

## **Development Planning & Policies under Mahalanobis Strategy: A Tale of India's Dilemma**

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### **Abstract**

*The designer of India's Second Five Year Plan (1956-61) was Professor Prasanta Chandra Mahalanobis, who had adopted the simple two sector model of Soviet Planning of Feldman type. He gave top priority to investment goods, as they were crucial for further economic growth of India. The disadvantage of this strategy was capital deepening, that is, the commitment of large amounts of capital to heavy industry, which would yield low returns. At the same time this investment would generate buying power, which could not be absorbed due to neglect of consumption goods, and this could lead to inflation.*

*Mahalanobis also designed a four sector model. This time also, he retained the emphasis on investment goods, but divided the other sector into three sub-sectors: (a) industry; (b) agriculture and cottage industry and (c) services, education and health etc. Only one third of the total investment should go to the three sub-sectors as mentioned above. Cottage industry, in particular, was singled out as a major potential producer of consumption goods. The fact that cottage industry required little capital and was labour intensive was highlighted. Of course, for this very reason one could not expect a great deal of savings from cottage industry, which would be required for future economic growth. Heavy industry in the public sector was considered to be the major item once more, as it was the very symbol of economic independence and was thought to be crucial for the maintenance of political independence.*

*In the above backdrop the present paper gives a short review of Mahalanobis strategy of development planning in the context of the then India's dilemma: dynamic industrialization and static agriculture.*

**Key Words:** Dutch Disease, Contagion, Speculative Attack

**Jel Classification:** F2, F21, F32,

India's approach to rapid industrialization in the mid- Fifties deserves attention. This approach was devised to enable India to industrialization under conditions of stagnant or slowly growing exports. Under such conditions, foreign exchange needed to import capital goods was not available and consequently the country must develop its own capital goods sector. P.C. Mahalanobis, clearly influenced by the Soviet experience, and being believed in the argument of A. G. Feldman (1884-1958) 1928 paper that "an increase in the rate of income demands industrialization ,heavy industry, machine building, electrification..." designed an inward-looking industrialization strategy for India's Second Five- Year plan that was spearheaded by the development and expansion of the capital goods industries and the government took responsibility for the country's economic development. Policy

was formulated within the framework of a series of five-year plans in which the public sector was expected to play the leading role. Second, beginning with the Second Five –Year Plan (1955-60) particular emphasis was placed upon the growth of the capital goods sector. One reason for this

emphasis was "export pessimism", a belief that the world market would grow relatively slowly and following the Prebisch- Singer argument that the terms of trade were likely to move against India's primary export commodities. It was also believed that only after industrialization had proceeded some way that increased production would be reflected in larger export earnings. It was also argued that given the India's large domestic market to absorb the increased supply of tradable manufactures, exports need not be an engine of growth. Accordingly exports were regarded as a residual, a vent-for surplus on those occasions when surpluses were available. In addition, third, the country wished to be self-reliant through time in heavy industry and related commodities.

If one assumes that the primary objective of economic policy was to develop a capital goods sector so that India's rate of accumulation could be independent of the growth of export earnings, then India's industrialization in the mid-Fifties must be judged a success. The inward-looking industrialization strategy resulted in higher rate of industrial production. Industrialization progress had also led to the growth of technological and managerial skills, and industrial and scientific research. The country also achieved near self-sufficiency in the production of manufactured goods as reflected in the composition of imports which mainly consisted of petroleum products, chemical and capital goods. The capital goods sector received a severe blow after 1966. The share of the capital goods sector rose steadily from less than 5 percent of industrial output at the beginning of the Second Five- Year Plan to nearly 18 per cent in 1979-80. The share of the so-called basic goods (fertilizer, cement, electric power, etc.) also rose substantially. The net value added in the capital goods industries grew much faster than in any other sub-sector. Thus in relative terms the priority given to capital goods by the policymakers was achieved. But the disquieting fact was that the signs of strains in the balance of payments were clearly visible in the Second Plan. As the import demand surged on account of development of heavy industries, current account deficits in the Second Plan surged to 2.3 percent of GDP. The difficulties in financing fast growing imports with stagnant exports put considerable strain on reserves as import cover of reserves (or foreign currency assets ) plunged to barely two months by the terminal year of the Second Plan. Moreover, dynamism of public sector locomotive had run out of steam and the momentum achieved towards the higher rates of growth of output and total factor productivity in India's manufacturing sector in the period 1955-65 had never been regained until 1975. On the other hand the heavy industrialization strategy could not have led to increased supplies of food and agricultural commodities. In the above backdrop the present paper tries to trace the dynamics of the Mahalanobis model with its major limitations and to show India's dilemma: dynamic industrialization and static agriculture of the then time during those periods.

