The Role of Labour in the Post Independence Growth of the Indian Economy

1. The growth of the Indian Economy, as measured by real net output, has been modest in the past. While opinions may differ as to the actual rate of growth, it was presumably between one and one and half per cent per year during the first half of the present century. According to the calculation used here, the growth was 89.2 p.c. over the half century or about 1.3 p.c. per year. The rate of growth accelerated after the independence and it was 44 p.c. during the decade 1950-51—1960-61 or about 3.7 p.c. per year. The object of the present paper is to study the role of labour in the post-independence economic growth of India, for the national economy as a whole and also for a few convenient sectors. In addition, an attempt will be made to contrast the current findings with some findings relating to the period 1900-1950. But this part of the study will be speculative in nature in the absence of adequate statistical data. All findings will, however, be tentative because some uncertainty attaches to the estimates of labour force relating to both the periods. The current period ends in 1960-61, *i.e.*, the year of completion of the Second Plan.

2. It is not easy to obtain a separate estimate of the contribution of labour to the growth of national output. Different methods can be thought of for the purpose. In our stuly, we have used the method followed by Abramovitz, Kuznets, Denison and some others to obtain an estimate of the contribution of "technical progress" to the growth of national product[1]. In this method, the contribution to growth in output (Y), made jointly by inputs of labour (L) and capital (K), is derived by multiplying the observed percentage increases of the inputs by respective shares in the national product (in a base period) attributable to the factors, labour and capital. Deducting the result from the overall percentage growth in output, we get an estimate of the contribution of the so called "technical progress". It follows from this that the index of percentage growth of labour input multiplied by the contribution of labour in the current period. Likewise, we can get the contribution of capital input; and the residual is attributable to "technical

[1] Moseh Abramovitz : Resources and output trends in the US since 1870: *American Economic Review*, Vol. 46, No- 2, March, 1956.

Simon Kuznets : *Post War Economic Growth : Four Lectures,* (1964).
Edward F- Denison : *Sources of Economic Growth in the United States and the Alternatives before us,* (1962). Published by the Committee for Economic Development.

progress". We can, thus, compare the contribution made by labour with those made by capital and "technical progress". Obviously, we also get the contribution of labour in the aggregate percentage growth.

3. The procedure is not fully satisfactory for several reasons. First, the experience of western countries shows that "technical progress" contributes much more to growth than either of the factor inputs. This is due to the fact that qualitative changes in labour and capital inputs are inadequately covered in the series used for labour and capital. The residual factor, "technical progress" thus means all other unknown factors. Hence, Abramovitz considers the contribution of this factor as a measure of our ignorance of the factors affecting growth other than labour and capital. Denison attempted to itemise several components of this ; yet his residual also makes the largest contribution. In India, the growth in labour input is measured by labour force only, without any allowance even for man-hours worked. Consequently, we propose to use the phrase "residual factors" (R) for "technical progress".

4. Second, the method depends on the assumption that factors receive the value of their marginal products, and it may, therefore, lead to misleading results unless the system behaves as if there is perfect competition. There is no reason to believe that this hypothesis is valid under Indian conditions, except as a crude assumption. Third, the approach lepends on the assumption of a constant return to scale, and it is not impossible that there may be increasing (or diminishing) returns. Finally, statistical inaccuracies attach to series of output, labour and capital, and the base period estimates of factor distribution of national product. In view of all these shortcomings, the procedure is not expected to give an accurate assessment of the contribution of labour to Indian economic growth. The results obtained by us are, however, suggestive of certain tendencies. Also, irrespective of results, the procedure furnishes a useful tool of analysis.

5. As already indicated, data used by us relate to output, labour and capital, as well as distribution of national income by factors shares in a base period. Net national output at constant prices is used as the measure of output, labour force as the measure of labour input and stock of capital as the measure of capital input. Estimates of net output are taken from official sources, estimates of labour force are consistent with the *official* estimates of national income and estimates of capital stock are culled from a paper by one of the authors.[2] The estimate of factor breakdown of national income is

taken from a paper by Narayanan and Roy.[3] We have taken figures for 1956-57 for our calculations. At the national level, the labour share was 75 p.c. and capital share was 25 p.c. in his year. For the organised sectors considered by us, we have taken 70 p.c. as the labour share and 30 p.c. as the capital share, the figures being obtained by rounding of observed figures of 68 p.c. and 32 p.c. Likewise, for unorganised sectors, observed figures of 81 p.c. for labour and 19 p.c. for capital were rounded off to 80 p.c. and 20 p.c. We have used some other data also for certain alternative calculations ; these will be briefly described as and when used.

