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A FRAMEWORK FOR MARKETING STRATEGIES IN THE DEVELOPING COUNTRIES 1/

by

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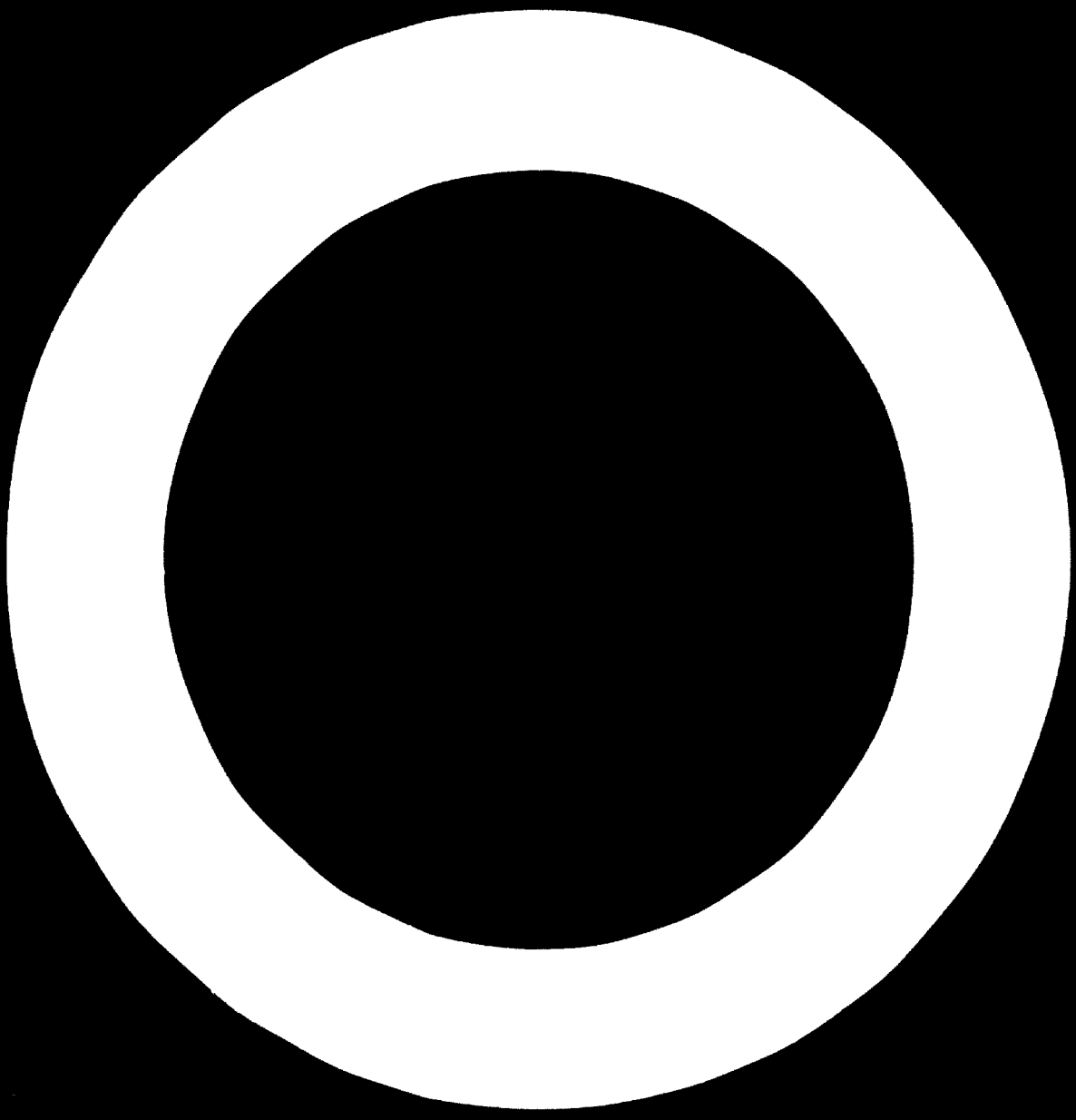

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1. Introduction

The object of this paper is to explore the ways by which modern technology can help to promote economic and social growth in the developing countries. The paper is an attempt to study innovation strategies for industrialization, full employment, and self-sustained growth in developing countries. The urgency of this task is related to the widening gap between the rich and the poor. Unless great efforts are made the gap will be still wider - and disastrously wider - by the end of the century.

The social impact of technological development has become so great that it affects many fundamental aspects of economic planning and national life of the developing countries. Unless dependable means are developed to identify, study, and forecast the varying impacts that these technological developments might have on various sectors, each developing country will be subjected to increasing stress in times of technological change and social turbulence and will not benefit fully from technological and societal opportunities. An expanded, rational planning mechanism is required, therefore, to support political and operational decisions at all levels of government, in private and public enterprise, and in citizen and community groups. This new, expanded planning process should involve all segments of both the public and private sectors, and should not, in itself, inhibit the introduction of new technology. The implementation of technological innovations will be made more complex by participatory decision-making at all levels of society. State planning must contain and channel these conflicts into productive and accelerated growth of the developing countries.

The paper (1) analyses the relationships between industrialized and developing countries, (2) shows operational innovation strategies for economic and social development, (3) demonstrates the inability of industrial systems in market economy countries to cope with a uniform territorial expansion, (4) describes state planning, supported by technology assessments, as a process which activates all connections necessary to make evolve the market mechanism in accordance with the needs of society, (5) discusses the contribution of and the environment within which technology assessment is developed and implemented, (6) emphasizes State planning and technology assessment as instrument for the control of the entrepreneurial activities the public sector must carry out in developing countries.

Four main conclusions are derived in this paper. First, the market mechanism, particularly in developing countries, does not work up a satisfactory impulse to establish and maintain a balance between agricultural and industrial production; it cannot even foster a "territorially-balanced" growth of the production system. Second, the dominant vehicle of economic and social growth will be innovation appropriate to the developing countries which should use additional labour as justified by the saving in capital; this means that industrial processes of small productivity, which are today employed in industrialized countries, must in greater measure than in the past be transferred to developing countries. Third, State intervention is requested to accelerate capital accumulation and to allocate it properly not only in developing countries, but also in underdeveloped areas of industrialized countries. Fourth, the character of a free market system is to be maintained in developing countries in order to preserve and develop entrepreneurial vigour; through State planning and technology assessments market mechanism has to be orientated towards the achievment of social objectives, whereby the State regards it as one of its tasks to assume responsibility for those innovations and investments which, while foreseen in the general plan, are not or cannot be undertaken by private initiative.

2. The relationships between industrialized and developing countries

The past vicissitudes of the industrialized countries suggest that the market mechanism not only does not work up a satisfactory impulse to establish and maintain a balance between agricultural and industrial production, but that it cannot even foster a "territorially-balanced" growth of the production system[1]. By "territorially-balanced" I mean that, wherever possible job vacancies happen to be, they should be filled not only by migration towards those regions which are already industrialized, but also by a continuous and spontaneous spread of the original productive nucleus towards the areas of underemployment.

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(1) See P. SARACENO, L'economia dei Paesi industrializzati, ET/AS Kompass, Milano 1970, p. 69

It has thus happened that the type of economy, brought about with the birth of industry, has not been gradually extended by the market mechanism itself, but it has been limited to a group of countries which constitute a minority in terms of world population.

