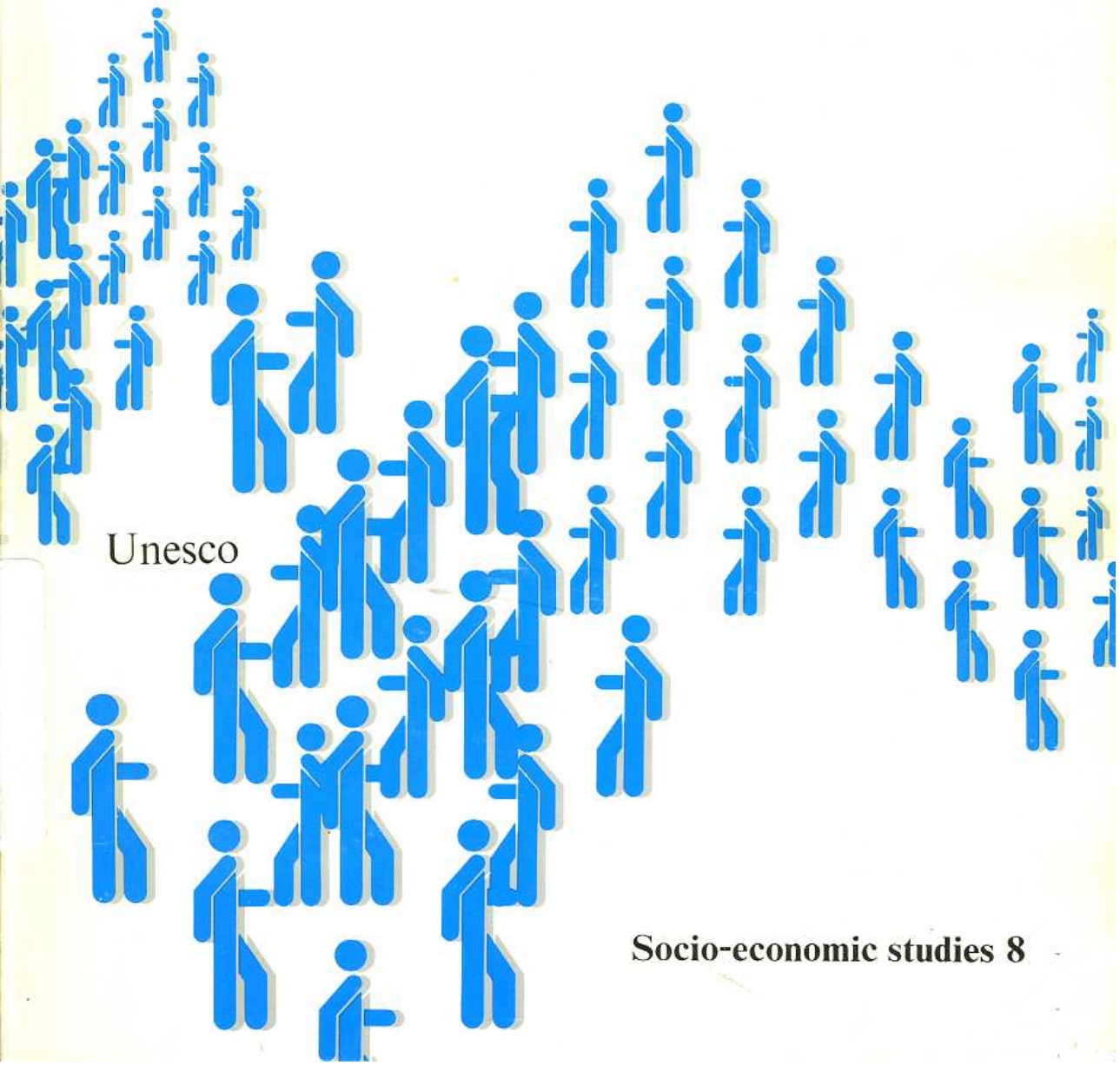
Social science methods, decision-making and development planning



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Preface

This is the eighth issue of Socio-economic studies. It is concerned with the use of social science methods for decision-making and development planning. The papers in this issue are the results of some of the research which has been carried out in recent years on the possibilities and limits of quantification in social sciences as perceived in different socio-cultural contexts.

The 'The process of planning: Introduction' by John Robinson critically presents the four papers prepared in cultural contexts as different as those of France, Sahelian countries, Tanzania and Peru.

The French author, Alain Cotta, University of Paris-Dauphine thinks that the period starting with the end of the Second World War has been characterized, in the social sciences, by the 'passion of measurement'. However, practical limitations resulting from the evalution of the field, the cost and the utilization of measurement were now emerging, issuing new challenges to the scientific community.

Mamadou M. Kassé, University of Dakar, Senegal, points to the failure of the planning methods inherited from the former colonial power in the Sahel countries. He underlines the need for a new pattern of endogenous development as well as a re-evaluation of the instruments of quantification and decision-making.

The paper 'The case of Tanzania' by L.A. Msambichaka, M.S.D. Bachagwa and A.V. Mbele emphasizes the insufficiency of data mainly due to the understaffing of Planning institutions in Tanzania. They conclude that the use of quantitative methods in such a situation renders the planning exercise meaningless.

The same problem of data is underlined in 'The case of Peru' by B. Podesta who emphasizes, as have the other authors, the need for the existence of a socio-political and institutional framework for promoting and using quantitative concepts and criteria for policy-making.

In spite of the fact that the needs and interests vary widely, all the authors agree that the choice of the concepts to be measured and the data to be collected must be made with reference to a theory relevant to the specific set of social goals of the country concerned, and that there is no theory which is correct at all times in all countries. This idea may appear commonplace; it is however essential to stimulate new approaches and new methods appropriate to various stages of development.

Comments and suggestions about this issue and the series in general, including proposals for future content as well as requests for additional copies of this and past issues may be addressed to:

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The process of planning: introduction

John Robinson

1. *Policy making in a cultural context*

In a sense it is a pity that there has been some editorial condensation of the papers presented here, and in particular that they cannot be presented in the original languages. For in a very real sense these papers, from a diversity of sources, illustrate one central factor of their subject and display each of the influence of the dominant culture. In my task of editing the documents for this publication I have been particularly struck by the difference in style between the two papers from Africa--from French-speaking Sahel and from English-speaking Tanzania. As is made clear within the chapters, the influence of the ancient colonial powers remains strong. It remains to be asked, however, whether the cultural attitudes imported from Europe and supported by the training of expertise in the old metropoles is at all appropriate for Africa.

The failure of an imported planning methodology with its evident emphasis on the concerns and attitudes of the central power (and indeed the concerns of a particular group) is presented in graphic detail in the paper describing the experiences of the Sahel. Now such countries are searching for policies, and with this planning methods, which answer to their particular needs.

Policies must be adjusted to, and appropriate to, various stages of development. There is no one policy which is correct at all times. This is true for the developed as well as the developing countries, for policies which served well in a period of expansion fail to solve the problems of a depression. Developing countries should plan to pass through a series of stages of development, first constructing a viable agricultural base and then protecting this during the succeeding phases, the next of which may be the formation of a nascent industry within a protected environment. Free trade and open competition (so far as they may exist) are for the strong.

