CHAPTER V

INDUSTRIAL STRUCTURE, PRODUCTIVITY, WORKER PARTICIPATION RATIO AND DISTRICT PER CAPITA INCOME

1. INTRODUCTION

The size of the labourforce and the product per worker, in a way, determine the level of an economy's Net Domestic Product. The variations in the product per worker between the sectors and the regions are also obvious. Such variations are more pronounced in the case of the less developed economies. Therefore, the distribution of workforce (industrial structure) of an economy has an important bearing on the product per worker and consequently on the Net Domestic Product. In fact, the studies conducted by F. A. Hanna,[1] H. S. Perloff,[2]

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1 F. A. Hanna, " State Income Differentials, 1919-54 ". Duke University Press, Durham, N. C., London, 1959.

2 H. S. Perloff, " Interrelations of the State Income and Industrial Structure ", Review of Economics and Statistics, Vol. 29(2), May 1957, pp 162-171.

V. R. Fuches,[3] A. J. Brown and E. M. Burrows,[4] among others, are evidences to show the importance of the industrial structure in explaining the interregional or inter-state Per Capita Income Differences.

In his thesis on the economic sector, Colin Clark argues that, "..... low real income per head is always associated with a low proportion of the working population engaged in tertiary production and a high percentage in Primary Production ..... A high average level of real income per head is always associated with a high proportion of the working population in tertiary industry. The reasons for this growth of the relative number of tertiary producers must largely be sought on the demand side. As income rises the demand for such services rises, and being non-transferable they must be supplied by workers within the country concerned ..... Generally speaking, the main dynamic of economic advances has been rising income per head in either secondary or tertiary industry, often both and the transfer of population away from primary industry".[5]

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3 V. R. Fuches, " The determinants of the redistribution of manufacturing in the U.S.A. since 1929", Review of Economics and Statistics, Vol.XLIV, May 1962, pp 167-177.

4 A. J. Brown and E. M. Burrows, " Regional Economic Problems - Comparative experiences of some market economies ", George Allen and Unwin Ltd., London, 1977, pp 122-127.

5 Colin Clark, " The Conditions of Economic Progress ", (First edition), London, 1940, pp 7-12.

Thus, the thesis is descriptive of the economic growth and the differences in per capita income levels in relation to the industrial structure, productivity and pattern of demand. A number of studies were also conducted to test the validity of the sectoral thesis. S.Kuznets,[6] on the basis of the experience of each of the 48 states of U. S. A. from 1919 to 1955, finds that, among regions (states) the high Per Capita Income was : i) negatively associated with the share of agriculture and related industries in labourforce; ii) positively associated with the share of mining; manufacturing and construction in labourforce; and iii) positively, but weakly, associated with the shares of all service activities in labourforce. There has been, over a period of time, in a majority of the states, i) a decline in the share of agriculture and related industries in the labourforce, ii) a slight increase in the share of mining, manufacturing and construction in the labourforce, iii) a fairly substantial increase in the share of all service activities in the labourforce. The empirical studies conducted by M.M.Dadi[7]

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6 S.Kuznets, " Quantitative Aspects of the Economic Growth of Nations III, Industrial Distribution of Income and Labourforce by States, U.S.A., 1919 - 1955 ", Economic Development and Cultural Change, Vol. VI, July 1958,pp 1-128.

7 M. M. Dadi, 1969, op. cit., pp.28-29.

(cross - section), and K. L. Gupta[8] support the sectoral hypothesis reasoning at the state level data in India. K. R. G. Nair's[9] temporal study of Indian States (1951 to 1961) does not fall on the lines implied in the hypothesis, though cross - section study does. A. K. Singh's[10] findings (based on cross - section data) at the district level data for U. P. are in conformity with the above hypothesis. The present study, however, besides examining the above sectoral hypothesis, attempts to disscect the observed variations of District Per Capita Income, as compared to the state level, in to analytically meaningful parts attributable to i) industrial structure, ii) productivity and iii) worker participation ratio. Such a slicing is done with the help of shift and share analysis.

Section 2 deals with the district-wise distributions of workers, Net Domestic Product and district relative status in productivity. Section 3 studies the three way classification of labourforce employment and the regional pattern of development. The methodology of isolation and

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8 K. L. Gupta, " Development Patterns : An interregional study", Quarterly Journal of Economics, Vol. 85(4), Nov. 1971, pp 644-666.

9 K. R. G. Nair, "Regional Experience in A Developing Economy", Wiley Eastern Limited, New Delhi, 1982.

10 A. K. Singh, op. cit., pp. 102.

quantification of variations in District Per Capita Income is presented in Section 4. Section 5 discusses the contribution of the Industrial Structure, Productivity and Worker Participation Ratio to the Per Capita Income variations. Section 6 attempts to examine the causes of variations in worker participation ratio. The conclusion is given at the end.

2. VARIATIONS IN NUMBER OF WORKERS, NET DOMESTIC PRODUCT AND PRODUCTIVITY

The dissimilarity of shares in Net Domestic Product and in the number of workers between the districts of the state may indicate inter-district differences in the productivity of labour. Therefore, an attempt is made to find out whether the district-wise distribution of Net Domestic Product and the number of workers are identical. On the basis of this, the study on the relative economic status of the districts in terms of product per worker as compared to the Karnataka State product per worker and their changes is conducted for the years 1960-61 and 1970-71 . To find out the relative economic status of the district in terms of productivity as compared to State productivity, the Productivity Relative (Pr) of the district is calculated as under,

$Pr = \frac{YD}{YS} / \frac{WD}{WS}$, where $\frac{YD}{YS}$ = District N.D.P. as proportion

of State N.D.P., $\frac{WD}{WS}$ = District workers as proportion of State total workers. If Pr = 1, Pr > 1 and Pr < 1, then, the district's labour productivity is considered as equal to, higher than and lower than, respectively, the State's labour productivity.[11]

The district-wise distributions of workers, N.D.P. and Productivity Relatives (Pr) for the years 1960-61 and 1970-71 are given in Table 5.1 . It is evident, from the table, that the distributions of workers and Net Domestic Product among the districts of Karnataka were not identical in both the periods of study. In 1961, six of the ninenteen districts had a larger per cent share of N.D.P. than that of workers. In 1971, per cent share of N.D.P. was found to be higher than per cent share of workers in as many as ten districts. Although, the districts of Group Two increased their share in the number of workers from 73.82 % in 1961 to 74.11 % in 1971, their share in N.D.P. declined from 67.36 % to 66.58 % during the same period.[12]

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11 S.Kuznets has used a similar measure to study the inter-sectoral differences in the productivity of labour. See, S.Kuznets,"Modern Economic Growth-Rate, Structure and Spread", Yale University Press, London, 1969, Chapter 3.