The "world market" - this new economic perspective, introduced for the first time in history, since the industrial revolution - has been such only in the sense that the network of exchanges has so quickly extended as to connect most countries. Nevertheless, only a limited number of countries - more precisely those whose industrialization grew, or, at least, took place in the last century - has been able to see their own development mechanism come to such an integration as to derive an adequate impetus to lasting progress from it. Instead, the remaining countries not only did not partake of that progress, but because of their presence in the world market of raw materials and farm-produce, of which they had become important suppliers, they found themselves open to the counterblows of the very crisis of the industrialized world, without either getting the benefits for which crises are in a certain sense the price or finding an opportunity, owing to their weakness, for an adequate defence.

In other words, the industrial revolution, which took place at the end of the eighteenth century, did not promote a world market in the sense that the whole world partakes in and benefits from the process of industrialization: for a large number of countries, covering the majority of the world population, participation in the industrial market has not meant the establishment of processes of capital accumulation analogous to those, found in the western world after the industrial revolution. This accounts for the survival, in the majority of countries, of archaic systems much like those which have been superseded in the countries that had experienced the industrial revolution. Technological change in the industrialized world has also contributed to the growing economic problems of developing countries by providing expensive, complex, labour-saving machinery, and equipment at a higher rate than the rate at which skills can be acquired and capital be formed in these countries for their efficient and effective utilization(1).

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(1) See J.E. STEPANEK, New Perspectives: Industrial Development in the Third World, IBE, Wien 1972, p. 56

In the OECD classification, there are 15 main rich industrialized countries and 28 main poor developing countries. The former have a population of 600 million with a GNP of 2,500 $ per head. The latter have a population of 1,700 million and a GNP a head of 150 $, that is, in round figures, 1/20 of that of the former. These average figures cover wide ranges. For instance, a few years ago the pro capita incomes of the United States and of India were 3,500 $ and 90 $ respectively, giving a ratio of 40 to 1. This ratio is still increasing. The total GNP of the industrialized countries is six times that of the developing countries.

Since the net rate of rice of the GNP a head of the industrialized countries is 3,5 % compared with 2,5 % for the developing countries, the rich countries are getting richer 1 per cent faster than the poor countries. So the gap is still widening. If present trends continue until A.D. 2000, than the arithmetic excess of the GNP a head of the industrialized countries of that of the developing countries will have risen from about 2,500 $ to about 7,000 $. Another way of looking at the gap is to note that the annual added wealth of a citizen of an industrialized country is nearly as much as a citizen of a developing country has to live on for a whole year.

If the relative gap is to be halved, say, from the present 20 to 1, to 10 to 1, by A.D. 2000, then the net rate of increase of GNP of the developing countries will have to be raised from the present 1 per cent below to 2 per cent above that of the industrialized countries. The degree to which modern technology can assist this growth process will depend on the total amount of investment funds available, the fraction, allocated by the government of any country to science and technology (in competition with all the other social demands), and the wisdom, skill, and entrepreneurship with which these financial resources are used [1].

Actually, since world war 1, an increasing number among the economically underdeveloped countries has resolutely rejected the system of relationships they had been confined to by the forces of the existing market and has adopted a policy inspired by the thought that it is up to the State to start and maintain the process of economic development[2]. The under-

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(1) See Lord BLACKETT, Introduction to: G. JONES, The Role of Science and Technology in Developing Countries, Oxford University Press, London 1970, p. XIII

(2) See H. HINTERHUBER, Der Staat als Unternehmer, "Weltwirtschaftliches Archiv", Vol. 103, pp. 58-76 (1969)

taking of such responsibility has followed two very different lines: there is a) the communist one which is characterized, in principle, by a rejection of the system based upon the assignment to the private sector of the profit coming from the utilization, by means of the wage -systems, of the production facilities of which it is the owner: according to this line of thought, it is the task of the State, on the ground of a defined programme, to provide for the accumulation of capital required to carry out the process of development wanted.

Then there is b) the line we shall call "mixed", which still relies on the formulation of a development plan by the State, though the State's task is only restricted to realizing those investments which are foreseen in the plan, but are not carried out by private enterprises. In the latter case,the plan has a double purpose:

(1) to increase the effectiveness of the public economic activity which, having become very complex, requires a rigorous co-ordination;

(2) to notify the private operators of the type of development process which is aimed at in order to open a form of ex-ante co-ordination of investment able to reduce the risks and make them accessible to private enterprises which are inevitably very weak in a developing country.

Since it is the State which points out the strategic line of development which is meant to be pursued,a practice typical to the policy of many countries has followed: the involvement in and direct operation of the State of all those productive activities which are foreseen in the plan, but are not undertaken by private enterprises.

This trend has actually developed also in the industrialized market oriented countries; in such cases, however, the State company only integrates private initiative which continues to determine most industrially important decisions(1); in developing countries, where private enterprises are lacking or are of a very small proportion, the enterprises, directly operated by State institutions, are of paramount significance. This situation is strengthened by the fact that, in the developing countries, private enterprises often link up to foreign corporations where the State cannot allow too great expansion, without running the risk of introducing some alien elements in the political life of the country or damaging the country itself.

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(1) See H. HINTERHUBER, Management of Technology and Parliamentary Control, Council of Europe, Third Parliamentary and Scientific Conference, Lausanne, 11-14 April 1972.

Especially in Latin America there have been frequent cases when economic progress has proved an impediment to social advancement, in other words, bringing itself handicaps to the achievement of the very aims for which the former had been promoted. Because of the poverty of local private enterprises and of the limits to which the foreign corporations are to be submitted, it is easily understood how the State controlled company can play a role which is similar to that, for ideological reasons, found in the socialist countries.

Nowadays, there is a large group of countries that are committed to the so-called "mixed" line, that is engaged in development strategies presenting the four following aspects:

(1) basing themselves on long-term programmes;
(2) allowing private enterprises;
(3) providing for a large contribution of State controlled companies, and
(4) orienting the market mechanism towards the achievement of social goals.

Such strategies, which have been set in motion at different times, since the end of World War II, are obviously working under the most disparate conditions, owing to the social and economic differences of the countries. One has only to be reminded of the disproportion of dimensions among them - say for instance between India's and the small African States' - a disproportion which, by itself, implies very different types of planning and implementation.

Yet, there is a distinctive feature common to all those realties, gathered under the name of "developing countries", that is the state of extreme uncertainty and very serious difficulties in which the strategies undertaken by their governments take place and the actual impossibility to foresee the course which the various situations forming the object of this strategies can take(1).

First of all comes the fact that the growth of a country does not so far depend on capital accumulation and sound planning, so much as on the cultural and professional formation and on radical changes in its social structures. It is at present not clear how this may be achieved. As to what is concerning the human resources, the problem of technological training, though complex, does not certainly stand out as the most difficult to solve.