This set of papers looks at the question of the use of social science methods in the decision-making process. The need for a set of basic measures is clear, as are the many problems experienced within these countries in the collection and analysis of data. Principle amongst these is the provision of the funds to pay for this activity: and then there is the training of the staff to carry out the various surveys.

All agree that the choice of the data to be measured must be made with reference to some theory which will include or be based on some set of social goals. Here the guidance followed in the past twenty years is strongly criticized There has been neither the hoped for level of economic advancement nor the expected improvement in living standards and quality of life. In several regions, there is at present a review of planning methods and the discussion and the experiences presented here will, it is to be hoped, help in this process and aid countries with different planning needs, in keeping with their different cultures, social goals, historical backgrounds and environmental concerns and possibilities, towards a wiser choice. An introduction to the general topic of the social sciences is found in each chapter, which thus provides a variety of views on the value of this branch of human activity.

I have chosen to present a short critique of the idea of development, for often it is our most basic assumptions and apparent areas of agreement that must be called into question in a period of crisis or of the failure of a policy. In too many ways the world is looked upon today in a short-term perspective. A vision that takes in the global and long-term features of our societies will insist on a greater consideration for the environment and for an increased comprehension of historical forces and of the lessons of past historical experiences. I emphasize here that the process of development has quite often been accompanied by social misery, that many features seem common to all experiences of development, and that the appreciation of this may cool the ardour of many for a too rapid move into the industrial age and beyond as well as helping to formulate policies which can make use of all the magnificent discoveries and capabilities while protecting and honouring all that is of value in the diverse ancient cultures of the world--which have grown out of the needs of humanity and which are often better adapted to local conditions than a way of life which developed elsewhere, often within the system of colonization from which so many have only recently escaped.

Alain Cotta describes the very real advances in the social sciences which have rested on the increased use of measurement. Many important methods have been developed and now it is appreciated that a more balanced application of these new capabilities will both provide a stimulus to the social sciences and guide an improved form of policy-making.

The limits of quantification are now recognized--perhaps too much was expected in the early days of the increased use of measurement. Doubts and questionings abound, but it is felt that the problems can be resolved and the subjects move ahead.

Three new lines of emphasis have emerged from this awareness of the limitations of measurement. The first is the requirement that measurement be based clearly and explicitly on a theoretical base, the second that a great deal of attention be given to the social cost of producing and using measurements, and the third that an emphasis on crossdisciplinarity is indicated. This point of the importance of planning methods, and the measurement associated, becoming free from the constraints of disciplinary boundaries and thus capable of dealing with the totality of problem areas--considering together the related factors of culture, environment, human needs, economics, etc.--is made by all authors and may be seen to be a major concern of the present period.

Cotta feels that the totalitarian social scientism of the 1950s is now a thing of the past. Hopefully he is right, but I have expressed a concern at the rise of a new technocratic class and a return to that ideology. The new, impressive computer capabilities are there to be used. Some past planning efforts have however been recognized to be seriously flawed--and one must question, for example the realism of projections made assuming high economic growth rates during the decade of the 1970s just when the world was moving into depression--and a counter-current may be identified which refuses any reliance on this type of modelling. Again a new maturity is to be hoped for which realizes both the limitations and the usefulness of these new tools of measurement and modelling and makes a proper, balanced use of them within a wider planning context; and here I continue to hold that pride of place must be given to the classical disciplines of philosophy (in its broadest sense) and history.

Mamadou Moustapha Kassé has pointed to the failure of the planning methods inherited from the former colonial power--in this case France--to guide development in the fragile, natural and international climate of the Sahel, as became obvious in the recent famine. A great deal of rethinking is now under way. Both Western and Soviet planning techniques are being considered, but it is uncertain whether either will prove to be appropriate to these countries which are in the middle of a structural change.

A new pattern of endogenous development, which may be more at the service of human needs is being studied. This requires an improved analysis (again a firm theoretical base) and a re-evaluation of the instruments of quantification and decision-making.

The serious insufficiency of data is emphasized by Msambichaka, Bagachwa and Mbele when writing about planning in Tanzania. Planners and decision-makers have, to a great extent, to rely on the 1971/1972 census. Growth coefficients or percentage changes of certain variables are historically derived based on 'good' years which may not be very typical of the Tanzanian experience over the years.

Prominent among the problems of data collection is the matter of understaffing, with less than half of the technical posts in the Development Plan actually filled. Given the weak national economic strength, data collection and processing which could easily be done by modern methods like computers have to be done by the staff, using simple tools such as calculators, adding machines, etc.

Their major conclusion is that quantitative methods should be regarded as guiding tools for policy formulators and not as a substitute for planning. Quantitative planning techniques should not be used to the detriment of other socio-political criteria in the planning process.

The importance of incorporating social or even political objectives in planning models is of immediate concern for a developing country like Tanzania. The government has articulated a socialist ideology and a development strategy that will ensure the attainment of socialism and self-reliance. The Basic Industry Strategy is related to the aim of providing basic needs for the masses and the government strategy emphasizes that the politics will be controlled directly by the productive workers and peasants.

Quantitative planning techniques may help planners in identifying appropriate techniques which can be used to generate both direct and indirect inputs to be used in the production of the basic, mass goods. Once a political decision has been made on the nature of the goods to be produced, planning techniques can help planners to identify the logical production and distribution system for providing such goods and services at the least cost to the people.

In Peru, again the data base is very weak. Census information dates back to 1972 and 1973. Many generalizations made at a national level are based on samples obtained in Lima and some other cities. Because of the considerable plurality of the social, cultural andd economic situations in Peru and the fact that the majority of the population develops activities in unconventional sectors this represents a very serious limitation on the usefulness of the data.

Bruno Podesta provides another viewpoint on the development of the social sciences and their contribution to policy-making, from a South American perspective. He emphasizes, as do the other authors, the need for the existence of a socio-political and institutional framework for promoting and using quantitative concepts as criteria for policy-making.

The changes which occurred throughout the Third World at the beginning of the 1960s had deep repercussions on the Peruvian universities. In the field of sociology for example there was a strong reaction against sociological functionalism and historical social studies began to impose their point of view.

From 1968 onwards the Peruvian Government introduced a series of important changes which differentiated radically from the past, increasing its influence in the economy and social life of the country. Contrary to past eras, planning became of central importance in the handling of national problems. There was a notable increase in the number of students and graduates in sociology, but with the historical-social orientation they lacked the necessary training to contribute effectively to the quantified evaluation of social indicators.

From the time of the economic crisis in 1975 it was decided to turn to a neo-liberal type of planning, which presupposed an ever lessening importance in planning for the government. Thus Peru adopted the opposite policy to Tanzania.

Since planning has now ceased to be of importance, especially since 1980, the whole relevance of quantitative evaluation for policy-making is of less interest. The fact that the organisms responsible for policy-making have changed their priorities an that planning is no longer as important as it was in the past has had a negative influence on the conceptual evolution and quantification of economic and social indicators.

This experience provides a very real practical example of the linkage between political priorities and the social sciences, of the placement of any scientific enterprise within the surrounding culture. It is significant that the policy changes took place in the key years of 1968 and 1975. This fact, and the direction of the changes, illustrates the strong influence of the United States the dominant power in the region and the continuing influence of central, developed nations over the periphery, developing countries.