### **Mahalanobis Model of Development Planning**

A model attempts to identify the main variables in the system and show the various interrelationships that exist among them. From an ideal point of view, an economic model should be a reflection of economic reality. However, no model can achieve a perfect reflection. In practice, the model, therefore, remains an abstraction which can only incorporate the quantifiable aspects of the real world. When economic model is used for the purpose of achieving certain predetermined objectives, it then becomes planning models.

There are three types of planning models. The first one is aggregative models that embrace the entire economy. They, being the broad macroeconomic models, normally try to determine the possible growth rates of national income and the relationship with saving and investment. The Harrod-Domar model is such an example that seeks to establish a consistent relationship between the desired or

targeted rate of growth of national income and the total amount of savings required to attain this growth rate through the ICOR. According to this model, given the overall ICOR, a higher rate of saving will lead to a higher rate of growth.

The second type of planning model is sector model emphasizing few selected sectors of the economy. Their main purpose is to determine the levels of production and the alternative production possibilities in these sectors. The last one is the multi-sector inter-industry models. They try to determine the output of various sectors, given a vector of final demand in the form of consumption and investment. The aggregative models and the inter-industry models make an attempt to cover all the sectors of the economy. Then it becomes an operational model.

The Mahalanobis model represented an alternative approach to planning that focused on the bottlenecks created by a shortage of capital goods rather than a shortage of aggregate savings as emphasized by the Harrod-Domar model and tried to remove those bottlenecks to rapid economic growth. The two sector model formulated by Professor Mahalanobis played an important role in the development of major ideas relating to economic planning in India. As against the Harrod-Domar model, the Mahalanobis model laid considerable emphasis on the possibility that the overall rate of real investment in the economy might be constrained by the level of output in the capital goods industry within the economy. In such a situation, since the overall rate of growth over a given period of time tended to vary directly with the overall rate of investment in the economy, the Mahalanobis model suggested that the allocation of a higher proportion of total investment to capital goods industries rather than to consumer goods industries.

Feldman model, which lay at the back of Stalinist model, was constructed as early as in 1928, but it remained in obscurity till its discovery (after the publication of Mahalanobis model) by Evsy Domar. In Feldman model, the output of wage goods and of agricultural commodities was kept constant. This pattern emphasized the network of building heavy industry for erstwhile USSR. Mahalanobis produced a model similar rather identical with that of Feldman. This appealed to Jawaharlal Nehru because by modernisation of the Indian economy, Nehru meant industrialization. This Feldmanite type of industrialization strategy was forced on the Indian economy. Leftist economists of that time treated Marxist theory in a naïve manner. They interpreted the Stalinist model as tantamount to Marxist theory in practice. Agricultural development for the same got naturally neglected.

The Feldman-Mahalanobis approach is basically a model which tries to explore the allocation of investment between the different sectors of the economy. Feldman used his model in the Third Five-Year Plan for erstwhile USSR and Mahalanobis used the model in India's Second Five-Year Plan. In the growth theoretic area, A.G Feldman alone appears to be the true predecessor of Mahalanobis.

The Mahalanobis model is based on the following assumptions:

The economy is a closed one: there are no exports or there are severe constraints on the growth of exports. This leads to a strategy of maximising investment in the capital goods industries and this, it was thought, will maximise the growth of productivity in the economy as a whole.

The capital or machinery once installed in a particular industry cannot be shifted to another.

The economy is divided into two sectors—the consumer goods sector and the investment goods sector.

Growth rate of aggregate investment in the economy is exactly equal to the growth rate of output in the capital goods sector within the economy. The model assumes away the possibilities of acquiring additional capital goods through imports.

There is no excess capital in either of the two sectors and whatever is produced by the capital goods sector is fully utilised for the purpose of capital formation in the economy.

Mahalanobis assumes that relative prices are constant. Thus he assumes away the problems of the terms of trade debate between the two sectors.

Model: Let  $\lambda_k$  be the ratio of allocation in favour of investment goods sector.

And  $\lambda_c$  be the ratio of allocation in favour of consumption goods sector.

