POPULATION AND DEVELOPMENT

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1. The Relationship Between Population And Resources — The Malthusian Formulation

The population of the world by mid-1975 and its growth rate, as can be seen from Table 1, has been estimated by the United Nations at 3.967 billions and 1.95 per cent per annum. Less than two human generations ago, in 1930, it was two billions. At the beginning of the modern era, that is around 1650, world population was only half a billion. By the year 2000, if current growth rates are maintained or fall slightly, world population would be about 6.25 billions. Everyday about 212,000 people, that is around 7.7 millions annually, are being added to the population of the world. The current population situation appears unique in mankind’s experience. For, although since the first great economic revolution in the history of man — the development of agriculture and the domestication of animals, which ushered in the Neolithic age about 10,000 years ago — the population of mankind has been growing, the increase of population seems to have been at a modest pace until the first part of this century, when a marked acceleration in the growth rate became apparent.

For almost all of man’s existence population has grown at an annual rate of about 0.002 per cent per annum or about 20 persons per million population. This growth was uneven, sometimes increasing with improved conditions of living, sometimes decreasing when society became more unstable, or when there were pestilences and wars. By the middle of the eighteenth century, as can be seen from Table 2, the growth rate had accelerated by two hundred and fifty times from 0.002 per cent to 0.5 per cent per annum or from 20 to 5,000 per million. By the 1950s the
growth rate had accelerated another two-fold to about one per cent per annum or ten thousand per million. Now only twenty-five years later, as can be seen from Table 1, the rate of growth has almost doubled to about 1.95 per cent per annum or nearly twenty thousand per million.

**Table 2 — Conjectures of Historical Population Growth**

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated Population (millions)</th>
<th>Average Annual Increase (per cent) since Preceding Period</th>
<th>Approximate Number of years Required for Population to Double</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 7000-6000</td>
<td>5-10 (a)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AD 1</td>
<td>200-400 (a)</td>
<td>0.0</td>
<td>—</td>
</tr>
<tr>
<td>1650</td>
<td>470-545 (a)</td>
<td>0.0</td>
<td>—</td>
</tr>
<tr>
<td>1750</td>
<td>629-961 (a)</td>
<td>0.4</td>
<td>173</td>
</tr>
<tr>
<td>1800</td>
<td>813-1125 (a)</td>
<td>0.4</td>
<td>173</td>
</tr>
<tr>
<td>1850</td>
<td>1128-1402 (a)</td>
<td>0.5</td>
<td>139</td>
</tr>
<tr>
<td>1900</td>
<td>1550-1762 (a)</td>
<td>0.5</td>
<td>139</td>
</tr>
<tr>
<td>1950</td>
<td>2486 (a)</td>
<td>0.8</td>
<td>86</td>
</tr>
<tr>
<td>1960</td>
<td>2982 (a)</td>
<td>1.8</td>
<td>38</td>
</tr>
<tr>
<td>1965</td>
<td>3289 (a)</td>
<td>2.0</td>
<td>35</td>
</tr>
<tr>
<td>1970</td>
<td>3632 (b)</td>
<td>2.1</td>
<td>36</td>
</tr>
<tr>
<td>1975</td>
<td>3967 (b)</td>
<td>1.8</td>
<td>38</td>
</tr>
<tr>
<td>1980</td>
<td>4373 (b)</td>
<td>2.0</td>
<td>36</td>
</tr>
</tbody>
</table>


Of the 1975 world population nearly four-fifths live in the less developed countries of the world and slightly more than one-fifth in the developed or richer countries. These two groups of countries have marked differences in their patterns of birth and death rates, birth rates in the less developed countries being generally of the order of forty per thousand while those of the developed countries are less than half of that. Death rates in the less developed countries are higher than those of the developed countries with death rates in Africa at 18.0 per thousand, for example, being more than twice those of the Union of Soviet Socialist Republics and twice those of Oceania. Even then the average rate of population growth in the less developed countries is now about 2.4 per cent per annum, implying a doubling, at this rate of growth, of their population in 30 years while that of the developed countries is slightly less than one per cent per annum so that their population can be expected to double in about 70 years. Thus, of the current total increase to world population, almost 80 per cent is contributed by the less developed countries, which are perhaps economically, less in a position to bear this burden.

The question therefore arises and must be answered whether the world can provide sustenance and or guarantee a decent standard of living for its rapidly growing population by say the year 2,000 some 25 years from now, considering the increasing scarcity of natural resources and, in particular, whether the less developed countries, whose population growth is disproportionate to their wealth and economic growth, can, in a world compartmentalised into nation states, carry the accompanying burden of population growth. This particular problem has been posed in many forms, even at the very beginning of the development of economics as a science.4

Two types of answers have been given by the classical economists to these questions, one group, amongst whom is numbered Adam Smith, arguing that, up to a point, an increase in population would be conducive to national prosperity and that, past that point, population becomes self-regulating.5 The second group amongst whom are Bentham, Cantillon, Hobbes, Mill and Malthus have argued, on the other hand, that population increase, by exerting pressure on the existing resources necessary for production, ultimately causes growing misery. In consequence, they
advocated that measures ought to be taken to control its increase. Since Malthus’ formulation of this argument in his 1798 Essay on the Principle of Population is the most famous and best known, we quote him in extensio.

"I think I may fairly make two postulata. First That food is necessary to the existence of man.

Second, That the passion between the sexes is necessary, and will remain nearly in its present state . . .

Assuming then, my postulata as granted, I say, that the power of population is indefinitely greater than the power in the earth to produce subsistence for man.

Population, when unchecked, increases in a geometrical ratio. A slight acquaintance with numbers will show the immensity of the first power as compared with the second.

By that law of our nature which makes food necessary to the life of man, the effects of these two unequal powers must be kept equal.

This implies a strong and constantly operating check on population from the difficulty of subsistence . . . The race of plants, and the race of animals shrink under this great restrictive law. And the race of man cannot, by any efforts of reason, escape from it. Among plants and animals its effects are waste of seed, sickness, and premature death. Among mankind, misery and vice. The former, misery, is an absolutely necessary consequence . . . I see no way by which man can escape from the weight of this law which pervades all animated nature . . . "

It should be noted that the contention of Malthus and his supporters is based on a particular world view and the implicit acceptance of the value systems and the social framework of a capitalist society which determined his attitudes to the objectives of the development of society.

Karl Marx was quick to attack Malthus and his population theory calling it a contrivance of the capitalists to rationalise the depressed status of the working class and saw ‘the population problem’ and the fall in per capita income more in terms of employ-
ment, which he thought was caused by factors other than population increase. Following his footsteps, economists in the socialist world have argued that under socialism unemployment will disappear and hence the so called 'population problem' would vanish. In the case of China, as Aluko has remarked, it has been advocated in the light of the Chinese struggle with the capitalist and neo-capitalist world that poor people want change, want to do things and want revolution. A large population is therefore an asset to creativity and production and a new 'theory of hands' should replace the old theory of population which saw men more as 'mouths for consumption' rather than 'hands for production.' Be that as it may, the Chinese leadership has not only been successful in eliminating mass unemployment and starvation but has also taken steps to bring the number of people in China in consonance with the availability of resources and population control is now a part of the paraphernalia of policies used to maintain an adequate standard of living in the People's Republic of China.