2. *The history of development*

What are we planning for? Perhaps, as William Blake (1757-1827) wrote during the British industrial revolution, to 'build Jerusalem'--a new paradise on earth, a society of plenty and of joy. But what was it really like? Continue that line from Blake and we find: 'in England's dark satanic mills'.(1) For that was the reality, of social disintegration, drunkenness, child labour, misery, starvation. Should we look again at the forced, rapid industrialization of Stalinist Russia? Development is often spoken of as a magic wand to lead the poorer countries to the promised land of consumerism, but the reality is not an immediate transfer of present-day United States or Europe, taking only the best and somehow leaving all that went with their experiences of development. Why do we not look at those past experiences, why not recognize the harm to generations as one cultural structure is torn apart and another built upon the wreckage? It is possible that only China has managed to move into industrialization without such misery, choosing (or being forced into) the endogenous path of the great leap forward, which is so sadly referred to today as a failure. Yet even there cities threaten to grow out of control and restrictions are necessary, the population is booming and restrictions are necessary.

Once the old culture is reduced to shreds as the young turn away from the customs of their elders, as the agricultural system becomes more 'efficient' and the rural societies break down, as people flood to join the unemployment of the exploding cities, with investment flowing into the more profitable, labour-replacing industries--such phenomena typical of the industrial countries in their early development and found so frequently today; once a society has passed through all that, then where do we arrive? Are our human needs well satisfied? Here is a list prepared by Professor S. Boyden(2) of the Australian National University; a list which is similar to those set out by other social scientists (Piaget, Maslow, Bruner, Koestler, Illich, Newell), by the World Health Organisation(3) (principles for primary health care), a list of 'musts' for development(4) and the concept of a 'conserver' society developed by the Advanced Concepts Centre of Environment Canada. None of these optimal health needs could be regarded as characteristic of the conditions of life of a typical member of a modern Western community, yet they were satisfied in a primitive primeval society.

- 'Opportunities and incentives for personal creative behaviour, usually with clear goal-direction, involving especially the exercise of learned manual skills, but including story-telling, music-making and so on.
- A considerable degree of emotional involvement in the main activities of the day.
- An immediate sense of purpose associated with the main activities of the day.

- A full awareness of one's role and usefulness in the community.
- General opportunities for self-expression and self-fulfilment.'(5)

Maurice Casimir, Director of Medeas, recently remarked to me that poets have spoken more to us of our future than all the futurologists and other scientific experts. He is right. This is true too of the past, and we must understand our past in order to plan our future. Let us look again briefly at eighteenth and nineteenth century England. And I leave it to the reader to find a sense of optimism in modern Western art.

'Wanderer' William Wordsworth (written 1809-13)

'Men, maidens, youths,
Mother and little children, boys and girls,
Enter, and each the wonted task resumes
Within this temple, where is offered up
To Gain, the master-idol of the realm
Perpetual sacrifice.'
From England 'the old domestic morals of the land' have fled,
'Ne'er to return! That birthright now is lost.
Economists will tell you that the state
Thrives by the forfeiture--unfeeling thought,
And false as monstrous!'(6)

Look again at the paintings of the squalor and drunkenness in the cities by William Hogarth.

Charles Dickens wrote a great deal of the conditions of the time (1830s and 1840s) as: 'On every side, and as far as the eye could see into the heavy distance, tall chimneys, crowding on each other, and presenting that endless repetition of the same dull, ugly form, which is the horror of oppressive dreams, poured out their plague of smoke, obscured the light, and made foul the melancholy air.' 'Men, women, children, wan in their looks and ragged in atire, tended the engines, fed their tributary fires, begged upon the road, or scowled half-naked from the doorless houses.'(7)

Robert Owen (1771-1858) wrote of the New Lanark mills: 'But to defray the expense of these well-devised arrangements, and to support the establishment generally, it was absolutely necessary that the children should be employed within the mills from six o'clock in the morning till seven in the evening, summer and winter; and after these hours their education commenced'. Many of the children 'became dwarfs in body and mind, and some of them were deformed'.(8)

As Karl Marx (1818-1883) was to write: 'In our days everything seems pregnant with its contrary; machinery gifted with the wonderful power of shortening and fructifying human labour, we behold starving and overworking it. The new-fangled sources of wealth, by some strange weird spell, are turned into sources of want'.(9)

Power breeds power, and new classes arise--it has always been so, we must be ignorant of history to expect otherwise. Unless society is built, and planned, to prevent exploitation, and in particular for those countries which were until recently colonized by the waves of Europeans escaping from their developing world, from misery to new lands which remain today colonized (North and South America, Australia, New Zealand, South Africa) or which are still controlled from the continuing centres of power, the process will continue. In the words of Irma Adelman, 'redistribution must preceed growth'.(10)

Go back, understand your culture and what is of value there and come forward steadily, making a wiser use of man's new knowledge and capabilities. Develop gradually and carefully, conserving what is valuable, bringing richness and not misery into human life. The less-developed world is confused, is just waking up

from twenty years of effort along a false path and hopefully can now escape from the propaganda of the former masters of the world with their self-serving dogma of an international division of labour, with the false and dangerous idea that a developed consumer society can be built overnight. Why repeat the errors of the past? For that, indeed, is what is happening today across the world.

3. Environment and the future

'No man is an island.' As John Donne (1572-1631) reminded us, we are all 'a piece of the continent, a part of the main'. 'Therefore do not send to ask for whom the bell tolls; it tolls for thee.' How do we relate to our earth, to our environment? The expansion of humanity across the globe has brought vaste changes to the ecosystem, the destruction of habitats and the extinction of many of our fellow life forms. This continues today. Should we collectively be proud of this? Do we wish all the world to resemble the ancient centres of civilization, transformed and denuded of much wildlife? Are the seas and rivers only 'resources' or are they, along with the mountains and prairies, trees, birds, insects, etc. things of wonder?

At a prior level we must consider our place on the earth, questioning the proper use of the immense power at our disposal, and recognizing honestly that we as a species form a human plague which has killed so much and which threatens so much more.

At the next level we must consider the survival of many of our fellow human beings. A number of highly detailed studies have suggested that with a great deal of effort, and a considerable degree of success, we will move into the next century with about the same number of malnourished people as today. Yet two considerations must be added to those analyses. Firstly it needs to be recognized that the populations of several regions are able to eat well only by importing food--which they can afford to purchase because of the high levels of economic growth fed into the models. But since the time of much of the modelling, in the mid-1970s, the world has entered a depression and that growth is not taking place.

Secondly we must consider the great differences of opinion, and the marked degree of uncertainty concerning the number of people that the earth might support--leaving aside for the moment the important question of the effect on other species and the ecosystem in general raised above, but not forgetting the considerable natural changes in large-scale weather patterns. The limiting factor in the provision of food appears increasingly to be that of water, and here the situation may become critical in many regions. Ancient supplies of groundwater are being consumed, salination threatens many irrigated areas, topsoil is being lost, desertification continues and often food for local consumption is being replaced by crops for export. Again much of this is a repeat of the past; for example grain was exported to England from Ireland during the potatoe famines. And do not forget that it is no longer possible to leave and expand into new territories as the Europeans did during their period of demographic expansion.