We further have  $\lambda_k + \lambda_c = 1$

Thus  $\lambda_k I_t$  is the investment allocation for capital goods sector.

and  $\lambda_c I_t$  is the investment allocation for consumption goods sector.

$$\text{Let } \beta_k = \frac{\Delta I_t}{\lambda_k I_t} \therefore I_{t+1} - I_t = \beta_k \lambda_k I_t.$$

$$\text{and } \beta_c = \frac{\Delta C_t}{\lambda_c I_t} \therefore C_{t+1} - C_t = \beta_c \lambda_c I_t.$$

we now write :  $\Delta Y_t = \Delta C_t + \Delta I_t \dots \dots \dots (1)$

$$\Delta I_t = \beta_k \lambda_k I_t \dots \dots \dots (2)$$

$$\Delta C_t = \beta_c \lambda_c I_t \dots \dots \dots (3)$$

from (1) & (2) we have

$$\Delta Y_t = \beta_c \lambda_c I_t + \beta_k \lambda_k I_t$$

$\therefore \Delta Y_t = I_t (\beta_c \lambda_c + \beta_k \lambda_k)$  and  $\lambda_k + \lambda_c = 1$

Here we have  $\beta_k, \beta_c$  as constant. It is parameter and unknowns are  $\lambda_k, \lambda_c$  and  $\Delta Y_t$ . Three unknowns and two equations. This gives the planner an opportunity to choose.

This makes Mahalanobis model a planning model as opposed to growth model where there is no degree of freedom.

Now  $\Delta I_t = \lambda_k \beta_k I_t$ , or,  $I_{t+1} - I_t = \beta_k \lambda_k I_t$ , or,  $I_{t+1} = (1 + \beta_k \lambda_k) I_t$ ,  $\therefore I_t = (1 + \beta_k \lambda_k) I_{t-1}$

Now  $I_{t-1} = (1 + \beta_k \lambda_k) I_{t-2}$ , Hence  $I_t = (1 + \beta_k \lambda_k)^2 I_{t-2}$

Again  $I_{t-2} = (1 + \beta_k \lambda_k) I_{t-3}$ , Hence  $I_t = (1 + \beta_k \lambda_k)^3 I_{t-3}$

Ultimately we have

$$I_t = (1 + \beta_k \lambda_k)^t I_{t-t}, \text{ or, } I_t = (1 + \beta_k \lambda_k)^t I_0, \text{ or, } I_t - I_0 = (1 + \beta_k \lambda_k)^t I_0 - I_0 \\ \therefore I_t - I_0 = [(1 + \beta_k \lambda_k)^{t-1}] I_0$$

$$\beta_c = \frac{\Delta C_t}{\lambda_c I_t}$$

Now,  $\therefore \Delta C_t = \beta_c \lambda_c I_t$

Putting  $t = 0$ ,  $\therefore \Delta C_0 = \beta_c \lambda_c I_0$ ,  $\therefore C_1 - C_0 = \beta_c \lambda_c I_0$

$$\text{and } C_2 - C_0 = (C_2 - C_1) + (C_1 - C_0) = (\beta_c \lambda_c I_1) + (\beta_c \lambda_c I_0) = \beta_c \lambda_c (I_1 + I_0) \\ = \beta_c \lambda_c [(1 + \beta_k \lambda_k) I_0 + I_0] = \beta_c \lambda_c [(1 + \beta_k \lambda_k) I_0] + \beta_c \lambda_c I_0$$

$$C_3 - C_0 = (C_3 - C_2) + (C_2 - C_1) + (C_1 - C_0)$$

$$= \beta_c \lambda_c [(1 + \beta_k \lambda_k)^2 I_0] + \beta_c \lambda_c [(1 + \beta_k \lambda_k) I_0] + \beta_c \lambda_c I_0$$

$$= \beta_c \lambda_c I_0 [(1 + \beta_k \lambda_k)^2 + (1 + \beta_k \lambda_k) + 1]$$

$$\therefore C_t - C_0 = \beta_c \lambda_c I_0 [(1 + \beta_k \lambda_k)_{t-1} + (1 + \beta_k \lambda_k)_{t-2} + \dots + (1 + \beta_k \lambda_k)^2 + (1 + \beta_k \lambda_k)^1 + 1]$$

$$= \beta_c \lambda_c I_0 \cdot \frac{1 \cdot (1 + \beta_k \lambda_k)^t - 1}{(1 + \beta_k \lambda_k) - 1} = \frac{\beta_c \lambda_c I_0}{\beta_k \lambda_k} [(1 + \beta_k \lambda_k)^t - 1]$$

Now we have in us :

$$I_t = (1 + \beta_k \lambda_k)^t I_0, \text{ or } I_t - I_0 = [(1 + \beta_k \lambda_k)^t - 1] I_0$$

$$C_t - C_0 = \frac{\beta_c \lambda_c I_0}{\beta_k \lambda_k} \left[ \frac{(1 + \beta_k \lambda_k)^t - 1}{1} \right]$$