12 The classification of Groups One and Two are made on the basis of 1961 development status of the districts. All districts classified as developed and backward in the year 1960-61 are included in Groups One and Two respectively.

TABLE 5.1 : Distribution of Workers, Net Domestic Product (N.D.P.) and Productivity Relative (Pr) Among The Districts Of Karnataka State : 1960-61 and 1970-71.

Sr. No.	Districts	% share of workers (WD/WS)%		% share of N.D.P. (YD/YS)%		Productivity Relative (Pr)		
		1960-61	1970-71	1960-61	1970-71	1960-61	1970-71	Change between 1961 & 1971
1	Kodagu	1.55	1.50	3.37	3.48	2.17	2.32	+0.15
2	Shimoga	4.17	4.09	8.42	6.23	2.02	1.52	-0.50
3	U. K.	2.88	2.81	5.70	3.71	1.98	1.32	-0.66
4	Chikmagalur	2.60	2.50	4.10	4.29	1.57	1.72	+0.15
5	D. K.	7.20	7.36	8.10	7.53	1.11	1.02	-0.09
6	Bellary	4.30	4.19	4.01	4.47	0.93	1.06	+0.16
7	Hassan	3.48	3.44	3.87	3.71	1.11	1.08	-0.03
8	Tumkur	5.63	5.44	5.55	4.13	0.98	0.76	-0.22
9	Chitradurga	4.98	5.10	4.30	4.70	0.86	0.92	+0.06
10	Belgaum	8.49	8.45	7.58	6.76	0.89	0.80	-0.09
11	Mysore	6.77	6.86	6.20	7.71	0.91	1.12	+0.21
12	Mandya	3.60	3.69	3.33	3.45	0.92	0.93	+0.01
13	Dharwad	8.40	8.17	7.19	6.86	0.85	0.84	-0.01
14	Bangalore	9.34	10.44	9.20	11.77	0.98	1.12	+0.14
15	Kolar	5.48	5.20	4.40	3.67	0.80	0.70	-0.10
16	Raichur	5.09	5.18	3.58	5.28	0.70	1.02	+0.32
17	Gulbarga	6.04	5.97	4.47	5.41	0.74	0.90	+0.16
18	Bijapur	7.29	6.94	4.83	4.74	0.66	0.68	+0.02
19	Bidar	2.71	2.67	1.90	2.07	0.70	0.77	+0.07
	Total	100	100	100	100	1.00	1.00	-

Source : Computed from i) Appendix Tables 2.1 and 2.2,
ii) Table 3.2 .

However, the districts of Group One experienced a fall in their per cent shares of both Net Domestic Product and workers from 37.47 % to 33.42 % and 26.18 % to 23.42 % respectively, between the years 1960-61 and 1970-71. These findings suggest that the productivity of labour in the districts of Group One is higher than that in districts of Group Two. This is reflected in the productivity relatives shown in the table. However, in 1971, the values of productivity relatives in three districts of Group Two increased beyond 1. When the district-wise changes in (Pr) are considered between the years 1961 and 1971, seven districts experienced a rise of more than 10 %, while three districts experienced a decline of more than 10 %. The increase in the Productivity Relative(Pr) in seven districts, viz., Kodagu, Chikmagalur, Bellary, Mysore, Bangalore, Raichur and Gulbarga, perhaps indicates that, in these districts, the labour productivity increased at somewhat higher rates than that state-wide. It appears that the productivity status of Group Two districts has, in 1971, improved over that of in 1961. The coefficient of determination (R^2) between the Pr in 1960-61 and changes in Pr from 1961 to 1971, which was worked out at (-)0.29, indicates the convergence of productivity inequality from 1960-61 to 1970-71 in Karnataka.

3. LABOURFORCE EMPLOYMENT AND REGIONAL DEVELOPMENT : THREE-WAY CLASSIFICATION

The above analysis provides sufficient proof to show that there are, wide differences in the product per worker among the districts of Karnataka. In this section an attempt is made to examine the relationship between regional development as indicated by District Per Capita Income and the three way classification of labourforce employment (industrial structure) in Karnataka for the years 1960-61 and 1970-71. In addition, an analysis of the relationship between the changes in per capita income and in industrial structure from 1960-61 to 1970-71 is discussed.

The industrial structure (as reflected in the three way classification of labourforce employment) are already given in Tables 3.4 and 3.5 (Chapter Three) for the years 1961 and 1971 respectively. At first sight, the data contained in the tables do not seem to reveal a definite relationship between the District Per Capita Income and the sectoral occupation of workers. When the per cent share of workers in the different sectors is worked out separately for the group of developed and backward districts, the relationship becomes a little clear. The share of workers in the Primary, Secondary and Tertiary

Sectors for the group of developed and backward districts (as classified in different years on the basis of per capita income) is given in Table 5.2 for the years 1961 and 1971.

TABLE 5.2 : Per Cent Share Of Workers In The Three Sectors For The Group of Developed@ And Backward Districts, Karnataka : 1961 and 1971.