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(1) See J.E. STEPANEK, New Perspectives: Industrial Development in the Third World, op.cit., p. 25

One difficulty has to be stressed: schools of engineering in industrialized countries take justifiable pride in sharing with students from developing countries the latest in modern techniques and even employ these students in graduate and post-graduate research projects to design still more sophisticated techniques. Engineers, wishing to design factories that are more capital-saving, generally find information, lacking on the availability of more appropriate technologies. The engineering education for developing countries should therefore reflect a more discriminating approach for the selection of technologies; particular emphasis should be given to design to save capital by using additional labour as justified by the saving in capital[1]. The major need is a broad scientific and technological training, including related social studies, which aims at technical competence in a wide setting.

An important premise to the start of any development process is, therefore, the action in the educational field which is inevitably a hard task with very slow results[2]. In the creative and efficient use of resources management is probably the most important factor. In developing countries there is an urgent need for building up the supply of managers who are able to create and develop modern enterprises, either in the private or the public sector. Then deep changes in the social structures are necessary, in particular those changes which derive from radical land reforms; the reforms must overcome two obstacles: the political one, consisting in the opposition of the landed class, and the technical one, deriving from the uncertainties of their technical implementation.

The rapidity of population growth represents an other element of difficulty for the identification and implementation of a development policy; the development policy itself has to reflect, in a relatively short term perspective, a demographic framework which is very different from that, existing when it is being inaugurated.

In the strictly economic sense, moreover, the price-decrease of raw materials and food-stuffs has proved very disturbing for the development process of these countries; the consequences of a decline of the price of primary goods have a sharp impact on the developing countries, both because they, having economies based on one type of crop or a particular mining production, have an exportable surplus of only one or few of these goods.

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(1) See J.E. STEPANEK, New Perspectives: Industrial Development in the Third World, op.cit., p. 31.

(2) See H. HINTERHUBER, Führungsausbildung im Zeichen der technischen Entwicklung, "Betriebswirtschaftliche Forschung und Praxis", 2, 101-114 (1973)

Increased supply of developing countries, resulting from the growth in productivity in the industrial sector and in the agricultural and mining fields, is mainly responsible for the unfavourable course of prices of primary goods. The demand of raw materials and food-produce, furthermore, is constantly depressed by the competition of synthetics, made by the industry of the importing countries and by the technological progress which, for the same production, reduces the quantity of raw materials, employed by the industries of the importing countries.

The market situation of goods, exported by the developing countries, is, further, made unstable by the economic trend of the industrialized countries; when adverse business cycles occur, purchases of raw materials are reduced, causing serious damage to the exporting countries, without any possibility for them to recover, by any other means, from the reduction of outlets; neither are they able to settle the question by using currency reserves. It must be added that raw materials and farm-produce, compared with industrial production, can be stockpiled. That's what allow possible speculation by stockjobbers, adding a new element of uncertainty to the already precarious market situation of some raw materials and further weaking the developing countries(1).

The unfavourable consequences of this state of affairs are further worsened by the fact that the supply of primary goods is rather inelastic, that is, they scarcely reflect fluctuations in prices. While an industrial production which proved no longer economic, might be cut down or even abandoned, and its labour forces and capital transferred to other activities, nothing of this kind is possible for a country, exporting only few materials, because they lack other fields of activity to which available resources can be transferred. For agricultural production, it may even happen that, when prices go down, the farmers intensify production in order not to reduce their real income when it is impossible to give another utilization to their work and their available resources.

Price fluctuations with a tendency to sag, the inelasticity of supply, concentration on a single or few products, the absence of industrial production, are all reflected in the impossibility for these countries to make basic forecasts, even in the medium term, and therefore to formulate

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(1) See P. SARACENO, L'economia dei Paesi industrializzati, op.cit., p. 70

concrete programmes. Elements of further damage are added by ignorance and corruption, often introduced into these programmes or into their execution. The need for money is therefore increased by waste, incurring in the political and administrative life of these countries. Savings are consequently very inadequate, compared with the bulk of investments, required in a long term development process. The execution of any development programme, then, involves an appropriate and constant contribution of foreign capital, and this contribution, besides, must generally have a character of aid and not of loan, owing to the poor solvency of a developing country. In this connection, it must be kept in mind that if loans, granted in the past to a developing country, are paid back, that's only because this country is getting new loans or further aid.

From this point of view, a remarkably different position from the typical one of the developing countries can be seen in the oil-producing countries; oil-export has determined public revenues in foreign currencies large enough to permit, on one hand, a relevant expansion in real terms, of public expenditure, and on the other hand, the creation of a considerable surplus in the balance of payments, surplus which has removed every need for loans and aid and which has also permitted to these countries the formation of considerable reserves as means of payment abroad (1).

This means a new unforeseen situation, the further development of which can give to the countries in question a position (even political) very particular among the developing countries; above all this applies to the group of Arab countries, in the case that, between themselves, they institute forms of agreement or even of integration. The fact, however, that in countries without any lack of capital, progress proves equally uncertain, shows how relevant non-economic factors are.

Underdevelopment means a combination of great poverty and of the impossibility of rapid improvement through the employment of available labour forces. There is a lack, in fact, of the capital, required to utilize this labour force, and even if this capital existed, it would lack the necessary structures for an economic use of productive capital. Progress is, therefore, very slow, or in some cases, even practically null and void (when

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(1) See H. HINTERHUBER, Die Explorationspolitik in den internationalen Erdölunternehmungen, "Erdöl-Erdgas-Zeitschrift", 86, pp. 318-327 (1970)

there is no regression) if account is given for the emergence of new problems and of the worsening of the old ones; population increase is often the principal cause of the widening of difficulties.

From an economic point of view, the major need that the developing countries today feel, when they are not oil-producers, is that of strengthening their position in the international economy; this objective can be pursued by them only by increasing exports in the quantity required to meet:

a) the increase in imports which is determined by three phenomena : the growing need for production goods, required for the execution of development programmes, the urgency of improving the tone of life and the increase in population.
b) the growing number of loans which the developing countries in question must negotiate to equalize their balance of payments, a balance which is today obtained in large measure from aid and loans which, in great part, are never reimbursed.
c) reduction in exports which in more than one case are the result of the technological progress of industrialized countries, a progress which continually offers new synthetic products, substituting raw materials, or diminishing, on a par with production, the need for the said raw materials.

In view of this, it is understood how a rapid development of industrial production is the only way open to developing countries to solve their economic problems; the industrial development not only must supply production and consumer goods today imported, but must also feed export outlets in the already industrialized countries.

3. Technological innovation and industrial development

By innovation, I mean effactive innovation which is the sum of the creative activities in the fields of R & D, production, and marketing. Too often, in this technological age, innovation is automatically associated with R & D, based on the natural sciences. But the fact is that critical innovation, regardless of the field, may occur in the production and marketing functions as well as in the R & D function. An enterprise or a country which is outstanding in R & D and creates really useful products and services,

but which is relatively weak in innovation, in the production, and marketing functions may well be surpassed, both in product and service contributions and in profitability by an enterprise or a country with less outstanding R & D results but with a better balance of high-level innovation in all three categories - R & D, production and marketing[1]. Innovation, in other words, means the whole process from scientific discovery or invention to the final emergence of a marketable product or a social service.

Economic growth through technological development depends on continual innovation[1] in the form of new or improved products, processes, and services, and the general acceptance of these innovations throughout the production structure. In developing countries the dominant vehicle of economic growth will be innovations which (1) bring about productivity gains, and (2) represent new contributions to existing products, processes, or services. In fact, the prime need is to ensure the full and effective use, through adaptation, of foreign science and technology.