The less developed countries of the world, characterised by their rapid population growth without rapid rises in material welfare and the production of food, seem to face the prospects which Malthus has so ably painted. Luckily for the less developed countries and the world, Malthus has been proved wrong and his dire predictions have not been fulfilled, not because it has been possible to control the growth of population — for since his prediction 177 years ago, the population of mankind has increased roughly four and half times — but rather because there has been a considerable increase in the production of food in the world since the 19th century, with vast new acreages being brought under cultivation in America, Australia, Asia and Africa, followed by a series of technological break-throughs involving the use of improved plant varieties, fertilizers, pesticides and mechanization.

2. Developing the Less Developed — the 'Development Explosion' and the Resurgence of Malthus

Since the end of the 2nd world war and with the creation of the United Nations and the Food and Agriculture Organisation (FAO) in 1945, there has been renewed pessimism about man's
chances for survival on earth. In particular the theme of population outstripping food resources has been recurrent. These views have been fuelled by the First, Second and Third World Food Surveys of the FAO which have highlighted the seeming gap between world food supply and demand. Great authority and weight has been lent to these predictions and the seriousness of the shortages in the world food supply by the recent drought in the Sahelian Zone of Africa, with the accompanying famine and death by starvation of thousands of people, the crop failures in the Soviet Union and India, as well as the flood disasters in Bangladesh. As a result the Malthusian theme has now found a re-formulation in terms of what Brown and Eckholm have called 'The Global Food Crisis', that is, the soaring demand for food which has begun to outrun the production capacity of the world's farmers and fishermen. This demand has come about as a result of continuing population growth and rising affluence.

While the influence of population growth on the demand for food is easily understood, for three per cent rise in population will lead, ceteris paribus, to a three per cent rise in the demand for food, that of affluence is not as easily comprehended. Briefly explained, in less developed countries like Ghana per capita food consumption, measured in terms of the per capita grain requirements of the population, is of the order of one hundred and eighty kilograms (180 kg) of grain per annum, with most of these grains or grain equivalent being consumed directly to meet minimal energy needs and very little indirectly as livestock products. In contrast, the average North American consumes five times as much grain or grain equivalent, only ninety kilograms (90 kg) of these however being consumed directly as bread, breakfast cereals or similar food while the remaining eight hundred and twenty kilograms (820 kg) is consumed indirectly in the form of animal products like meat, milk and eggs. It is to be noted that while one kilogram of grain or grain equivalent consumed directly requires that only one kilogram of grain or grain equivalent be produced, in order to produce one kilogram of meat or livestock products, an animal must be fed three to ten kilograms of grain, that is, much more grain is required for consumption when food is taken indirectly in the form of animal products.
In a world dominated by purchasing power on the market, production is geared towards meeting effective demand. Since affluent individuals and nations change their diets, their food no longer being dominated by cheap starchy foods like wheat, rice, potatoes and cassava, which can be consumed directly without extra inputs in terms of grain but rather by meat and other livestock products, there has been an accelerating demand for food in the world as a whole, as more individuals and countries have become affluent.

However, unlike the period when Malthus was making his predictions when there was an immediate possibility of expanding food production either through more advanced technology or increased acreage, there are now technological constraints limiting the increase of food production, while the major resources for food production, land, water, energy and fertiliser are in increasing tight supply. For example, taking two important items in the world — food economy, beef and soya beans, scientists have not been able to devise any commercially viable means of producing more than one calf per cow per year. This means that for every animal entering the beef production process one adult animal must be fed and maintained for a full year and with the over-grazing of most of the world’s pasture lands, expanding the capacity for feeding the animals is becoming a problem.

Further, it has also not been possible for scientists to expand appreciably the increase in per acre yields of soya beans, the major source of high quality protein for livestock and poultry throughout the world and for food consumed directly by at least one thousand million people in East Asia, yield per acre in the United States, the world’s leading exporter of soya beans, having increased by less than 30 per cent since 1950 as against 140 per cent for maize. With one acre out of every six of farm land in the United States being planted to soya beans and idled crop land disappearing, the inability to achieve a break-through in soya beans could create serious global supply problems.9

The present position has been complicated by the running down of the food reserves of the United States as a matter of deliberate policy, from 222 million tons of grain or 95 days of world consumption in 1961 to a level representing global needs
for only 26 days. This, since 1972, with the increase in global
demands for cereals which has grown from around an annual
increase in demand of four million tons around 1900 to about
12 million tons in 1950 and now runs at 30 million tons per annum.
has led to a precarious world food supply—demand balance
and to an abrupt transition, following the failure of the wheat
crop in the Soviet Union in that year, or the world food economy
from a buyers’ to a sellers’ market. Between late 1972 and the
end of 1973, the world price of wheat trebled, the price of rice
followed, while soya beans prices doubled in a two-year period,
all these followed in a matter of months by the dramatic rise in
petroleum prices with consequences for the energy required for
farming as well as fertilizers.10

Theoretically, it should be possible for food production to
keep pace with the growth of world population up till the end of
the 20th century, provided the highly productive techniques of
modern United States agriculture and the Green Revolution are
adopted and applied throughout the world. Whether it will be
possible for this to happen, taking into consideration the structural
rigidities of society in many countries, resources, shortages and
international economic and political development are a problematic
question. In the interim, however, gains in food production in
developed countries like the United States have been made at
very large environmental cost with pollution by agricultural
chemicals and organic wastes, the decreasing genetic diversity of
the agricultural ecosystem not only degrading the environmental
quality but also perhaps undermining the ecological stability of
the food growing process.11

In consequence, countries like the United States are increasingly
being forced to take measures to protect their environment. In
effect then, while the United States could meet the food needs of
its own population for the rest of this country, the measures
being advocated would limit total production and make the
surplus available for sales on the world market and for emergency
aid to countries suffering from severe food shortages smaller
and will thus not be enough to meet growing world requirements.
As a result of all these factors, food supplies both now and in
the foreseeable future will not be able to catch up with the demand
and the world is faced with the prospect of a long climb in food prices, which will outstrip the purchasing power of a large proportion of mankind. In the final analysis, Malthusian logic, it is argued, is inescapable, for the capacity of the earth to feed humanity is finite.

As has been demonstrated by the purchase by the Soviet Union of American grain this year, affluent individuals and nations are in a position to purchase what they require for maintaining their food supply at their acceptable standard of living either in national or international markets, when the food exporting areas of a country or nations have food surpluses. This means that poor individuals and nations who are not in a position to exert an effective demand for food in national or world markets will not be able to afford the minimum amounts of foods required for existence. In other words, unless such countries and individuals can succeed in raising their levels of income they will not be able in the future to guarantee even their current low levels of living.