And

$$\text{Now, } \Delta Y_t = \Delta C_t + \Delta I_t, \therefore Y_t - Y_0 = C_t - C_0 + I_t - I_0$$

$$Y_t - Y_0 = \frac{\beta_c \lambda_c I_0}{\beta_k \lambda_k} [(1 + \beta_k \lambda_k)^t - 1] + [(1 + \beta_k \lambda_k)^t - 1] I_0$$

or,

$$= \left[ \frac{\beta_c \lambda_c I_0}{\beta_k \lambda_k} + I_0 \right] [(1 + \lambda_k \beta_k)^t - 1] = I_0 \left[ \frac{\beta_c \lambda_c}{\beta_k \lambda_k} + 1 \right] [(1 + \lambda_k \beta_k)^t - 1]$$

$I_0$  is the investment in the initial period. If we put  $I_0 = \alpha_0 Y_0$ , where  $I_0$  bears a constant proportional relationship to initial income, then the growth of income can be written as:

$$Y_t = Y_0 + \alpha_0 Y_0 \left[ \frac{\beta_k \lambda_k + \beta_c \lambda_c}{\beta_k \lambda_k} \right] [(1 + \lambda_k \beta_k)^t - 1]$$

where  $Y_t$  = Gross domestic product (GDP) in year  $t$  (at constant prices)

$Y_0$  = national income in the initial period.

$$\alpha_0 = \left( \frac{I_0}{Y_0} \right)$$

is the rate of net investment in the base year '0'

$\lambda_k$  = share of investment going to investment goods sector.

$\lambda_c = (1 - \lambda_k)$  share of investment going to consumption goods sector.

$\beta_k$  = incremental output-capital ratio going to investment goods sector.

$\beta_c$  = incremental output-capital ratio going to consumption goods sector.

Now the unknowns are  $Y_t$ ,  $\lambda_k$ ,  $\lambda_c$ . Number of equations are two.

$\beta_k$  is the reciprocal of sectoral marginal capital- output ratio in the investment goods sector.

$I_0$  and  $Y_0$  are given.

The policy variables are  $\lambda_k$  and  $\lambda_c$ .  $Y_t$  is the target variable.

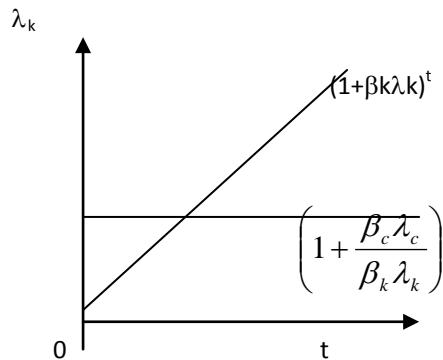
We are now going to find out what would happen to the time path of  $Y_t$  if  $\lambda_k$  has a lower

$$\left( 1 + \frac{\beta_c \lambda_c}{\beta_k \lambda_k} \right)$$

value ? If  $\lambda_k$  has lower value, then  $\left( 1 + \frac{\beta_c \lambda_c}{\beta_k \lambda_k} \right)$  will increase. This implies that we have an increasing value in favour of consumption goods sector. But in the long run, the term  $(1 + \beta_k \lambda_k)_{t-1}$  would be the dominant factor. This implies that as  $\lambda_k$  increases,  $(1 + \beta_k \lambda_k)_{t-1}$  will be the present prosperity at the

$$\left( 1 + \frac{\beta_c \lambda_c}{\beta_k \lambda_k} \right)$$

cost of future prosperity. Similarly, if  $\lambda_k$  increases, then the term  $\left( 1 + \frac{\beta_c \lambda_c}{\beta_k \lambda_k} \right)$  will fall, thus lowering the short- run consumption and income. Again,  $(1 + \beta_k \lambda_k)_{t-1}$  will increase, thus increasing long-run consumption and income. Figure below depicts the case in question . However income path is intrinsically exponential path.



**Observations:**

Relative rate of growth of output changes over time. And for any value of  $\lambda_k$  maintained over time the rate of growth of aggregate output tends, over a sufficiently long period, to a magnitude  $\beta_k \lambda_k$ .

Given the value of  $\beta_k$  and  $\beta_c$ , higher  $\lambda_k$  would always have a favourable effect on the asymptotic growth rate of output. So  $\lambda_k$  is a crucial variable.

