	5.03	4.46	5.70	4.91	6.28	4.93
1976-77	4.77	4.62	4.07	4.78	4.24	4.75	3.97	5.61	4.87	4.38	5.04	6.05	6.07	4.69
1977-78	4.89	4.40	4.23	4.62	4.95	4.92	4.55	5.39	4.92	4.38	5.13	6.42	5.50	4.92
1978-79	5.12	4.35	4.62	5.26	5.26	4.77	4.49	5.71	5.67	4.91	5.50	6.80	5.98	5.22
1979-80	5.07	5.41	4.26	5.47	4.68	5.68	4.72	6.92	6.96	6.49	6.42	7.94	6.39	5.89
1980-81	5.02	5.14	4.49	6.03	6.00	6.71	5.26	7.27	6.95	6.13	7.56	8.55	8.26	6.14
1981-82	5.96	5.77	4.85	5.64	5.89	7.33	6.19	10.28	8.35	7.45	6.99	8.86	11.19	7.32
1982-83	6.74	6.04	4.66	7.68	5.68	8.08	6.47	9.21	7.67	7.52	8.01	8.33	11.12	7.54
1983-84	7.20	5.89	5.53	8.77	5.91	9.05	7.31	10.19	9.10	8.96	9.57	9.44	13.13	8.51
1984-85	7.38	6.55	5.75	9.05	6.14	10.61	7.88	11.05	10.44	9.72	10.33	11.96	14.13	9.47

Source: Compiled and constructed from Government of Tamil Nadu, Department of Statistics, Season and Crop Reports of Tamil Nadu for the Various Agricultural Years.

TABLE XXX

MONEY WAGE-RATES FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1960-61 to 1984-85

(in Rupees per day)

Year	Cheng- leput	South Arcot	North Arcot	Salem	Dharma- puri	Coimb- atore	Trichy	Thanj- avur	Madu- rai	Ramana- thapuram	Tirunel- veli	Nilgi- ris	Kanya- kumari	State
1960-61	0.97	0.85	0.96	0.88	-	0.62	0.78	1.06	0.83	0.96	0.85	1.04	1.09	0.94
1961-62	1.14	0.83	0.96	0.99	-	0.63	0.78	0.98	0.84	1.00	0.89	1.23	1.36	0.95
1962-63	1.21	0.84	0.98	0.95	-	0.70	0.66	1.11	0.85	1.02	0.93	1.21	0.99	0.96
1963-64	1.22	0.91	1.01	0.96	-	0.86	0.83	1.35	0.89	1.33	0.85	1.31	1.21	1.06
1964-65	1.46	0.97	1.15	1.37	-	0.87	1.12	1.85	0.95	1.20	0.92	1.45	1.38	1.20
1965-66	1.90	1.13	1.46	1.51	-	0.84	1.22	1.06	0.93	1.26	1.16	1.63	1.39	1.28
1966-67	1.82	1.44	1.44	1.83	-	1.03	1.40	1.14	1.32	1.31	1.34	1.88	2.00	1.50
1967-68	1.87	1.51	1.43	2.31	-	1.25	1.59	1.43	1.48	1.27	1.52	1.79	2.07	1.64
1968-69	2.01	1.61	1.69	2.18	-	1.52	1.74	1.34	1.18	1.23	1.29	1.80	2.41	1.67
1969-70	2.16	1.65	2.19	1.81	1.93	1.41	1.59	1.31	1.27	1.14	1.38	2.23	2.46	1.77
1970-71	2.20	1.51	2.27	1.60	2.54	1.49	1.56	1.33	1.25	1.19	1.19	2.30	2.29	1.80
1971-72	2.20	1.59	2.23	1.63	1.75	1.72	1.65	2.15	1.30	1.35	1.18	2.32	2.44	1.82
1972-73	2.20	1.53	2.40	1.65	1.77	1.96	1.98	2.03	1.32	1.50	1.38	2.25	2.94	1.90
1973-74	2.47	1.54	2.36	1.81	2.09	2.33	2.01	2.75	2.47	1.83	2.08	2.34	3.67	2.24
1974-75	3.63	3.24	3.12	2.91	2.95	2.81	3.51	3.55	3.20	3.02	3.51	3.29	4.39	3.34
1975-76	3.76	2.74	3.11	3.37	3.66	2.79	3.34	3.85	3.30	2.99	3.47	3.16	4.02	3.29
1976-77	4.07	3.08	3.17	3.26	2.94	2.79	3.34	3.42	3.22	3.01	3.56	3.64	4.16	3.34
1977-78	3.11	2.98	3.32	3.31	2.97	2.78	3.12	4.76	2.99	2.88	4.01	3.61	4.65	3.38
1978-79	4.33	3.42	4.49	3.46	3.47	3.09	3.14	4.25	3.38	3.15	3.77	4.81	3.76	3.62
1979-80	4.99	4.25	4.08	4.58	3.38	3.95	3.96	4.93	4.76	4.76	5.18	5.09	5.34	4.46
1980-81	4.95	4.44	3.71	4.49	3.32	4.04	4.29	5.55	4.66	4.28	5.34	8.07	7.73	4.93
1981-82	5.33	4.50	4.34	4.45	3.49	4.65	4.88	7.47	5.42	4.39	6.93	6.39	7.32	5.27
1982-83	5.58	4.56	4.09	5.26	3.75	5.10	4.61	7.25	4.80	5.03	6.40	6.53	9.00	5.44
1983-84	6.02	5.01	4.67	5.72	4.00	5.34	4.94	8.30	5.44	6.09	7.62	6.67	9.00	6.02
1984-85	6.55	5.27	4.90	5.76	4.27	6.43	5.91	8.50	5.70	6.25	7.13	6.90	10.36	6.20

Source: Compiled and constructed from Government of Tamil Nadu, Department of Statistics, Season and Crop Reports of Tamil Nadu for the Various Agricultural Years.

TABLE XXXIII

REAL WAGE RATES FOR MALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1964-65 TO 1984-85

(in Rupees per day)
Base 1960-61 = 100

Year	Cheng- leput	South Arcot	North Arcot	Salem	Dharma- puri	Coimb- atore	Trichy	Thanj- avur	Madu- rai	Ramana- thapuram	Tirunel- veli	Nilgi- ris	Kanya- kumari	State
1964-65	1.18	0.99	1.07	1.54	-	0.91	1.42	1.96	1.07	1.49	1.01	1.58	1.54	1.28
1965-66	1.44	1.07	1.55	1.60	-	1.03	1.46	1.27	1.08	1.34	1.17	1.85	1.55	1.36
1966-67	1.25	1.04	1.19	1.55	-	1.02	1.31	1.15	1.15	1.18	1.22	1.65	1.71	1.27
1967-68	1.33	1.13	1.58	1.56	-	1.16	1.57	1.51	1.30	1.09	1.38	1.74	2.10	1.40
1968-69	1.40	1.15	1.32	1.60	-	1.33	1.51	1.60	1.32	1.13	1.28	1.93	2.31	1.47
1969-70	1.31	1.16	1.81	1.18	1.42	1.32	1.42	1.43	1.11	1.09	1.18	1.93	2.24	1.43
1970-71	1.47	1.12	2.11	1.15	2.21	1.47	1.05	1.47	1.20	1.23	1.17	2.11	2.34	1.57
1971-72	1.36	1.29	1.65	1.13	1.67	1.56	1.36	1.89	1.14	1.28	1.09	1.96	2.16	1.48
1972-73	1.36	1.30	1.74	1.04	1.59	1.65	1.34	1.65	1.23	1.30	1.16	1.91	2.48	1.54
1973-74	1.26	1.15	1.64	1.12	1.40	1.52	1.33	1.55	1.40	1.32	1.18	1.54	2.33	1.45
1974-75	1.63	1.16	1.27	1.07	1.11	1.14	1.55	1.44	1.23	0.96	1.58	1.20	1.75	1.32
1975-76	1.44	1.24	1.03	1.58	1.25	1.49	1.51	1.59	1.51	1.34	1.71	1.47	1.88	1.48
1976-77	1.60	1.55	1.37	1.60	1.42	1.59	1.33	1.88	1.63	1.47	1.69	2.03	2.04	1.57
1977-78	1.60	1.44	1.38	1.51	1.62	1.61	1.49	1.76	1.61	1.43	1.68	2.10	1.80	1.61
1978-79	1.72	1.46	1.56	1.77	1.77	1.61	1.51	1.92	1.91	1.65	1.85	2.29	2.01	1.76
1979-80	1.52	1.62	1.28	1.64	1.40	1.70	1.41	2.07	2.08	1.94	1.92	2.38	1.91	1.76
1980-81	1.28	1.31	1.15	1.54	1.53	1.72	1.35	1.86	1.78	1.57	1.93	2.19	2.11	1.57
1981-82	1.38	1.34	1.12	1.31	1.36	1.70	1.43	2.38	1.93	1.72	1.62	2.05	2.59	1.69
1982-83	1.45	1.30	1.00	1.66	1.22	1.74	1.39	1.98	1.65	1.62	1.73	1.80	2.40	1.63
1983-84	1.36	1.12	1.05	1.66	1.12	1.71	1.38	1.93	1.72	1.70	1.81	1.79	2.49	1.61
1984-85	1.44	1.28	1.12	1.77	1.20	2.07	1.54	2.16	2.04	1.90	2.02	2.34	2.76	1.85

TABLE XXXIV

REAL WAGE RATES FOR FEMALE FIELD LABOUR IN THE MAJOR DISTRICTS OF TAMIL NADU 1964-65 TO 1984-85

(in Rupees per day)
Base 1960-61 = 100

Year	Cheng- leput	South Arcot	North Arcot	Salem	Dharma- puri	Coimb- atore	Trichy	Thanj- avur	Madu- rai	Ramana- thapuram	Tirunel- veli	Nilgi- ris	Kanya- kumari	State
1964-65	1.06	0.70	0.83	0.99	-	0.63	0.81	1.34	0.69	0.87	0.67	1.05	1.00	0.87
1965-66	1.33	0.79	1.02	1.06	-	0.59	0.85	0.74	0.65	0.88	0.81	1.14	0.97	0.90
1966-67	1.04	0.82	0.82	1.05	-	0.59	0.80	0.65	0.75	0.75	0.77	1.07	1.14	0.86
1967-68	1.09	0.88	0.83	1.34	-	0.73	0.92	0.83	0.86	0.74	0.88	1.04	1.20	0.95
1968-69	1.14	0.91	0.95	1.23	-	0.86	0.98	0.76	0.67	0.69	0.73	1.02	1.36	0.94
1969-70	1.14	0.87	1.15	0.95	1.02	0.74	0.84	0.69	0.67	0.60	0.73	1.17	1.29	0.93
1970-71	1.26	0.87	1.30	0.92	1.46	0.86	0.90	0.76	0.72	0.68	0.68	1.32	1.32	1.03
1971-72	1.18	0.85	1.19	0.87	0.94	0.92	0.88	1.15	0.70	0.72	0.63	1.24	1.30	0.97
1972-73	1.15	0.80	1.25	0.86	0.92	1.02	1.03	1.06	0.69	0.78	0.72	1.17	1.53	0.99
1973-74	1.02	0.64	0.98	0.75	0.86	0.96	0.83	1.14	1.02	0.76	0.86	0.97	1.52	0.93
1974-75	0.90	0.80	0.77	0.72	0.73	0.69	0.87	0.88	0.79	0.75	0.87	0.81	1.08	0.82
1975-76	1.13	0.82	0.93	1.01	1.10	0.84	1.00	1.15	0.99	0.90	1.04	0.95	1.20	0.99
1976-77	1.37	1.03	1.06	1.09	0.99	0.94	1.12	1.15	1.08	1.01	1.19	1.22	1.40	1.12
1977-78	1.02	0.97	1.08	1.08	0.97	0.91	1.02	1.56	0.98	0.94	1.31	1.18	1.52	1.10
1978-79	1.46	1.15	1.51	1.16	1.17	1.04	1.06	1.43	1.14	1.06	1.27	1.62	1.27	1.22
1979-80	1.49	1.27	1.22	1.37	1.01	1.18	1.19	1.48	1.43	1.43	1.55	1.52	1.60	1.34
1980-81	1.27	1.14	0.95	1.15	0.85	1.03	1.10	1.42	1.19	1.09	1.37	2.06	1.98	1.26
1981-82	1.23	1.04	1.00	1.03	0.81	1.08	1.13	1.73	1.25	1.02	1.60	1.48	1.69	1.22
1982-83	1.20	0.98	0.88	1.13	0.81	1.10	0.99	1.56	1.03	1.08	1.38	1.41	1.94	1.17
1983-84	1.14	0.95	0.88	1.08	0.76	1.01	0.94	1.57	1.03	1.15	1.44	1.26	1.70	1.14
1984-85	1.28	1.03	0.96	1.13	0.83	1.26	1.15	1.66	1.11	1.22	1.39	1.35	2.02	1.21

1964-65 TO 1984-85

(in Rupees per day)
Base 1960-61 = 100

[illegible]

In the early 1960's (i.e. 1960-61, 1961-62 and 1962-63) male field labour in Salem was getting the highest money wage rates. However, its position was clearly reversed to that of the lowest wages in early 1970's. The male field labour of Kanyakumari district occupied the top rank in terms of wage rates in the first half of 1970's, as also in 1980's.