The fact that affluence guarantees against the suffering of such shortages has of course not been lost on both poor individuals and nations, who have tried in various ways to increase their levels of living and welfare through either the process of redistribution of income or through accelerating their development. Since policies aimed at redistributing national or international wealth are meeting with increasing resistance, both on the national and international planes, practical politics dictates that instead of trying to redistribute the national or international cake, it might be easier to provide increasing portions out of a growing cake to all. That is, both individuals and nations could obtain a larger per capita income through the process whereby gross national income and global income are increased. Perception of this possibility has led, since the end of the Second World War, to a rash of development plans or what we can call ‘the development explosion’, an attempt being made by almost every country to increase its gross domestic product and ensure that its population has increasing access to manufactured consumer durable goods, health facilities, adequate nourishment, social security and education through planned programmes of development.
Since however in a monetised economy individuals require money in order to be able to exert effective demand for a minimum of these commodities and services required for an adequate level of living, people must have employment. For a person without work or without enough work or work which is inadequately compensated will not be in a position to have the means with which to purchase these basic commodities and services essential for satisfactory existence. In other words with unemployment, underemployment or inadequately compensated employment, an individual is excluded from the good things of life.

The neo-Malthusian reformulation of the problem of population out-stripping resources in a modern economy can therefore be reduced to that of providing employment and adequately compensating it, in order to enable the population, through the operation of market forces, to ensure for themselves an adequate supply of goods and services which will guarantee for them a satisfactory and recognizably adequate level of living. While the measures which can be undertaken to achieve the goals described above are easily formulated, given the social and economic framework of most less developed countries, the translation of such measures into activities, which will enable the said goals to be achieved is defeated by the discrepancy between the growth of population and the growth of employment, usually referred to as 'the employment gap'.

The mechanism of the employment gap in the less developed countries of the world is easily described. Given a particular age — sex specific activity schedule, the size of the labour force is basically a function of the size and age composition of the population for a population closed to migration. The impact of mortality and fertility on the supply of labour are essentially long term. Thus for example, new entrants into the labour force in 1975 were born some fifteen to twenty-five years ago, while the magnitude of the labour force from 1990 onwards is already being determined by the number of persons born in 1975, if we take as a theoretical dividing line for entry into the labour force, the generally accepted age of 15 years.

In the case of the less developed countries of the world that are passing through various stages of the demographic transition, characterised, as their demographic behaviour in this theory
is by, falling death rates and constant high or rising birth rates, birth rates, there is an increasing proportion of the population in the young inactive age groups, this proportion begin in some countries at times up to 50 per cent of the total population for the age group 0-15, and ranging usually between 40-46 per cent for most less developed countries of the world. We can therefore formulate this observation slightly differently and say that the labour force in the less developed countries is growing at a slower rate than the total population. We should therefore expect to find that the provision of employment for a given labour force in such countries would be a less intractable task than if provision had to be made for labour force growing at the same or a faster rate than the population.

This of course presumes that the economic system and the technology of production adopted in the development process reflect the concern of such countries to provide as many work places as possible. Given, however, the capitalist economic system and the economics of technology in such a system, the goal of providing maximum employment cannot be taken for granted. For the economic system and technology in the developed countries of the world whether capitalist or socialist, are characterised by their extreme capital intensiveness, technology in such countries being designed to eliminate the need for people and to maximise the need for capital.

Providing jobs using the advanced technology of the developed countries is thus a very costly enterprise. For example, in a labour intensive economy it takes 6 months salary to buy equipment needed to provide work for one man, while in a capital intensive advanced technology economy, in contrast, 350 months or 29 years salary is required to equip one man. The choice, therefore, by a less developed country of a development strategy using capital intensive advanced technology, implies not only that development would be a slow costly process, but as the case of the Nigerian Third National Development Plan shows, the number of jobs created will be a small fraction of the number of entrants into the labour force.

Put in another way, the choice of such technology for development would lead to the growth of the labour force being too
rapid in relation to the capacity of the economy to generate employment — an employment gap develops. As Raulet has remarked, the less developed countries are then thought to be caught in a kind of low level equilibrium trap in which the high rate of population growth impedes economic development and economic backwardness and traditionalism hold back the completion of the demographic transition.\(^\text{14}\) It therefore becomes necessary for the control of population growth to be embarked upon as an essential prerequisite of economic transformation and sustained economic growth in such countries. As Spengler has put it, in many less developed countries even a moderate rate of population growth can be looked upon as a barrier or perhaps the barrier to economic development and the amelioration which such development brings.\(^\text{15}\)

Since the technology mix is taken as given, in terms of the desire for technical efficiency as contrasted with economic efficiency, both by the Western purveyors of technology and the purchasers from the less developed countries, we are inevitably led to the conclusion that the only way to close the gap between the labour force and the opportunities for employment is, in the short term, ignoring the problem — a process which is achieved in the development plans of most less developed countries by assuming that the extra labour force will provide itself with employment opportunities in the countryside and the urban slums as self-employed workers. And, in the long term, equilibrium is achieved through shutting off the increasing labour supply by decreasing the number of births or in more polite phraseology, as Geoffrey McNicoll has so ably put it, 'closing the gap between the sum of actual births in a society and the number that would be socially optimal' (under some specified means of determining social objectives).\(^\text{16}\)

Population policy in such countries is then essentially defined as measures aimed at limiting excessively high levels of fertility. Thus less developed countries, under the political, economic and intellectual influence of Western nations are usually advised as an integral component of their development plans to cut down their birth rates if they are to bring employment and the opportunities for employment into equilibrium. The method usually advocated for achieving this end is that of ‘family planning’ or alternatively that of ‘legalised abortion’.
This conclusion is predicated on the acceptance of the social framework — the capitalist system — the technological mix of the system as also the system of values taken as given in the argumentation. That is, we must accept not only the capitalist system and its capital intensive advanced technology with its high capital cost, high pollution rate, exploitative use of natural resources, its capacity for misuse, its incompatibility with local culture, its dependence on a technological specialist elite, its tendency to centralise, its divorce from traditional forms of knowledge, its alienating effect on workers but also its materialistic, individualistic, consumption goods, profit motivated orientation of its value system.

3. A Further Dimension to the ‘Population and Development Problem’ — The Limits to Model Building

The conclusion reached that the limitation of births through family planning methods or legalized abortion is the primary element in the solution of the problems of underdevelopment of the less developed countries has not been generally acceptable to the elite of these countries for the following reasons:

In the first place, in a situation where 50 per cent of the children born alive die before they are five years old, it is not practical politics to compel parents to limit births when infant and child mortality are at such high levels.