In the typical mixed economy of a developing country innovations stem only partially from a continuous demand pressure on entrepreneurs for new or improved products, processes, and services; in these countries, innovative efforts need State planning. The less advanced a country is, the more the emphasis in its scientific and technological activities needs to be on the diffusion of information, and on technical advisory and other extension services, with R & D primarily concerned with supporting, adapting, and exploiting the transfer of technology. In both agriculture and industry, the improvement and adaptation of indigenous or imported technology and increased efficiency in the use of resources deserve close attention[2].

Shortage of capital is one characteristic of the developing countries which justifies the use of more appropriate technologies. There are others which distinguish the developing from the industrialized countries and require new design factors to be built into capital equipment.

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(1) See H. HINTERHUBER, Technische Innovation und Unternehmungsführung, in W. Kirsch (ED.): Unternehmensführung und Organisation, Gabler Verlag, Wiesbaden 1972, pp. 151-171.

(2) See G. JONES, The Role of Science and Technology in Developing Countries, op.cit., p. 105 and p. 157.

Markets in most developing countries demand a smaller scale of operation than in the industrialized countries. Disposable incomes are lower, populations within the economic barriers in many cases are small, widely dispersed, and with greatly differing tastes. Transport and distribution systems are under-developed. The result is a need for technologies, appropriate to small markets, supplied by smaller factories. The technologies, designed for large-scale operations, are most inappropriate for small markets.

Raw materials supplies like markets have a tendency to be limited, dispersed, and uncertain as to regularity of supply and quality. Often a technology, designed for high quality raw materials and for an exacting market is used to manufacture products from raw materials of indifferent quality and for an undemanding, goods hungry, market. The technology is misused. Indeed, in order to make it work at all, it may prove necessary to import raw materials to replace low quality indigenous supplies.

According to many industrialists, the quality standards, required for the export market, make necessary the use of labour-saving technologies.

Fuel and electric power costs in developing countries may be double those in industrialized countries, and the supply is often uncertain. A technology, requiring continuous operation, may lose its advantages if a stand-by power plant has to be installed.

The developing countries are often described as lacking investment opportunities. What is meant is that there are few markets sufficiently large to justify investment in the types of plants which international investors are generally accustomed to in the industrial countries. But if we had sharper vision and refined mechanisms for conducting the search, we could find opportunities to supply smaller markets, using technologies of a different type.

One argument in favour of labour-saving technologies is that large-scale modern plants return such high profits that the spiral of growth can be started much more rapidly than by employing a strategy of smaller and perhaps less profitable industrial establishments. Large-scale plants can return high profits, particularly, when serving a large domestic market, exporting or enjoying a monopoly. However, a large-scale plant at partial

capacity, shut down because it cannot obtain managers or operating inefficiently because of spare parts shortages, is not likely to show a profit[1].

The technologies currently used in the industrialized countries can be characterized as "labour-saving" per unit output. The technogies most appropriate to the developing countries might be termed "capital-saving" and should be designed to employ relatively more labour.

The search for greater technological flexibility, which is stimulated by typical factor proportions in developing countries, need not involve a return to primitive processes of production. Rather, it requires a greater readiness to eschew unquestioned adoption of the most up-to-date and most prestigious capital-intensive and integrated production processes which have been developed for use in countries where labour is particularly scarce and to seek out the efficient processes, employed in those industrialized countries where the relative abundance of capital and labour is somewhat closer to the situation in many developing countries.

The procurement by a technologically backward state of publicly accessible technologies which are individually difficult to define can take place by two means[2]:

(1) Procurement of direct access to specific foreign sources of capital saving technologies by:
   a) acquisition of patents, licences, know-how, and technological assistance from foreign enterprises,
   b) cession to foreign enterprises of participations in enterprise capital for formation of joint ventures.

(2) State promotion of specific scientific and technological research

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(1) See J.E. STEPANEK, New Perspectives: Industrial Development in the Third World, op.cit. pp. 8-9.

(2) See H. HINTERHUBER, Wissenschaftliche Forschung, technischer Fortschritt und industrielle Entwicklung, "Der österreichische Betriebswirt", 20, pp. 169-186 (1970);
see also H. HINTERHUBER, Management of Technology and Parliamentary Control, op.cit.

of which it can be assumed that the results achieved will find useful application[1].

Industrial processes of small productivity which are today employed by industrialized countries, must in greater measure than in the past be transferred to developing countries and be substituted by processes of higher productivity and therefore of higher technological content. The interest of industrialized countries in dedicating appropriate resources to scientific and technological research derives from this prospect[2]. The countries which would not resolutely proceed in this way, would see the prevailing wage rates, not only not improving, but even drawing back towards the lower levels in force in the countries able to master only the simplest technologies.

A socialist line of thought being adopted or not, the majority of countries in which industrialization had not yet started at the beginning of this century, is today involved in processes of economic development which see the State the major, and often, as the only protagonist. The behaviour of these countries in the world market cannot escape, fundamentally, from the logic of market opportunity; this is an element destined to bear, in a growing and considerable measure, on the

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(1) The major roles of research institutions in a developing country are:

(1) to help select and adapt existing scientific and technological knowledge to meet specific local needs

(2) to maintain contact with developments elsewhere of potential local importance

(3) to design plants and equipment to save capital by using additional labour as justified by the saving in capital and, more generally, to augment existing knowledge in fields of actual and potential relevance which, for various reasons, are not or cannot be properly studied in industrialized countries.

(4) to train, within the limits of the foregoing, scientific and technical personnel and to stimulate entrepreneurship.

(5) to transmit information on more appropriate technologies.

Through their planning organizations, governments can ensure that due priority in the allocation of limited human and financial resources is given to projects and programmes, related to economic and social needs.

(2) See H. HINTERHUBER, Management of Technology and Parliamentary Control, Third Parliamentary and Scientific Conference, Council of Europe, Lausanne, 11-14 April 1972.

position of industrialized countries with a market economy, given that:

a) the progress of the industrialized countries is to a great extent subordinate to the constant expansion of commercial exchanges with the developing countries;

b) in the developing countries lives the majority of the world population (a population which is moreover growing at the highest rate) and there is to be found the richest part of the natural resources of the earth.

The industrialized countries are therefore vitally interested in co-operating to solve the problems of developing countries; they and only they are able to realize two necessary (though not sufficient) conditions for determining a more favourable course of the actual position of these countries. These conditions are:

(1) the guarantee of relevant and constant flow of aids, and

(2) the renouncement of certain types of industrial production of which they are also exporters and, of which, instead, they should become importers(1)

It does not seem, however, that these two conditions today figure as appreciable components in the development process of industrialized countries; the social forces, operating in the rich countries, do not feel the improvement in the conditions of life of poor countries as a significant value which they can sacrifice:

(1) with a generous increase in aid, one part, even small, of the higher well-being they can immediately achieve,

(2) the operation of those industrial activities (e.g. textile production) which in developing countries can more easily be performed.