How can we grasp the magnitude of the potential catastrophe? Assume that ecological problems are limited in scope, that worldwide agriculture succeeds in increasing output, despite limitations of land areas and water resources, at 1 per cent per year, to feed 5 billions rather than the 4 billions today. But the world population is projected to pass 6 billions. The potential for the starvation of one billion people exists; and the forecasts depend on the optimism or pessimism of the particular expert, which factors are emphasized and which are ignored.

Two key factors must then be brought into the consciences of us all, and of the planners in particular. We are but one species in a magnificient natural world and must act with more humility and a greater respect towards other species and the ecosphere. We do not know how many people could be fed, we see widespread starvation today and the world population is expanding rapidly. The potential for

a colossal famine has been identified. Why not start the long process of looking towards an optimal--not a maximum--population for the world? If the population explosion could be reversed over a period of the centuries to come, the future--our descendents--could enjoy a decent standard of living, without the need to destroy the environment. A decrease of 0.5 per cent per year over 200 years for example could bring the population down from 6 billions to 2 billions.

4. *The growth ethic and the economic crisis*

The present economic crisis was foreseen as one of a series of long-term depressions which have been experienced over the past two centuries. It is a result of the formation of an overproductive capacity worldwide in a number of key industries. After a period of rapid growth the early 1970s saw overproductive capacity in steel production, shipbuilding, diesel-engine manufacture, synthetic textile fibres, chemicals, electronics, automobiles. Throughout the period of the 1950s and 1960s world productivity was growing (at about 5 per cent a year), world trade was growing (at about 7.5 per cent a year), international liquidity was growing (at 16 per cent a year with the stock of Eurodollars increasing at 25 per cent a year), the velocity of the circulation of money doubled between 1945 and 1967, reaching the rhythm of the year 1929 again. The strengthening of international contacts led to increasing interdependency and the multinational corporations expanded rapidly from about 1967 onwards--several technological developments made this global expansion possible: worldwide transport systems, worldwide communications and increasing computer capabilities. The system has overheated and ground to a halt; it is a structural crisis first shown in the breakdown of the Bretton Woods agreement in 1971.

Cause precedes effect. Yet we are today in an astounding situation in which all those factors and systems behaviours that led into this crisis are being presented as solutions: more trade, more production, more efficiency and modernization (replacing workers at a time of high unemployment), more loans and investment, deepening of the international division of labour and a stimulus from some powerful 'engine of development'. Some even suggest that new technology could be a decentralizing force, increasing democracy, ignoring the very great centralization following on the widespread use of the automobile and the telephone, forgetting the recent centralization of the multinationals following on their use of modern computer capabilities and communications.

The developing countries in particular must ask why this should be so. What is the first priority of any system, particularly under attack or in difficult circumstances? Self-preservation. In whose interests does any group speak? Its own. But this does not imply that the policy suggestions will be appropriate for other groups, for their various stages of development, cultures, histories or national goals. This is a natural enough development. It is not to prescribe any negative motives to metropoles if they speak with their own interests at heart or from their particular cultural perspectives. But it does imply the necessity for the developing countries to look to their own interests, to be prepared to dismiss the advice of experts from other cultures or with other ideologies, even though they might appear to have more impressive credentials than local people.

5. *The information society and a new technocratic elite*

Throughout the various stages of development there is a steady evolution as the primary and agricultural sector is replaced in importance by the industrial sector and then as the service sector comes to dominate. The present stage of development in the developed world involves the ascendancy of an information sector and the

formation of a technocratic elite. These are the people who may programme the computers and control the workerless, robotised factories. The potential is there--and it is happening already--for the widening of class barriers, with this increasingly powerful and well-paid elite at one end of the spectrum, dependent on and serving the interests of the rulers of the society, and the mass of underprivileged and unemployed at the bottom--and the idea of a permanent, significant degree of 'structural' unemployment is again becoming accepted amongst some circles (even if not amongst the unemployed who by and large would like to have the self-appreciation and social acceptance deriving from work; note the list of human needs given above).

The appearance of this technocratic elite, with its particular class interests, is of considerable importance in the evolution of planning systems, for if the path of excessive quantification is followed, together with complicated and mystifying theories and the extensive use of high-technology tools such as computers, the societies of the future may become dominated by behind-the-scenes expertise and decisions may be biased by the unstated but very real value systems of the technocrats. This would be the death of democracy; for a while at least. For it would be expected that the large numbers at the base of the pyramid would eventually wake up and organize, and a familiar pattern historically would be seen--the formation of a new powerful class, and its overthrow when the social contradictions become too great.

This brief comment is not to deny the value of much of the new technologies, which may reduce human drudgery and extend our capabilities, but rather to caution against too great a reliance on experts and on pseudo-science, to recommend the democratization of the decision-making process and an insistence on the part of decision-makers that any policy options and recommendations be clear and comprehensible with the basic assumptions and values clearly spelt out.

6. Philosophy of science

A scientific study will start with a problem. There is a first element of choice, what is to be considered. This will be guided by a complex of considerations, social and personal. Does the society give prominence to theologians or basic researchers? Who can pay well, the military or a multinational? Would the individual seek the fame of a Nobel Prize in some highly technical subject, or follow an idealism in some less-well paid and less-recognized field such as ecology? After all there are no prizes as yet for energy conservation.

Then comes a theory, an idea of the important factors and of the basic behaviour of the system. The task of the scientist is then to devise an experiment to test the theory, with the aim of proving it to be correct. Within this stage appears a model which expresses the understanding implicit in the theory.

First stage, selection of a problem and an analysis which formulates a theory. Second stage, a model built on that theory. Third stage, is the analysis of the model output. Within the planning process, first there is a perception of social goals and what is of importance. Second comes a set of measurements to examine what is happening in those chosen areas. Third is the consideration of the meaning of the results and the lessons to be learned.

This is by no means a neutral process; the aim of objectivity is illusory, and indeed dangerous.

There is a magic to much science, for scientists have been able to play their games with mathematics in some areas and to predict the presence of a new planet, the equivalence of mass and energy, and the existence of new subatomic particles. The physical world is found to obey laws of elegance and of a relative simplicity. It is dangerous and foolish to think that all of science is as straightforward as some well-known instances might lead one to believe, or to expect that other areas

of research must display that special type of simplicity if only one can find the key. Such a belief, that the social sciences (the 'soft' sciences) can be treated like the most precise of the physical sciences (the 'hard' sciences) by the introduction of sophisticated mathematical theories not only denies the essential beauty of life but also indicates a lack of awareness of so much of science, such as geology and oceanography. Just stop to think for a moment of our success in forecasting the weather, and there the basic physical laws are well known. Cold logic cannot be applied when the basic assumptions are not known, or where they depend on the point of view of the researcher.

At the base of each science is a paradigm, a world view which guides the work. This takes in not only the understanding of facts but also cultural influences. It would be a retrograde step indeed if we were to return to the mysticism of a Pythagorus who, overwhelmed by the successes of mathematics, felt that all of life could be expressed, indeed predicted by numbers.