It was assumed by Mahalanobis that normally  $\beta_c$  is greater than  $\beta_k$ . If  $\beta_c > \beta_k$ , then a higher value of  $\lambda_k$  would always imply a lower increment in consumption and in the long run this shortage will be compensated by higher growth rate of consumption.

$$\begin{aligned} C_t &= C_0 + \frac{\lambda_c \beta_c I_0}{\lambda_k \beta_k} \left\{ (1 + \lambda_k \beta_k)^t - 1 \right\} \\ &= C_0 \left[ 1 + \frac{\lambda_c \beta_c}{\lambda_k \beta_k} \cdot \frac{I_0}{C_0} \right] \left[ (1 + \lambda_k \beta_k)^t - 1 \right] \end{aligned}$$

In what follows the higher the value of  $\lambda_k$ , the lower will be the growth of consumption in the short run but higher it would be in the long run. Then the best policy in this case is to give the priority to the development of investment goods industries, even though the better may have higher capital output ratio.

When  $\lambda_k = 1$ , then  $\lambda_c = 0$ . From time path of consumption ( $C_t$ ) where  $\lambda_c = 0$ , then  $C_t = 0$

But the above model was not without its flaws. Indian experience in the 1950s and 1960s had shown the limitations of the Mahalanobis model which is placed below:

Overall saving rate was not being determined in the economy as it was being treated as a rigid function of the structural parameters of the economy such as the capacity of capital goods sector within the economy, the ICOR in the capital goods and consumer goods sectors and the allocative ratio. Important aspect like the behaviouralistic pattern of income earners was ignored. Moreover the model concentrated only on the supply side of investment.

Charles Bettleheim in his "Some Basic Planning Problems" articulated that India's Second Five-Year Plan was over-ambitious. It had not been a bold implementation. The validity of the formula (i.e. basic equation) was subject to certain assumptions with one of the following which was most questionable: Net product of branch k = Net Investment. In our opinion, this assumption is valid only in the short run and in exceptional circumstances. This point can be illustrated by the following remark:

If  $\lambda_k \rightarrow 0$ , his basic equation will become

$Y_t \rightarrow Y_0 (1 + \alpha_0 B_{ct})$  which is economically impossible.

In the Mahalanobis Two-Sector model, there is a planner, as Prof. Asok Rudra articulates, who can take decisions about the numerical value of  $\lambda_k$ , the proportion of investment to be allocated to industries producing capital goods. The assumption of such a dictorial planning is perfectly reasonable in such economies where there is central or command planning with total coverage of all the sectors. It is most inappropriate for an economy like India where government can enforce decisions by command only in a small part of the economy. There are in this country several decision-makers, not one. Agriculture and other services lie beyond the range of the command of the government authority. A single decision-maker cannot command all the decisions in this vast, overwhelming private sector economy. Hence Mahalanobis approach suffered from a lack of interest towards agricultural side of the planning. Concentration on the build-up of the heavy industries base by Mahalanobis strategy caused relative retardation of agricultural investment over the period. As a consequence, the country became more and more dependent on the import of food articles, which

surely could have been produced domestically within a reasonable cost because food grains productions were much less capital intensive.

Prof. Mahalanobis laid emphasis to the heavy industries such as steel, machine tools, heavy engineering, heavy chemicals etc. which does not add directly to the production of consumer goods. An additional investment was required then for the increase in the level of output of the consumer goods. So a whole new industrial network was necessary to be built-up for this purpose. In India at that time there was no such alternative for such additional resource. That is why heavy industries could not add to the flows of consumer goods.

Generation of additional unemployment persons was not taken care of. The plan makers were under the impression that their postulated 5% annual increase in national income would lead to full employment and traditional sectors for consumption goods would soak up the entire additional labour force.

The strategy of concentrating on heavy industries and building the capital base advocated by the model was also criticized on the ground that it would generate inflationary pressures in India affecting thereby the macroeconomic stability of the system, which in turn, would affect the rate of investment and growth of employment as well as output. The reason was that if the supply of wage goods component of consumer goods sector would fall short of demand, their prices would rise and thus result in increase in the money wage rate. The situation would become worse if there was a serious crop failure due to vagaries of weather. The Indian experience, especially after 1965-66 lent considerable support to this view.

A.K. Dasgupta, though at first spoke highly of Mahalanobis strategy and sought to built-up the strategy by identifying heavy industries with capital in standard theory, later undefined his positions by arguing that the Indian planning process had overemphasized fixed capitals such as buildings and machinery etc and underemphasized circulating capitals like raw materials and food. He further added that 'The short of growth that accompanies a production process under which unemployment and underemployment remain chronic phenomenon is spurious growth and is defined to be short-lived; it tends to exhaust itself in a pattern of consumption which turns out in the long run to be antigrowth'.