The male field labour of Madurai was the worst paid of all in 1960's. In early 70's Salem and Tirunelveli workers received the lowest wage rates and in 1980's, it was the North Arcot labourers. All these districts were backward districts.

The money wages of male field labourers in 1984-85 in the districts of Tamil Nadu ranged between Rs.5.75 to Rs.14.13 per day with the state average at Rs.9.47 per day. These wages, however, are far lower than the daily minimum wage of Rs.22 worked out by Gopalan, on the basis of the cost of a least cost balanced diet for a family; of a minimum standard of living, after providing for weekly holidays and some leave periods for unanticipated loss of earnings (Sankaran 1984).

The female field labour was paid the highest in Kanyakumari in most of the years since 1960-61. The socio-cultural milieu of the district had been responsible for the poor outturn of women as agricultural labourers in this district and consequently their relatively high wage rates. Among the lowest paid districts were Coimbatore in early 1960's (60-61 and 61-62); Tirunelveli in early 1970's (70-71 and 71-72; and Dharmapuri in 1980's (80-'84).

These districts again were agriculturally backward, during the periods mentioned against them.

In 1984-85, the money wage rates of female field labour ranged between Rs.4.27 and Rs.10.36 in the districts with the state average remaining at Rs.6.20 per day.

Real wages for male field labour which ranged between 91 paise (Coimbatore) to Rs.1.58 (Nilgiris) per day in 1964-65 had increased to the higher range of Rs.1.12 (North Arcot) to Rs.2.76 (Kanyakumari) in 1984-85.

Real wages for female field labour ranged between 63 paise (Coimbatore) to Rs.1.34 (Thanjavur) in 1964-65 and between 83 paise (Dharmapuri) to Rs.2.02 (Kanyakumari) in 1984-85.

Three year moving average wage series was worked out for isolating the long term movements in wage rates, eliminating the impact of short term factors. A study of the tables on real wages (moving average) against the review of the agricultural performance during the years 1964-65 to 1984-85 indicates that -

- a. Real wage rates for female labour have been much lower than those of male labour.
- b. The dips in real wages had occurred for women during 1974-75 and again during 1981-84. For men, the first dip was between 1973-75. The second dip was between 1979-80 and 1981-82. The extent of dip differed from district to district. There has been a lag in women's wages. These periods of dips in real wages in the State coincide with the dips observed elsewhere in other

regions in the country. Acharya (1989) says that the first period of dip in wages 1973-75 was when India faced the lagged effect of inflation resulting from the first oil shock; suffered from a poor monsoon; and experienced the after-effect of the Bangladesh war. The downswing in the economy was reflected in a fall in real wages. The second dip in wages observed during the period of late seventies and early eighties again coincided with the second oil shock, inflation and deficit monsoon.

2. Trends in real wages:

The growth rates were estimated for the real wage series, since only the real wages reflect the changes in the levels of living of the workers concerned. The movements in money wage rates become inconsequential to the workers, when they are neutralised by increases in the cost of living. As such, to assess the changes in the levels of living and project them into the future, the choice of moving average real wages series was considered the best as long term trends in levels of living could be ascertained through estimating its growth trend.

Trend rates of growth in moving average real wage series were estimated using the semilog function:

$$\log W_t = a + b t + u$$

where

- W_t - was the moving average real wage rate in year t ,
- t - time period
- a - the constant term
- b - the coefficient
- u - the random error term

Table XXXVII gives the estimates of the annual growth rates in real wages for male and female field labour.

TABLE XXXVII

GROWTH TRENDS IN REAL WAGE RATE (THREE YEAR MOVING AVERAGE) OF MALE AND
FEMALE FIELD LABOUR - TAMIL NADU 1964-65 to 1984-85

$$\log W_t = a + bt$$

S.No.	District	Compound growth rate of	
		male wages	female wages
1.	Chengleput	0.62*	0.77*
2.	South Arcot	1.48*	1.84*
3.	North Arcot	-1.96*	0.30
4.	Salem	0.93	0.51
5.	Dharmapuri @	-1.83*	-1.73*
6.	Coimbatore	2.73*	2.97*
7.	Trichirapalli	0.13	1.53*
8.	Thanjavur	2.47*	4.95*
9.	Madurai	3.32*	3.59*
10.	Ramanathapuram	2.57*	3.20*
11.	Tirunelveli	3.13*	4.98*
12.	Nilgiris	0.95*	2.19*
13.	Kanyakumari	0.97*	2.73*
	State	1.34*	2.03*

Note : * Significant at 5 percent level.

@ These growth rates relate to the period 1969-70 to 1984-85.

At the state level, the real wage rate for female field labour had grown at a slightly higher pace (2.03 percent) than the real wage rate for male field labour (1.34 percent). But this relatively higher rate of growth had not been able to bridge the wage gap between the two categories to any extent. The gender gap in real wages had closed down only by 1.1 percent over the period.

The high wage growth districts, in respect of male labour were Madurai, Tirunelveli, Coimbatore, Ramanathapuram, Thanjavur and South Arcot in that order. Low wage growth districts were Chengleput, Nilgiris, and Kanyakumari in that order. In Tiruchirapalli and Salem the growth rate was too low to be statistically significant and in North Arcot and Dharmapuri there had been a regression, the real wage rates there had decreased at the rate of about 2 percent per annum. In these agriculturally backward districts, the agricultural labourers had been adversely affected by a fall in their levels of living, as reflected in the deceleration in their real wages. In respect of female wage rates, the districts which recorded high growth rates were Tirunelveli, Thanjavur, Madurai, Ramanathapuram, Coimbatore, Kanyakumari and Nilgiris. Low wage growth districts were Chengleput, Tiruchirapalli and South Arcot in that order. In North Arcot and Salem districts, the growth rates were less than or about one half of one percent per annum and they were statistically insignificant. Dharmapuri was the lone district to have recorded regression in female wage rates. There the real wage rates had fallen by 1.73 percent per annum since 1970-71.

North Arcot, Salem and Dharmapuri were backward districts in terms of agricultural development. Hence the female labourers in these districts had recorded very imperceptible or clearly negative growth rates in their real wages. These districts need to be declared as special districts for purposes of implementing rural development programmes for the benefit of agricultural labourers especially female labourers.

The insignificant and at times negative growth trends observed in these districts support the stagnation in real wages observed elsewhere by Parthasarathy and Adisesu (1982) and Jose (1988). Parthasarathy and Adisesu (1982) in their study of 'Real Wages of Agricultural Labour in Andhra Pradesh, 1958-59 to 1978-79' found the trends in real wages negative but statistically significant in several districts of Andhra Pradesh. In others, the growth trend was positive, but statistically significant only in respect of three districts. They therefore inferred that real wages had stagnated during the two decades of study. Jose (1988) also reported a tendency towards stagnation or decline in real wages during the greater part of 1970-71 to 1984-85 as the characteristic feature in Tamil Nadu along with the states of Assam, Karnataka, Madhya Pradesh, Maharashtra, Orissa, West Bengal and Bihar.

3. Instability in the Real Wage Series:

The extent of instability in real wage rates was assessed through the computation of the co-efficient of variation of the detrended series of wage rates. Table XXXVIII describes the instability characterising the real wage rates of male and female field labour.

TABLE XXXVIII

INSTABILITY IN REAL WAGE RATES (THREE YEAR MOVING AVERAGE) - MALE AND
FEMALE FIELD LABOUR - TAMIL NADU 1964-65 to 1984-85

S.No.	District	Coefficient of variation in	
		male wage rates	female wage rates
1.	Chengleput	77.54	70.82
2.	South Arcot	96.58	71.97
3.	North Arcot	67.13	65.78
4.	Salem	64.81	71.95
5.	Dharmapuri	61.50	61.55
6.	Coimbatore	55.65	62.16
7.	Trichirapalli	67.95	64.87
8.	Thanjavur	66.55	72.05
9.	Madurai	88.54	87.62
10.	Ramanathapuram	64.53	77.52
11.	Tirunelveli	57.09	52.64
12.	Nilgiris	78.23	82.10
13.	Kanyakumari	37.42	83.29
	State	69.57	77.11

South Arcot, Madurai, Nilgiris and Chengleput emerged as high instability districts in respect of male wage rates, amongst which Madurai was a high growth district, followed by South Arcot, but not too closely. The other two were low wage growth districts.

In regard to real wage rates for female field labour, the high instability districts were Madurai, Kanyakumari, Nilgiris and Ramanathapuram. All these districts were also high growth districts.

The fact that by and large high growth districts also registered more instability in wage rates indicated that wage rates were more volatile and responded rather quickly to the changes in the immediate environment characterising the labour market in these districts. This larger degree of instability reflecting the market forces, however, tends to upset the household budgets of these workers, depending primarily as they are, on wage incomes.

At the state level, the degree of instability suffered by female agricultural labourers was higher than that experienced by the male agricultural labourers.

4. Gender gap in wage rates:

The real wage differentials between male and female field labour had been worked out to estimate the trends in gender gap in wages. The wage differentials which are defined as the ratio of female wage rate to male wage rate, expressed in percentages indicate the extent of parity between female and male wage rates.

Table XXXIX gives details of the real wage differentials between male and female field labour.

REAL WAGE DIFFERENTIALS (THREE YEAR MOVING AVERAGE) BETWEEN MALE AND FEMALE FIELD LABOUR IN TAMIL NADU 1964-65 to 1984-85
(in percentage)

[illegible]

The ratios of real wage differentials indicate that at the state level the differentials tended to widen upto 1974-75. Thereafter, it narrowed down upto 1980-81. Since the turn of 1980's, however, it again tended to worsen.

The districts which had the lowest extent of differentials in payment for female and male labour were Chengleput in the latter half of 60's, and first half of 70's, North Arcot in the period 1975-76 to 1978-79, Chengleput again in 1979-1982 followed by North Arcot in 1982-84. In brief, these two districts alternated as the best paying districts for female field labour. Trichy had the worst differentials in the first two years 1965-67 followed by Thanjavur in the next four years 1967-71. Subsequently in the green revolution period, however, Thanjavur registered impressive increases in female wage rates to close down the differential substantially.

5. Spatial variations in wage rates and wage differentials:

The spatial variation in wages each year had been large across the districts and they had been maintained over the period. In respect of male field labour, the ratio of maximum to minimum wages was 1.7 in 1965-66, became 1.9 in 1969-70, was maintained at 1.9 in 1980-81 and became larger in 1983-84 at 2.4. In respect of female field labour, the ratio of maximum to minimum wages was 1.9 in 1965-66 and became slightly higher in 1980-81 (1.98) and still higher (2.4) in 1983-84. These ratios were strikingly similar for both the groups of labour. The regional wage gap

which tended to widen over this period exhibited a discernible trend, which was studied by the co-efficient of variation of moving average real wage rates across the districts for each year..