Workers in	Group of developed districts in the year		Group of backward districts in the year	
	1961	1971	1961	1971
1 Primary Sector	73.54 %	68.53 %	77.02 %	77.00 %
2 Secondary Sector	11.48 %	12.90 %	9.84 %	9.51 %
3 Tertiary Sector	14.98 %	18.57 %	13.14 %	13.49 %

@ The classification of Developed and Backward districts is based on District Per Capita Income in the respective years (see Chapter Two).

Source : Computed from Tables 3.4 and 3.5

Thus, from the table, one can broadly generalise that , in Karnataka, the group of poor districts has a higher proportion of workers in Primary Sector and a lower proportion of workers in secondary and tertiary sectors than that in the group of developed districts in the years 1961 and 1971. However, there are a number of variations in the central idea of the sectoral hypothesis.

In 1961, Kodagu and Dharwad, with, more or less, the same proportion of labourforce in the Primary Sector exhibit a contrasting picture in their per capita income. Kodagu and Dharwad are placed at the first and the thirteenth ranks respectively, when the districts are arranged in descending order on the basis of per capita income. In 1971, Bangalore, with the lowest proportion of labourforce in the Primary Sector and the highest Proportion in the Secondary and Tertiary Sectors stands at the ninth place.

A much clearer picture in this connection emerges from Table 5.3, where the coefficients of correlation of Per Capita Income with the pattern of occupations in the Primary, Secondary and Tertiary Sectors for the years 1961 and 1971 are given .

TABLE 5.3 : Relationship Between The Labourforce Employment In The Three Sectors And The District Per Capita Income, Karnataka : 1960-61, 1970-71.

With per cent share of workers in	Coefficients of correlation of D.P.C.I. in	
	1960-61	1970-71
1 Primary Sector	-0.29	-0.12
2 Secondary Sector	+0.23	+0.28
3 Tertiary Sector	+0.28	-0.06

Source : Computed from Tables 2.1 and 3.4, 3.5.

Almost all the signs of the coefficients are along the lines that can be expected in terms of the hypothesis outlined, but none of the coefficients of correlations is significant at 5 % level. Hence, it is difficult to generalise the sectoral thesis.

It also appears that the changes in D.P.C.I. are not related to the changes in industrial structure along the lines implied in the sectoral hypothesis considered in the study. The calculated coefficients of correlation between the changes in Per Capita Income and the changes in workforce in the Primary, Secondary, Tertiary Sectors from 1961 to 1971, are -0.17, +0.41 and +0.02 respectively. The signs of the coefficients seem to indicate that regional development is accompanied by changes in the accupational pattern along expected lines. But no definite conclusion can be drawn on the basis of these coefficients, because none of the coefficients are significant at 5 % level. Though the period under consideration seems to be not so long, it, however, helps to draw a rough outline of the pattern of changes in the industrial structure that occured in the course of the economic growth of districts in the state.

Thus the analysis indicates the existence of industrial structure (employment in three sectors)

differences among the districts of Karnataka. Such differences may give rise to inter-district differences in output per worker. In the present study, it is hard to find indications along the lines of Colin Clark's Sectoral Hypothesis, to show that the economic development at the regional level (district) is accompanied by changes in the industrial structure in Karnataka for the years under examination, viz., 1961 and 1971.

In fact, such a threeway sector pattern alone fails to provide an explanation for the inter-district income differences in the state. This does not mean that Colin Clark's sectoral hypothesis is to be rejected outright from the analytical point of view. As H.S.Perloff puts it, "what suggests itself is that there is a significant relationship between the levels and the industry (employment) structure, but this relationship is not best analysed by threeway classification which has been employed by Colin Clark and others".[13] He is of the opinion that, through certain amount of disaggregation and refinements, the usefulness of the concept can be enhanced by analysing the relationships of income and industrial structure within the various regions of a nation. However, Perloff emphasised the role of the industrial structure and productivity

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13 H. S. Perloff, op. cit., pp 165.

in explaning the variations in state income differences. Thus, in what follows, not only the industrial structure but productivity and labour participation ratio are also to be considered to examine the per capita income variations in different districts.

4. VARIATIONS IN DISTRICT PER CAPITA INCOME : ISOLATION AND QUANTIFICATION

Natural resources, occupational composition (industrial structure), quality of labour, availability of capital and technological factors, are, broadly, the factors responsible for the inter-regional differences in the levels of economic development. Therefore, some of the inter - district income variations may be explained in terms of differences in the occupational structure prevailing in different districts, because, the earnings may differ from sector to sector. It may also be true that the inter-district income differences do prevail, even though, there are no differences in the occupational structure among the districts. This might be due to either differences in the quality of labour employed or differences in the quantity of capital in use or technological differences, among other things, in different districts. However, all such other influences can conviniently be clubbed into one source and called 'productivity' differences in the districts.

The differences in per capita income levels in this way may leave out the variations attributable to labour participation ratio[@](per capita income = labour productivity x labour participation ratio). The inclusion of labour participation ratio, thus, may make it possible to exhaust the observed inter-district per capita income variations among these sources. The relationship between the per capita income and industrial structure, productivity, labour participation ratio may be shown with the following identities :

Let ;

Y_j = Total Income of j^{th} district, where $j = 1,2,3 \ldots n$, y_j = Per Capita Income of j^{th} district, P_j = Total Population of j^{th} district, L_j = Total Workers in the j^{th} district, Y_{ij} = Income in i^{th} sector of j^{th} district, where $i = 1, 2,3.....m$, P_{ij} = Productivity in i^{th} sector of j^{th} district, L_{ij} = Labourforce in i^{th} sector of j^{th} district,

$W_j = \frac{L_j}{P_j}$ = Labour Participation ratio of j^{th} district,

$S_{ij} = \frac{L_{ij}}{L_j}$ = Industrial Structure or Proportion of Labour-force employed in i^{th} sector of j^{th} district.

To make for the difference in symbols used for district and for state, the symbols for the state are used without any subscripts.