Aids and loans to developing countries rest, therefore, within the restricted limits which are imposed on the industrialized countries by the international political situation or by the opportunity to sustain their

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(1) In an international division of labour, those components, able to absorb large amounts of labour and requiring little capital equipment, should be manufactured in developing countries. The establishing of pilot plants for the manufacture of goods under the economic and social conditions prevailing in the developing countries, should be encouraged in industrialized countries.

own exports of production goods[1]. At the same time, a concrete follow up has not been given to promises made by industrialized countries at international conferences

(1) to stabilize the market of raw materials which the developing countries export,
(2) to reduce their own agricultural production, and
(3) to open their own markets to the new industries of the poor countries.

The developing countries, or at least, a great part of them which are unable to achieve intensive processes of capital accumulation and formation of human resources cannot therefore avoid serious political and economic crisis; their relationships with industrialized countries happen more in an atmosphere of conflict than of co-operation. In substance, this complex pattern of relationships which used to be called the "class struggle" is fading inside industrialized countries with high GNP, to be revived, instead, as a tension between rich and poor countries: the former, being economically homogeneous and in a state of continuous progress, the latter, proceeding too slowly or not at all, in respect of their miserable level of life. And probably, it will be only in the way in which this situation becomes more acute that the problem of the developing countries will become one of "our" problems and not only the problem of far away countries or of countries which are believed to be far.

4. Development gaps in industrialized and developing countries

The inability of industrial systems, born in the last century in market economy countries, to cope with a uniform territorial expansion, has been shown not only in the world context, with regard to the developing countries, but also inside the very industrialized countries. Islands of rapid economic growth exist also in developing countries which can be distinguished from the rest of the country by marked differences in pro capita income - the differences increasing each year.

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(1) The amount of capital supplied to developing countries (an amount which according to programmes formulated by international organizations, should have reached an entity, certainly not considerable, equal to 1% of the GNP of industrialized countries), has not reached the said amount. Also, the operation of special development agency, formed by the World Bank, has been until now hardly considerable.

It has in fact happened that the accumulation of industrial capital in a country tends to be concentrated in the sole regions where the accumulation process started; thus, not only the world economy is nowadays split into two sections - the developed and the underdeveloped one - but the developed countries, too, often reveal, inside themselves, single areas, sometimes very widespread, which were left underdeveloped; more precisely those areas, where:

a) the accumulation of industrial capital was not sufficient, in the past, to bring the labour force of a prevalently agricultural region to a productivity level of the same order as achieved by the labour force in the remaining national territory where the process of industrialization has been concentrated;.

b) the deficiency which has been so determined in the industrial capital structure, cannot be eliminated by the action of the existing market mechanism.

Old and new economies which, as said above, are in a country evidenced as a result of the process of industrialization, generally tend to be located, on one hand, in some regions - (those that are industrialized), and on the other, in the remaining regions which stay agricultural. The differences in revenue and in the way of life, which form between region and region, tend to worsen because low productivity industries, following the process already illustrated, are no longer convenient because of rises in wage levels, and are then transferred to the countries with low income and not to those areas in the country which, although being underdeveloped, have wage levels of the developed part.

Now, because the situation of internal underdevelopment in industrialized countries cannot be eliminated by the action of market forces, this type of disequilibrium cannot but be continually worsened. The increase in productivity which is so intense in our times, will determine in fact a continual increase in income of the industrialized area; even the culture and any other manifestation of life of the area will evolve intensely, therefore, according to the schemes, good or bad as they may be, which are appropriate of more progressed societies.

Non-industrialized areas stay fixed in their antiquated economic and social structures and the imbalances of their social life will be upset in the end by the fact of belonging to a country whose economic and social life evolves under impulses which become more and more alienated from the possibility of development in poor areas. Because in rich areas income and power go together, the situation now under examination, has been defined as internal colonialism which, for example, could well apply to the Italian South, considering the system of social forces which came about in Italy after unification.

From this one recognizes the economic and political opportunity of public action which is directed towards the intensification of the process of productive capital accumulation, in order to endow even the underdeveloped region(1). A similar action will, however, always be conditioned by the interest of the more powerful rich zone. This action cannot, therefore, develop according to the logic of an action which is intended to unify the culture and economy of the country; the gap between rich and poor areas could therefore be reduced only under the pressure of protest from the poor zone. The reduction of the gap will be limited and in part considerably determined by the transfer of labour from the underdeveloped area to that more advanced.

The problem is partly different if the underdeveloped area does not play a great part in the economy of the country; in this case, the accumulation of capital which is formed in the whole of the country, may be sufficient to give work in developed areas even to labour which is underemployed or unemployed in the underdeveloped areas. In this situation migrations from underdeveloped to developed areas and establishing in these areas of those activities which the existing market is able to set up, are considered to be adequate to give full employment to the total labour force of the country.

The fact is that experience has already clearly indicated that an equalization process of the productivity of the work force existing in various regions of a country, being mainly obtained through internal migration, gives rise to decay, in the areas of emigration, even of those modest economic activities which were yet flourishing before the exodus, and, more, determines a social disequilibrium no less serious than that existing before; from here rise new problems which are more difficult to solve due to the demografic impoverishment, produced by the exodus.

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(1) See H. HINTELMANN, Management of Technology and Parliamentary Control, op.cit.

The relatively high level of economic activity in the metropolitan areas first attracts and then holds the most talented, educated and risk taking individuals from the entire country. Their removal from the underdeveloped regions results in a relative decrease in economic activity, reduced attraction for other innovation-minded individuals and, thus, a repetition of the cycle. Therefore, the idea that public action to accelerate capital accumulation in underdeveloped areas should take place even if in the country the process of capital accumulation develops in an intense way has gained ground. In this case, the development action will tend not to intensify the formation of new capital, but to allocate differently, between the various regions of the country, the capital which is already currently being formed, in order to favour the return and the retention of innovative individuals in the underdeveloped areas.

Insufficiencies in capital accumulation processes, revealed in industrialized countries, do not concern only lack of development. Since the end of world war II, State action has been asked for elsewhere than in areas poorly endowed with capital investment, even in areas which had already adequately been provided for in the past, but that because of intransient crises, can no longer give to that capital an economic employment. The causes of the crisis may be various: exhaustion of mines, reduction in the demand for goods the production of which had a considerable role in the zone, abandonment of production of a military character and, above all, in these times, of production which, having an inadequate productivity in respect of current wage level, must be left to the countries technologically less advanced. The said crisis is due to the phenomenon of changing from high developed processes to mature processes[1].

It has been proved that, when similar events happen to a considerable part of a productive system of a given area, the existing development mechanism does not efficiently react, in general, by immediately using, in the region struck by crisis, the productive factors (and in particular the work force) which have become available. State intervention is requested in this situation for reason substantially similar to these mentioned above for the underdeveloped regions: in fact, the development mechanisms, existing in the area, are unable to give employment to a considerable part of the labour forces of the same area, at a productivity

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(1) See H. HINTERHUBER, Management of Technology and Parliamentary Control, op.cit.

level which correspronds to current wage -rates. Public action is justified, in this case, other than for the motives, already mentioned for underdeveloped areas, as it also permits the employment of qualified professional people and investments of a social character (public works, schools, nurseries and other private and public services) the formation of which had been previously determined, and which would be lost in the case of any contraction of economc activities.