Secondly, politicians in less developed countries perceive the so-called ‘population problem’ in part as a geo-political problem which resolves itself into a question of the distribution of wealth and resource use in the world. On the one hand they recognise the unsatisfactory distribution of wealth in their own countries, which threatens their privileged position, but which using the techniques evolved and so well operated by the ruling classes in the Western countries could lead to their safeguarding their privileges for the foreseeable future; on the other, they can point to the unsatisfactory distribution of world wealth and the use, or should we say misuse, of world resources by the developed countries of the world.
In a world situation, where a re-distribution of world wealth and resource use can be reasonably advocated without attention being directed to the necessity of the elite having to reduce their own standards of living relative to that of their people, they have forcefully pointed out that the experience of the Western countries has shown that the demographic transition from high to low birth and death rates has been consequent to and contingent on the generality of the population enjoying higher levels of living. These higher levels of living have been achieved through accelerated economic development and only this, can, in the long run, lead to the population adjusting its birth rate in the desired direction downwards. And in view of the paucity of investible surpluses in these countries, such development should be financed through a re-distribution of world wealth and resource use.

With rising levels of living, fertility in the less developed countries would then decline and population size would stabilize at a level, which it is hoped, would not exert undue pressure on world resources and its carrying capacity. The developed countries, understandably, have not been willing to concede a re-distribution of world wealth and resource use to the less developed countries, as this would mean an immediate cut in the rates of growth of their standard of living to which they have become accustomed.

This basic conflict of interest, given the present world economic system, between Western economic and political interests and the development of the new nations has already been stressed in a study made in 1944 by Frank Notestein, one of the proponents of the theory of the demographic transition, at a time when most of the less developed countries were still under the colonial domination of the Western powers. Observing that “by launching a program of modernization the now dominant powers would become progressively smaller minorities, and possess a progressively smaller proportion of the world’s wealth and power, he concluded that, “the determination of national policy toward the underdeveloped regions must be made in the light of that fact.”17 This conclusion has been epitomised in the political sphere by the famous statement of the most celebrated Englishman of modern times — Sir Winston Churchill. "I have not been made the King’s first Minister to sit over the liquidation of the
British Empire. What we have, we hold”. The sentiments expressed in this statement are fully appreciated by the leadership of the less developed countries.

In consequence it has been hypothesized that the motives of the developed countries in promoting family planning programmes in the less developed countries is principally to control their population. The “centre”, that is the developed countries, seeks to limit the population growth of the “periphery client—states” — the less developed countries which have developed and are developing within the context of economic dependence — so that the growing internal consumption of resources in the latter will not impede the export of resources to the former.18

There are many other reasons, of which we will only touch a few, why the prescriptions of the neo-Malthusians have not been acceptable. First, there is no clear evidence that rapid population growth is incompatible with rapid economic development, there being examples, which neo-Malthusians tend to ignore, of countries where rapid population growth has been associated with rapid economic development, as in the cases of Albania, Outer Mongolia and Taiwan.19 Neither do low birth rates guarantee an economy a faster rate of growth as compared with other economics that are at approximately the same level of development but have high birth rates. For, as Sauvy has pointed out, if there were any clear-cut relationship between economic development and population growth, then France, which started practising birth control almost one century before the rest of Europe, should be at a considerable advantage. This has clearly not been the case, France, of all the countries of Europe, having had one of the lowest rates of economic growth over the period.20

Moreover, development is a holistic process of which population is only one aspect. Thus variables like the quantity of disposable resources, the level of technology, the size of the population and its growth rate and the form of social organisation, which decide the distribution of the goods and services resulting from the production process, are all of importance in determining the rate of development.

Lastly the neo-Malthusian viewpoint is essentially a partial analysis of a dynamic system in which all other variables except-
ing population are kept static. Such an analysis while giving limited insights into certain aspects of the problem is no substitute for a generalised dynamic analysis. In any case this partial analysis cannot be the proper basis for useful and meaningful predictions on the behaviour of the dynamic system being investigated.

To amplify this point, the familiar representation of the growth of world population as in Figure 1.1 drives home the magnitude of the current increase in population in the world most of which is attributable to the less developed countries. Such diagrams, as Poleman points out, are however misleading in several important respects. For the current upturn in population growth is not the first but the third in a sequence of bursts that have been associated with major breakthroughs in man’s ability to cope with his environment. The first occurred several million years ago when man discovered how to make tools and store them. The second is that associated with the beginnings of agriculture or the ‘Neolithic Revolution’, as it is called, while the third is associated with the scientific and industrial revolution.

We can take a second look at the growing numbers of world population using a simple graphing technique developed by E. S. Deevey in which both time and numbers are plotted on logarithmic scales to make them manageable. The result strikes at the heart of Malthusian thinking. As can be seen from Fig. 1.2, each burst in population growth has eventually levelled off. That technological breakthroughs are accompanied by rapid rises in population seems obvious. What is not so clear is the nature of the forces that ultimately compel a levelling off as also the modality by which this process is achieved. Evidence however exists to show that the long-term population equilibria of the past seem to have been set at levels below those associated with marginal starvation.

In the case of current population growth, we can see the levelling off process already taking place in the developed countries, with the stabilisation of their population growth rates, which are now approaching a level of zero population growth. Since the less developed countries are already experiencing falling death rates, the question then is simply in what manner and how fast the less developed countries will follow the developed countries
FIG. 3. — POPULATION GROWTH AND APPROACHES TO THE ULTIMATE CARRYING CAPACITY OF THE ENVIRONMENT

**FIG. 3.1** — Smooth adjustment to the carrying capacity

**FIG. 3.2** — Overshooting the limit of the carrying capacity followed by smooth adjustment.

**FIG. 3.3** — Overshooting the limit of the carrying capacity followed by oscillatory adjustment.

**FIG. 3.4** — Overshooting the limit of the carrying capacity followed by a decrease of the ultimate carrying capacity.

in reducing their birth rates and stabilizing their own population growth rates at a lower level, given the effects of the scientific and industrial revolution in these countries.

Here it is pertinent to remark that the less developed countries do not need to follow the pattern of the demand orientated model of the demographic transition, which is shown in Figures 2.1 and 2.2, the former being thought to characterise the transition in the developed countries of Europe and the latter that of the less developed countries. These models have been criticised on various grounds. Easterlin has now however provided a broader economic framework in which the demographic transition model is one of a number of possible real world models and which lends itself to a greater recognition of such demographic concepts as natural fertility in the system and to the formulation of alternative hypotheses which have been the subject of discussion by social scientists who are not economists.

These hypotheses lead to the conclusion that the speed with which the transition takes place is dependent on how fast the levels of living in the less developed countries rise and on whether the generality of their populations participate in the rise in the levels of living. For this transforms the nature of the child-bearing problem from that of having enough surviving children, that is, maximization of output within the existing set of biological constraints and established social practices, to one posing difficult problems of individual choice regarding the limitation of family size, or, a shift from a social to an individual control situation. And this transformation is not brought about by birth control alone, which tries to prevent potentially unemployed or under-employed people from being born, but rather by the immediate provision of work places for the already unemployed and under-employed and adequately compensating them.