Then ,

$$y_j = \frac{Y_j}{P_j} = \frac{\sum Y_{ij}}{P_j} \qquad \ldots\ldots\ldots\ldots\ldots(1)$$

$$= \frac{\sum (Y_{ij} / L_{ij}) (L_{ij})}{P_j} \qquad \ldots\ldots\ldots(2)$$

$$= \frac{L_j}{P_j} \sum \frac{Y_{ij}}{L_{ij}} \cdot \frac{L_{ij}}{L_j} \qquad \ldots\ldots\ldots(3)$$

Equation(3) can be re-written as

$$y_j = W_j \sum P_{ij} \cdot S_{ij} \qquad \ldots\ldots\ldots(4)$$

If there are no district inequalities in Karnataka then $y = y_j$ for every j. But, in reality $y \neq y_j$. Therefore, it is the difference between $y_j - y$, viz., the extent of divergence between the state per capita income and per capita income of j^{th} district, which needs to be explained in terms of the three important factors, namely, industrial structure, productivity and labour participation ratio.

To isolate and quantify the contributions of the three factors to the observed inter-district income variations, the 'Shift and Share' or what is called 'Standardisation Procedure' is employed in the present study. Though the technique was formulated as early as

in 1942 by Danial Creamer,[14] it was employed as a major tool of analysis by H. S. Perloff, Dunn, Lampard and Muth in their opus, 'Regions, Resources and Economic Growth' published in 1960. F.A. Hanna[15] emphasised its role in explaining statistically the state differences in per capita incomes. To L.D.Ashby the'Shift and Share' technique offers " a powerful tool for relating either industrial or regional growth to the overall national growth pace in terms of employment".[16] In fact, the technique has been widely applied in most of the regional studies. However, the specific methodology of the present study is similar to that of M.M.Dadi's work.[17]

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14 Quoted, D. B. Houston, " The Shift and Share analysis of regional growth : A Critique", The southern Economic Journal, Vol.33(4), April 1967, pp 577 - 581.

15 For its limitations and uses see, F. A. Hanna, "Analysis of Inter-state Income Differentials : Theory and Practice" in NBER : Regional Income Studies in Income and Wealth, Vol. 21, 1957. And also see 14 above.

16 Lowell. D. Ashby, "Regional Change in a National Setting - Staff working paper in economics and statistics, No.7, U.S. Department of Commerce, August 1964, pp 27.

17 M. M. Dadi, " Interrelation of State Income, Industrial Structure, Productivity and Labour Participation Ratio", Indian Journal of Industrial Relations, Vol.8(4), April 1973 , pp 571-572.

In the present analysis, an attempt is made to derive the inter-district differences in productivity level first. Then, the productivity differences equation is converted into per capita income levels so as to isolate the influence of labour participation ratio. Such a method is found to be more convinient.

Let;

W_{ij} = number of workers in i^{th} sector for j^{th} district, where, $i = 1,2,3,.....n$, $j = 1,2,3,.....m$, P_{ij} = productivity per worker in i^{th} sector for j^{th} district, where $i=1,2,3,.....n$ and $j = 1,2,3,.....m$. P_i = state productivity in i^{th} sector, where $i = 1,2,3,....n$. W_i = proportion of workers of i^{th} sector to total workers in the state, where $i = 1,2,3,.....n$. W_j = total workforce in the j^{th} district, where, $j = 1,2,3....m$.

Then,

$\sum_{i=1}^{n} (P_i W_{ij})$ gives the expected total income of the j^{th} region attributable to industrial structure (since state productivity set P_i is kept constant), whereas $\sum_{i=1}^{n} (W_i P_{ij})$ would give the expected productivity of the j^{th} region attributable to differences in the net output per person engaged in the region. The term $\sum_{i=1}^{n} \left[\{W_{ij} - (W_j W_i)\} \{P_{ij} - P_i\} \right]$ would, then, indicate

the combined effect (expected change in product) of both industrial structure and labour productivity . In otherwords, the term indicates the extent to which the observed variations in productivity are due to both industrial structure and productivity.

The total differential in the observed productivity in the region as compared to the state productivity , therefore, can be expressed as under :[18]

$$\frac{Y_j}{W_j} - \frac{Y}{W} = \left[\sum_{i=1}^{n} (P_i W_{ij}) \div W_j \right] - \frac{Y}{W}$$

$$+ \sum_{i=1}^{n} (W_i P_{ij}) - \frac{Y}{W}$$

$$+ \sum_{i=1}^{n} \left[\left\{ W_{ij} - (W_j W_i) \right\} \left\{ P_{ij} - P_i \right\} \right]$$

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18 In the equation, the third term on the right hand side which indicates the combined effect of industrial structure and productivity, is retained to know the exact contribution of industrial structure and productivity separately. This combined effect is sometimes refferred to "residual unexplained" which could have been eliminated by using asystem of 'cross weights'. See, for further studies, (a) F.A.Hanna, "Some notes on standardisation procedures", "State Income Differentials 1919-54", Duke University Press, Durham, N.C. 1959, pp 232-245. (b) A. P. Thirlwal, "Weighting Systems and Regional Analysis : A. Reply to Mr.Chnningham", Oxford Economic Papers, vol. 21(1), March 1969,pp 128-33, (c) R.H.Dholakia, 1977, op. cit., pp.305-308.

where; Y_j and Y denote the net product of j^{th} region and State respectively, W_j and W denote total workers for the j^{th} region and State respectively.

From the above productivity differential equations for each district, it is possible to findout observed variations of district per capita income as compared to state level, which, in turn, is attributable to industrial structure, productivity and worker participation ratios. The extent of the unexplained part is attributable to the combined effect of industrial structure and productivity. When the first and second terms of the left hand side equation are multiplied by worker participation ratios of j^{th} district and State, respectively, the observed variation of per capita income of j^{th} district as compared to the State level is obtained. When each term of the right hand side equation is multiplied by State worker participation ratio, the resulting values indicate the contributions of industrial structure, productivity and the combined effect of both the factors, respectively, to the observed variation in the j^{th} district per capita income . However, the right hand side and the left hand side of the equation may not tally each other with the above said multiplications. The residual of the two will show the extent of variations in per capita income attributable to differences in worker participation ratio in different districts. From these

variations, it is possible to generate the series of what is known, expected or hypothetical incomes, due to industrial structure, due to productivity and due to worker participation rates, separately for each district.