In recent times, on the basis of the same elements which justify the intervention here metioned, it has also been demonstrated that the economic policy of a developed country should take charge not only of the insufficient use of the work force available in underdeveloped regions or areas in crisis , but also of the effects, determined by the fact that further considerable expansion of private investment in highly developed regions gives rise to a demand for work which exceeds the existing availability of it in some regions, and therefore provokes considerable immigration. The forming of a similar imbalance, while worsening phenomena of underdevelopment and of depression, which other areas already suffer from, may in the developed areas demand extremely high public investment and determine social disorder and damage (pollution, for example) which a different regional distribution of industrial investments could avoid. Direct public action, contrasting the tendency of productive investment to concentrate further in the said congested zones, is thus justified.

5. State Planning as a method of orientation and stimulation of the market mechanism

The point of departure for a first orientation as regards planning shall be the general statement that with the evolution of society from cultures which might be defined as rural to cultures dominated by technology the degree of dependence of each individual on other individuals is increased. This increase, however, does not express itself in an increase in the amount and intensity of bilateral relationships instituted by people among themselves. On the contrary, these relationships appear to decrease both in number and in intensity; technological progress heightens to an increasing extent the isolation of the individual in proportion to the increase in his mobility and his control over nature.

The increase in this degree of dependence shows itself in a continuous increase in the number, the size, and the complexity of two systems: firstly that system whose regulation takes place through spontaneous connections which form between men as a result of chance, and secondly those systems which are regulated by man by means of certain procedures with a view to the attainment of certain aims (1).

The transition to a programmed economy is a problem of transforming a self-regulated system into a regulated system; the application of planning means that a given society does not, in the judgment of the competent authorities possess that capacity of self-regulation which suffices to lead the system in the direction of the general aims which these authorities propose to attain.

The incapacity for self-regulation is based on the fact that changes in one part of the system do not automatically and at the right time give rise in other parts of the system to the reactions which are necessary to move the system in the desired direction. The localization of large-scale technological projects was able to take place at an earlier stage without a superior office having to estimate automatically all the positive, negative, direct and indirect effects in all spheres of society (economy, environment, institutions, general public) or having to provide the indications and resources necessary for the creation of the required structures at the right time. Today an "adjustment" of this kind is no longer possible, and it must be with the help of technology assessments(2) that the connections are set up which improve the extent and the quality of the information serving as a basis for political and entrepreneurial decisions. This is a case of faulty coordination between the private and public decision centres. The grave deficiencies in all spheres of public and private life are simply proof of the impossibility on the part of the public decision-centres to react at the proper time to the decisions of the private decision centres ,and, on

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(1) See P. SARACENO, L'economia dei Paesi industrializzati, op.cit. p.97

(2) For the purpose of this paper, technology assessment is the systematic evaluation of the secondary or higher order effects or impacts on society of a present or proposed application of technology. It is the systematic forecasting and planning process that evaluates the impacts of present or proposed applications of technology on all sectors of society, encompassing economic as well as environmental, social, institutional, legal and political considerations that are both external and internal to the technologies in question.
See, for example, M.V. JONES, A Technology Assessment Methodology: Some Basic Propositions, The MITRE Corporation, Boston 1971.

the part of the private decision-centres, to assess the developments of public action which with their decisions are unreachable and unmodifiable (1)

The adoption of a planning mechanism thus synonymous with the activating of all connections which are necessary if the various initiatives of the decision centres of the system are to propel the system in the right direction in as economical a manner as possible. The laying down of the aims for the actions to be carried out is of course a political and not an economic operation. The classification of the planning as economic planning does not refer to the procedure of the formulation of the aims; the aims laid down at the political level in sequential and stochastic approximation are pieced together by means of technology assessment and of successive elaborations of an economic nature to form an organic, programmed action. These elaborations are to make sure that the resources which can be accumulated for the attainment of the given aims are sufficient and that the required instruments for the action are produced.

An absolute prerequisite for the transition to a programmed economy - programmed society would be a more suitable term - is the construction of an order by means of which the aims which have to be attained by the different decision centres of the system can be exactly defined. These aims are numerous and of a varying nature, and besides this they are definable with the aid of differing standards adapted to the diverse actions; e.g. intensification of progress in poor underdeveloped areas, acceleration of technological development in various areas, building and/or introduction of plants for the reduction of pollution, and so on.

The multiplicity of the aims, the varying times of technological implementation, and the great variety do not constitute a hindrance for a programmed action. After the transition from the political moment (definition of aims) to the economic and administrative moment (implementation of the systems analysis and the technology assessments) the aims laid down on the political level become conditions or restrictions which have to be taken into account in the process of formation and distribution of the national income.

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(1) See P. SARACENO, L'economia dei Paesi industrializzati, op.cit., p. 99

In the economic phase the planning activity is thus a procedure for maximizing the national income, whereby certain conditions are observed. The ideals which prevail in the society which is the object of the programmed action are concretely reflected in these conditions in the form of aims.

When as a result of the given conditions the attainable national income proves to be insufficient, the aims must be modified on the political level. The comparison between aims and resources must be continued until the optimum totality of the aims attainable with the resources available is reached at the political level. The planning activity thus consists of a political moment in which the aims are laid down and of an economic,technical, and administrative moment which guarantees the progress of the system under the conditions which reflect the aims.

From the above exposition it can be clearly seen that the transition to a programmed action does not effect the mechanism of the market, Certain public actions, either individually or as a whole, or the manner in which they are carried out, but not the fact that they are carried out within or outside the framework of a programmed action can lead per se to an impairing of the market mechanism. If the public action is geared to the attainment of certain aims, the fact that the modalities of this action are fixed with the aid of planning heightens the efficiency of the market mechanism.

The planning mechanisms which are able to bring about fundamental changes in an economic structure are characterized by two elements:

(1) The State takes over direct responsibility, mainly through State owned companies, for the attainment of certain aims of innovation, production and income distribution within a certain period of time.

(2) The achievement of these objectives is effected by maintaining a free economic system whose framework undergoes a certain modification.

The character of a free market system is maintained in order to preserve and develop entrepreneurial vigour which is encouraged by private

ownership of the means of production. By State action the market system is geared to the achievements of social objectives which cannot be attained by the market mechanism alone [1].

In the "mixed economy" of a developing country, for which the establishment of a general plan by the State is a prerequisite, the State should regard it as one of its tasks to assume responsibility for those innovations and investments which, while foreseen in the general plan, cannot be undertaken by private initiative.

It is not likely that there will be any innovations in development strategies comparable to those to which industrialized countries have become accustomed in industrial production. Some opportunities do appear for improving the design and for accelerating the implementation of industrial development programmes. Slight improvements can be expected, but no sudden changes will dramatically increase industrial growth rates.

The most important block to industrial development is the lack of risk-taking, innovation-minded individuals. If a culture can produce large numbers of such individuals, the problem of industrial development in developing countries would be nearing solution. The incidence of entrepreneurs in the newly industrializing countries is grossly inadequate. The very activities of the State planning agency to accelerate industrial development has to tend more and more to form and mobilize these vitally important entrepreneurs. The success of development plans may depend more upon a strategy for the formation and retention of such individuals than the provision of physical and financial resources from the planning agency. In developing countries, however, entrepreneurship should be favoured among engineers since this combination of skills can lead to effective formation of new enterprises and to relevant enterprise growth rates. Entrepreneurial training could be associated with the granting of credit by development banks.