6. The percentage changes in Y, L and K during a period may respectively be depicted by r, r_l and r_k. If λ_l is the share of labour in the base period and λ_k the share of capital, then the joint contribution of labour and capital is given by $\lambda_l\, r_l + \lambda_k\, r_k$. The contribution of residual factors (R) is thus $r - \lambda_l\, r_l - \lambda_k\, r_k$. The contributions to overall growth by labour, capital and residual factors are thus measured respectively by :

$$\frac{\lambda_l\, r_l}{r}, \quad \frac{\lambda_k\, r_k}{r} \quad \text{and} \quad \frac{r - \lambda_l\, r_l - \lambda_k\, r_k}{r} .[4]$$

It is possible to take up these calculations on a per capita basis, replacing Y, L and K by Y/P, L/P and K/P, P standing for population. Second, while we have worked with percentages over a number of years, it is possible to obtain annual percentage changes and then adopt this analysis. We have not, however, attempted these refinements because they do not add very much to our analysis.

7. The basic finding about the post-independence period, 1950-51 to 1960-61, are presented in the table below :

[3] R. Narayanan and Bina Roy : The movement of distributive shares in India 1948-49 to 1957-58, *Papers of National Income and Allied Topics*, III, (1965).

[4] Suppose there are L_0 units of labour and K_0 units of capital in the base year. Also let labour and capital shares in the national product be respectively λ_l and λ_k ($\lambda_l + \lambda_k = 1$) in the base year. If Y_0 be national product in the base year, labour gets $\lambda_l\, Y_0$ and capital gets $\lambda_k\, Y_0$. Thus base year unit costs of labour and capital are respectively $\lambda_l\, Y_0/L_0$ and $\lambda_k\, Y_0/K_0$. If labour now grows from L_0 to $L_0\,(1+r_l)$ and capital from K_0 to $\overline{K}_0\,(1+r_k)$ during a period, the joint contribution of labour and capital at base period prices is given by $(1 + r_l)\, L_0 \cdot \lambda_l\, Y_0/L_0 + (1+r_k)\, K_0 \cdot \lambda_k\, r_k/\overline{K}_0 = (1 + \lambda_l\, r_l + \lambda_k\, r_k)\, Y_0$. If the output grows from Y_0 to $(1+r)\, Y_0$ during the period, then the contributions of labour, capital and "technical progress" are seen to be measured respectively by $\lambda_l\, r_l$, $\lambda_k\, r_k$ and $r - \lambda_l\, r_l - \lambda_k\, r_k$.

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Table No. 1

Contribution to growth of national output by labour, capital and residual factors, 1950-51—1960-61

contribution of	entire economy		organised sectors		unorganised sectors	
	contribution p.c.	col. (2) as p.c of line (5)	contribution p.c.	col. (4) as p.c. of line (5)	contribution p.c.	col. (6) as p.c of line (5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. labour	12.8	29	10.2	17	11.8	36
2. capital	13.8	32	21.1	35	10.6	32
3. labour & capital	26.6	61	31.3	51	22.4	68
4. residual factors	17.2	39	29.6	49	10.4	32
5. total p.c. growth of national output	43.8	100	60.9	100	32.8	100

For the entire economy, the contributions of labour and capital are roughly equal, both being somewhat lower than one-third. The residual factors equal, both being somewhat lower than one-third. The residual factors contribute about 40 p.c. of the growth in output. The organised sectors comprise mining, large-scale manufacturing, railways, other transport and communications and the entire trading and commercial activities. For this sector, the contribution of residual factors is larger, nearing one-half. Here, thus, "technical progress" contributes relatively more. The share of labour here reduces to about one-sixth while the share of capital remains only a little above one-third. Coming to the unorganised sectors comprising agriculture, animal husbandary, forestry, fishery and small scale and household industries,[5] we note that the labour share is more than one-third, the capital share is slightly less then one-third and the role of residual factors is lowest being again slightly lower than one-third. The contribution of labour to growth during the period under study was thus 29 p.c. for the entire economy,

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[5] National income sectors, house property using little labour force and professions and liberal arts, government service and domestic service all using little capital have been left out, for the purposes of abofe calculations.