Table XL gives the co-efficient of variation across the districts in respect of real wage rates for male and female field labour, as well as the wage differentials.

TABLE XL

INTER DISTRICT VARIATIONS IN REAL WAGE RATES/DIFFERENTIALS (THREE YEAR
MOVING AVERAGE) OF MALE AND FEMALE FIELD LABOUR IN TAMIL NADU
1964-65 TO 1984-85

Year	Coefficient of variation in		
	Male wage rates	Female wage rates	Wage differentials
1964-65	—	—	—
1965-66	17.38	18.96	12.00
1966-67	17.44	19.48	12.94
1967-68	19.45	20.12	13.67
1968-69	21.84	21.00	15.82
1969-70	24.66	23.91	16.68
1970-71	24.76	23.58	14.57
1971-72	24.98	23.13	13.84
1972-73	22.50	21.65	11.05
1973-74	19.11	18.34	5.37
1974-75	14.80	14.43	5.40
1975-76	13.14	11.21	7.61
1976-77	12.21	12.74	9.00
1977-78	12.39	13.00	10.03
1978-79	13.49	12.77	10.99
1979-80	16.04	16.17	12.51
1980-81	20.06	20.06	12.86
1981-82	21.69	24.94	12.73
1982-83	23.73	24.22	12.15
1983-84	24.32	24.63	12.13
1984-85	—	—	—

The spatial variability in male wages began to increase initially in the second half of the 60's. In the 70's it showed a tendency to increase. Variability in female wage rates also exhibited a similar tendency but with a lag. A lag of one year could be observed between the patterns of variability in the two series. The increasing co-efficient of variation in the second half of the period starting from 1974-75, indicates that the spatial differences in real wage rates had been on par with those in the second half of the sixties. This picture of spatial inequity in wage rates, however, contradicts Acharya's (1989) finding of a gradual movement towards equity between the different NSS regions of the country over the period 1970-71 to 1984-85. But then his finding was based on movements in money wage rates whereas the observations made above regarding divergence of wage rates were based on movements in real wage rates.

The variability in real wage differentials became sharper in the second half of 60's. It became less sharp in the first half of 70's. In the post 1974-75 period it had shown a definite tendency to increase. These illustrate clearly that the differentials in wage rates across the districts had exacerbated over the period. The cut-off year 1974-75 was the year when the green revolution stabilised in the country (Singh, 1988). That after this date, the variability in the gender differentials had become sharper, indicates that the new technology had resulted in greater variability in the wage differentials.

This larger variability in wage differentials with the advent of new technology was in agreement with the empirical evidence obtained on the labour market model. Earlier it was shown that with an increase in irrigation which facilitated the adoption of new technology, male wage rates increased and female wage rates decreased. Together these resulted in greater variability in wage differentials.

Summing up, the gender gap in real wages had persisted in spite of a faster rate of growth in female wage rates (2.03%), than in male wage rates (1.34%). Districts with relatively high growth rates in female wages also experienced more instability, reflecting the greater sensitivity of the labour market, to the changes in the economic environment. There had been stagnation in real wages of agricultural labourers in some districts of Tamil Nadu. The spatial imbalances in wage rates had been aggravated since mid 1970's. The divergence pattern had almost been the same for both male and female labourers, but for a lag of one year. The green revolution had further widened the wage differentials, because male wage rates had grown at a faster rate.

F. Impact of NREP on Rural Employment and Earnings

In this section the results are presented under the following headings:

1. Background information on the rural labour households participating in NREP;

2. Distribution of labour force by sex and social background;
 3. Extent of employment and unemployment; and
 4. Labour market outcomes for NREP and non NREP workers.
1. Background information on the rural labour households participating in NREP:

The rural labour households covered for the study at the micro level were spread over twelve randomly selected blocks of the six districts of Tamil Nadu viz., Anna, Coimbatore, Dharmapuri, Periyar, Salem and Nilgiris districts. The background information relating to these households, viz., their labour force participation rate, percentage days of employment per household per month, mean earnings per head per day and their per capita incomes, all controlled for their household size, are presented in Tables XLI, XLII and XLIII for the entire group of households, for the households in the SC/ST group and for the non-SC/ST households.

TABLE XLI

DISTRIBUTION OF ALL NREP HOUSEHOLDS BY HOUSEHOLD SIZE, LABOUR FORCE PARTICIPATION RATE, EMPLOYMENT, EARNINGS AND PERCAPITA INCOME

S.No.	Household size	Fre- que- ncy	Labour force partici- pation rate	Percentage days of employment per house- hold per month	Mean earnings (Rs. per day)	Per capita income(Rs. per month)
1.	1	2	100	70.00	12.11	256
2.	2	12	71	66.92	13.18	166
3.	3	52	57	66.44	11.73	132
4.	4	82	50	64.84	13.25	120
5.	5	73	47	66.05	13.29	109
6.	6	29	47	57.83	12.08	88
7.	7	17	42	58.35	11.22	83
8.	8	7	38	58.57	12.64	89
9.	10	1	30	50.00	20.67	93
10.	11	2	59	30.00	13.86	71
11.	12	1	25	91.00	20.98	143
12.	17	1	29	83.00	10.00	74
Group Average	4.61	279	48	64.16	12.75	116

TABLE XLII

DISTRIBUTION OF NREP SC/ST HOUSEHOLDS BY HOUSEHOLD SIZE, LABOUR FORCE
PARTICIPATION RATE, EMPLOYMENT, EARNINGS AND PERCAPITA INCOME

S.No.	Household size	Frequency	Labour force participation rate	Percentage days of employment per household per month	Mean earnings (Rs. per day)	Per capita income (Rs. per month)
1.	1	2	100	70.00	12.11	256
2.	2	10	70	67.50	13.88	176
3.	3	36	56	62.64	11.10	120
4.	4	58	50	64.07	11.45	105
5.	5	52	50	64.06	11.67	101
6.	6	22	48	57.68	10.44	79
7.	7	13	43	55.31	10.68	77
8.	8	6	38	54.67	10.72	67
9.	11	1	73	20.00	9.39	42
10.	17	1	29	83.00	10.00	74
Group Average	4.58	201	49	62.36	11.37	105

TABLE XLIII

DISTRIBUTION OF NREP NON SC/ST HOUSEHOLDS BY HOUSEHOLD SIZE,
 LABOUR FORCE PARTICIPATION RATE, EMPLOYMENT
 EARNINGS AND PERCAPITA INCOME

S.No.	Household size	Frequency	Labour force participation rate	Percentage days of employment per household per month	Mean earnings (Rs. per day)	Per capita income(Rs. per month)
1.	1	—	—	—	—	—
2.	2	2	75	64.00	9.71	115
3.	3	16	60	75.00	13.15	161
4.	4	24	50	66.71	17.62	156
5.	5	21	42	71.00	17.31	130
6.	6	7	48	58.29	17.22	116
7.	7	4	39	68.25	12.96	106
8.	8	1	38	82.00	24.19	224
9.	10	1	30	50.00	20.67	93
10.	11	1	45	40.00	18.33	100
11.	12	1	25	91.00	20.98	143
Group Average	4.67	78	46	68.77	16.32	142

In the aggregate, the household size was found to be 4.61; the labour force participation rate was 48 percent and the employment was 64.16 percent of man days per month. The mean daily earnings per worker was Rs.12.75 and the percapita income was Rs.116 per month at current prices (1987-88). As the household size increased, the labour force participation rate decreased, except for the last three cases, as also the percentage man days of employment. These in turn pulled down the per capita income. The official norm of poverty line of Rs.76 per capita per month at 1980-81 prices, when revised to 1987-88 prices, comes upto Rs.124 per capita per month. If this cut off point of poverty line were applied to the group under study, we find that only 67 out of the 279 households (24 percent) live above the poverty line with the rest (76 percent) falling below it.

Between the SC/ST households and the non-SC/ST households, the former group was the poorer, with the per capita income of Rs.105 as against Rs.142 of the latter. In the SC/ST group, 94 percent of the families were below the poverty line with a per capita income of less than Rs.124 per month, while in the non SC/ST group, 19 percent of the households only were below the poverty line. The relatively lower levels of living of the SC/ST households were accounted for by the relatively lower levels of employment and mean earnings as compared to other groups. Within

these two groups again the per capita income figures in general were directly related to the levels of labour force participation rate and the extent of employment.

2. Distribution of labour force by sex and social background:

The incidence of labourers in these households was analysed separately for the SC/ST and the non SC/ST groups. The presence of male labour, female labour and the ratio of male labour to female labour are given by the size of household labour force in Table XLIV.

TABLE XLIV

DISTRIBUTION OF LABOUR FORCE BY SEX IN THE SC/ST AND NON SC/ST
HOUSEHOLDS

Size of the house- hold labour force	Male labour			Female labour			Ratio of male labour to female labour		
	SC/ ST	Non SC/ ST	Both	SC/ ST	Non SC/ ST	Both	SC/ ST	Non SC/ ST	Both
1	34	16	50	8	3	11	80:20	84:16	82:18
2	103	41	144	93	35	128	53:47	54:46	53:47
3	53	28	81	40	14	54	57:43	67:33	60:40
4	37	3	40	47	4	51	44:56	43:57	44:56
5	3	8	11	2	2	4	60:40	80:20	73:27
6	2	8	10	4	4	8	33:67	67:33	56:44
7	4	---	4	4	---	4	50:50	---	50:50
	236	104	340	198	62	260	54:46	63:37	57:43

Overall there were 600 workers in these households, 340 male and 260 female, making for a ratio of 57:43. Roughly out of every 10 workers in this group, six were men and four were women. The SC/ST group had a relatively higher percentage of female labour (46) than the non SC/ST group (37). The SC/ST families had the highest incidence of labourers, (69.4 percent), with the rest belonging to the non SC/ST families (30.6 percent). In households other than single earner households, the additional workers were drawn from both the sexes and hardly any uniformity could be discerned about the incidence of female labour.

3. Extent of employment and unemployment:

For the purpose of measuring the extent of employment and unemployment, a 5-point scale was used:

- a. Full employment (25 days and more of employment per month i.e., 100 percent);
- b. Moderate unemployment (20 to 25 days of employment per month i.e., 80-100 percent);
- c. Severe unemployment (15 to 20 days of employment per month i.e., 60-80 percent);
- d. Very severe unemployment (10 to 15 days of employment per month i.e., 40-60 percent);
- e. Chronic unemployment (less than 10 days of employment per month i.e., less than 40 percent).

The distribution of workers as per their levels of employment and unemployment is given in Table XLV.

TABLE XLV

EMPLOYMENT AND UNEMPLOYMENT AMONG WORKERS IN NREP

BENEFICIARY HOUSEHOLDS

S.No.	Category	SC/ST males	Non SC/ST males	All males	SC/ST females	Non SC/ST females	All females
1.	Full employment	64 (27.12)	44 (42.31)	108 (31.76)	41 (20.71)	26 (41.94)	67 (25.77)
2.	Moderate un-employment	72 (30.51)	21 (20.19)	93 (27.35)	40 (20.20)	13 (20.97)	53 (20.38)
3.	Severe unemployment	40 (16.95)	15 (14.42)	55 (16.18)	38 (19.19)	5 (8.06)	43 (16.54)
4.	Very severe unemployment	33 (13.98)	9 (8.65)	42 (12.35)	45 (22.73)	6 (9.68)	51 (19.62)
5.	Chronic un-employment	27 (11.44)	15 (14.42)	42 (12.35)	34 (17.17)	12 (19.35)	46 (17.69)
	Total	236	104	340	198	62	260

Note : Figures in brackets are percentages to the column total.

Proportionately more male workers (32 percent) were fully employed than female workers (26 percent). Full employment was more prevalent among the non SC/ST workers both male and female (42 percent each) than among the SC/ST workers (27 percent and 21 percent respectively). All others had varying spells of unemployment.