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(1) See H. HINTERHUBER, Der Staat als Unternehmer, "Weltwirtschaftliches Archiv", 103, pp. 58-76 (1969)

6. The contribution of and environment for technology assessment

What is the contribution of technology assessment studies? With the aid of these studies it is possible above all to assess measure and evaluate the effects which appear unintentionally, indirectly, or after considerable delay (secondary and tertiary effects). In the traditional primary stages of State planning these effects are not taken into account to any great extent and must often be eliminated by expensive State interventions. Technology assessments, in other words, provide for economic planning an overall sketch of the advantages and disadvantages of various orders and render it possible to choose among available alternatives with fairly similar primary effects that which has the smalles negative secondary and tertiary effects or the greatest positive ones (1).

Technology assessment can indeed be expected to perform important roles of economic planning by:

(1) Clarifying the nature of existing social problems as they are influenced by technology, possibly indicating the legislation needed to achieve satisfactory control.

(2) Providing insights into future problems, to make possible the establishment of long-term priorities and to provide guidance for the allocation of national resources.

(3) Stimulating the private and public sectors of our society to take those courses of action for the development of new technology that are most socially desirable. Such actions may be creative or defensive. Creative actions would be those that follow from the awareness of new opportunities for social development; defensive actions would be those, involving restrictions on the use of technological developments.

(4) Educating the public and the government about the short-term and long-term effects of the range of alternative solutions to current problems (2).

(1) See H. DIERKES, K.W. STAEHLE, Technology Assessment, Battelle-Institut, Frankfurt 1973, p. 6

(2) A Study of Technology Assessment, Report of the Committee on Public Engineering Policy, National Academy of Engineering, U.S. House of Representatives, Washington 1969, p.3

The overall objectives of technology assessments within the framework of economic planning are:

(1) To improve a country's quality of life. This is the long-range objective to which somehow and to some extent all other objectives are subordinated.

(2) To strengthen the country's technological infrastructure and innovative capacity, including relationships between government, industry, and universities. This is a shorter-range objective, but basic to the accomplishment of the first objective.

(3) To focus efforts of government laboratories, State owned companies, and universities on specific areas of technology believed to offer promise for national pre-eminence and to improve a country's competitiveness in foreign trade.

(4) To retain in domestic hands control of designated "growth" industries that incorporate new advanced technologies.

(5) To enhance national prestige.

The effectiveness of technology assessments appears to be greater in those countries in which (1) the national science and technology policy and goals, particularly as they affect designated industries, are well-defined and less subject to change, and (2) government involvement in economic planning and integration of technology assessments into the planning mechanism, has been direct and substantial. The public sector, indeed, needs technological assessments if its planning and development policy is to allow for foreseeable or desired technological trends. The planning agency must know which inventions are expected to induce potential basic innovations of the future, i.e. are likely to modify national economic structures significantly. It must have an approximate date for the introduction of these innovations and the timing of their effective impact. Above all it must have adequate advance notice of technological mutations so powerful as to be capable of causing upheavals of entire sectors of the production process in a short period of time (1).

(1) See H. AUJAC, A French Experiment in Long- and Very-Long Term National Technological Forecasting: The Basic Role of Semantics, "Technological Forecasting and Social Change", 4, 23-35 (1972)

The effectiveness of technology assessment programs seems to require the establishment of a Science and Technology office within the national planning agency (1) to perform a planning and coordinating function for the Science and Technology programs of government laboratories, State owned companies, and universities, and (2) to promote, through the national planning mechanism, invention, innovation, and the development, transfer, utilization of new technologies that would contribute to the solution of national, social, and environmental problems and the competitiveness of the country's foreign trade. ( )

In summary, State planning and technology assessment render it possible to identify the incoherences of actions to be undertaken and thus to avoid successive interventions which correct the effects of decisions not in conformity with the aims of society. State planning and technology assessments procure for all public and private decisions-centres a reference framework which renders it possible to avoid the risks which they would otherwise run if they were left, as is the case at present, in a situation of uncertainty, regarding the general and particular aims of public action.

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(1) See B.C. NICHOLS, et al., Technological Enhancement Programs in Five Foreign Countries, Office of the Assistant Secretary for Science and Technology, U.S. Department of Commerce, Springfield 1972, p. 3

7. State planning and technology assessment as instruments for the control of the public sector

The control of the public sector

is a question of solving a relatively new problem which results from the numerous activitites that have been added in recent decades to traditional public action: the assessment of the "secondary effects" of the introduction of new technologies, the protection of the environment and the consumer, the increase in new environment and society oriented products, processes etc. demonstrate the necessity for the public action to constantly take decisions in a state of uncertainty. This uncertainty does not come from any inadequacy of existing laws and institutions and cannot be eliminated by the modification of these, even if changes are in many cases urgently necessary. The position of uncertainty in which a large part of public action takes place in the spheres which have been added in recent years is identical with that in which the entrepreneurs and the industrial decision-centres must evaluate the probability of various future developments and to take their decisions accordingly.[4] The entrepreneurial activity cannot be bound to precise norms like the traditional public action. Legal norms, regulations, etc. which direct the public action with regard to its entrepreneurial functions can give to the corresponding institutions only the statement of the tasks to be carried out, the authority, and the resources necessary for implementing the decisions; but they cannot provide normative modalities for the actions to be undertaken. Not only State enterprises [2] but also many public ministries and administrative organs operate in this situation.

Public action is characterized today firstly by wide extension and differentiation and secondly by the increasing importance of the entrepreneurial element which was formerly considered typical of the activities of the private sphere and abnormal for the activities of the public sector.

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(4) See H. HINTERHUBER, Technological Innovation Strategies for Developing Countries, op.cit.

(2) See H. HINTERHUBER, Management of Technology and Parliamentary Control, op.cit.

The great differences in the new functions of the public sector arise also from the fact that the spread of public action shows itself not only in a corresponding expansion of State administration or of the institutions which are organically incorporated therein; an action which is described as public is often performed by other institutions, often by civil law institutions (1). These institutions, whose difference from traditional institutions has been emphasised, are not the consequence of the provisional nature of their functions, the elementary nature of the process of task-definition or the requisite structures; neither are they the result of political or bureaucratic arbitrary acts. Even if these institutions are not rare, they nevertheless reflect the appearance of new public functions and demand a new type of organ and control.

What control can be exercised over an activity which requires decisions to be taken in a situation of uncertainty? Control of the legitimacy of the actions to be carried out could only be exercised with reference to norms which are set down for the individual actions; these norms, however, do not exist for actions which are the consequence of entrepreneurial decisions; they can only confer authority, allocate resources and define actions which are to be carried out.

But a programmed action can have as its aim the identification of the optimum modalities of the activities of the public action and thus exercise a merit control which should never be lacking in the public sector and certainly finds no basis in the corresponding legal acts, administration norms and statutes.

The three programme types on which planning is built up are:

objective-programmes, orientation programmes and verification programmes.

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(1) This, for instance is the case of joint-stock companies with state participation which in Austria and Italy direct a large section of the production apparatus. The importance of the public sector in these countries gives the governments direct and selective means to influence the private sector.
See H. HINTERHUBER, Der Staat als Unternehmer, op.cit.