17 p.c. fo more organised sectors and 36 p.c. for unorganised sectors. Also, so-called "technical progress" made larger contribution in organised sectors than in unorganised sectors, being 49 p.c. in the former against 32 p.c. in the later.

8. Data permitted an additional computation of this type for the period 1948-49 to 1960-61 for the national economy as a whole. The results are similar to those presented earlier. The share of labour, however, slightly rises while that of residual factors reduces to some extent. This vaguely suggests improvement in "technical progress" during the plan era.

9. We have already mentioned that the above calculations depend on the labour force estimates implicit in the official national income statistics. The rate of growth of labour force here is about 1.6 p.c. per year. As is well known, these estimates do not depend on the 1961 census labour force data. If we use 1951 and 1961 labour force data from the census sources, the rate of increase becomes as much as 3 p.c. per year. If this is done, then at the national level, for the period 1948-49 to 1960-61, the growth in output is almost fully explained by labour and capital, the residual factors making no contribution. The share of labour in this case, becomes two-thirds while that of capital, one-third. For the 10 year period, 1950-51 to 1960-61, the residual factors make a small contribution of a little less than 10 p.c. while labour contributes about 60 p.c. and capital about 30 p.c. The relative importance of labour brought out by the above calculations, however, may not be realistic. The labour force estimate given in the 1961 census are not comparable with that based on 1951 census. The rate of growth is as much as 3 p.c. and exceeds the rate of population growth which was of the order of 2 p.c. Further, population in working ages increased by only 17 p.c. between 1951 and 1961. Finally, the national income estimates partly depend on the labour force data and a switching over to larger rate of growth in labour force would have resulted in an increase in the rate of growth of national product. Thus, the finding based on the 1961 census labour force data does not contradict our earlier results. There is, however, a suggestion that probably the labour force increased at a higher rate than 1.6 p.c. per year. If this is so, then in reality, the contribution of labour to national product given earlier would be somewhat higher while that of residual factors would go down to this extent. The results presented, earlier, thus need this qualification.

10. How does our post-independence finding fit in with our historical experience? It is only possible to speculate on this interesting topic because we do not have any estimate of capital stock relating to a past year enabling us to guess the rate of growth of capital in the country. However, if we assume an invariance of capital output ratio, or in other words, postulate

equal rates of growth for output and capital, it is possible to repeat the above
calculations for the period 1900-1950. The salient point about this period is
a relatively low rate of growth of the labour force (26.5 p.c.) during a pe-
riod in which output went up by 89.2 p.c.[6] In view of this, for the period
as a whole, a little more than half of the growth (53 p.c.) is contributed
by residual factors, and the remaining 47 p.c. in shared more or less equal-
ly by capital (25 p.c.) and labour (22 p.c.). Thus, during the period
1900-1950, labour contributed to a little less than one-fourth of the growth
as against about one-third during the post-independence period studied. The
finding is thus a little surprising particularly because of the large role of the
so-called "technical progress" factor. Even in the Indian context, it ap-
ears that qualitative improvement in labour and capital did have a significant
role to play in the growth of output. However, as the statistical basis of
these estimated are weak, it may be possible that the growth of income during
the period was somewhat lower and the increase in labour force was more
than what the census estimates convey. This will probably give a better ap-
proximation to reality with a higher contribution of labour and a lower con-
tribution of the residual factor. For example, if the rate of growth of labour
force observed during the period 1901-1961 is ascribed to the period 1901-
1951, we get a 55 p.c. rise in labour force during 1901-1951 instead of only
26.5 p.c. In this case, other things remaining the same, residual factors
contribute only 29 p.c., capital 25 p.c. as before and labour, as much as
46 p.c.