Recently attempts have been made to obtain some clarity on the approach by population and other variables to the limiting situation using dynamic models. The best known of these attempts is the World Model, constructed at the Massachusetts Institute of Technology (M.I.T.) under the direction of D. L. Meadows and at the instance of the ‘Club of Rome.’ Built into the model are five basic quantities or levels which are of major concern to the
world — accelerating industrialization, rapid population growth, widespread malnutrition, depletion of non-renewable resources and a deteriorating environment.27

As can be seen from figure 3, the variable population can approach the limit carrying capacity of the environment in various ways. It can adjust smoothly to an equilibrium below the environmental limit by means of a gradual decrease in growth rate as is shown in figure 3.1 or it can over-shoot the limit and then die back again in a smooth or an oscillatory way as shown in figures 3.2 and 3.3 or it can over-shoot the limit and in the process decrease the ultimate carrying capacity by consuming some necessary non-renewable resources, as is shown in figure 3.4. In the latter case the system collapses and adjusts itself at a level lower than the initial carrying capacity. This type of behaviour has been noted in many natural systems.

So, for example, over the past 35 years population increase both human and animal have led to over grazing and deforestation in the Sahelian and sub-Saharan zones of Africa and the Sahara Desert has been advancing at rates of up to 50 kilometres per year at its 5,600 kilometre southern fringe and if this process of desert expansion is not reversed, Africa may lose a sizeable portion of its food producing capacity. Similarly in India the progressive increase of human and livestock populations has led to the progressive deforestation of large areas of the sub-continent, especially in the Himalaya foothills, which in turn has increased the incidence and the severity of floods and is gradually undermining the food producing capacity of the sub-continent.28
Fig. 1 Two views of world population growth

Logarithmic vertical and horizontal scales

Fig. 2 The demographic transition schematized

Fig 2.1 The developed countries

Fig 2.2 Less developed countries
It is important to direct attention at this stage to the shift in the basis of the argument. It is no longer being contended that the world system must of necessity explode or implode if population or any of the other variables which are hypothesized to grow exponentially continue to grow, unless a stationary state of zero growth is achieved; but rather, that the modality of the approach to the limits of the carrying capacity of the world system could in certain forms lead to an explosion or implosion of the system with equilibrium being achieved at a lower limit of the carrying capacity of the world. In other words the argument is no longer the Malthusian one of the inevitability of doom if the growth of population or that of the other variables is not reduced to zero but rather one of the advisability of process control.

The simulated model, which has now gone through three versions, is basically a population—capital system, in which the interrelationships between five basic quantities or levels—population, capital, food, non-renewable resources and pollution hypothesized to grow exponentially—and the tendencies of these variables to change with time are investigated, using the method of System Dynamics Analysis evolved by Forrester at the M.I.T. 29
investigation comes to the conclusion that given the assumption that there is no major change in the present system, the basic behaviour mode is the exponential growth of population and capital, followed by collapse. Advances in technology which do not alter the fundamental relationships between the variables in the system only shift the limits of the carrying capacity of the system in time, that is, they serve to buy time. In addition such advances in technology also raise certain side-effects like the arms race, unemployment, noise, crime, pollution and social tensions, which admit of no technical solutions.\textsuperscript{30}

It is not the intention here to give a comprehensive account of the criticisms of this model, which include errors in the logical structure, poor or partly wrong quantification, as this has been provided, amongst others, by a research team at Sussex University.\textsuperscript{31} we would only wish to stress with Hyrennius, that, unless it is possible to express the influence of exogenous variables on the central phenomena, the model cannot be used for analysing the effects of alternative measures in the demographic, economic, social and cultural fields, an evaluation which can only be made by a systems approach incorporating variables like natural resources, the labour force, capital, technology, economic structure, consumption patterns, social factors and environmental effects.\textsuperscript{32}

These and other models, like the I.L.O. Bachue model which incorporates a policy variable and the Latin America ‘first alternative World Model’ which tries to estimate, over a period of 30 to 35 years, the possibilities of development for the less developed countries and their prospects of economic equalization with the developed countries in the light of the effects of development on the ecosystem, can be used less ambitiously in what might be called “the process-control of society”.

4. Process Control and Global Equilibrium — Elements of a New International Order

If the conclusion of the M.I.T. World Model that sustained indefinite growth of capital, just like the sustained indefinite growth of population can lead to an over shooting of the current
carrying capacity of the earth, is accepted, current levels of technology being taken as given, it becomes necessary to undertake a process control of the world system. This is because we would not wish to run the risk of the system exploding or imploding while the modalities of approaching the limits of its carrying capacity and how to alter it are being investigated. In consequence it behoves us not only to plan for the stabilization of population but also for the eventual stabilization of the per capita rate of consumption which has given rise to the exponential growth in capital and which does have, with regard to the time dimension, the potentially more dangerous consequences for the world system. For as Miles and Pradervand have pointed out, 214 million Americans who constitute 5.4 per cent of the world population and possess 8 per cent of the world’s surface, consume 50 per cent of world production and are depleting world resources and polluting the natural environment more than the 2.8 billion inhabitants of the less developed countries.33

Stabilization of the per capita rates of consumption, however, brings the whole question of the reallocation of resources and the redistribution of income in the world to the fore. It also raises the question of the diversion of the energy of the countries of the world away from the current emphasis on the production of manufactured consumer durables, whose production has deleterious effects on the world ecosystem, to that of the production of goods and services which enhance the quality of our physical and social environments.34 Such a system with the stabilized components of population and capital should grow in a manner which does not offer the threat of sudden and uncontrollable collapse and must be capable of satisfying the basic material requirements of all the peoples of the world, not just that of a few.

These conditions in turn imply not only a deliberate constraint on population increase, that is, bringing birth and death rates into a low level equilibrium all over the world but also that the growth of capital be also brought into low level equilibrium by setting the investment rate equal to the depreciation rate. In order to achieve low level equilibrium in this regard, resource consumption and the pollution per unit of industrial output will
have to be reduced and there would be a shift of the economic preferences of society from factory produced consumer goods to services such as education and health, which do not require as much resource consumption and do not pollute the environment.

It would also mean that capital, currently wasted in the developed countries in producing new private and public mass consumption goods with a short lifetime, will be diverted to other pursuits like food production, in order to eliminate malnutrition which exists in a large part of the world. Industrial stock would then be better designed to obviate rapid obsolescence, while in order to maintain the ecosystem organic waste would be composed and returned to the soil.\textsuperscript{35} The minimum set of requirements for the state of global equilibrium can then be summarised as follows: —

\begin{enumerate}
\item the capital plant and population are constant in size (the birth rate equals the death rate and the capital investment rate equals the depreciation rate);
\item all input and output rates — births, deaths, investment and depreciation — are kept to a minimum;
\item the levels of capital and population and the ratio of the two are set in accordance with the values of the society.\textsuperscript{36}
\end{enumerate}

The framework for such a system can be established now and its structure progressively built up in the fairly long time horizon of say 70 years, which is the current expectation of life of the average person in the developed countries.