Objective programmes take on the character of decisions; in them the actions are first defined which are to be carried out for the attainment of certain definite results; secondly the sources are given from which the requisite resources are drawn, and thirdly the institutional changes are specified which are required for the carrying out of the actions proposed.

The orientation programmes state the general aims which must be attained by means of the decisions of the competent authorities; they do not have decisional character and can cause extremely varied effects according to the political answer which they receive and the reasonableness of the aims which they propose.

With the aid of the verification programmes the state of the system, the direction of its evolution and the difference between this evolution and that which is thought to have been given to the system are assessed at periodic intervals. In this way there result the decisions to be taken and the problems to be solved in order that the system may be brought to the line which has been fixed at the political level. The concept of a verification programme can come into being only in an advanced phase of the system and presupposes important impulses of planning activity already. The orientation programme, on the other hand, can, as for instance in Italy, be produced also in the absence of an action which can be defined as programmed.

Prerequisites for the control function of technology assessments are (1):

(1) Technology assessments should be produced in an environment free from political influence or predetermined bias.

(2) Members of a technology assessment task force should be chosen for their expertise but not as representatives of affected parties or special interests. The viewpoints of affected parties should be brought to the task force by volunteered or solicited presentations, and with special concern to elicit views from those affected parties who are not normally organized in their own interests.

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(1) See A Study of Technology Assessment, op. cit., p. 4

(3) The necessary, thorough investigation of the sociological and political impacts of technologies under assessment requires extensive participation by behavioral and political scientists.

(4) In order to give full consideration to social as well as technical issues, technology assessments should include analyses of the cause-effect relationship between different government strategies and their social impacts and should be supplemented by the intuitive judgments of knowledgeable individuals

(5) It is useful to classify technology assessments as initiated (a) by an existing social problem or (b) by the potential of a new technology. The methodology of assessment should proceed differently for each; more fully tested methodologies of systems analysis are available for the first class but the Planning agency is probably more concerned about the second.

(6) Criteria for establishing the priority of topics for assessment include the breadth and depth of the expected social impact, the visibility of the problems to legislators and to the people, and the current and expected rates of development of the technologies.

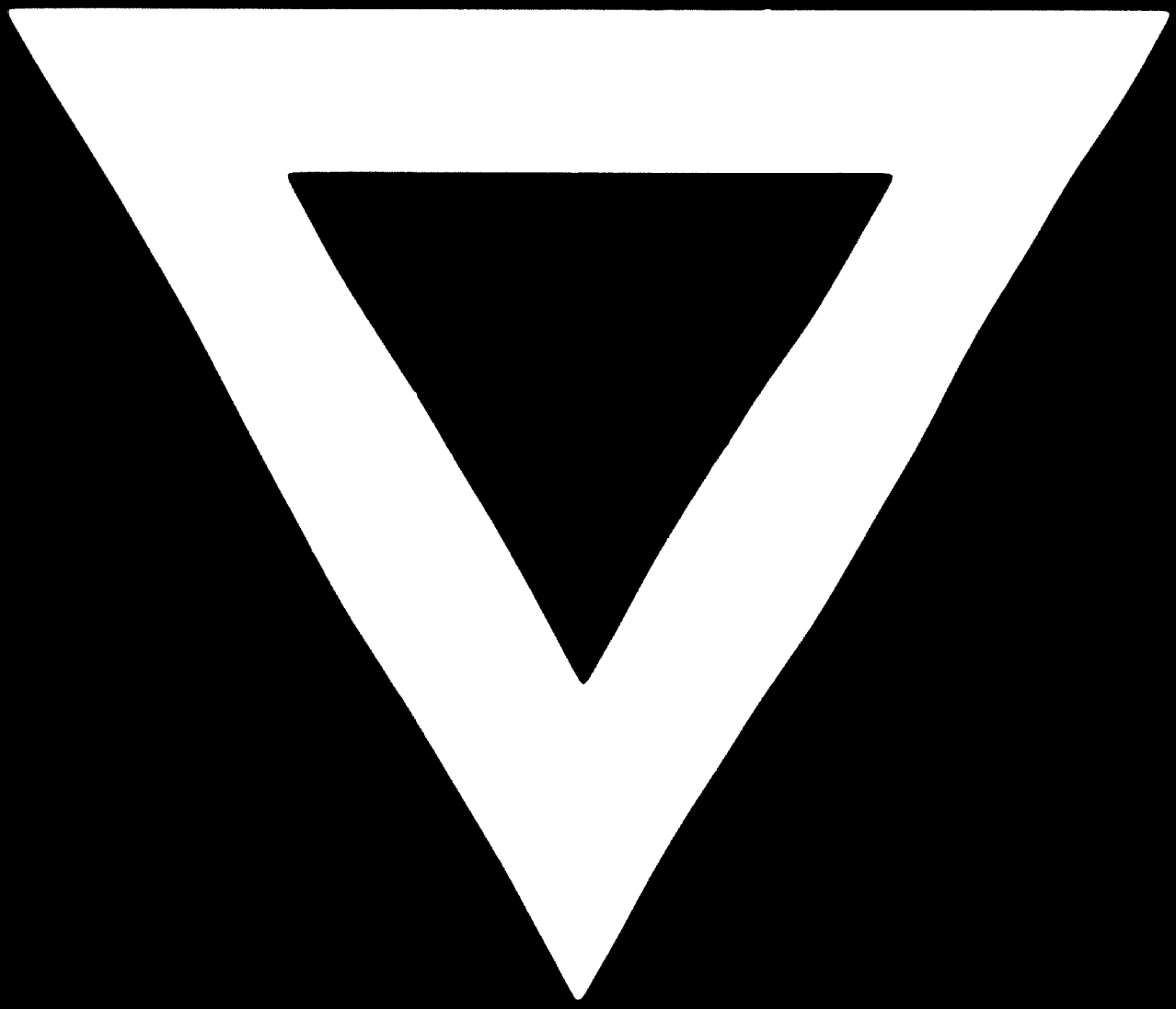
(7) The appraisal of the accumulated spectrum of consequences of technological developments must include the derivation and use of measures of social value pertinent to "the quality of life," in addition to the conventional economic and technical risk-benefit criteria.

(8) Technology assessments can help alert the nation to future benefits and to future problems and can thus provide the public support necessary for national programs, designed to secure the benefits and to avoid those problems.

8. Concluding remarks

I think it is the opinion of everyone that the gap between the ideal combination of instruments set out above and the instruments in use today in the developing countries is a large one. The efforts which we are today dedicating to eliminating this gap can thus easily be understood. The first approaches to this end do not lie exclusively in the improvement of the conceptual schemes which are in our possession today but also simply in the more rational and more extensive use of those instruments already at our disposal.

The so-called industrial society in all countries has at bottom a rather primitive knowledge of the modalities through which the enormous and increasing flow of goods can be regulated and controlled; in other words, our society in the developing as well as in the industrialized world is proving to be less and less in a position to keep under control, with efficient decisions taken at the proper time, the multiplicity of systems of which it is composed. And it is this state of affairs which is, I think, the cause of the crises and disequilibrium which is continually being revealed to us every day of our lifes.



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