Numerical measures are essential to good planning. The strength of the above comments does not derive from any refusal of the value of measurement and clear modelling. It is rather an expression of concern at the claims from some quarters for a social engineering approach which will leave technical experts free to develop complicated and confusing methodologies which can be used to guide development following the aims and intents of a group at the service of a ruling class and with no appreciation of the lives and wishes of the majority.

7. Methodology of planning

A comprehensive planning effort implies the bringing together of people from a variety of disciplines. For example it is most important to consider the reality of the instability of the environment in the Sahel, as well as economic and social factors. All factors must be thoroughly covered, all knowledge must be brought to bear, and the group must be able to work as a team of equals, not dominated by some particular subject area. All too often, indeed almost every time, planning becomes dominated by economics to the total exclusion of other areas of concern, with disastrous effects when, for example, ignored environmental features dominate the life--and death--of the population. In this, an interdisciplinary approach is required, and in order to understand the basic elements of this type of study it is useful to consider some properties of disciplines and of three stages of increasing co-operation and co-ordination across disciplines: multidisciplinarity, cross-disciplinarity and interdisciplinarity.

It must first be recognized that all disciplinary studies form a part of the culture to which they belong, and cannot be disassociated from it. Studies which support the status quo or dominant paradigm are far more likely to receive funding and prestige--and to be suggested to developing, periphery countries by developed, centre countries--than those which suggest change.

The differences between disciplines lie not only in the subject matter, but in differences of approach, differences in axiomatics, accepted dogma, mental models, sense of direction, group ethics, perspective, goals and vocabulary. Thus an economist, a fisherman, a marine scientist, a molecular biologist and a nutritions expert will each consider a fish population from a particular perspective.

Disciplines may also be defined as much by what is left out as by what is included, and here we find a significant difference between undisciplinary and interdisciplinary approaches. A worker within one discipline is forced to turn back when the disciplinary boundary is reached; an interdisciplinary team will follow the problem study wherever the problem prescription leads.

The recognition that each discipline will contain both a particular perspective and a particular language points to the need for a careful and appropriate approach to the art of interdisciplinary research, for there will be a difficulty in communication across the interface between disciplines.

The aim of an interdisciplinary study is to treat all the relevant factors of a problem. This demands a conscious element of co-ordination over the whole system based on a clear understanding of the problem to be considered, the aims of the study and the paradigm or world-view to be adopted. Each person taking part must understand all facets of the work and must be able to develop a comprehensive, holistic outlook. The major task of the core group involved in an inter-disciplinary analysis is to fuse a diversity of information into a comprehensive mold or model and thus to provide a clarification of interactions and systemic behaviour in order to assist in a form of planning which no longer ignores key factors.

What are the major requirements of this approach to planning? The bringing together of a group of people from a diversity of disciplines and backgrounds is a human activity. The first demand is for an appropriate group organization, and here many developing countries may have recourse to traditional forms of planning, appropriate to their cultures, without necessarily turning to the developed world for advice. After all, such has been the predominance of the reductionist approach in the sciences and planning methods of those countries, it is only recently that a return to more traditional, complete, holistic methods has been attempted in the West.

Some guidance on the group organization appropriate to this approach can be taken from experiences with scenario analyses, process consultation and management research. Here is a typical list:

- the size of the team must be appropriate to a collective effort, 5-6 persons;
- the problem study must be approached in the correct order, starting with considerations of philosophy, world views and paradigms within which the problem is to be studied;
- the work must be continuous and full-time, spanning at least six months;
- there is a need for a fully occupied week at the beginning, for team members to get to know one another and the project, and for each to describe his individual discipline before entering into a unifying discussion;
- brainstorming sessions will be essential both at the initial stage and throughout the project;
- the degree of co-operation must be very strong, team members must all understand all facets of the work;
- the task must be clearly defined, and during the work the team must constantly return to the basic theme;
- the role of the group leader is very important;
- there will always be some conflict in this difficult task: issues and attitudes must be clarified as the work progresses, a common vision developed; and
- about half the time will be spent organizing an information base, which must constantly be related to the central problem topic.

8. Quantification

First there are the obvious physical and monetary measures, which are by and large well covered in the developed world, but which are not yet sufficiently known in the developing countries to provide the guidance necessary to decision-making. For this, the recommendation is reasonably obvious, the provision of sufficient funds to enable a well understood process of information collection to be put into operation.

At an international level, measurement of physical flows would be of value to both developed and developing countries alike. The setting up of an information base would redress the balance between the increasingly powerful multinationals with their own sophisticated centralized information systems and the national governments; and it must not be forgotten that knowledge is power. Some check could then be made of such practices as transfer pricing.

It has however been recognized that economic statistics such as gross national product provide only a partial measure of the quality of life. The desire to extend statistical measures to other equally important factors which could help (and force) planners to take a more extended spectrum of considerations into account and to provide a useful shorthand for happiness as well as for economic prosperity led to the choice and collection of such data being referred to, in a rather idealistic manner, as the 'social indicator movement'. Too much was expected of social and cultural indicators. This was an attempt to replace one chimera with another, but faced with reality the social indicator movement has come down to earth. It is now recognized that no simple set of quality of life measures, to be maximized in a mathematical formulation in order to provide an optimal quality of life, can exist. The importance of value judgements in the choice of social indicators is now well recognized.

The concept of aggregate indicators, formed by some weighted combination of measures is similarly increasingly rejected. Both the OECD Social Indicator Programme(11) and the Unesco(12) work on cultural statistics, for example, concentrate on 'simple' indicators which have a clear meaning.

The OECD group recognizes that a different list of social indicators would be more appropriate for countries outside of the OECD group, but feel that the same basic principles apply in the choice of simple output measures connected to the quality of life in different regions. The OECD list can of course be suggestive of key areas of concern, in basic health, education and so on. Thus the developing countries, like the developed countries, can call upon the experience of these two groups for guidance in the setting up of any programme of social measures.

9. A Unesco effort

In a sense, the arguments outlined suggest that Unesco simply continue along its present path. The major points touched upon in this chapter are, I believe, enshrined within many Unesco documents, and in particular in sections of the 1984-1989 Medium-Term Plan. Thus Unesco can continue to build upon debates and expertise dating back over a number of years, and help Member States to set up and organize comprehensive planning schemes which can it is hoped lead to a greater satisfaction of human needs within the diversity of cultures throughout the world.

The principle planning need of the present is the setting up of process teams to develop and communicate the methodologies of holistic planning, encouraging at the same time the formation of a cadre of generalists who, like the philosophers of old, may help us all to gain a clearer appreciation of our human condition.

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Measurement in the social sciences

Alain Cotta

1. *Introduction*

It is not possible to understand the human adventure by considering in isolation the changes affecting knowledge, environmental processes and ways of life, unless the object is subsequently to see more clearly how they interrelate. The relations between beings and things and the relations between beings and other beings are governed by these alternatives which are subject to a large number of constraints, the most imperious of which is no doubt man's ability to bend nature to his desires. Moreover, the three types of change with which we are concerned here do not occur simultaneously. Advances in knowledge must in nearly every case precede the technological changes that make for an improvement in living conditions. There are favoured moments in the life of some civilizations when advances are regulated and recognized for what they are in each of these three areas of social activity. In the sciences, knowledge is developed on the basis of uncontested paradigms. Technology accumulates things at a rate faster than that at which beings proliferate. Social relations densify when order prevails. But such moments are few and far between. A constant threat of disorder is the rule; man is assailed by questionings and doubt; conflicts arise that need to be overcome. In a word, a state of order is exceptional; 'noise' is the rule. For more than twenty years or one generation, industrial civilization, which had formerly been enjoyed only by a small number of countries of the North where it had originated, was considered capable of forcing itself upon all mankind in the name of efficiency, reason and happiness.