It is to be noted that a constant size of capital and population in a world system in equilibrium does not imply a stationary state of human affairs. For any activities which do not require a large flow of irreplaceable resources or do not degrade the environment like research, education, music, art, religion can be pursued. Similarly, activities which are directed at minimizing input and output rates, for example, those which ensure that discarded waste material is available for recycling, technologies which minimize the capital depreciation rate, alternative technologies which harness solar energy, the most pollution free power source, medical advances which decrease the birth rate etc. could be
pursued and would all enhance man’s quality of life and ensure that the evolution of mankind goes on.

For, as Bronowski has pointed out, if the human species reaches a steady state and steps evolving, individuals would fall into uniform and identical types, a situation to which we all will be opposed. On the other hand, we must not fall into the trap of approaching the stabilization of our environment with the hidden assumption that the fullness of human life is to be equated with man as he is now. For the quality of life is not god-given but has since the evolutionary rise of man been man-made and we must not fix it to mean what happens to be agreeable to the kind of men that we are not.  

The establishment then of a world system that is in global equilibrium has implications as well for the current social and economic organisation prevalent in the world today. As has been pointed out elsewhere, growthmania whether of population or of capital only accentuates the differences between nations and individuals. If the world system therefore reaches a stationary state, the most important question will then not be that of production but rather that of distribution, a situation which does have important implications for current consumption in the developed countries. For it means, first and foremost, the leveling off of the growth of consumption in the developed countries, which as Galbraith has demonstrated in his ‘Affluent Society’ has now reached a state where durable consumer goods of zero marginal utility are being produced, while public mass consumption goods and services are not provided. The resources thus saved from the production of unnecessary consumer durables could be diverted to enable the less developed countries to catch up in their levels of living with the developed countries in a matter of one or two generations. For a growth of the economies of the less developed countries of ten per cent per annum, financed with the resources of the developed countries now being wasted in producing unnecessary consumer durables and armaments, will be more than sufficient to ensure a doubling of the gross national product of the less developed countries every seven years.

Next policies of zero population growth should be pursued leading to a stable population for all the countries in the world
and in view of the political history of man on earth since 1750, it is only fit that the developed countries, who have benefited most from the resources of the world, as a whole, should set the pace here. For their populations are still growing, even though at a slower pace than those of the less developed countries, while their consumption of the non-renewable resources of the world system is increasing.

Since the successful implementation of the goals set out for the world system in equilibrium require the reallocation of resource use and the redistribution of world wealth, it is important that we examine the international structures of the world economy a little more closely. A cursory examination of the international economic system and the international structures which were set up in the post-Second World War period, when most of the less developed countries were still under the colonial domination of the Western Powers and so could not fully participate in the establishment of these structures and the principles which governed their operation, shows that the economic system and the structures created for its operation are heavily weighed in the favour of the developed countries and have only served to perpetuate their economic linkages with and the dependency relationships of the less developed countries. Thus to take only a few examples of this skewed and lopsided relationship.  

(i) As Robert Triffin has noted the less developed countries containing 80 per cent of the world population received less than 4 per cent of the total international liquidity of one hundred and twenty-six billion dollars ($126 billion) created in the last two decades;

(ii) The infrastructure of world trade is dominated by the developed nations of the world. Of the over two hundred billion dollars ($200 billion) paid annually by consumers for the primary commodities exported by the less developed countries only thirty billion dollars ($30 billion) is received by these countries;

(iii) Although, as Lord Snow has remarked, not one additional scientific discovery is required in order to remove the unnecessary suffering of some 2.8 billion people living in
the less developed countries, suffering of a kind which has been largely forgotten in the privileged societies of the developed countries, the direct costs to the less developed countries of importing technology from the developed countries was in 1968 one thousand five hundred millions dollars ($1500m.) and is expected to run at about nine thousand million dollars ($9000m.) per year by the end of the 1970s; 40

(iv) The less developed countries are denied access to the markets of the developed countries for their manufactured and semi-manufactured goods through tariff escalation, non-tariff barriers like variable levies, discretionary licensing and quotas; 41

(v) Although constituting 80 per cent of mankind, the voting strength of the less developed countries on the International Monetary Fund and the International Bank for Reconstruction and Development is less than one third.

Since it is now generally agreed, that the less developed countries should receive a greater share of the benefits of world economic expansion than they have received hitherto, and it is also agreed, that the achievement of such an outcome cannot be left to the normal working of market forces but must be achieved as a matter of deliberate policy to be applied by the international community as a whole, or where appropriate by the less developed countries themselves, it becomes necessary to reform the existent international institutions and structures, in order to enable the less developed countries to participate more fully in the formulation and implementation of international strategies for accelerating the development of the less developed countries.

In this connection reforms in five major areas of the world economic system — in the monetary system, trade, technology, resource transfers and institutional structures — require immediate attention. We shall touch on them briefly as the events of the last two years have made the less developed countries realize that the developed countries can be in a position, in which, they through their own fault, are unable to manage their monetary affairs
satisfactorily and thus generate a negative feedback effect on the development of the international community.

Accordingly, one of the pressing priorities in reforming the international economic system is that of monetary reform. The necessity to expand the world economy and trade, distribute the benefits of such growth and trade more equitably, among the countries of the world, requires that an international currency be established, a fact which has been recognized by the creation of Special Drawing Rights. Since the issue of money has always been an attribute of sovereignty, legally, the creation of an international currency should be a matter for the international community as a whole. A position in which gold, the production of which is concentrated in the hands of a few countries, or national currencies, which are created at the exclusive will of a few rich nations, serve as the reserves of the world monetary system contradicts this attribute of sovereignty of the international community with respect to its currency.

The proposed international currency will be backed by the economic potential of the member countries and should be so regulated that it would promote the rapid and orderly growth of the world economy and trade without inflationary pressures. This currency should be managed by an International Central Bank which would be responsible also for managing the international credit system. The less developed countries would then need to be given a voting power on the management of this International Central Bank which is commensurate with their future role in world affairs.

Further the structure of international trade and the present imperfect and badly distorted market mechanisms which distribute the gains and benefits of such trade unequally between the developed and less developed countries must be reformed. As part of this reform the barriers placed by the developed countries on the free movement of goods and services and the factors of production from the less developed countries must be dismantled. The fluctuation in the prices of primary commodities and the combined steady deterioration in the terms of trade of the less developed countries require as a countermeasure the exporting of raw materials in a more highly processed form, the stabilization
of the prices of such products and the indexing of these prices of the imports of the less developed countries. It also requires a greater degree of planning of the world economy and trade than has hitherto existed.

Thirdly, resource transfers, which should exclude all transfers inconsistent with national development priorities, should be geared to promoting national efforts at development not subverting them and should increase the capacity of the less developed countries to rely on themselves for their future sustained growth. Thus technological transfers should promote national technological capacity not increase its dependence. In this connection the arrangements whereby technological knowledge already available to the developed countries are used to transfer resources from the less developed to the developed countries need immediate review. In addition the external debt of the less developed countries — some one hundred and twenty billion dollars ($120 billion) now — which has reached unmanageable proportions and is placing an unbearable burden on the economies of the less developed countries, since they are a result of past unequal economic and trading relationships also need immediate review.