This basic two- sector model was later extended and elaborated in the four- sector model of an essentially similar type where Prof. Mahalanobis retained the emphasis on investment goods, but divided the other sector into three sub-sectors (a) industrial, (b) agriculture and cottage industry and (c) services, education, health, etc, to focus on the issue of reduction in unemployment, along with an increase in income.

Only one-third of the total investment would go to the investment goods sector whereas two-thirds would be devoted to the three sub-sectors. In due course of time the limitations of the Mahalanobis types of model became self- evident and they clearly pointed to the need for a more extensive, comprehensive, multi-sectoral as well as multi-period model that would be capable of considering the various interrelated aspects of the choice problems facing Indian economy. Consequently, multi-sector inter- industry models were constructed during the third plan period. But the Third Plan again emphasized on heavy industries. In Fourth Plan, there was a shift away from emphasis on heavy industry and stress was laid on agriculture. But this was again changed in the Fifth Plan.

So much so what we find is that with one significant exception is the wage goods model designed and advocated by the Late Professor Brahmananda in collaboration with his Bombay School of Economics colleague C.N. Vakil. The model discussed in elaborate detail in Brahmananda and Vakil '*Planning for*

*an Expanding Economy*', stands as a monument to Brahmananda's scholarship deeply rooted in the work of the classical economists.

The Vakil Brahmananda strategy assumed that while surplus labour from the agricultural sector could be transferred to produce capital goods, the average consumption of wage goods of those transferred labourers would remain unchanged. They recognized also the possibility of leakage such that not the entire stock of hypothetical surplus could be procured to feed the migrated workers. They derived the wage goods multiplier akin to the Keynesian one as the reciprocal of the leakages, and the multiplicand was an autonomous rise in the stock of wage goods at the disposal of planning agency. In 1973, P.R. Brahmananda had suggested an 'Extended Wage Goods Strategy' (EWGS) where he made a distinction between the basic and the non-basic sector commodities as per the framework of Piero Sraffa (1960). The basic sector comprises the wage goods and should grow at a higher rate than the non-basic sector so as to sustain the desired pattern of growth which is employment-intensive. He also has advocated the scope of expanding the wage goods sub-system by incorporation of foreign trade induced transformation. This was suggested by him at the time when the country had already expanded its base of foodgrains production and was capable of generating export surpluses to import necessary capital goods for further expansion of basic wage goods, thus alleviating poverty and reducing the incidence of unemployment. The basic framework of the EWGS remains the same as the VBS through the operation of wage goods multiplier, but he has tried to link the working of the system to the combination of fiscal and monetary policies that would keep the inflation rate within a reasonable bound. The suggestions for a high long term real interest rate, the need for a stable population, the detailed spread of safety nets through PDS – all follow from his well-formulated extended wage goods strategy for the Indian economy. M.J. Manohar Rao (1996) has formalized the Vakil-Brahmananda wage goods strategy in terms of an optimization framework and compared its projections on employment generation in the Indian economy vis-à-vis the Mahalanobis strategy of planning adopted in our Second Five Year Plan. According to him, the most important aspect of the wage goods model was that it had a built-in bias for employment expansion and a social welfare function, which emphasized the need to minimize the time required to reach full employment in a labour surplus economy. This would require an optimal saving plough back ratio ( $r^*$ ), which would be consistent with steady-state growth. The simulation exercise by Rao also shows that it is possible to achieve an instant growth rate of nearly 6.2 percent in the VBS, to which the Mahalanobis trajectory would converge after a lapse of 40 years. Rao has also considered the employment block of the wage goods model in a similar fashion to obtain the growth of the employment in the economy, and found that steady-state employment growth in the economy would also require an optimal policy choice of  $r^*$ . The apparent conflict between output growth and employment growth could be resolved by choosing the optimal  $r^*$ , which Rao has estimated to be equal to 0.36. There may be problem of achieving this optimal  $r^*$  if the full employment in the Indian economy is hit. Rao suggested an  $r^* = 0.71$  to achieve full employment in the Indian economy by 2026 AD. The real question is: to what extent would the working of the economy ensure such a high savings plough back ratio and what forms of institutional governance would permit such a growth trajectory to be achieved at all? This question also assumes crucial importance in the contemporary context of the Indian economy with its renewed emphasis on ensuring a human face to the globalization process though it has been initiated for about a decade.