5. INDUSTRIAL STRUCTURE, PRODUCTIVITY, WORKER PARTICIPATION RATIO : THEIR CONTRIBUTIONS TO DISTRICT INCOME DIFFERENTIALS

To calculate the contributions of the three factors, viz., industrial structure, productivity and worker participation ratio, to the inter-district differences in Karnataka, the expected incomes are worked out on the basis of six industrial categaries, namely, agriculture and other related industries; extractive and manufacturing industries; construction; transport, storage and communications; trade and commerce; and other services. Though, many more classifications are desirable, the study is restricted to only six industrial categories, simply because, these are only six industry classifications which can be made on the basis of the available data. The six industry group for workers and income, based on population Census classification of workers and sectoral classification of district income respectively, is given in Appendix Table 5.1 .

By employing the Shift and Share Technique, which is disussed in the previous section, the expected district per capita income levels are calculated for the years 1960-61 and 1970-71 at 1960-61 prices. The expected per capita incomes and the deviations in the observed district per capita incomes from the state per capita income, attributable to i) industrial structure, ii) productivity, iii) worker participation ratio, are given in Table 5.4 for the year 1960-61 and in Table 5.5 for the year 1970-71.

From the tables, it can be observed that the contribution of the industrial structure to the observed divergence of district per capita income is more than 5 % of state per capita income in four districts, viz., Tumkur, Mandya, Bangalore and Kolar for the year 1970-71 (i.e. by Rs.18) as against that in six districts, namely, Shimoga, Hassan, Tumkur, Mandya, Bangalore and Kolar for the year 1960-61 (i.e. by Rs. 15). The contribution of worker participation ratio in the observed per capita income is found to be more than 5 % of state per capita income in nine districts for both the periods of study, though the districts are not the same in both the periods. The contribution of productivity to the observed per capita income divergence, however, is less than 10 % of state per capita income in six districts, viz., Bellary,

TABLE 5.4 : Expected District Per Capita Income Levels And Contribution Of Industrial Structure, Productivity And Worker Participation Ratio(W.P.R.) To The Observed Per Capita Income Differences, Karnataka : 1960-61.

(in Rs. At 1960-61 prices)

Sr. No.	Districts	Expected per capita income due to			Variation in observed PCI as compared to state PCI (Rs. 293)	Variations in expected PCI as compared to the state PCI due to			
		Industrial structure	Productivity	Worker participation ratio		Industrial structure	Productivity	Industrial structure & Productivity	Worker participation ratio
1	Kodagu	293	669	379	428	0	+376	-34	+86
2	Shimoga	352	567	273	279	+59	+274	-34	-20
3	U. K.	303	595	284	279	+10	+302	-24	-9
4	Chikmagalur	292	457	305	182	-1	+164	+7	+12
5	D. K.	302	327	320	61	+9	+34	-9	+27
6	Bellary	396	272	322	10	+3	-21	-1	+29
7	Hassan	266	364	266	6	-27	+71	-11	-27
8	Tumkur	268	326	285	-12	-25	+33	-12	-8
9	Chitradurga	288	262	312	-21	-5	-31	-4	+19
10	Belgaum	283	273	295	-29	-10	-20	-1	+2
11	Mysore	292	271	281	-36	-1	-22	-1	-12
12	Mandya	265	321	278	-37	-28	+28	-22	-15
13	Dharwad	303	241	297	-38	+10	-52	0	+4
14	Bangalore	335	234	258	-39	+42	-59	+13	-35
15	Kolar	276	270	294	-57	-17	-23	-18	+1
16	Raichur	279	223	312	-68	-14	-70	-3	+19
17	Gulbarga	279	234	298	-72	-14	-59	-4	+5
18	Bijapur	283	211	299	-92	-10	-82	-6	+6
19	Bidar	280	224	286	-96	-13	-69	-7	-7

Source : Computed from i) Appendix Table 2.1 and
ii) Appendix Table 3.4

TABLE 5.5 : Expected District Per Capita Income Levels And Contribution Of Industrial Structure, Productivity And Worker Participation Ratio(W.P.R.) To The Observed Per Capita Income Differences, Karnataka : 1970-71.

(in Rs. At 1960-61 prices)

Sr. No.	Districts	Expected per capita income due to			Variation in observed PCI as compared to state PCI (Rs. 357)	Variations in expected PCI as compared to the state PCI due to			
		Industrial structure	Productivity	Worker participation ratio		Industrial structure	Productivity	Industrial structure & productivity	Worker participation ratio
1	Kodagu	366	807	492	606	+9	+450	+12	+135
2	Shimoga	360	539	315	144	+3	+182	+1	-42
3	U. K.	358	474	342	100	+1	+117	-3	-15
4	Chikmagalur	347	602	354	253	-10	+245	+21	-3
5	D. K.	374	365	401	53	+17	+8	-16	+44
6	Bellary	349	387	393	59	-8	+30	+1	+36
7	Hassan	347	395	324	-5	-10	+38	0	-33
8	Tumkur	335	299	351	-90	-22	-58	-4	-6
9	Chitradurga	349	342	382	-5	-8	-15	-7	+25
10	Belgaum	348	298	364	-65	-9	-59	-4	+7
11	Mysore	364	394	344	31	+7	+37	0	-13
12	Mandya	329	365	336	-44	-28	+8	-3	-21
13	Dharwad	361	297	364	-50	+4	-60	-1	+7
14	Bangalore	409	310	320	9	+52	-47	+41	-37
15	Kolar	337	285	359	-104	-20	-72	-14	+2
16	Raichur	340	379	383	33	-17	+22	+2	+26
17	Gulbarga	350	330	359	-32	-7	-27	0	+2
18	Bijapur	344	264	360	-107	-13	-93	-4	+3
19	Bidar	346	283	346	-94	-11	-74	+2	-11

Source : Computed from i) Appendix Table 2.2 and
ii) Appendix Table 3.2

Chitradurga, Mandya, Raichur and Gulbarga for the year 1970-71 (i.e. by more than Rs.36)as against that in five districts, viz., Bellary, Belgaum, Mysore, Mandya and Kolar in 1960-61 (i.e. by more than Rs. 29). This means, the similar set of factors are responsible for the divergence of per capita income of some of the districts from state per capita income for the years 1960-61 and 1970-71. However, the results of the two tables are summerised in the following summary table. The summary table indicates the districts which enjoy favourability of the factors, namely, industrial structure, productivity and worker participation ratio in the years under examination.