4. Labour market outcomes for NREP and non-NREP workers:

This section is discussed under three sub-heads:

- a. Actual levels of employment, earnings and contribution to household income per capita;
 - b. Potential levels of employment, earnings and contribution to household income per capita; and
 - c. Difference between NREP and non-NREP workers in terms of employment, daily and monthly earnings.
- a. Actual levels of employment, earnings and contribution to household income per capita:

For purposes of comparing the economic welfare of the rural labour households under study, as also for evaluating the effectiveness of the employment intervention programme, namely the NREP, the household income per capita, rather than household income per se was taken as the basis for comparison. Kuznets (1976) and Datta and Meerman (1980) had said that the household income per capita was preferable to household income per se. In the words of Kuznets (1976), "It makes little sense to talk about household income when the underlying units differ so much in

size". The differences in the levels of employment, earnings and contribution to household economic welfare i.e. household income per capita between the workers who had participated in NREP and those who did not participate in NREP, were ascertained.

Table XLVI gives details of the mean days of employment per month, mean daily and monthly earnings together with their contribution to household income per capita, of the NREP and non-NREP groups of workers, classified by their sex and social background.

TABLE XLVI

DISTRIBUTION OF WORKERS BY THEIR MEAN EMPLOYMENT, DAILY AND MONTHLY EARNINGS AND CONTRIBUTION TO HOUSEHOLD PER CAPITA INCOME

S. No.	Category	Frequency			Current levels of Employment* (days per month)			Mean Daily Earnings (in Rs.)			Monthly Earnings at current levels of employment (in Rs.)			Family size			Contribution to household income per capita at current levels of Employment (in Rs./Month)		
		Non-NREP	Over NREP	Non-NREP	Over NREP	all	all	Non-NREP	Over NREP	all	Non-NREP	Over NREP	all	Non-NREP	Over NREP	all	Non-NREP	Over NREP	all
1.	SC/ST Males	79	157	236	17	20	19	11.86	12.50	12.28	200.44	258.76	239.24	4.58	43.76	56.49	52.24		
2.	Non SC/ST Males	43	61	104	17	23	20	16.19	18.76	17.70	302.30	409.16	364.98	4.67	64.73	87.61	78.15		
3.	All Males	122	218	340	17	21	19	13.39	14.25	13.94	236.34	300.84	277.70	4.61	51.27	65.26	60.24		
4.	SC/ST Females	109	89	198	14	19	16	9.51	9.02	9.29	136.02	169.75	151.18	4.58	29.70	37.06	33.01		
5.	Non SC/ST Females	35	27	62	14	24	19	8.23	9.48	8.77	126.06	232.99	172.63	4.67	26.99	49.89	36.97		
6.	All Females	144	116	260	14	20	17	9.14	9.13	9.14	133.60	184.47	156.29	4.61	28.98	40.01	33.90		

Note: Person days of employment were rounded off. Hence the product of levels of employment and daily earnings may not tally with the figures of monthly earnings shown here.

The levels of employment among male and female workers of SC and ST and non SC/ST groups, as well as among all male and all female workers in the NREP group were consistently higher than those obtaining among the workers who had not participated in NREP. Their daily earnings also were consistently higher than those realised by the non-NREP workers. Because of the differences between the two groups in terms of levels of employment and daily earnings, the monthly earnings of all the categories in the NREP group were consistently higher than those realised by the non-NREP group of workers.

A comparison of the contribution of these workers to their household per capita income showed that the NREP workers registered consistently larger contributions to their monthly per capita household income than the non-NREP workers. The contribution to monthly per capita household income by the non-NREP workers ranged from Rs.27 (from non-SC/ST female workers) to Rs.65 (from non-SC/ST male workers). In the NREP group, their contribution to monthly per capita household income ranged from Rs.37 (SC/ST female workers) to Rs.88 (non SC/ST male workers).

b. Potential levels of employment, earnings, and contribution to household income per capita:

The employment gap was estimated as the difference between the full employment level of 25 days per worker per month and his/her current mean level of employment. On the assumption that this employment gap could be wiped out by additional wage employment opportunities in NREP and using his/her current level

of mean daily earnings, the potential monthly earnings of the worker was estimated. Thereafter, his/her hypothetical contribution to per capita household income was assessed. This exercise enabled the assessment of the effectiveness of the NREP programme in lifting the workers above the poverty line through its additional employment support. Table XLVII describes the employment gap of the workers, together with their maximum potential earnings and contribution to per capita household income at full employment.

TABLE XLVII

DISTRIBUTION OF WORKERS BY EXTENT OF EMPLOYMENT GAP, MAXIMUM POTENTIAL EARNINGS AND CONTRIBUTION TO HOUSEHOLD
INCOME PER CAPITA AT FULL EMPLOYMENT

S. No.	Category	Employment gap (in persons days per month)		Potential monthly earnings at full employment (in Rs.)		Potential full employment (in Rs. per month)	
		Non- NREP	NREP	Over all	Non- NREP	Over all	Over all
1.	SC/ST Males	8	5	6	296.50	312.50	67.03
2.	Non SC/ST Males	8	2	5	404.75	469.00	94.75
3.	All Males	8	4	6	334.75	356.25	74.63
4.	SC/ST Females	11	6	9	237.75	225.50	50.71
5.	Non SC/ST Females	11	1	6	205.75	237.00	46.95
6.	All Females	11	5	8	228.25	228.25	49.67

This analysis showed that with the guarantee of full employment, the contribution to household income per capita could be increased by about 24 percent from Rs.60.24 to Rs.74.63 for the male workers and by 46.52 percent from Rs.33.90 to Rs.49.67 for female workers. This additional employment support would be still inadequate to pull their income above the poverty line per capita income of Rs.124 per month in the event of these workers being the sole supporters of their families. None of the subgroups was in a position to reach the cut-off point of per capita income. The maximum potential amount of household income per capita with the additional employment support was Rs.94.75 which the non-SC/ST male workers could have realised.

c. Difference between NREP and non-NREP workers in terms of employment, daily and monthly earnings:

Since the sample was a large one, Z tests of difference, using the formula

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_{X_1}^2}{n_1} + \frac{\sigma_{X_2}^2}{n_2}}}, \text{ with } n_1 + n_2 - 2 \text{ degrees of freedom.}$$

where

$\bar{X}_1, \bar{X}_2$ - are the means of the variables

$\sigma_{X_1}^2, \sigma_{X_2}^2$ - their standard deviations

n_1, n_2 - the size of the samples

were carried out to find out if the difference in the levels of employment, daily and monthly earnings of the different social and sex groups of workers employed in NREP and otherwise were statistically significant or not. The test results are indicated in Table XLVIII.

TABLE XLVIII

RESULTS OF STATISTICAL TESTS OF DIFFERENCE (Z TEST) BETWEEN NREP AND
NON-NREP WORKERS IN THEIR LEVELS OF EMPLOYMENT,
DAILY AND MONTHLY EARNINGS

Group	Z - test results in respect of		
	Employment	Daily earnings	Monthly earnings
SC/ST group			
Male workers	4.055**	0.9661	3.037**
Female workers	4.6010*	-1.2082	2.6637**
Non-SC/ST group			
Male workers	3.4560**	1.2718	2.0513*
Female workers	6.3405**	2.6494**	5.4894**
Both groups			
Male workers	5.1326**	1.0428	2.8913**
Female workers	6.6326**	-0.0355	4.6159**

Note : ** indicates significance at 1 percent level

* indicates significance at 5 percent level

The test results show that the NREP programme had been successful in raising the levels of employment among all the groups, the maximum impact was felt on the female workers in both the groups and the minimum impact was on the male workers in the non SC/ST group. Its impact by way of improving the daily earnings of the workers, however, had been of a mixed pattern. Except for the group of female workers in the non SC/ST group, the impact of NREP on daily earnings had been statistically insignificant on the rest. In the case of female workers of the SC/ST group, it appears that NREP had reduced their daily earnings more than among the overall female workers. This was because the SC/ST female workers had been primarily employed under NREP in the less paying jobs of maintenance of social forestry works or as unskilled labour in housing and latrine projects where they were paid less than others. The NREP had, nevertheless, raised the monthly earnings of all the participating workers to a significant degree.

Summing up in this study it had been found that NREP had been beneficial to all categories of rural labour in raising their levels of employment and monthly earnings, though not necessarily their daily earnings. Thus, it can be inferred that NREP had helped to some extent in stabilising the levels of rural employment, but not yet the wage rates.

Summary and Conclusion

V. SUMMARY AND CONCLUSION

The current study on Female Work Participation with Special Reference to Wage Labour in Agriculture was based on the following premises: (1) that employment is a basic and prime necessity for women's existence as for men's; and (2) that women's decision to work is not born of adventitious circumstances though the sociological and cultural milieu might make it appear so. Therefore, it was considered imperative that the working of the labour market in the context of its outcomes for women should be probed within the appropriate theoretical contexts. This understanding, it was expected, would fill a vital gap in women's studies on the issue of women and work relating to the determinants of female participation rates and also widen the scope of labour economics for analysing the issues relating to women's work participation.

The study focussed on female agricultural labourers who constituted the single largest category of women workers and whose terms and conditions of employment were by no means enviable. With Tamil Nadu as the locale, it specifically aimed at:

- a. identifying the structural changes in women's employment;
- b. assessing the factors influencing the changes in rural FPRs;
- c. constructing and empirically testing a labour market model to identify their labour market position;

- d. estimating the trends and variability in their wage rates, which primarily reflects their levels of living; and
- e. evaluating the contribution of NREP programme in improving their employment and wages.

The study with its reference period of 1960-61 to 1984-85 had used both secondary and primary data. Data from Census Reports, Season and Crop Reports of Tamil Nadu, Economic Appraisals of Tamil Nadu, Reserve Bank of India Bulletins, and Agricultural Situation in India were used for clarifying the hypotheses on FPRs and structural aspects of female employment; for constructing the data set for verifying the labour market model; and for constructing the wage series to discern the growth trends and variability in wages. Household level primary data were collected from rural female labour households, farm households and NREP beneficiary households for getting a profile of these labourers, the pattern of labour demand facing them and for finding out the outcomes of employment intervention in respect of their labour market position. A comparative analysis of both male and female labour was made to highlight the labour market position of women and the specific factors having a bearing on them.

The specific hypotheses investigated in the study were:

1. There has been no structural diversification in women's employment since 1961.

2. The FPRs have changed because of the increasing displacement of female workers by male workers, slow growth of employment opportunities and the declining sex ratio in the population.
3. The labour supply decision of individual members in a household is an outcome of the household's attempts at utility maximisation, subject to budget and time or resources constraints.
4. The labour market is either equally stable or unstable for both male and female agricultural labour.
5. There is no difference in the rates of growth or extent of instability, characterising the wage rate of male and female agricultural labourers.
6. There is no difference in the employment and mean earnings of workers participating or not participating in NREP programme.

Methods of triangular graph, decomposition analysis, simple and multiple regression analysis, tests of difference besides ratios, means and percentages were used to evaluate these hypotheses and draw relevant conclusions.

The key results of the study are summarised below under relevant heads:

Structural changes in women's employment:

1. At the all - India level, the sectoral distribution of women workers indicates that the proportion of women workers in the secondary and tertiary sectors had steadily fallen both in absolute and in proportionate terms from 26.1 percent in 1961 to 18.8 percent in 1981. During the same period the proportion of women cultivators had fallen by 10 percentage points. These two together have pushed up the percentage of women agricultural labourers from 30.6 percent to 48 percent. The process of planned development since 1950's was unable to reverse these tendencies.

2. The opportunities for women workers in Tamil Nadu reflect the pattern at the All India level. Their share in the non-agricultural sector had been reduced from 29.19 percent in 1961 to 21.43 percent in 1981. Cultivators among them have declined from 42.45 percent to 22.76 percent, whereas the proportion of agricultural labourers have increased from 28.36 percent in 1961 to 55.8 percent in 1981.

3. In Tamil Nadu, the aggregate number of female workers had increased by one-tenth of a percent per annum, whereas agricultural labourers had increased at the rate of 5.03 percent per annum. The rate of growth in the latter is equivalent to fifty times the rate of growth in the aggregate.