By the end of the 1960s however, it became clear that numerous difficulties stood in the way of such contagion. The centre of this movement towards worldwide uniformity, the developed countries, showed the first signs of a loss of dynamism. The post-war baby boom gave way to a rapid drop in the birth rate. Consumer durables were accumulated at a slower pace. People gave evidence of a reduced propensity for work and what had until then been an overriding belief in the virtues of growth started to come under attack.

The periphery, i.e. the more or less rapidly developing countries, could not long continue to conform to the image that had been formed of it: an attentive and somewhat passive receptacle for all the forces of industrialization, implicitly confused with those of social development. Some of these countries in fact revealed a very limited capacity to introduce the new technological processes along with all their consequences. Other countries lacked not the capacity so much as the desire. The trend was accentuated but also in some cases hindered by their culture. 'Noises' consequently succeeded each other and attested to the fact that the dream of a worldwide scientific and cultural order was but the modern form of a scientism doomed since time out of mind to be a type of utopianism, an active type it is true, but one limited in respect of practical results.

The events of the early 1970s and, in particular, the considerable increases in the relative price of energy, which were at the origin of a large number of changes, signalled the return of a more normal period when nature could be less easily bent to our desires, when we were less sure about the merits of our ways of life and when there was less assurance about the methods and results of scientific

research. None of man's questionings in this latter part of the twentieth century can be dissociated from the general disarray affecting the human system as a whole. Between the many questions raised about all individual and social value systems today in all the more or less developed countries, in both the North and South and from East to West, and the hesitant searchings of all the sciences the relation is absolutely direct. The doubts of scientists are both a reflection and a cause of social dissatisfactions. These doubts are not confined to the social sciences, i.e. those sciences that are concerned with the relations between individuals and the relations between individuals and things. They are also an unavoidable feature of the natural sciences, hitherto dominated by a kind of physics which, overtaken by its own experiments, is questioning the validity of its concepts and basic postulates. The problems besetting the natural sciences, are, however, different from those affecting the social sciences. In the first case, they are problems of understanding and, in the second, of action. The space shuttle is able to fly through the air even though a satisfactory unified field theory has still not been discovered and even though the possibility of remote-controlled action is no longer dismissed with the same insistence as in the past.(1) But inflation persists, unemployment is on the increase and inequalities remain or become more marked in every society, once again subject to many forms of tension, even though economists, sociologists, psychologists and other social scientists remain for the time being firmly attached to their concepts and to their perceptions of the world. However, they cannot be expected to remain entrenched in their positions any more than in the past, as is revealed by the history of scientific thought, in the face of the agitation into which the world has been plunged.(2) The social sciences, more than any other of the sciences, are faced with two permanent challenges. The first concerns their field: social relations; the second, more indirect, relates to their scientific status. Hence it is not difficult to understand the extent of the disarray into which all the social sciences have been thrown at a time that marks a transition between the third quarter of this century--a period of rapid growth--and a period whose features cannot be clearly distinguished but which is obviously going to be very different from that preceding it. This disarray is particularly marked, and so, then, is the resistance to change, in that the social sciences have been developed to an exceptional extent since the end of the Second World War.

2. *The recent development of the social sciences and the virtue of measurement*

2.1 *Towards an exact science*

Since the end of the Second World War it has indeed been taken for granted that the social sciences could acquire the same status as the natural sciences by becoming, like them, subject to the rule of measurement. While it was possible, during the last fifteen years or so, to allow for the various enthusiasms that were at the origin of the advance of the social sciences, there was scarcely any doubt that the passion for measurement would occupy a leading place. The practice of measurement was, for one or two generations, regarded by all social scientists as the only way of ensuring that their field of study would cease to be disparaged as one of the inexact and consequently unuseable sciences.

This passion was sufficiently intense for the very term 'measurement' to appear simple and clear cut. It is now known as a result of certain work that has been done in mathematics,(3) but also and above all due to the epistemological inquiries that have been conducted within the social sciences that such is far from being the case. The desire to measure everything first produced a theory of measurement which can now be applied to all types of scientific work in no matter what field.

The simplest or most rudimentary level of measurement(4) is the nominal scale which does no more than match real objects with symbols or names. This level is so elementary that it is generally forgotten that without it there would be no other, higher, levels of measurement. The immediately higher level is the partially ordered scale. A nominal scale becomes a partially ordered scale when the objects placed together in one class are not simply different from objects belonging to another class but can legitimately be considered to be in relationship with objects in another class. The most common example is that where this relationship is one of superiority or inferiority, whether in the case of individuals or of sets of individuals considered, for instance, to be superior to others from one or more points of view (income, wealth, status). Comparison can begin on the basis of the partially ordered scale. Comparison can then become surer and more precise once the level of measurement corresponds to the third type of scale, the ordinal scale. Such is the case when the same relationship can be known for all pairs of objects belonging to different classes. Measurement, in the most common sense, can be perceived as a possibility at the fourth level, corresponding to the ordered metric scale. Once it is no longer enough to postulate relations between classes of objects but it also becomes necessary to define the distance between them, it then becomes possible to situate each one of them on a scale and hence to define the distances between each of these objects on that scale. Measurement, as it is commonly understood, becomes a reality only when the last two scales, known as the interval and ratio scales, have been established. The objects of knowledge can then be set out in an order such that the size of the intervals between them is revealed, which presupposes the existence of a common and constant unit of measurement and enables arithmetical operations to be performed such as the difference between the numbers appearing on the scale. The ratio scale is the last and highest level of measurement. The origin of such a scale is an absolute zero and not an arbitrary zero. All arithmetical operations are then possible, including not only subtraction but also multiplication.

The most marked dividing line between any two of these levels is that between the fourth and the fifth. Up to and including the ordered metric scale, measurement serves only as a means of classification. The kind of measurement involved is 'qualitative measurement'. At the level of the ratio scale and interval scale, measurement becomes quantitative.(5)

The recent history of the social sciences is entirely dominated by the concern to submit all social phenomena to the highest possible level of measurement. This measurement will, then, be subject to scientific criteria only in so far, then , as it presupposes the choice of a scale. Once this sacrifice has been made,(6) which, be it said, is all too soon forgotten, the necessity of measurement comes to be regarded as ineluctable. It provides a basis for distinguishing among existing concepts those that are sound, i.e. measurable, and those that are not and, in the same way, is a source of guidance for the creation of new concepts. It brings home the fact that objectivity begins with evaluation, that quantification alone provides a means of settling once and for all the opposing argument put forward by all the social forces and that there are two ways of representing the world--one, serious, expressed in figures, the other literary, tainted with suspicion and marked by subjectivity, flippancy, or bias. Be that as it may, whatever the scale of measurement chosen, quantification makes it possible to develop two lines of research that are central to every form of knowledge and enable it to lead to action. The first is that which is involved in the description analysis of a phenomenon, in the evaluation of that phenomenon in the course of time and at each moment in time. It is in this context that the three essential qualities of the operation of measurement are defined: exactitude, relevance and coherence. Exactitude is an ideal to be aimed at. Relevance means electing to study phenomena that correspond to the objectives pursued by research. And, lastly, the importance of coherence is becoming apparent as attention is

being focused upon sets of interdependent phenomena or systems. The measurements need to be reconcilable so that when they are combined new interpretations or indeed new concepts can emerge.