Favourable factors	Developed Districts*		Backward Districts	
	1960-61	1970-71	1960-61	1970-71
1 Industrial structure, productivity & W.P.R.	D. K.	Kodagu, D. K.	-	-
2 Industrial structure, and productivity	Shimoga, U. K.	Shimoga, U. K. Mysore	-	-
3 Industrial structure, and W.P.R.	Bellary	-	Dharwad	Dharwad
4.Productivity & Worker participation ratio	Kodagu, Chikmagalur	Bellary, Raichur	-	-
5 Industrial structure,	-	Bangalore	Bangalore	-
6 Productivity	Hassan	Chikmagalur	Tumkur, Mandya	Hassan, Mandya
7 Worker participation ratio	-	-	Chitradurga, Mandya, Belgaum, Kolar, Raichur, Gulbarga & Bijapur	Chitradurga, Belgaum, Kolar, Gulbarga, and Bijapur

*The Classification of districts in to developed &backward is based on district per capita income (see Chapter Two).

The table indicates that all the three factors are favourable in only one or two districts, viz., D.K. in 1960-61, Kodagu and D.K. in 1970-71. When favourability with at least two factors, i.e., industrial structure and productivity, industrial structure and worker participation ratio, productivity and worker participation ratio, is considered, the factors are favourable in most of the developed districts in both the periods, whereas they are found to be unfavourable in all backward districts, except Dharwad. Bangalore district alone has the favourable industrial structure in both the periods when favourability with only that factor is studied. When favourability with productivity alone is examined, such a favourability is found only in two of the backward districts in both the periods i.e., Tumkur and Mandya in 1960-61, Hassan and Mandya in 1970-71. However, most of the backward districts exhibited favourability in worker participation ratio in the periods under examination, when its favourability alone is considered. It is clear that none of the developed districts shows favourability in worker participation ratio when it is considered singly. Thus, it is to be realised that Mysore and Bidar in 1960-61 and Tumkur and Bidar in 1970-71, the backward districts in the respective years have suffered most due to industrial structure, productivity and worker participation ratio.

To find out the extent to which the district per capita income variations are explained by each factor under examination the correlation coefficients between the observed per capita income and the expected per capita incomes due to industrial structure, productivity and worker participation ratio are worked out. The results are presented in Table 5.6.

TABLE 5.6 : Correlation Coefficients Between the Observed Per Capita Income And The Expected Per Capita Income Due To Industrial Structure, Productivity And Worker Participation Ratio, Karnataka : 1960-61, 1970-71.

Expected Per Capita Income Due To	Correlation Coefficients with Observed Per Capita Income	
	1960-61	1970-71
1 Industrial Structure	+0.2662	+0.2848
2 Productivity	+0.9722**	+0.9725**
3 Worker Participation Ratio	+0.4327	+0.6464**

** Significant at 1 % level.

Source : Computed from Table 2.1 and Tables 5.4, 5.5.

The results show that the industrial structure does not explain inter district income differences for the years 1960-61 and 1970-71 in Karnataka even when we consider the disaggregation of industries into more than the three way classification. The coefficients are not at all found to be significant at

5 % level, though they have positive signs before them. The worker participation ratio explains the per capita income variations to the extent of 42 % in 1970-71. However, its influence on income variations is inconclusive in 1960-61, as the coefficient of correlation between observed per capita income and expected per capita income due to worker participation ratio is not found to be statistically significant at 5 % level. It is clear that productivity explains most of the inter-district income variations in Karnataka for both the years, as the coefficients in case of productivity are highly significant at 1 % level . Thus, it can be said that only productivity and worker participation ratio stand out as important factors in explaining the inter-district variations in Karnataka for the year 1970-71. Here it is to be noted that the coefficients of determination(R^2) between observed per capita income levels and expected per capita income levels due to industrial structure, productivity and worker participation ratio turned out to be (+) 0.302, (+) 0.740 and (-)0.144 respectively, for the Indian States during 1960-61.[19] According to H.S.Perloff, the industrial structure explains 74 % of state income inequalities in the U.S.A. during the fifties.[20]

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19 M.M.Dadi, April 1973, op. cit., pp 575.

20 H.S.Perloff, May 1957, op. cit., pp 167.

At this stage, it can be known as to what the income inequalities would be if only one of the factors varies from district to district. For this purpose, coefficients of variation of the expected incomes due to industrial structure, productivity and worker participation ratio are worked out and presented in Table 5.7 for the years 1960-61 and 1970-71.

TABLE 5.7 : Coefficients Of Variation Of Expected Per Capita Incomes, Karnataka : 1960-61 and 1970-71 .

Expected Per Capita Income Due To	Coefficient of Variation (%)	
	1960-61	1970-71
1 Industrial Structure	10.98	4.99
2 Productivity	41.17	34.46
3 Worker Participation Ratio	8.88	10.78
Observed Per Capita Income	45.08	42.12

Source : Computed from Table 5.4 and Table 5.5 .