4. This trend of declining opportunities for women workers in the secondary and tertiary sectors at the national and state level was also confirmed by the analysis at the district level in Tamil Nadu. The triangular graphs showed that there was

a gradual improvement in the male employment status. Female employment in rural areas was fairly dispersed in 1961. In 1981, however, they were found concentrated heavily in the primary sector. What little diversified employment opportunities women workers were having in 1961 had been wiped out and by 1981, the process of their marginalisation into the primary sector had been almost complete. Planning had not improved their employment pattern.

Factors influencing rural female participation rates:

5. The component element analysis which pinpointed the factors having a bearing on rural female participation rates, showed the displacement of the female by the male in the total work force as the dominant factor, followed by the sluggish growth of employment opportunities in the economy as the second important factor. The demographic factor had played only a marginal role in determining the rural female participation rates. Thus displacement effect and employment effect emerged as the most important factors in inducing changes in female participation rates.

Rural female participation rates in agriculture:

6. In Tamil Nadu, out of 63.43 lakhs female labour force in 1981, 54.09 lakhs are in rural areas, of whom 47.24 lakhs are engaged in agriculture. Among them 33.21 lakhs are agricultural labourers, 26.97 lakhs in the main workers category and 6.24 lakhs in the marginal workers category. As percentage of main workers,

they constitute 60.07 percent and as percentage of marginal workers, they form 67.88 percent of the total marginal workers.

7. Nearly half (48 percent) of the main agricultural labourers and nearly 90 percent of the marginal agricultural labourers are drawn from among the women workers. Thus between male and female labourers in agriculture, female labour is more proletarianised than male labour.

8. Thanjavur had the highest incidence of female main agricultural labourers (80 percent). This district, lying in the Cauvery delta region and cultivating the female labour intensive crop of paddy had the highest proportion of women agricultural labourers in the State. This was followed by Chengleput (70.26%), South Arcot (68.87%), Coimbatore (67.94%) and North Arcot (67.01%).

9. Among the marginal female agricultural labourers, the highest incidence was again in Thanjavur (84.53%) followed by Chengleput (77.76%), South Arcot (77.43%) and North Arcot (73.82%). Where irrigated crops like paddy are cultivated, and there is more need for intermittent labour, incidence of female marginal agricultural labour is rather high.

10. By and large, both in the districts and at the State level, female agricultural labourers had consistently increased over time, while male agricultural labour had shown a tendency to decline in relative terms since 1971.

11. The relationship between agricultural development and labour intensity showed that labour use in agriculture had been

decreasing with an increase in agricultural efficiency and that the degree of dependence of agriculture on labour is decreasing. The degree of labour displacement in Tamil Nadu in 1980's had been higher than at the all-India level in 1960's and 1970's.

Empirical evidence on the agricultural labour market:

12. The labour market model verified in the study was the neo-classical model. The labour supply decisions were conceived as outcomes of the process of household utility maximisation subject to budget and time constraints. The labour demand functions were based on the profit maximising behaviour of the labour hiring farm households, subject to diminishing returns to scale.

13. The labour market model in explaining the determinants of male/female participation in wage labour and their wage rates had used as its arguments a set of land and land augmenting variables as proxies for the probability of farm income of the rural households; the levels of education and the population in non-agricultural activities as proxies for the probability of their off-farm income, SC/ST population to represent the social characteristics of the population and a structural dummy variable to capture the effect of structural changes. This set of variables emerged with good explanatory power ranging from 73 percent to 86 percent in the equations at the first stage of reduced form estimation and 74 percent to 81 percent in the equations at the second stage of structural estimation.

14. The unrestricted OLS estimates showed that land augmenting factors increased male participation rates but decreased female participation rates. The structural change also had a similar effect. The more the level of education, the less the women worked as agricultural labourers.

15. The structural parameters showed that female wage response was negative and male wage response positive. That is, with an increase in wage rates, labour supplied by females decreased, whereas labour supplied by males increased. In the wage equation, the structural co-efficient pertaining to male labour participation and female wage rates was positive and significant indicating that the more the level of male employment, the less female labour was supplied, pushing up their wage rates.

16. Increases in the size of land holdings strengthened the position of male labour vis-a-vis the female labour.

17. The co-efficients of landlessness with respect to both the wage rates were positive, showing that the causation was via better organisation and bargaining strength among the workers.

18. The land augmenting variables had a negative and statistically significant relationship to female wage rates, throwing up the proposition that when there is an increase in land augmenting factors, irrigation and rainfall, there is a demand for additional labour which is by and large met by male labour, rather than female labour, further substantiating the labour displacement hypothesis.

19. Education when operationalised through a larger proportion of the population in non-agricultural sector, reduced the number of people working as agricultural labour.

20. The SC/ST population had raised the participation rates of both male and female agricultural labour.

21. More than three-fourths of the co-efficients in the structural equations had the expected a priori signs, indicating that the variables used in the model had explained well the behaviour of the labour supply and demand forces in the agricultural labour market and had validated the relevance of the neo-classical approach, used in the analysis.

22. The labour supply and demand elasticities indicated that the labour market tended to maintain the equilibrium wages and employment at high and stable levels for male labour. However, it adjusted in such a way as to keep the equilibrium wages and employment for female labour at low levels.

23. The cross elasticity co-efficients confirmed that female labour constitutes a vital part of the labour reserves.

24. The own wage elasticity of supply of female labour was much less than that of male labour showing that the employer had greater monopsony power over women caused by their relative lack of mobility; lack of demand for them in alternative occupations, and occupational segregation.

25. By and large, the village case study confirmed the findings of the district level labour market model. In the village under study, a larger proportion of female agricultural

labourers were drawn from SC/STs; two thirds of them were below the poverty line; skilled labour was totally lacking among female labourers; even in the relatively busy season the extent of employment was only 71 percent; they were employed in the tedious and back breaking jobs of sowing, weeding and harvesting; and their mean earnings ranged from Rs.140 to Rs.190 per month.

26. The labour use pattern by crop showed that female hired labour was used relatively more in the cultivation of dry crops (groundnut and maize) and less in the wet crop (turmeric). That the irrigated crop produced less employment for hired female labour only confirmed the findings of the macro-level study.

Trends and variability in wage rates:

27. In 1984-85, the money wage rates of female field labour in the districts ranged between Rs.4.27 and Rs.10.36, with the state average of Rs.6.20 per day. The money wage rates for male field labour ranged between Rs.5.75 to Rs.14.13, with the state average of Rs.9.47 per day. These wages were however, far lower than the daily minimum wage of Rs.22 worked out by Gopalan based on the least cost of a balanced diet for a family (Sankaran 1984).

28. Trend rates of growth in real wages showed that over the period 1964-65 to 1984-85, real wage rates for female labour had increased at a slightly higher rate of 2.03 percent per annum, against the rate of growth of 1.34 percent in male wage rates at 1960-61 prices. It had, however, not been high enough to raise their real wage rates (Rs.1.17) on par with that of males

(Rs.1.70). The gender gap in real wages had been reduced only by 1.1 percent.

29. At the state level, the degree of instability in wages suffered by female agricultural labourers was higher than that experienced by the male agricultural labourers.

30. Districts with relatively high growth rates in female wages also experienced more instability (Madurai, Kanyakumari, Nilgiris and Ramanathapuram) reflecting the greater sensitivity of the labour market in these areas to the changes in the economic environment. The behaviour of Nilgiris was different from normal, in all cases, because of the commercialisation of crops.

31. In agriculturally backward districts (Dharmapuri, Salem and North Arcot) the labourers had been adversely affected by a fall in their levels of living, as reflected in the deceleration/imperceptible growth in their real wages.

32. Chengleput and North Arcot alternated as the best paying districts for female agricultural labour.

33. There was no tendency towards equalisation of wage rates across the districts. Rather the spatial imbalance in wage rates had been aggravated since the mid 70's. The divergence pattern had almost been the same in both male and female wage rates, but for a lag of one year.

34. In the post 1975 period i.e., after green revolution had stabilised itself, the variability in wage differentials had become greater.

Impact of NREP programme:

35. In the sample households (279) spread over six districts, which were covered for finding out the impact of NREP on rural employment and earnings, the labour force participation rate was 48 percent and the employment percentage was 64.16. The mean earnings per worker per day was Rs.12.75 and the mean household per capita income was Rs.116 per month at 1987-88 prices. Seventy six percent of these households were below the poverty line. The SC/ST households were poorer than non-SC/ST households.

36. The incidence of female labour was 43 percent overall; 46 percent in the SC/ST households; and 37 percent in non-SC/ST households.

37. The levels of employment among male and female workers of SC/ST and non-SC/ST groups as well as among all male and all female in the NREP group were consistently higher than those obtaining among the workers who had not participated in NREP. Their daily average earnings also were consistently higher than those of the non NREP workers.

38. In general, the NREP had helped the three groups of SC/ST male labour, and non SC/ST male and female labour in securing higher employment and earnings. Only in the case of SC/ST female, NREP was not of much help. Statistical analysis (Z test) confirmed these findings.

However, the fulfilment of the objective of wage stabilisation through expansion of NREP is very much in doubt

because of financial constraints and difficulties in identifying physical projects. Currently it meets only less than two percent of the employment requirements (Hirway 1988).

Summing up, development had contributed very little towards diversifying women's employment; rather it had marginalised women workers heavily into the agricultural sector as agricultural labourers, that too as marginal workers. Even within the agricultural sector, they had been displaced by male labour with an increase in land augmenting factors of irrigation and rainfall and with an increase in the cultivation of high value irrigated crops. The cross elasticity co-efficients also indicated that male labour functioned as a close substitute for female labour and not vice versa further reiterating the displacement phenomenon.

Agricultural labourers were largely drawn from among the socially disadvantaged groups of Scheduled Caste and Scheduled Tribe communities. About three fourths of their households were living below the poverty line. Skilled labour was virtually absent among women workers. Their labour supply decisions were, nevertheless, highly rational. The substitution effect weighed with male labour; but income effect weighed with female labour indicating that women were seeking work mainly in response to survival needs. The male and female time in rural labour households were complements to each other, in own farm and household production activities.

The labour market stabilised for male agricultural labour at high levels of employment and fairly good wages for them; whereas

the market for female agricultural labourers tended towards instability, keeping their wages and employment at low levels. Their labour market was also more monopsonistic in character, further dampening their levels of employment and wages. This kind of working of the labour market explained why the gender gap in real wages had failed to narrow down to any significant extent, over the past 20 years, making it yet another great ratio in economics. The employment intervention programme had to some extent improved the employment position of rural female labourers, but not yet their earnings.

Recommendations

The specific recommendations emanating from the study are:

1. More of women agricultural labourers will be rendered surplus, with the introduction of new technologies in agriculture. These workers cannot be lightly dismissed by the State, as what is at stake is their human dignity, the right to earn a fair means of livelihood by their own effort. These women need to work as much as men. Hence alternate arrangements are necessary to rehabilitate them, and equip them for productive employment:

- a. They should be rehabilitated by ensuring employment in the rapidly expanding sectors associated with agriculture—in the agro-based industries especially the food processing industries.
- b. Since the female agricultural labour market is more unstable than the male labour market, it is imperative that the employment intervention programmes, such as NREP

focus exclusively on them as a target group, at least in the backward districts. These programmes, however, can not and should not become the main strategy of employment generation in the country. The mainstream economy should be able to absorb them in productive and continuous employment.

- c. In Public Works Programmes, where the State generates employment, equal opportunities must be given for women labourers.
- d. The State should extend social security benefits to them; if and when they are displaced from jobs, until they find alternate productive employment. A fool proof social security scheme should be introduced which will cover not only the urban industrial workers, but also the rural agricultural labourers, both male and female.
- e. Preparation for productive employment is as much a felt need for women as for men. Hence it should be the endeavour of the Government to provide opportunities for skill training, more purposeful vocational training etc. for women at the local level so that they can avail of these opportunities and diversify into the non-agricultural sectors of employment.

2. The persistently low rate of growth in real wages—for both female and male agricultural labour, indicate the need for taking a close look at the wages and incomes policy and revising it, taking into account their relative standing vis-a-vis organised

labour in other sectors and the perspective the country wants to achieve, in the foreseeable future. A more realistic wage policy and a better monitoring mechanism are the needs of the day.