Over and above these descriptions which are determined in specific terms by measurement alone, quantification reveals all its usefulness when efforts are made to identify static or dynamic causes. Casual analysis cannot be taken beyond the level of hypothesis unless the evaluation of phenomena makes it possible, after suitable statistical treatment, to know whether the relations between them are strong or weak, permanent or provisional, to gauge the intensity of those relations and thereby to test the validity of certain theoretical hypotheses. Measurement alone opens up the possibility of verification; it alone furnishes proof even before it becomes possible, once the proof has or has not been produced, to envisage a course of action which will legitimize, both individually and socially, all the previous efforts made.

The passion for measurement, however, is not enough in itself except in the isolation of the science laboratory. But such isolation is impossible. Although he is not always aware of it, the research worker is in fact under the continual scouting of all the social pressure-groups attentive to what he is up to in his laboratory. It is no more possible to dissociate the recent development of the social sciences from the pervasive influence of measurement than it is to dissociate this pervasive influence itself from the use made by the whole of society of the findings of those sciences. The fact that social measurement has become an out-and-out myth cannot be attributed to the sometimes exaggerated ambition of scientists; it is due rather to the fact that all those who have power are on the look-out for past formulas for re-arranging the social field. Whether scientists like it or not, all knowledge is subject to the imperatives of positivism. By and large, only scientists are interested in understanding and, consequently, in objectivity. But value accorded to any particular science by society depends on how far it makes it possible to gain control of natural and social phenomena. As the social sciences have developed they have increasingly come to labour under this permanent handicap. Their discovery presents three types of interest according to the nature of those who use them. They are of interest first, to all social scientists. They contain their own sources of enrichment within a system of relations which would remain closed if there did not exist other, more interested users, namely, all men of action, those who now go by the name of the decision-makers, whether they are active in the economic, the political or the cultural field. When these 'trail-blazers' enter the scene, the system breaks up without it being possible for the social scientists to regulate or even to keep track of the use made of their findings. This is true for all the sciences, but especially so for the social sciences. No one can dictate to a man of action. There is no course of action that can be said to be correctly designed to maximize goal achievements but only one or more ethical standards. But the man of science would like at least to keep an eye on those who make use of his research findings. However, he can do nothing about the way in which use is made of objective social knowledge which remains but a tiny area that has not yet been taken over by the social power groups. As soon as it is, it becomes subjective, governed by a wide range of often conflicting goals, used in confusing ways, praised or criticized according to circumstances in a manner that has little to do with, or even runs counter to, the scientific hypotheses that were at its origin. But the social sciences have to labour under an even greater handicap. Ultimately, as time goes on, they come to be of interest to all men, either because they are seen to be of direct value to them, or because individuals end up by realizing that the power groups governing them look to those sciences for legitimization. This latter use is very broadly educational in that men find in the social sciences reasons for falling into line or asserting themselves, or, in other words, for constantly changing. Scientific progress in the social sciences,

acceptance of the necessity of measurement, and the social utilization of those sciences are three phenomena that must now be regarded as absolutely indissociable.

Thus, keyed to the systematic discovery of measureable phenomena, all the social sciences, during the twenty years that followed the end of the Second World War, witnessed the most revolutionary period in their history. This exceptional movement originated in a still political form of economy which could not but accept a godsent Keynesian revolution whose interest lay not so much in the novelty, which was after all only relative, of hypotheses specifically designed to account for the relations existing between certain patterns of social behaviour (investment, savings, consumption) as in the emergence of a set of measurable concepts, forming between them a coherent system. Here was an opening not to be missed. Economists were thereby afforded an opportunity to acquire a scientific and social status which they had not even suspected was within their grasp. The governments of all the nations of the world showed no hesitation in taking all the steps needed to quantify the major manifestations of social attitudes and to ascertain and keep track of the efforts made by man to prevail over his environment (work and investment), as well as the results of those efforts (consumption). Rapidly, even before this basic knowledge became applicable to all mankind--which it virtually is today--quantitative economics or econometrics achieved greater precision and was transformed into a means of private and, above all, public action. Over a period of twenty years this had two momentous and interrelated consequences. One was that measurement became increasingly precise and detailed (national production broken down into production by sector and consumption into specific types of consumption) and the other was that other fields (education, health, culture...(7)) were subjected in their turn to the demands of quantification. A standard system of national accounting, originating in the developed countries but applied to nearly every other nation in the world, came to be generally accepted with the result that there now exists a data bank that enables concepts that were originally of a purely national character to be used as sources of measurement throughout the world economy.(8)

It is now possible to be informed about what might have appeared quite unknowable less than a generation ago, namely, the world national product and worldwide investment, together with international exchange flows which have been recorded for a longer time.

All the data necessary for such measurements could be collected only within smaller units that turn to account all available human and material resources, to wit, firms. In their turn, carried away by the dynamic of data transmission and reception, firms could not resist the temptation of also developing their own means of keeping a quantitative check on their own operations and those of their competitors. Moreover, the improvement of their methods of management was closely related to the development of their own specific means of measurement, particularly in the field of accounting and finance, this being a precondition for any improvement in their management control. These two types of measurement were bound to be taken up by all social organizations, which found themselves unable to enter into economic negotiations unless they had their own figures at hand when measurements were invoked in the form of advantages or disadvantages. Following this extraordinary period all social organizations have now come to possess a wide range of means for quantifying their own performance, thereby putting to the test their desire for rationality in the specific sense of the minimization of the means of achieving one or more particular objectives.(9)

It thus follows that this first great flood of quantitative data cannot be dissociated from a second produced by the deliberate decision to proceed with what may go by the name of planning, policy-making or programming, which was able to come into being and develop only through recourse to the measurements made available by statisticians. These measurements could not be used, however, unless

they were subjected to a far more detailed and complex process of formalization than had formerly been necessary for the traditional economist. Once the objectives of organizations (firms, nations, groups of nations ...) were able to be measured, once this was also true of the means to be used to achieve them and of the constraints weighing upon every form of action, it was realized that models had to be adjusted, as indeed they were, in such a way as to turn to account the quantitative results of international action and thereby to become essential to the carrying out of any operation. Nowadays, at least in all the developed countries, such models are synthetic. In countries where society is more loosely organized than in the industrialized countries, models specific to any particular type of far-ranging action constitute a precedent for all economic policy-making. Hence there no longer exists today any economic policy whose coherence, not to say rationality, has not been tried and tested against a model.(10)