11. In all above calculations, we have used a current period base for
calculating the shares of labour and capital in the national product. The shares
at the national level used by us are 25 p.c. for capital and 75 p.c. for labour
obtained in 1956-57. A shift of base will alter all above results to some extent
though not widely. If we adopt a lower share for property, the relative contri-
bution of capital will reduce and the relative contribution of labour will in-
crease. But since property income shares have little relation with economic
growth, the share could not have been significantly lower in the past and
as such the procedure followed by us is permissible.

12. For capital, we have uniformly used reproducible tangible wealth.
What will happen if we include land also in wealth? This will probably re-
duce the rate of growth of capital, both for the current period and for 1900-
1950, and thus bring down the contribution of capital to growth. Since,
contribution by labour remains unaffected, the contribution by the residual
factor will increase as a result of this. However, available estimates of the

rate of growth of the value of land are extremely weak, and hence, a study of this type will be of dubious value.

13. The assumption of constancy of capital output ratio is no doubt unrealistic. If we assume that the capital output ratio was somewhat lower in 1900, this will increase the contribution of capital and reduce the contribution of residual factors, the contribution of labour remaining the same. Postulation of a higher capital output ratio in 1900, on the other hand, will increase the contribution of residual factors at the expense of that of capital. Since it is unrealistic to assume a lower capital output ratio in 1900 because it would imply very low rate of saving in the past, this line of reasoning cannot establish that the role of residual factors in India was, in fact, less important than what we have conveyed.

14. In a recent study[7], Uma Datta Roy Chowdhury has furnished some material enabling us to repeat our calculations for several sectors of the Indian economy for the period 1950-51 to 1960-61 covered by the first two five year plans. She gives index numbers for Y | L and Y. It is, therefore, possible to calculate the index number for L. The index number for K, also necessary for our purpose, can be obtained from her estimates of capital stock. For each sector, we have used separate property : labour income ratios relating to 1950-51 taken from the paper by Narayanan and Roy. The results of our calculation are given below :

Table No. 2

Percentage contributions to growth by labour, capital and residual factors for the national economy and individual sectors, 1950-51.

sectors	p.c. contributions to growth by			
	labour	capital	residual	all factors
(1)	(2)	(3)	(4)	(5)
1. agriculture, etc.	36	10	46	100
2. Mining	2	41	57	100
3. large industries	14	70	16	100
4. small industries	30	63	7	100
5. railways	22	34	44	100
6. communications	77	11	12	100
7. trade and transport	16	20	64	100
8. other services	32	17	51	100
9. entire economy	29	26	45	100

[7] Uma Datta Roy Chowdhury : Technological changes in the Indian Economy : *Economic and Political Weekly*, Vol. I, August 10, 1966.

15. For the economy as a whole, the findings are not widely different from our earlier findings. The role of the residual factors is slightly higher while those of labour and capital somewhat lower. These changes are to be expected because her series for capital is different : also the weight base of factor shares relates to 1950-51 instead of 1956-57 used earlier. Coming to the sectors, we notice that the contribution of labour to growth has been large for communications, moderate for agriculture, small industries and other services and low in other sectors. As one would expect, contribution of capital was large in large industries, mining and railways. Surprisingly, it is also large for small industries. Its role is relatively low in agriculture, communications, trade and transport and other services. The residual unexplained factors were important for trade and transport, mining, other services, railways and agriculture. It is low in small industries, communications and large industries.

16. The above findings, in many cases, do not fit in with our general notions. One would, for example, have expected a larger contribution of residual factors to large scale industries and a smaller contribution to trade and non-railway transport. The explanation of this may be found partly in the inaccuracy of the estimates, particularly that of the labour force. The figures at sectoral levels are naturally less accurate than those at the national level or at the level of major groups of sectors. But even granting inaccuracy in data, it is clear that large increases in output occurred in several sectors without any considerable addition to the primary inputs, labour and capital. While technical progress may be regarded as one of the residual factors, there must be various "non-technical" factors promoting growth. A study of these factors will be a fruitful line of work.

17. In conclusion, we may point out that this brief paper, apart from throwing up some interesting results, indicates a type of analysis which has not been used in India. We feel that more work can be done on the these lines, in given time. But to be fruitful, further work would require critical appraisal of the available statistical series. Particularly, it is necessary to work out a series giving a better measure of the movements in labour input.

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