3. In the agriculturally backward districts of Dharmapuri, Salem and North Arcot, the labourers had suffered a fall in their levels of living. Hence these districts may be declared as special/sensitive districts for purposes of strengthening the implementation of rural development programmes.

4. The bargaining strength of the women agricultural labourers is negligible. Hence to empower them to demand better working conditions and wages, more organisation is needed along with conscientisation.

5. Unionisation among the women agricultural labourers in particular and women labourers in general needs to be strengthened to help them with improved wages and working conditions. Unionisation will be difficult because of the scattered nature of labour and dispersed agriculture. It may also have its negative side effects. Yet it is the only alternative considering the very weak position of women agricultural labourers, their marginalisation and low wages bordering on subsistence.

6. The special employment programmes-both the wage employment and self employment - should be continued for the time being as they provide an alternative to agricultural employment. The lacunae and administrative lapses observed in the implementation of these programmes should be reduced by careful management. However, it needs to be reiterated that the intervention

programme can at the most offer only a temporary palliative. The real solution lies in improving their employment opportunities, with improved wages on par with those of men workers.

7. Since employment constitutes a vital state of one's being, the data generating systems should pay attention to this issue. They should devise strategies and mechanisms by which such data could be generated at block and district levels and made available at closer intervals, as against the Census or the NSS data which provide them at ten yearly or five yearly intervals. The data on employment-unemployment as mobilised by the NSS is more comprehensive and if available at yearly intervals, time series studies on labour market behaviour could be undertaken to furnish a more reliable basis for regional/area planning as also for national planning. This data, along with data on wages and cost of living at the district level and state level will help in the formulation of a more logical wages and prices policy in the agricultural sector.

8. The Farm Management Studies and Cost of Cultivation Studies have an outmoded practice of reckoning women's labour. One day of woman's work is considered equivalent to half-a-day of man's work. This practice is both unfair and unrealistic and needs a reappraisal. A day's labour should be considered as such, whether performed by man or woman.

Agenda for Research:

The directions for future research as emanating from the study are:

1. Research is needed on areas where employment could be provided for women and the type of training that should be developed to enable them to acquire the requisite skills.
2. The energy expenditure involved in the various agricultural operations should form the basis for fixing the minimum wage rates. Hence, research on the energy used up in various agricultural operations in different cropping systems may be undertaken for both male and female labour.
3. Studies on the economics of labour force participation of women working in other sectors are needed to form the basis for improving/redesigning the theory of female labour force participation.
4. The causes of gender gap in wages in different occupations need to be probed into.

In conclusion, the study points to the need for improving the position of women labourers in the rural agricultural sector. The intervention programmes can not be a permanent solution. The real solution lies in improving their employment opportunities, with improved wages on par with that of men workers. All these will be possible only when agriculture progresses at high rates of growth and when women workers are recognised on par with men,

for their contribution to agricultural productivity and hence for an equal claim on it. On their part, the consciousness among women workers, as among all workers needs to be raised through sustained efforts at organising themselves. They should also constantly endeavour to upgrade their skills both to increase their productivity in agriculture and diversify into other sectors. In effect, all these imply that employment of human resources should become the starting point of the planning process. The people should be the focus of planning and activating other resources should follow, not only as a solution of the unemployment problem, but also from the point of building up a self reliant economy. The productive employment of women among the weaker sections is thus the major challenge before the planners.

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Appendices

APPENDIX I. a.

AVINISHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR
WOMEN, COIMBATORE - 641 043.

An Interview Schedule to Elicit Information on the Labour
Supply Condition of Female Agricultural Labourers.

1. Name of the worker :
2. Address :
3. Caste :
4. Education :
5. Age :
6. At what age did you
start working :
7. Land possessed if any
Area of land cultivated :
8. Land hired if any
Area of land hired :
9. Number of labourers :
10. Family income :
11. Individual income :
12. Income of the household :

13. Number of workers in the household :

S.No.	Category	Men	Women	Children
1.	Agricultural Labourers			
2.	Non-Agricultural Manual Labourers.			
3.	Non-Agricultural Skilled Labourers.			

14. Employment in Agriculture :

S. No.	Days Employed	Activity	Wages/day	Payment fully in cash	Payment fully in kind	Nature of contract	No. of days available for employment

1. July

2. August

3. September

4. October

5. November

6. December

7. January

15. Employment and Unemployment in the off-period:

S. No.	Month Employed	days available for other employment	How employed	Wages/day	No. of days when no work was available

1.	July				
2.	August				
3.	September				
4.	October				
5.	November				
6.	December				
7.	January				

16. Member in any Union :

17. Any other information :

APPENDIX I. b.

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION
FOR WOMEN, COIMBATORE - 641043.

An Interview Schedule to Elicit Information on Labour use at the
Farm Level.

1. Name of the Farmer :
2. Address :
3. Land Tenure:
 - a) Land Owner :
 - b) Tenant :
 - c) Share Cropper :
4. Total area cultivated:
 - a) Area Owned :
 - b) Area Hired :
5. Area irrigated:
Sources of irrigation:
 - a) Dug well :
 - b) Tube well :
 - c) Dug and Borewell :
6. Animal power/implements
in use:
 - a) Oxen :
 - b) Tractor :

8. Employment details :

Note: Employment details to be collected separately
crop-wise and season-wise.

S.No.	Operation	Labour category	No. emplo- yed	Days emplo- yed	Hours emplo- yed	Wage rate per day

APPENDIX II

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION
FOR WOMEN, COIMBATORE - 641 043.

An Interview Schedule to Elicit Information on the Employment and
Earnings of Workers in Rural Households where at least one worker
was employed in an NREP Project:

Name : Age:

Address:

1. Name of the Labourer :
2. Social background :
(SC, ST, others)
3. Occupational background :
Landless agricultural labourer :
Marginal Farmer :
Small Farmer :
Artisan :
Others :- 4. Household size :
- 5. How many of them are
in labour force :
- 6. Household monthly
Income (Rs.) :
(As per the prescribed
worksheet).

7. Number of days of
employment during last
30 days :

(i) By self

(ii) By other members of
household

8. Payment of wages :

What is your daily wage
(actual)

(i) Cash (Rs.) :

(ii) Food grains(Kgs)

Rice :

Wheat :

Work Sheet For Assessment of Income of the Labour Household.

(A) Income from wage/salary (Rs.).

Activity	No. of workers in the family		Wage rate including value of wage in kind	No. of working days	Total income Col.3xCol.4 (adjusted for Col.2)
	M	F			
1. NREP Works					
2. Agricultural labour					
(i) Ploughing					
(ii) Sowing					
Harvesting					
(iii) Others					
(Specify)					
3. Skilled Labour					
(i) Blacksmith					
(ii) Carpenter					
(iii) Mason					
(iv) Others					
(specify)					
4. Trade/business					
5. Services					
6. Other activity for wage/salary					

(B) Income from production (Rs).

Item	Value of output	Cost of inputs	(Net income Col. 2) - (Col.3)
Agricultural production			
Cattle farming			
Poultry			
Household Industries			
Others			

APPENDIX III

MATHEMATICAL DERIVATION OF THE LABOUR FORCE PARTICIPATION MODEL.

The household utility function is $U = f(G, L_M, L_F)$ (1)

The household's income constraint is $P_G G = W_M H_M + W_F H_F + B$ (2)

The household's time constraint or resources constraint is

$$2T = L_M + L_F + H_M + H_F \quad (3)$$

The general form of the household utility function can be assumed as

$$U = a H_M^2 + (b W_M + c W_F) H_M H_F + d H_F^2 + eB + f W_M L_M + g W_F L_F \quad (4)$$

The optimum utility function with the constraints given in equations (2) and (3), Using Lagrange Multipliers, will become

$$U = a H_M^2 + (b W_M + c W_F) H_M H_F + d H_F^2 + eB + f W_M L_M + g W_F L_F + \lambda (P_G G - W_M H_M - W_F H_F - B) + \beta (2T - L_M - L_F - H_M - H_F) \quad (5)$$

Where λ and β are the Lagrange multipliers.

To solve for the optimal hours H_M^e and H_F^e , in terms of W_m

W_F and B, the partial derivatives are

$$\frac{\partial U}{\partial H_M} = 2a H_M + H_F (b W_M + c W_F) - \lambda W_M - \beta = 0 \quad (6)$$

$$\frac{\partial U}{\partial H_F} = 2 d \frac{H}{F} + \frac{H}{M} (b \frac{W}{M} + c \frac{W}{F}) - \lambda \frac{W}{F} - \beta = 0 \quad (7)$$

$$\frac{\partial U}{\partial H_F}$$

$$\frac{\partial U}{\partial B} = e - \lambda = 0 \quad (8)$$

$$\frac{\partial U}{\partial L_M} = f \frac{W}{M} - \beta = 0 \quad (9)$$

$$\frac{\partial U}{\partial L_M} = g \frac{W}{F} - \beta = 0 \quad (10)$$

$$\frac{\partial U}{\partial \lambda} = \frac{P}{G} - \frac{W}{M} \frac{H}{M} - \frac{W}{F} \frac{H}{F} - B = 0 \quad (11)$$

$$\frac{\partial U}{\partial \beta} = 2 T - \frac{L}{M} - \frac{L}{F} - \frac{H}{M} - \frac{H}{F} = 0 \quad (12)$$

Substituting for λ , β and H_F in equation (6) and imposing

linearity, the Optional hours H_M^e can be written as

$$H_M^e = \frac{H}{M} = a_1 + b_1 \frac{W}{M} + c_1 \frac{W}{F} + d_1 B$$

where the constants, a_1, b_1, c_1, d_1 are given by the co-efficients

of the utility function, namely a, b, c, d, e, f and g . Similarly

from equation (7), the optional hours H_F^e can be written as

$$H_F^e = \frac{H}{F} = a_2 + b_2 \frac{W}{F} + c_2 \frac{W}{M} + d_2 B.$$

APPENDIX IV
DATA SET USED IN THE EMPIRICAL ESTIMATION OF THE LABOUR
MARKET MODEL

S.No. District	W M	W F	λ M	λ F	X 1	X 2	X 3	X 4	X 5	X 6	X 7	X 8	X 9
1. Chengleput	1.17	0.97	33	29	1.52	47.13	70.8	119	9.91	2.40	30.17	33.16	0
2. North Arcot	1.25	0.96	19	27	1.42	35.17	47.6	97	8.73	1.60	22.20	19.09	0
3. South Arcot	1.14	0.85	34	33	1.36	35.49	46.2	118	7.07	1.22	16.13	28.95	0
4. Salem	1.92	0.88	18	17	1.82	38.71	20.6	83	6.57	1.31	24.65	18.90	0
5. Coimbatore	1.27	0.62	25	19	2.55	55.07	37.7	69	9.41	2.17	43.13	16.64	0
6. Nilgiris	1.39	1.04	17	16	3.07	70.73	1.4	189	22.04	5.83	58.41	21.32	0
7. Madurai	1.11	0.83	29	27	1.92	43.72	41.0	82	8.57	2.03	27.36	19.05	0
8. Trichy	1.71	0.78	20	23	1.61	31.14	34.2	88	8.05	1.58	19.69	20.47	0
9. Thanjavur	1.46	1.06	41	32	1.81	49.76	78.7	114	11.79	2.43	21.68	27.07	0
10. Ramana thapuram	1.32	0.96	17	21	1.91	31.77	43.3	82	7.28	1.62	20.25	18.27	0
11. Tirumelveli	1.12	0.85	18	23	1.96	45.88	40.9	81	9.38	3.36	37.01	19.04	0
12. Kanyakumari	1.76	1.09	14	4	1.00	55.28	46.0	133	19.72	10.69	67.09	4.31	0
13. Chengleput	2.55	2.20	47	24	1.68	37.84	73.9	121	33.73	10.83	23.20	33.50	1
14. North Arcot	3.67	2.27	34	27	1.57	32.49	54.9	97	34.82	9.65	18.70	23.47	1
15. South Arcot	1.95	1.51	42	21	1.43	29.08	55.9	119	32.08	8.32	13.90	28.79	1
16. Dharmapuri	3.85	2.54	29	17	2.18	24.12	17.9	84	20.97	5.78	11.70	16.05	1
17. Salem	2.00	1.60	32	22	1.57	38.05	31.8	84	26.48	7.85	22.80	22.73	1
18. Coimbatore	2.56	1.49	42	30	3.04	51.56	38.3	72	29.86	9.05	26.70	18.54	1
19. Nilgiris	3.67	2.30	10	7	2.39	50.08	0.9	192	47.94	17.62	84.60	23.73	1
20. Madurai	2.09	1.25	45	32	2.21	40.36	38.3	85	36.75	10.60	18.20	19.33	1

- contd.

where,

W_M = Daily wages (in Rupees) for field agricultural labour male.