From the table, it is evident that the district income inequality would have been the least for the years 1960-61 and 1970-71, if only worker participation ratio and industrial structure, respectively, varied from district

to district, whereas district income inequality would have been the highest for the same periods, if only productivity varied from district to district, other things remaining at the average level. The inter-district variations in labour productivity are found to be significant in Karnataka for the years 1960-61 and 1970-71. Here, it can be recalled that there were no substantial inter-state variations in the industrial structure in India for the year 1960-61.[21] However, from the income equality point of view, it can be said that the productivity is proved to be the most unfavourable in the years 1960-61 and 1970-71, so far as Karnataka is concerned. It seems, that the growth of different districts might have taken place in such a way that inequality appears to have increased on account of productivity rather than industrial sturcture and worker participation ratio.

6. FACTORS AFFECTING VARIATIONS IN WORKER PARTICIPATION RATES

At this stage, two questions may be asked: one, the factors that make the worker rates to vary from district to district; two, the factors that account for productivity differences among the districts. The present section is

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21 R. H. Dholakia, April 1977, op. cit., pp 313.

devoted to answering the first question, while the next two Chapters are devoted to answering the second.

Although, the variations in worker rates among the regions can be attributed to several socio-economic forces and demographic structures, the present study attempts to examine inter-district worker rate variations in Karnataka with respect to the two factors :

(i) Attitude towards work : The desire or the tendency to work depends upon a host of factors, like industrial structure, employment opportunities, facilities for all levels and kinds of education, wage levels, welfare measures and social security measures, among other things. Differences in these factors are reflected in the differences in worker participation rates.

(ii) Age-sex composition of the population : Since the labour force is expressed as a proportion of the population, it varies with different age structure and sex composition of the population. For instance, the districts with equal population may differ in worker participation rates due to differences in their proportion of men to the respective total population. In the same way, a district which has greater proportion of population in child or old age group will pull down the worker participation rate substantially.

The standardisation procedure is followed to find out the contributions of attitude towards work and age-sex composition of population to the variations in the worker participation rates. Such an exercise is carried out only for the year 1970-71, since, the 1971 population Census provides as many as eight age groups of population and workers, viz., 0 - 14, 15 - 19, 20 - 24, 25 - 29, 30 - 39, 40 - 49, 50 - 59, 60 + and age not stated. The population and worker figures in the different age groups in the Karnataka districts are obtained from the 1971 population Census Reports. Then, two types of district-wise expected worker participation rates, viz., expected worker participation rates due to differences in attitude towards work and expected worker participation rates due to differences in the age-sex composition of the population, are worked out. By applying the Karnataka State age-sex structure as fixed weights to the worker participation rates of different age-sex groups in each district, the standardised worker participation rates due to differences in attitude towards work are obtained. The worker participation rates so calculated indicate the rates due to attitude towards work only, since, the differences in age-sex composition are eliminated by applying the state age-sex structure of the population as fixed weights. Athother series, known as, the expected worker participation rates due to age-sex composition of the population can be

generated, by keeping the Karnataka State worker participation rates (age-sex) as fixed or constant weights. Since the Karnataka State worker participation rates are used as fixed weights, the differences in attitude towards work in the series are eliminated. Therefore, the rates so calculated provide worker participation rates due to the age-sex composition of the population only.

The results, presented in Table 5.8, show the standardised series of worker participation rates and the extent to which the two sources explain variations in the observed worker participation rates from the state average for the year 1971. The residual shows the combined effect of the two factors. To the extent of this residual, we are not able to separate the two effects. However, the smaller the residual, the better it is.

The Table reveals that, in 1971, there are ten districts with worker participation rates higher than the state average of 34.74 %. The high participation rates in Kodagu, Bellary and Raichur are attributable to both attitude towards work and age-sex composition of the population. D.K., Chitradurga, Belgaum, Dharwad and Bijapur districts show high participation rates only due to attitude

TABLE 5.8 : Expected Worker Participation Rates Due To Attitude Towards Work And Due To Age-Sex Composition And Their Contribution To The Deviation Of Observed Worker Participation Rates From The State Average Rate, Karnataka : 1971 .

Sr. No.	Districts	Expected worker participation rate due to (in %)		Observed worker participation rate (in %)	Variation in observed W.P.R. as compared to state W.P.R. of 34.74 %	Variations in worker participation rates due to (in %)		
		Attitude towards work	Age-Sex Composition			Attitude towards work	Age-Sex composition	Residual
1	Kodagu	39.55	35.51	40.40	+5.66	+4.81	+0.77	+0.08
2	Shimoga	33.62	33.24	32.01	-2.73	-1.12	-1.50	-0.11
3	Uttar Kannada	33.97	34.49	33.68	-1.06	-0.77	-0.25	-0.04
4	Chikmaglur	35.28	34.13	34.61	-0.13	+0.54	-0.61	-0.06
5	Dakshina Kannada	39.30	34.19	38.61	+3.84	+4.56	-0.55	-0.17
6	Bellary	37.77	34.98	37.99	+3.25	+3.03	+0.24	-0.02
7	Hassan	32.30	34.15	31.75	-2.99	-2.44	-0.59	+0.04
8	Tumkur	33.75	34.97	34.02	-0.72	-0.99	+0.23	+0.04
9	Chitradurga	38.04	34.25	37.17	+2.43	+3.30	-0.49	-0.38
10	Belgaum	35.56	34.65	35.48	+0.74	+0.82	-0.09	+0.01
11	Mysore	33.03	35.33	33.61	-1.13	-1.71	+0.59	-0.01
12	Mandya	32.90	34.30	32.56	-2.18	-1.84	-0.44	+0.01
13	Dharwad	36.03	34.22	35.56	+0.76	+1.29	-0.52	-0.01
14	Bangalore	30.57	35.86	31.58	-3.16	-4.17	+1.12	-0.11
15	Kolar	34.27	35.39	34.91	+0.17	-0.47	+0.65	-0.01
16	Raichur	36.15	34.96	37.22	+2.48	+1.41	+0.22	+0.85
17	Gulbarga	34.66	35.03	34.94	+0.20	-0.08	+0.29	-0.01
18	Bijapur	35.80	34.53	35.56	+0.82	+1.06	-0.21	+0.03
19	Bidar	33.33	34.27	33.02	-0.72	-1.41	-0.47	+0.16