Finally, in order to ensure that the stabilized world functions for the benefit of all, there should be a restructuring of all international institutions to ensure not only their democratisation and decentralisation but also the internationalisation of their location as experience has shown that most of the international agencies are located in the developed countries of the world and are affected to a greater or lesser extent by the environment in which they are working. These and other reforms of the world economic system would require supervision by an International Economic Authority which would be responsible for planning the whole world economy and co-ordinating the work of all international institutions in this field. It is suggested that the Economic and Social Council of the United Nations suitably restructured should become this international authority.
National Development and Population Policy in the Less Developed Countries in the Transitional Period — The Politics and Economics of Self-Reliance

The new world system which has been sketched out above will not be implemented overnight. It is a goal which given goodwill and understanding on all sides can be implemented over a period of seven decades, the average life expectancy of a man born in the developed countries today. In the interim, while the countries of the world debate and agree on a strategy, as well as to how the agreed strategy to achieve these desired goals is to be implemented, the less developed countries must continue to deal with their immediate problems of development.

It is therefore necessary to indicate what is desirable in this effort at development and what is possible, given the background of present needs, resources and limitations. We shall not attempt to embark on an exhaustive analysis of the causes of backwardness and its remedies but will only sketch a framework of programmes of action which can lead to the desired goals.

Eight characteristics of the economies of the less developed countries deserve attention in any framework of development—the low levels of living and the quality of life of these countries as shown by their high birth, death and morbidity rates; the grave weaknesses in their manpower training programmes and in their educational system which are expensive in relation to their gross domestic products, non-relevant to their needs and possess an inefficient primary, adult or agricultural education sub-system; the infra-structural gaps in these economies which are combined with a very high ratio of infra-structural to total investment of 60 to 70 per cent which leaves very little for direct productive investment; the faulted and fractured economic structures which do not allow the normal operation of the price system and are skewed to low growth and low linkage productive and service sectors, geared to the production of subsistence food and housing, primary agricultural exports, manufactured consumer goods with a high import content and a large service sector dominated by an administrative civil service, which consumes a considerable part of the national output; the lack of alternative technologies which has led to the importation
of advanced technologies and techniques more appropriate to the rich developed countries; the low average levels of resources per capita and the absence of substantial high income enclaves which aggravates the problem of resource mobilisation since it is necessary to invest 10 to 15 per cent of the domestic output in order to fulfil one of the requirements for sustained economic growth; institutional weaknesses including the fragmentation of institutions and the virtual absence of operationally articulated strategies for development. Lastly, the non-existence of industry and the related services which are the structural key to rapid growth. 43

These characteristics point to the need for national self-reliance. No nation can develop basing its chances of development on the charity of other countries or their technical assistance in the form of manpower and personnel; they indicate the need for rapid increases in per capita output in these countries which can only be achieved through the creation of export enclaves and the possibility of marketing these experts in the developed countries, provided the prices of these products are stabilised at a level which enables real resources to be transferred from the developed countries to the less developed ones. Moreover if population growth is to be sustained at current levels, then economic growth must exceed population growth by a very large margin and particular attention must be devoted to the export sector in view of the realistically attainable growth rates of the economy and the length of time required for development.

There is the necessity for public and private austerity particularly on the part of the elite of these countries and it is absolutely essential for them to concentrate on the welfare of the masses of their countries in order to ensure that the masses feel that they are benefiting from development and are thus prepared to make the necessary sacrifices which would enable these countries to achieve the levels of living of the developed countries within seventy years. It must also be understood, in view of the difficulties attendant on development, that rapid increases in the quantities of manufactured consumer goods that can be made available to the mass of the population will not be possible in view of the need to increase the investible surplus.
In this respect special attention has to be placed on income distribution. Since an absolute equality of income distribution is undesirable in the current situation of the less developed countries, efforts must be made to see that the gap is not too wide and that the inequality in purchasing power should be reduced to a 10:1 range, since inequality in income weakens agricultural producer incentives and creates bias in favour of consumption in imports, while politically it gives rise to very great tensions. As Green has remarked, the rich can only preach austerity to the poor only so long as they have the support of force. 44

There must be a concentration on providing mass demand, public consumption goods and services like health care, effective agricultural education, a good public transport system while domestic manufacture must concentrate on using local materials in the production of mass market consumer goods which when combined with good income redistribution will guarantee the growth of industry by ten to twenty per cent per annum which is necessary for the sustained take off into economic growth.

What role can population policy play towards the achievement of these goals? A population policy which is geared towards development as distinct from economic growth would, as its first priority, try to preserve the very substance of the population. That is, such a population policy will concentrate attention on lowering, as quickly as possible, the high levels of mortality and morbidity in the less developed countries and would ensure that comprehensive health coverage is provided for the whole population of a country. That such comprehensive and not too costly health care systems can be designed and do function is shown by the cases of China, Cuba, Tanzania and Venezuela, in experiments in certain areas of India and Bangladesh.

Emphasis would therefore be placed on the delivery of preventive health services to the population, with a hierarchy of curative health services, which would be available as reference centres to the grass roots preventive and curative health system. The policy with regard to disease control would aim at eradicating all communicable and preventable disease through the institution of grass roots health education, mass immunization and sanitation campaigns and would integrate the local health personnel — the native doctors and
midwives — who are currently the only source of health care for some 75 per cent of the population of the less developed countries — in the health care system, and then systematically upgrade all health personnel through a continuing system of education in health care. Such a policy should cultivate an awareness of the economic importance of diseases and negative health conditions and a reorientation of health policy to tackle and first eliminate those diseases and health conditions which have the greatest negative economic impact.

A second string of a population policy which is to ensure a better quality of life and higher levels of living for the population of the less developed countries, would with regard to fertility elaborate and implement two subsets of policy, one for the affluent portion of the population, the second for the poorer sections of the population. With respect to the affluent part of the population, it would aim at reducing their birth rates, as each addition to their number in the community exacts a disproportionately large per caput claim on scarce resources and reduces the resources available not only for direct productive investment but also for investing in the general upliftment of the larger and poorer sections of the population. Instead of, as is now the vogue, subsidizing the consumption of the elite and the urban population and their continued misuse of scarce resources, they should be made to pay a market price for the goods and services which they desire. Tax disincentives in the form of expenditure taxes be introduced to discourage conspicuous consumption, which considering the levels of living of the generality of the population, can only be considered economically and morally irresponsible.

With respect to the poorer sections of the population, policy would aim at meeting the basic social and economic needs of the disadvantaged. For it is only under these conditions that the interest and energies of the greater majority of the population can be harnessed for their own development in a developmental programme which is based on self-reliance.