W_F = Daily wages (in Rupees) for field agricultural labour female.

λ_M = Percentage of male agricultural labour 15+ per rural household.

λ_F = Percentage of female agricultural labour 15+ per rural household.

X_1 = Mean land holdings (in hectare).

X_2 = Percentage of households without land.

X_3 = Percentage of area irrigated.

X_4 = Normal rainfall in centimetres.

X_5 = Percentage of males with at least primary education.

X_6 = Percentage of females with at least primary education.

X_7 = Percentage of population in non-agricultural activities.

X_8 = Percentage of SC/ST population.

X_9 = Structural dummy variable. 0, if 1961, 1 if 1971 and 2 if 1981.

- Source:
1. Columns 1 and 2 compiled and computed from the Season and Crop Reports of Tamil Nadu - various issues.
 2. Columns 3, 4, 6, 11 compiled and computed from the General Economic Tables of Census of Tamil Nadu 1961, 1971 and 1981; Household Tables of the Census of Tamil Nadu 1961, 1981, Census Atlas of 1971.
 3. Columns 5, 7, 8 compiled from the Season and Crop Reports of Tamil Nadu - various issues.
 4. Columns 10 and 11, compiled and computed from the Social and Cultural Tables of the Census of Tamil Nadu 1961, 1971 and 1981.
 5. Column 12 from the General Reports on the Census of Tamil Nadu 1961, 1971 and 1981.

APPENDIX V. a.

1961 DATA SET FOR DECOMPOSITION ANALYSIS ON RURAL FEMALE
PARTICIPATION RATES

	Rural female workers (W) F	Rural female population (P) F	Rural workers Both male & female (W)	Rural population Both male & female (P)
1. Chengelput	243375	855256	794476	1740734
2. North Arcot	482115	1251158	1259331	2515101
3. South Arcot	433552	1318521	1271138	2655651
4. Salem	680996	1577524	1711286	2986760
5. Coimbatore	491492	1250502	1320491	2525302
6. Trichirapalli	545410	1267516	1347056	2512007
7. Thanjavur	373234	1304211	1158900	2584407
8. Madurai	425278	1103518	1110838	2195482
9. Ramanathapuram	411468	940160	942744	1822307
10. Tirunelveli	379033	967703	923566	1882397
11. Nilgiris	46676	110154	114562	229441
12. Kanyakumari	76318	418616	303450	846836
State	4589047	12364839	12257938	24696425

Source : Compiled from the General Economic Tables of the Census of Tamil Nadu, 1961.

1971 DATA SET FOR DECOMPOSITION ANALYSIS ON RURAL FEMALE
PARTICIPATION RATES

	Rural female workers (W) F	Rural female population (P) F	Rural workers Both male & female (W)	Rural population Both male & female (P)
1. Chengelput	134695	931319	684634	1896909
2. North Arcot	242312	1465096	1107027	2972702
3. South Arcot	194053	1530378	1114914	3104726
4. Dharmapuri	110832	755297	569310	1533834
5. Salem	221855	1080064	909332	2197234
6. Coimbatore	337271	1389709	1249644	2816936
7. Trichirapalli	273923	1496006	1177464	2991808
8. Thanjavur	193846	1522102	1071371	3052694
9. Madurai	284303	1305379	1057064	2614003
10. Ramanathapuram	207318	1083967	785727	2113545
11. Tirunelveli	251898	1112442	848874	2171019
12. Nilgiris	37514	122868	102748	250780
13. Kanyakumari	29500	500980	295173	1018144
State	2519320	14295607	10973282	28734334

Source : Compiled from the General Economic Tables of the Census of Tamil Nadu, 1971.

1981 DATA SET FOR DECOMPOSITION ANALYSIS ON RURAL FEMALE
PARTICIPATION RATES

	Rural female workers (W) F	Rural female population (P) F	Rural workers Both male & female (W)	Rural population Both male & female (P)
1. Chengelput	237785	1089657	860361	2208742
2. North Arcot	426540	1681731	1410154	3398795
3. South Arcot	412028	1747830	1430143	3542246
4. Dharmapuri	227264	886681	774725	1809876
5. Salem	410219	1191176	1195402	2446054
6. Periyar	293372	790185	851030	1613259
7. Coimbatore	282786	745736	777842	1515813
8. Trichirapalli	394249	1330730	1199587	2668596
9. Thanjavur	312827	1554017	1211752	3126588
10. Madurai	531588	1435115	1398544	2892285
11. Pudukottai	99455	504464	378081	1003145
12. Ramanathapuram	366731	1219017	1029741	2394483
13. Tirunelveli	404623	1201588	1036369	2335952
14. Nilgiris	50399	159883	131539	322321
15. Kanyakumari	40794	583961	322162	1177867
State	4490643	16121971	14022275	32456202

Source : Compiled from the General Economic Tables of the Census of Tamil Nadu, 1981.

APPENDIX V. b.

ILLUSTRATIVE CALCULATION FOR RFWPRs IN CHENGLEPUT DISTRICT

1961 - 1971.

The Decomposition equation is ,

$$\Delta Y = \left[\Delta X_1 \cdot X_{2.1} \cdot X_{3.1} \right] + \left[\Delta X_2 \cdot X_{1.1} \cdot X_{3.1} \right] +$$

$$\left[\Delta X_3 \cdot X_{1.1} \cdot X_{2.1} + \Delta X_1 \Delta X_2 \cdot X_{3.1} + \Delta X_1 \Delta X_3 \cdot X_{2.1} + \right.$$

$$\left. \Delta X_2 \Delta X_3 \cdot X_{1.1} + \Delta X_1 \cdot \Delta X_2 \cdot \Delta X_3 \right]$$

$$Y_1 = \frac{W_F}{P_F} = \frac{243375}{855256} = 0.2846$$

$$Y_2 = \frac{W_F}{P_F} = \frac{134695}{931319} = 0.1446$$

$$X_{1.1} = \frac{W_F}{W} = \frac{243375}{794476} = 0.3063$$

$$X_{1.2} = \frac{W_F}{W} = \frac{134695}{684634} = 0.1967$$

$$X_{2.1} = \frac{W}{P} = \frac{794476}{1740734} = 0.4564$$

$$X_{2.2} = \frac{W}{P} = \frac{684634}{1896909} = 0.3609$$

$$X_{3.1} = \frac{P}{P_F} = \frac{1740734}{855256} = 2.0353$$

$$X_{3.2} = \frac{P}{P_F} = \frac{1896909}{931319} = 2.0368$$

$$\Delta Y = Y_2 - Y_1 = -0.14$$

$$\Delta X_1 = X_{1.2} - X_{1.1} = -0.1096$$

$$\Delta X_2 = X_{2.2} - X_{2.1} = -0.0955$$

$$\Delta X_3 = X_{3.2} - X_{3.1} = 0.0015$$

$$\begin{aligned} \Delta Y = & [(-0.1096)(0.4564)(2.0353)] + \\ & [(-0.0955)(0.3063)(2.0353)] + \\ & [(0.0015)(0.3063)(0.4564)] + \\ & \{ [(-0.1096)(-0.0955)(2.0353)] + \\ & [(-0.1096)(0.0015)(0.4564)] + \\ & [(-0.0955)(0.0015)(0.3063)] + \\ & [(-0.1096)(-0.0955)(0.0015)] \} \end{aligned}$$

$$\Delta Y = -0.1398$$

Hence,

$$\text{Displacement Effect} = \Delta X_{1 \ 2.1 \ 3.1} \cdot X = -0.1018$$

$$\text{Employment Effect} = \Delta X_{2 \ 1.1 \ 3.1} \cdot X = -0.0595$$

$$\text{Demographic Effect} = \Delta X_{3 \ 1.1 \ 2.1} \cdot X = 0.000210$$

$$\begin{aligned} \text{Interaction Effect} &= \left[\Delta X_{1 \ 2 \ 3.1} \cdot \Delta X_{2 \ 3.1} + \Delta X_{1 \ 3 \ 2.1} \cdot \Delta X_{3 \ 2.1} + \right. \\ &\quad \left. \Delta X_{2 \ 3 \ 1.1} \cdot \Delta X_{3 \ 1.1} + \Delta X_{1 \ 2 \ 3} \cdot \Delta X_{3 \ 1.1} \right] \\ &= 0.0213 - 0.000075 - 0.0000515 + 0.000016 \\ &= 0.021190. \end{aligned}$$

APPENDIX VI

DATA SET ON SECTORAL DISTRIBUTION OF WORKFORCE USED AS THE BASIS FOR THE TRIANGULAR GRAPHS - 1961

S.No. District	Primary		Secondary		Tertiary		Total Workers	
	Males	Females	Males	Females	Males	Females	Males	Females
1. Chengleput T	406103	198419	117495	34623	154153	42482	677751	275424
R	386466	190831	68402	20220	96233	32424	551101	243375
U	19637	7588	49093	14303	57920	10058	126650	31949
2. North Arcot T	619262	409253	140424	40347	183134	76594	942820	526194
R	600432	398682	77864	23999	98920	59484	777216	482115
U	18830	10621	62560	16348	84214	17110	165604	44079
3. South Arcot T	726920	390480	74006	17119	141268	47264	942194	454863
R	702418	382714	48420	12751	86748	38087	837586	433552
U	24502	7766	25586	4368	54520	9177	104608	21311
4. Salem T	797205	549664	199212	91120	207358	107487	1203775	748271
R	778045	539982	120340	53359	131905	87655	1030290	680996
U	19160	9682	78872	37761	75453	19832	173485	67275
5. Coimbatore T	546891	308689	262210	113642	317539	163463	1126640	585794
R	499020	278015	152537	88337	177442	125140	828999	491492
U	47871	30674	109673	25305	140097	38323	297641	94302
6. Trichirapalli T	663797	478884	131097	36381	189739	72586	984633	587851
R	637157	464832	71281	25481	93208	55097	801646	545410
U	26640	14052	59816	10900	96531	17489	182987	42441

S.No. District		Primary		Secondary		Tertiary		Total Workers	
		Males	Females	Males	Females	Males	Females	Males	Females
7.	Thanjavur T	640953	334393	95424	24794	220231	47751	956608	406938
	R	610830	324319	50379	16028	124097	32887	785666	373234
	U	30123	10074	44685	8766	96134	14864	170942	33704
8.	Madurai T	559758	348759	134670	35560	262380	118506	956808	502825
	R	515851	329255	51092	14991	118617	81032	685560	425278
	U	43907	19504	83578	20569	143763	37474	271248	77547
9.	Ramanathapuram T	447558	358626	89586	63148	147737	54715	684881	476489
	R	424382	345023	37031	29252	69863	37193	531276	411468
	U	23176	13603	52555	33896	77874	17522	153605	65021
10.	Tirunelveli T	413924	271570	147816	134113	206712	70797	768452	476480
	R	368653	247594	71834	80785	104046	50654	544533	379033
	U	45271	23976	75982	53328	102666	20143	223919	97447
11.	Nilgiris T	60105	52192	11566	1551	47565	14796	119236	68539
	R	42791	38405	4084	583	21011	7688	67886	46676
	U	17314	13787	7482	968	26554	7108	51350	21863
12.	Kanyakumari T	116010	14828	48650	51395	99792	20499	264452	86722
	R	110084	13966	37585	45449	79463	16903	227132	76318
	U	5926	862	11065	5946	20329	3596	37320	10404
13.	Madras T & U	7189	273	155418	9174	312469	42458	475076	51905