Certain interesting implications of this strategy may be mentioned at this stage. First, the strategy gives priority to immediate consumption needs and well-being of the people, without sacrificing the potentials for long-term growth. In fact, by emphasizing the importance of employment-intensive output growth it suggests that the savings potential of the economy will be enhanced, and if the state is willing to undertake appropriate institutional reforms, these savings would automatically be channeled into productive investment. The state would be in a position to undertake non-inflationary and non-distortionary fiscal policies so as to maximize the growth potentials and help develop the infrastructure and institutions necessary for sustaining this tempo of economic growth. Secondly,

acceptance of this strategy at the initial stage of development or our economy would have reduced (a) dependence on foreign resources, (b) need for specific targeting for poverty alleviation through budgetary support, (c) the foreign exchange constraints because agricultural commodities and wage goods could have been exported and selected specific capital goods necessary for expanding the productive base of this wage goods composite, could have been imported. The working of our economy under sheltered markets and continuous state support, could not avoid periodic crisis and international borrowings from time to time, and failed to eradicate the fundamental ills of poverty, malnutrition and hunger, illiteracy, and morbidity and unemployment and underemployment, indicate clearly that India chose a wrong strategy at the initial days of her planning.

### **India's Dilemma: Dynamic Industrialization and Static Agriculture**

The development of basic and heavy industries is a prerequisite of economic development. The historical experience suggests that a country should develop agriculture first, then consumer goods industries and lastly basic and heavy industries. These may be counted as the stages of economic growth. India first of all skipped the earlier stages and more or less started for plan virtually with development of heavy and capital goods industries in the mid -Fifties, mainly in the public sector. Private sector was subjected to strict rules and regulations. Three new steel plants, each of 1 million tons capacity, were set up in the public sectors and the foundations were laid of heavy electrical and heavy machine tools industries, heavy machine building and other branches of heavy engineering. The production of machinery for the cement and paper industries were also started for the first time. In the field of chemical industries, there was an advance on a wide front, leading not only to larger units and greatly increased output of basic chemicals, e.g., nitrogenous fertilizers, caustic soda, soda Ash and  $H_2SO_4$ , but also to the manufacturer of a number of new products such as Urea, Ammonium phosphate, penicillin, synthetic Fibres, news-print etc. Production of steel ingots doubled, of Aluminium increased 2.5 times, of machine tools by 7 times, of petroleum products by 58 per cent and chemicals by 90 per cent. The output of many other industries such as bicycles, sewing machines, telephones, electrical goods, textiles and sugar machinery also recorded substantial expansion. All in all, it can be said that some of the basic conditions required for an accelerated growth towards the goal of a self-reliant economy were successfully established during the Second Plan (*Kausal*, 1979).

The development strategy by Nehru-Mahalanobis, though successful in helping India build up a heavy industrial base seemed to be a big push with unbalanced approach reversing the earlier commitment to balanced growth, agriculture growth and employment for rural poor. Agricultural production fluctuated from year to year and the backlog of unemployment at the end of Second Plan was estimated to 9 million, though the plan did succeed in creating about 8 million new jobs. And during the Second Plan the Indian economy was still a very long way from the "take-off" (the interval, according to W. W. Rostow, during which the rate of investment increases in such a way that real output per capita rises and this initial increase carries with it radical changes in production techniques and the disposition of income flows which perpetuate the new scale of investment and perpetuate the rising trend in per capita output.) Mahalanobis himself argued that his plan was of "industrialization of agriculture. An agricultural surplus is indispensable for industrialization progress. An increase in industrial input is equally indispensable for agricultural growth. Agriculture and industry must advance together" (*Sankhya*, Vol 31, Dec 1969). Actually Mahalanobis approach suffered a shift of focus away from agricultural side of planning. Agricultural development was given lower priority both in terms of investment allocation and in areas of policy reform, apparently in the premature belief that agriculture no longer would constitute a problem and a dynamic industrialization would help to trigger off an equally dynamic development in the field of agriculture. Someone is even critical to say that the neglect of agriculture by the planners was preordained.

The fact emerges is that, ignoring the first Five-Year Plan, the share of agriculture together with irrigation and flood control has virtually remained constant. Agricultural production, especially of food grains, jute, cotton and oil-seeds received a serious setback. The planners blamed the fall in agricultural production on the failure of monsoons in 1957-58 and 1959-60, but the bad monsoons added urgency to mounting concerns inside and outside India that not enough was done to raise food output. Given India's ample water supplies and fertile soils, low yield could have been doubled or trebled by the application of scientific agriculture. With the population growing steadily and the government focusing its development efforts on industry, India, in an effort to keep food supplies high and prices low, had to import huge quantities of food grains, much of it from the United States. The US Agriculture Trade Development and Assistance Act of 1954, also known as the PL480 Plan, funnelled US food grains into India for a decade beginning in 1957 (Dandekar, 1994). In 1959, a Ford Foundation report on India's food crisis recommended much keener focus on research, extension, intensifying input use and incentives.