With respect to migration, population policy would endeavour to restructure the spatial location of the population agglomerations in a country and ensure a better configuration of these agglomerations so that the developmental process can diffuse more
easily in the economy and the current diseconomies generated by the foreign trade orientation of the spatial distribution of population agglomerations is minimised. Further a migration policy which is to ensure that the population does not continue to migrate en masse from the rural to the urban areas, must provide equal or better economic opportunities in the countryside by reducing appreciably the income differential between the rural and urban areas.

There would also be a need to decentralize policy-making and implementation which is now tending to be concentrated in the capitals, provincial and district headquarters of countries. Formulation of developmental policy and their implementation would then take place at the grass roots and would tend to better meet the felt needs of the poorer sections of the population. This, in turn, implies, the mass participation of the population in decision-making and the democratization of the political and economic process. Lastly it implies the conscious search by government and other public agencies for alternative, as distinct from intermediate, technology and institutions which would replace the high cost capital intensive technology and institutions of the Western countries which are designed, to concentrate rather than decentralize decision-making and taking.

SUMMARY AND CONCLUSIONS

In our discussion of the close interrelationship between population and development, we outlined the positions taken by the classical economists on the issue and elaborated the Malthusian hypothesis and its predictions, which have since been falsified by the advances in technology and food production. We have sketched the renewed pessimism, after the Second World War, on the chances of man’s survival on earth which has found a reformulation in Neo-Malthusianism and its consequent prescription of a family planning cum abortion model of development for the less developed countries and shown that such theories are not only a partial and static analysis of a much more complex and dynamic situation but have also demonstrated that the explanations which these theories offer of the real world situation ignore facts which are inconsistent with their hypothesis and its predictions: further,
that underlying their conceptualisation are value systems that are not acceptable to the generality of humanity.

We have shown that these theories have been conceived as an ideological weapon in the discussion on development, that they are biased in favour of privilege, tautological in content and attempt to avoid the painful and massive structural reforms necessary in the development of the less developed countries. We have directed attention to the development of world models which attempt to explore the modalities whereby the world system approaches the limiting carrying capacity of the earth and pointed to the limitations in the logical formulation of these models which do not take into account basic policy variables like changes in the social system and do not integrate into the analysis quantifiable variables like the labour force and consumption patterns. We *warned* that the conclusions arrived at by these models cannot be regarded as predictions but rather as instruments for the process control of society, as it approaches the current limiting capacity of the earth and investigations are carried out on the possibilities of shifting this limit through advances in technology, reforms of the socio-techno structure and changes in the value system of society.

We have elaborated on some of the structural reforms necessary at the global and national levels for a successful implementation of a programme directed towards a smooth and gradual approach by humanity to the current limits of the carrying capacity of the earth, while the energies released by the restructuring of the economic systems of all nations are harnessed to solve the problem of modifying and extending the limits of the earth's carrying capacity. Finally we have shown that as a necessary consequence of these endeavours the old value systems have to be replaced by a new value system and ethic which would motivate and actuate national, international and inter-personal relationship in the new world we seek to create.

The question therefore arises as to what value system, what new ethic must underlie our brave new world? First our new world must be a world of *Freedom* — freedom from disease, domination, exploitation, fear, hunger, ignorance and superstition — for without these basic freedoms humanity cannot develop
of the limits of its capabilities. Secondly our new world and society will require a practical ethic of Equality. For while the benefits of development and technology are the privilege of a few, social and political tensions are generated which bid fair to explode the body politic; while it is recognised that the basis of all value is work, whether this work is done in Washington, London, Accra, Moscow, Peking or New Delhi, the unequal distribution of the results of work done, can only lead to the moral and material indignation of those who feel disadvantaged by such distributions.

Thirdly our new world requires to recognise the driving force of Nationalism. For in a world dominated by a few rich nations, it is easy to ignore the emotions aroused by the continued domination, whether political or economic, of the lives of nations by other nation states. The prolonged agony of Vietnam is an example of the deep rooted feelings which such domination can excite. Fourthly our new world will require Democracy. For humanity cannot properly function if the greater majority of humanity, whether in the world system or in the nation state, cannot participate or are not allowed to participate in making and taking decisions which are fundamental to their existence.

Lastly we need a world which is built on Social Justice. For it is only in an atmosphere in which there is social justice that international equalization can take place, that the energies of all humanity will be liberated and directed to the improvement of society as a whole, that the "haves" whether individuals or nations, will be willing to help the "have nots" and the "have nots" will be progressively freed from the necessity of being helped by the "haves."

The creation of a social order in which Freedom, Equality, Nationalism, Democracy and Social Justice (FENDS) are the basic elements of the value system will be a task exceeding in scope and challenge everything so far accomplished in human history, but it is a task, a challenge worthy of all our endeavours. For the building of a world based on freedom, equality, nationalism, democracy and social justice, a world which FENDS for all not the few needs no justification, just as man's claim to life, liberty, development and happiness needs no justification and this is a task to which our Institute, this University, the world's intellectual community and humanity should and must dedicate themselves.
FOOTNOTES

1. The author is Professor of Economics at the University of Nigeria, Nsukka — now on leave of absence — and Director of the Regional Institute for Population Studies at the University of Ghana. The Institute was established in 1972 by the United Nations and the Government of the Republic of Ghana and is supported by them. The views expressed here, however, reflect the author’s individual views and are not official points of view expressed by either the United Nations, the Ghana Government, the Institute or its Director.


3. See Berelson, Bernard et al. [1974]. p. 3.

4. Economics is thought of here as “the theory of choice among competing ends in order to maximize satisfactions (or utility), subject to the constraints imposed by limitations in the availability of the resources required to achieve those ends.” See Marc Nerlove. [November 1974].


9. The examples have been taken from Lester Brown and Eric Eckholm, op. cit.


13. An investment programme of 30 billion naira ($30 billion) is expected to create 3.85 million new jobs, each job costing seven thousand seven hundred and ninety-two naira ($7,792.00) or the equivalent of between 22 and 44 years earnings of an average Nigerian worker. For a further discussion of this case see C. Okonjo. [1975].


W. Peterson. [1967].

20. A. Sauvy. [1963].


24. F. O. Okediji op. cit. p. 1-17


29. A detailed description of System Dynamics Analysis is to be found in J. W. Forrester. [1961] and [1968].


34. For a further discussion of the conditions for global equilibrium see Donella H. Meadows et. al. op. cit. p. 163-188 and Rufus E. Miles. op. cit., p. 14-35.

35. Among the voluminous literature on the conservation of resources, the maintenance of the quality of environment and ensuring the non-degradation of the ecosystem see: George Borgstrom. [1973]. p. 129-135. University of California [1973]

36. Donella H. Meadows et. al., op. cit., p. 178


39. See Special Task Force of the Third World Forum. [1975] from which some of these examples and suggestions for the reform of the world's economic system have been drawn.


41. UNCTAD. [1974]. pp. 73-77.

42. See J. K. Galbraith. [1975].


44. R. H. Green. op. cit.
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