Source : Computed from, Census of India 1971, Series No.14, Mysore, Part 1-A, Vol.II, General Report, pp 924-944.

towards work, whereas, such a high rate is due to age-sex composition only in Kolar and Gulbarga districts. In Tumkur, Mysore and Bangalore, although, the observed worker participation rates are lower than the state average, the rates due to age-sex composition are above the state average. It is the attitude towards work which has pulled down the observed rates in these districts. On the other hand, it is the age-sex composition which has pulled down the observed worker participation rates in Chikmagalur. Thus the five districts, viz., Shimoga, U.K., Hassan, Mandya and Bidar are left with participation rates lower than the state average, due to both attitude towards work and age-sex composition. However, the residuals are not found to be large in any of the districts, except for Chitradurga and Raichur. The above findings may be summarised in the following tabular form :

	Favourable attitude towards work	Unfavourable attitude towards work
Favourable age-sex composition	Kodagu, Bellary, Raichur	Tumkur, Mysore, Bangalore, Kolar, Gulbarga
Unfavourable age-sex composition	Chikmagalur, D.K., Chitradurga, Belgaum, Dharwad, Bijapur	Shimoga, U.K., Hassan, Mandya, Bidar

Since, the observed worker participation rates are influenced by the attitude towards work and age-sex composition, it would be appropriate to examine the relative importance of each of the two forces. For this purpose, the coefficients of determination (R^2) between the observed worker participation rates on the one hand and each of the explanatory variables on the other are calculated. The coefficient of determination (R^2) between the observed worker participation rate and the expected worker participation rate due to attitude towards work has turned out to be at (+) 0.894 (significant at 1 % level). On the other hand, R^2 between the observed worker participation rate and the expected worker participation rate due to age-sex composition is worked out at (+) 0.078 (not significant at 5 %). Thus, the coefficients reveal that the attitude towards work explains the greater percentage of variations (90 %) in the observed worker participation rates in the Karnataka districts for the year 1971. Here, it is interesting to observe that the age-sex composition explains 85 % of the inter-state variations in the observed worker participation rates in India for the year 1961.[22]

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22 M.M.Dadi, "Variations in labourforce participation — an interregional analysis", Indian Journal of Industrial Relations, Vol. 10(1), July 1974, pp 78.

7. CONCLUSION

i) The study indicates clearly the existence of productivity differences among the districts of Karnataka for the years 1960-61 and 1970-71. The analysis of productivity relative reveals that the labour productivity increased at some what higher rates than the state wide productivity in Kodagu, Chikmagalur, Bellary, Mysore, Bangalore, Raichur and Gulbarga districts between 1960-61 and 1970-71. Further, the correlation analysis indicates the convergence of productivity inequality between the years 1960-61 and 1970-71 in the state.

ii) It is evident from the study that there are differences in industrial structure (employment in three sectors) among the districts of Karnataka for the periods 1960-61 and 1970-71. It is hard to find, in the present study, indications to show that the economic development at the regional level (district) is accompanied by changes in the industrial structure along the lines of Colin Clark's Sectoral hypothesis in Karnataka for the periods under examination. In fact, it can be concluded that the three - way classification of labourforce employment alone is not very useful to explain the differences in the district income levels.

iii) The isolation of sources of the inter-district income differentials, in terms of industrial structure, productivity and worker participation ratio, reveals that the industrial structure does not explain inter-district income difference for the years 1960-61 and 1970-71, even when we consider the disaggregation of industries into more than three-way classification. The worker participation ratio explains 42 % of the per capita income variations in 1970-71. However, its influence, on inter-district income variations is inconclusive in 1960-61. The study indicates that productivity explains most of the inter-district income differences (i.e. about 95 %) in Karnataka for both the periods of study. However, it is to be noted that Mysore and Bidar in 1960-61, and Tumkur and Bidar in 1970-71, have suffered most due to industrial structure, productivity and worker participation ratio. Further, the findings are indicative of the fact that the district income inequality would have been the least for the period 1960-61 and 1970-71, if only worker participation ratio and industrial structure respectively, varied from district to district, whereas district income inequality would have been the highest for the same periods, if only productivity varied from district to district, other things remaining at the average level. From the equality point of view, it can be said that the productivity is proved to be the most

unfavourable in the years 1960-61 and 1970-71, so far as Karnataka is concerned. It appears, that the growth of different districts might have taken place in such a way that inequality appears to have increased on account of productivity rather than industrial structure and worker participation ratio.

iv) The inter-district variations in worker participation rates can be attributed to two factors, inter-alia, a) attitude towards work (which reflects the socio-economic forces) and b) age-sex composition of population (which reflects demographic structure). The findings reveal that it is the attitude towards work, rather than age-sex composition of population, that explains (viz., 85 %) the inter-district differences in worker participation rates for the year 1971 in Karnataka. However, the lower worker participation rates than that of state average in Shimoga, Uttar - Kannada, Hassan, Mandya and Bidar are found to be due to the unfavourableness of both the factors for the year 1970-71.

APPENDIX TABLE 5.1 : Six Industry Group For Workers And Income

Industry Group		Workers	Income (Sectoral)
I	Primary	Cultivators+Agricultural Labourers+Forestry,Livestock, Fishing Hunting, etcetra.	Agriculture+Forestry and Logging+Fishing
II	Extractive And Manufacturing	Mining And Quarrying+ Manufacturing : a) Household b) Non-household	Mining And Quarrying+ Manufacturing : a) Registered b) Unregistered
III	Construction	Construction	Construction
IV	Transport And Communication	Transport,Storage And Communication	Railways+Transport by other Means+Storage+ Communication
V	Trade And Commerce	Trade And Commerce	Trade,Hotels And Restaurants+Banking And Insurance+Real Eastate Ownership,Dwellings And Business Service.
VI	Other Services	Other Services	Electricity, Gas And Water Supply+Public Administration+Other Services.