### **The Nehruvian-Mahalanobis Legacy and the Indian Economy today**

The economy of today is in sharp contrast to that of yesteryears in the growth rates it has achieved since 1991, the composition of its GDP, its development record and its world image. The growth rate of the economy since liberalization has surpassed all previous records, easily exceeded the 3 to 4% growth rate that has been the norm for long, touched 9% during the middle of the last decade and has not dipped below 6% even during the recent years of the so called credit crunch. Productivity of the manufacturing sector as measured by total factor productivity has increased.

There are though a number of unique factors of the economy as it has evolved over the years to be noted. One such feature widely noted is the composition of the GNP with the services sector accounting for 60% of the national product, agriculture for 20% and the manufacturing sector occupying the middle ground with a share of 18%. The economy has experienced a sort of a leap frog development from agriculture to services with a nod towards the manufacturing sector, a transition that is in contrast to the Kuznets hypothesis that would have the economy transit from agriculture to manufacturing and then on towards services. Also notable is the fact that whilst the share of agriculture in the national product is only 20% the percentage of population dependent on agriculture is as high as 60%.

Two other features of the economy are also worth noting. Gone are the days when the policy makers had to keep an ever watchful eye on the balance of payments. The economy possesses foreign exchange reserves worth \$254 billion. Indeed, India made the headlines when the policy makers decided to diversify the reserves away solely from dollars into gold. Although not an export led economy, exports do contribute a substantial 20% to the GDP. In addition, remittances from the Indian diaspora that have put the country's balance of payments and reserve position in a healthy state. Liberalization of the foreign direct investment regime has led to increased annual inflows of FDI in excess of \$15 billion per annum in recent years compared with annual flows of less than a million dollars during the pre-liberalization years.

But it is true that the model has its relevance even today on the question of mobilisation of resources. Because his approach emphasized development and systematic planning of the economy taking into consideration of interdependence of different sectors, thus bringing out some of the important relationship between different economic variables over time like rate of investment, allocation of investment and output- capital ratio and their implications for short- term and medium term policies with the precision of a mathematical model. For example, the Mahalanobis model implied a time path of acceleration of growth of consumer good production and employment where, in the initial period their growth would be slower, but in the long term it would be much higher than otherwise. .

His approach remains important for those who are working on quantitative approaches to problems of plan formulation, specially in the context of large- sized economies (*Chakravarty, 1993*).

### **Concluding Observations**

To conclude, from the authors of Bombay Plan (Plan of Economic Development for India) to Nehru and Mahalanobis, all looked upon industry as the key to India's economic development. For Nehru and his associates large- scale industrialization was a conduit of technology and the scientific spirit. Agriculture was associated with the traditional mode of production and thus was seen as providing little scope for the application of new technology, which demanded at that time sharp changes. Only land reforms and minor irrigation or water management were viewed to be major source of growth in agriculture. The often-cited so-called Green revolution occurred in India only towards the end of 1960s. Nay, agriculture was not considered capable of absorbing the surplus labour. In a country like India where 70 per cent of the population depended on agriculture and related activities, withdrawal of labour from agriculture to other productive activities and occupation was viewed as almost equivalent to economic development. Thereby exclusive emphasis on industrial development without regard for its agrarian base became fatal. Industrialization had been pushed ahead vertically and agriculture extended horizontally. As a result, industry grew more rapidly than agriculture. Until 1958, the index of agricultural production did not deviate very much from that of industrial production. By 1958, the index of industrial production stood at 160. After 1958, the two trends deviated very sharply and radically, as agricultural production stagnated at about 150 in 1960-63 (Rothermund, 1993). While during the first three plans (leaving out 1965-66), India's agriculture grew at an annual rate of over 3 percent, industry grew more than agriculture, at a compound rate of 7 percent per annum between 1951 and 1965. In an agricultural economy like India, however, the bulk of wage goods consists of food grain and other agriculture-based products. Programmes for Industrialization and employment generation required side by side sufficient supply of wage goods at stable prices. But it was not so. The demand and supply side interdependence between industry and agriculture was not fully recognized in the programmes and allocation of plan. Sukhamoy Chakravarty (1993) pointed out that even Mahalanobis himself did not make any serious attempt to grapple with the problem of institutional barriers to agricultural development. Mahalanobis did not make sufficiently thorough analysis of the barriers to growth emerging in the agrarian sector, though his consultant appointed at that time in the Indian Statistical Institute, Daniel Thorner, stressed these issues in a number of papers and described the agrarian sector acting as a built in-depressor of the Indian Economy.

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