Source : Compiled from the General Economic Tables of the Census of Tamil Nadu, 1961

DATA SET ON SECTORAL DISTRIBUTION OF WORKFORCE USED AS THE BASIS FOR THE TRIANGULAR GRAPHS - 1971

S.No. District	Primary		Secondary		Tertiary		Total Workers	
	Males	Females	Males	Females	Males	Females	Males	Females
1. Chengleput T	463568	127865	165394	16233	188413	22552	817105	166650
R	421457	119187	61162	7301	67320	8207	549939	134695
U	42111	8678	104232	8932	120823	14345	267166	31955
2. North Arcot T	714463	229120	148980	16872	199151	24583	1062594	270575
R	692554	222418	76314	7825	95847	12069	864715	242312
U	21909	6702	72666	9047	103304	12514	197879	28263
3. South Arcot T	818328	188047	87262	4868	141666	14992	1047256	207907
R	793062	181920	51641	3481	76158	8652	920861	194053
U	25266	6127	35621	1387	65508	6340	126395	13854
4. Dharmapuri T	411694	105001	25185	2601	58237	8160	495116	115762
R	405161	103563	17053	1941	36261	5328	458478	110832
U	6530	1438	8132	660	21976	2832	36638	4930
5. Salem T	552183	204258	206020	42849	151479	25490	909682	272597
R	523222	192054	99764	18351	64491	11450	687477	221855
U	28961	12204	106256	24498	86988	14040	222205	50742
6. Coimbatore T	718199	324551	319453	59946	311235	53076	1348887	437573
R	648938	283552	150184	32850	113251	20899	912373	337271
U	69261	41029	169269	27096	197984	32177	436514	100302
7. Trichirapalli T	757091	258836	155365	19514	208469	26324	1121195	304674
R	725491	249288	87508	12629	90542	12006	903541	273923
U	31600	9548	68127	6885	117927	14318	217654	30751

S.No. District		Primary		Secondary		Tertiary		Total Workers	
		Males	Females	Males	Females	Males	Females	Males	Females
8.	Thanjavur T	757534	183918	91611	7833	219443	22560	1068598	214311
	R	716991	177461	48859	4642	111665	11743	877525	193846
	U	40543	6457	42752	3191	107778	10817	191073	20465
9.	Madurai T	698364	284523	151737	24328	256997	37989	1107098	346840
	R	634888	261430	53675	8303	84198	14570	772761	284303
	U	63476	23093	98062	16025	172799	23419	334337	62537
10.	Ramanathapuram T	488560	184056	111140	51808	162176	22595	761876	258469
	R	459057	173062	50979	23377	68373	10869	578409	207318
	U	29503	10994	60161	28431	93803	11726	183467	51151
11.	Tirunelveli T	481072	204364	158687	84196	211205	31992	850964	320552
	R	428061	185722	77359	49384	91556	16792	596976	251898
	U	53011	18642	81328	34812	119649	15200	253988	68654
12.	Nilgiris T	73230	52773	18267	2576	37724	7243	129221	62592
	R	48965	34317	6423	1346	9846	1851	65234	37514
	U	24265	18456	11844	1230	27878	5392	63987	25078
13.	Kanyakumari T	200385	11531	45827	14007	67428	11316	313640	36854
	R	189521	10993	33858	10859	42294	7648	265673	29500
	U	10864	538	11969	3148	25134	3668	47967	7354
14.	Madras T & U	10206	427	214898	9479	411729	49640	636833	59546

Source : Compiled from the General Economic Tables of the Census of Tamil Nadu, 1971.

DATA SET ON SECTORAL DISTRIBUTION OF WORKFORCE USED AS THE BASIS FOR THE TRIANGULAR GRAPHS - 1981

S.No. District	Primary		Secondary		Tertiary		Total Workers	
	Males	Females	Males	Females	Males	Females	Males	Females
1. Chengleput T	501731	228098	277137	31036	238548	36168	1017416	295301
R	457667	210927	84715	13695	80794	13163	622576	237785
U	44664	17171	192422	17341	157754	23005	394840	57516
2. North Arcot T	782529	401808	223711	39457	234948	30163	1241188	471432
R	758985	392659	122166	19810	102463	14071	983614	426540
U	23544	9149	101545	19647	132485	16092	257574	44892
3. South Arcot T	881171	397123	122651	12594	174286	24932	1178108	434650
R	852956	387274	72780	9381	92379	15373	1018115	412028
U	28215	9849	49871	3213	81907	9559	159993	22622
4. Dharmapuri T	481041	215807	44270	7690	72037	12173	597348	235671
R	473142	213924	29463	5988	44856	7352	547461	227264
U	7899	1883	14807	1702	27181	4821	49887	8406
5. Salem T	601229	373998	281711	78022	188708	32145	1071648	484165
R	573050	359299	132430	36143	79730	14777	785183	410219
U	28179	14699	149308	41879	108978	17368	286465	73947
6. Periyar T	424671	263811	142993	43428	130850	21867	698514	329106
R	406972	252685	91542	29651	59144	11036	557658	293372
U	17699	11126	51451	13777	71706	10831	140856	35734
7. Coimbatore T	399924	291932	293420	57760	248803	43098	942147	392791
R	340875	246889	91892	23351	62289	12545	495056	282786
U	59049	45043	201528	34409	186514	30553	447091	110005

S.No. District	Primary		Secondary		Tertiary		Total Workers	
	Males	Females	Males	Females	Males	Females	Males	Females
8. Trichirapalli T	671398	379838	169967	30199	207721	28670	1049086	438706
R	640474	365464	85631	16485	79233	12300	805388	394249
U	30924	14374	84336	13714	128488	16370	243748	44457
9. Thanjavur T	774651	302907	121287	16757	234148	29098	1130086	348762
R	725991	291443	61527	8416	111407	12968	898925	312827
U	48660	11464	59760	8341	122741	16130	231161	35935
10. Madurai T	763707	526321	208152	47006	317108	52438	1288967	625765
R	694749	491473	69795	18098	102412	22017	866956	531588
U	68958	34848	138357	28908	214696	30421	422011	94177
11. Pudukottai T	229850	93650	31989	4518	53184	6262	315023	104430
R	226224	92567	20802	3374	31600	3514	278626	99455
U	3626	1083	11187	1144	21584	2748	36397	4975
12. Ramanathapuram T	558080	327903	151476	91476	189214	26263	898770	445642
R	520827	312704	66699	40999	75484	13028	663010	366731
U	37253	15199	84777	50477	113730	13235	235760	78911
13. Tirunelveli T	514513	313395	181254	157942	242898	36189	938665	507526
R	457906	287422	76823	100746	97017	16455	631746	404623
U	56607	25973	104431	57196	145881	19734	306919	102903
14. Nilgiris T	93249	69161	25802	3817	41289	7131	160340	80109
R	60965	47075	7522	1287	12653	2037	81140	50399
U	32284	22086	18280	2530	28636	5094	79200	29710

S.No. District	Primary		Secondary		Tertiary		Total Workers	
	Males	Females	Males	Females	Males	Females	Males	Females
15. Kanyakumari T	210260	16453	48934	20520	80881	16029	340075	53001
R	199569	15723	31998	14243	49802	10828	281368	40794
U	10691	730	16936	6277	31079	5201	58707	12207
16. Madras T & U	11511	549	302688	23317	497623	78427	811822	102293

*Source : Compiled from the General Economic Tables of Census of Tamil Nadu 1981.

APPENDIX VII

DATA SET USED IN THE DERIVATION OF AGRICULTURAL EFFICIENCY INDEX AND LABOUR INTENSITY INDEX
IN THE DISTRICT LEVEL OF TAMIL NADU - 1980-81.

S.No.	District	Total cropped area (in hectares)	Net area sown (in hectares)	Percentage of total gross area irrigated to total area sown	Percentage of area under commercial crops	Agricultural workers	Total food grains production (in hectares)	Area under food crops (in hectares)
		1	2	3	4	5	6	7
1.	Chengleput	3,72,933	2,79,405	79.4	18.2	7,04,912	4,69,480	3,05,228
2.	South Arcot	6,47,938	5,09,257	54.0	27.6	12,50,535	5,85,600	4,69,287
3.	North Arcot	5,02,650	4,26,767	48.0	42.3	11,61,642	3,45,150	2,89,032
4.	Salem	3,88,671	3,48,024	34.0	35.0	9,59,057	2,01,050	2,51,586
5.	Dharmapuri	3,77,595	3,17,758	25.8	15.9	6,92,028	2,27,980	3,17,676
6.	Coimbatore	3,94,493	3,53,490	48.6	23.0	6,38,790	2,41,580	3,03,756
7.	Periyar	3,63,581	2,97,350	62.9	33.2	6,78,032	2,78,580	2,42,899
8.	Trichirapalli	5,60,214	4,99,398	39.0	13.4	10,42,253	4,28,990	4,85,208
9.	Pudukkottai	1,52,515	1,43,141	53.9	23.6	3,21,166	85,940	1,16,517
10.	Thanjavur	8,96,018	5,56,107	72.0	10.4	10,49,634	14,45,090	8,03,078
11.	Madurai	5,78,479	5,13,098	51.0	25.0	12,50,632	5,64,400	4,33,632
12.	Ramanathapuram	5,58,174	5,44,297	40.0	23.4	8,49,364	2,02,060	4,27,619
13.	Tirunelveli	5,14,649	4,33,626	47.7	27.7	7,83,906	4,73,090	3,71,835
14.	Nilgiris	59,704	58,555	0.8	68.7	21,864	6,520	18,697
15.	Kanyakumari	1,01,905	79,781	46.1	30.1	1,90,423	95,930	71,242
	State	64,69,519	53,60,054	50.9	24.2	1,15,96,704	56,51,440	49,07,292

Source : 1. Columns 1-4, 6 and 7 from Government of Tamil Nadu, Department of Statistics (1985) Season and Crop Report of Tamil Nadu for the Agricultural year 1980-81. pp. 32-33, 38, 77-78, 90.

2. Column 5 from Tamil Nadu, Director of Census Operations (1987), Census of India 1981, Series 20 Tamil Nadu. General Economic Tables Part III A & B (i) Table B3, pp.154 - 273.

APPENDIX VIII

CONSUMER PRICE INDEX NUMBERS FOR AGRICULTURAL LABOURERS IN
TAMIL NADU 1964 - 65 to 1984 - 85.

1960 - 61 = 100

Year	Index Number
1964 - 65	138
1965 - 66	143
1966 - 67	175
1967 - 68	172
1968 - 69	177
1969 - 70	190
1970 - 71	174
1971 - 72	187
1972 - 73	192
1973 - 74	242
1974 - 75	405
1975 - 76	334
1976 - 77	298
1977 - 78	306
1978 - 79	297

1960 - 61 = 100

Year	Index Number
1979 - 80	334
1980 - 81	391
1981 - 82	432
1982 - 83	464
1983 - 84	528
1984 - 85	512

Source : As released by Labour Bureau, Government of India.
Compiled from the various issues of Agricultural
situation in India.

APPENDIX IX

Illustrative calculation of Z test of difference between NREP and non-NREP SC/ST male workers in levels of employment.

$$\begin{aligned}
 Z &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{X_1^2}{n_1} + \frac{X_2^2}{n_2}}} \quad \text{at } n_1 + n_2 - 2 \text{ degrees of freedom} \\
 &= \frac{20.3121 - 16.5696}{\sqrt{\frac{(6.1072)^2}{157} + \frac{(6.9659)^2}{79}}} \\
 &= \frac{3.7425}{\sqrt{\frac{37.2979}{157} + \frac{48.5238}{79}}} \\
 &= \frac{3.7425}{\sqrt{.2376 + .6142}} \\
 &= \frac{3.7425}{.9229} \\
 &= 4.055^{**} \text{ -- significant at 1 percent level}
 \end{aligned}$$

Table value: 1.96 at P = .05 level

2.58 at P = .01 level.