As measurement techniques become more refined, political economists gave way to the temptation to believe that their field of study had, once and for all, been raised to the status of an economic science. The advantage of this status, which they considered to have been acquired once and for all, was that they were able to gain acceptance for their discipline as a permanent touchstone for judging conventional political thinking, the motives behind which they thought would thereby be forced into the open. This movement speeded up in the late 1960s, for it benefited from a fairly extraordinary period in which the systematic bid to accumulate things could be considered to be sufficiently legitimate for it to become at once a simple and a unique objective. The developed societies could grow as rapidly as possible without ever coming up against one of those three essential constraints represented by unemployment, inflation and the balancing of international transactions. Hence the growth rate of the national product was able to become the new God, the new 'one and only chance'. For a while the imperialistic ambitions of economics in the developed countries were limitless. Within those societies it gave evidence of those ambitions while at the same time setting itself up as a source of salvation for the world; societies would cease to be underdeveloped if they submitted to the same system. Such success clearly attested to the virtues of measurement and could not but encourage the other social sciences to embark upon a comparable path.(11)

2.2 Measurement and sociology

The adoption of a quantitative approach in all the social sciences was undoubtedly the result of a concern lest the imperialism of economics become too pervasive. For a long time sociology had resounded with the praises of positivism and some sociologists had built a reputation on their determination to measure social phenomena in order to throw more light upon them. However, the nature of sociological concepts, and the concept of group in particular, did not easily lend itself to measurement, just as it was not possible to evaluate directly the vague and manifold relations that compose and structure a social system on the basis of the diversity of social groups.

Whether or not under the influence of the example set by economists, recent developments in sociology have shown that a discipline that had until then been a literary one could seek to achieve quantification without distorting its methods or modifying its area of special concern. The efforts made in sociology to introduce measurement were unquestionably less spontaneous than in political economy where this move was decided upon less as a direct reaction to advances in economics, the field of social studies most closely related to it. Advances in methodology and in measurement proper achieved in sociology over the past thirty years cannot, however, be underestimated. An effort was made, first of all, in regard to methodology, which seemed even more necessary in this field than in others in view of the highly specific nature of the basic concept, namely the

group.(12) Sociologists as well as economists rapidly recognized that there was a need to build formalized models that would be able to incorporate qualitative measurements that were more appropriate than others to the field of sociological investigation. Admittedly, a large number of such models still remain devoid of content. But there is no reason why advances in related sciences, particularly in regard to quantitative data, should not some day make it possible to fill this gap.(13)

A second more conclusive effort was determined by the nature of applied research as conducted by sociologists. Their work, carried out in social organizations and firms in particular, led to the rapid development of sociometric tests(14) and to the development of the methods for conducting and interpreting them. Their involvement with the broadest aspects of such social phenomena as town planning unemployment, justice and, more generally, all those that revealed the existence of social disorder, encouraged them to develop, initially on a piecemeal basis, a genuine system of social accounting which, in the developed countries at least, has become far more than purely economic accounting. The language of sociology today reflects the advances made in social measurement.

2.3 Measurement and social psychology

Following this second conquest, quantification in fact threatened to invade all the social sciences, either as a result of imitation or because the concern with measurement breaks down frontiers that literary polemic defends better than active research. The advances achieved by quantitative analysis in the field of psychology helped to affect all the social sciences with the contagion of measurement. The 1960s saw the emergence of a very large number of methods for measuring psychological phenomena, not only from the individual standpoint but also and above all from the collective standpoint. The submission of the concept of group to the demands of measurement is in fact due to psychologists far more than to sociologists. It is true that the 'group' of the psychologists is always better defined and has the characteristics more of an organized body than of the informal group that has been the subject of sociological studies since their beginnings.

The methods involved were first of all those making it possible to measure the composition of a group on the basis of the cognitive and non-cognitive characteristics of its numbers. In less than twenty years the concept of cognitive capacity came to be measured through reference to the intellectual quotient.(15) The concept of cognitive style was evaluated by means of the coefficient of dependence or independence in regard to the field.(16) The concept of motivation was measured by evaluating needs in respect of achievement, sociability and ascendancy.(17) And the concept of temperament was subjected to a treatment that led to the emergence of a personality similitude scale.(18) Even more recently the psychologists have carried their advantage so far as to propose methods for measuring modes of individual interaction within any given group. Organizational climate can be graded on the basis of individual perceptions (group understanding, group communication, interpersonal confidence, etc.).(19) The concept of group cohesiveness was itself pinpointed on the basis of its two technical and emotional components.(20)

These metrological advances in the field of psychology have had a decisive effect on methodological trends in all the social sciences and will continue even more to do so. They make it possible to set in relation, within most organizations, already quantified economic objectives (various indices or performance) and not only the famous factors of production (capital and labour) but also the practical conditions for combining them. Thus, provided that they collaborate, economics, psychology and sociology now have the means of giving a

quantitative content to all human processes of production and exchange. Organization theory, which had long sought to link together these three disciplines that had previously been quite separate from one another can thus acquire its necessary status as an applied social science.(21)

But this advance in psychology had another consequence, namely, the rapid development of a bridging discipline whose success was due mainly to the progress of the attractive quantitative methods of social psychology. The general nature of this trend is impressive, even if considered simply in regard to three important concepts. In the space of some twenty years the concept of national character was measured in a large number of ways.(22) Social change, which was long no more than an abstract notion, became a concept as those very methods were developed that enabled significant sets of attitudes of various organizations or groups to be measured.(23) And, lastly, the concept of expectation systems did not withstand the passion for measurement any more than the previous two, as evidenced, for instance, by the estimates made of the cost of life requirements compared with income in order to evaluate the degree of satisfaction of a set of individuals in a given economic and social situation.(24) These advances in social psychology, henceforth just as dominated as economics by the practice of measurement, were to lead to the emergence of a focal area in the vast field covered by the social sciences; an area in which the methods used by specialists of various scientific backgrounds are sufficiently related to result in a community of attitudes and thus lead to a real cross-disciplinarity. It can now be reasonably felt that the emergence of this area provided an opportunity for the social sciences to become unified under the impact of a methodology which was itself subject to the demands of measurement. Thus it soon became clear, to some at least, that quantification, purely on account of its virtues and requirements, was to bring about the unification of the social sciences, which had until then been separate from one another even though new lines of division were to replace the old. There is no longer a single social phenomenon that is not first quantified before being studied. And there is no 'measurement' that does not need to be multiple, revealing the various complementary aspects (economic, sociological and political) of a reality that is far more difficult to isolate and represent than the phenomena dealt with by the exact sciences. How, then, could social scientists fail to come together, especially since the procedure and methods using measurement for explanatory purposes are identical, whatever their field of application?

The recent development of quantitative methods has been the prime factor contributing to the unification of the social sciences. Measurement has its own codes and procedures; they are those of a statistical discipline which has undergone particularly rapid change in the last few years. The traditional techniques of enumeration, poll-taking, and, more generally, descriptive census-taking have been supplemented by the methods of causal analysis which have grown increasingly numerous and sophisticated. The most sophisticated are all those probability tests that now make it possible to measure the plausability of correlation analyses and thus increase our powers of explanation and our capacity for action. But even more remarkable is the considerable increase in the number of quantitative methods, deriving indeed from the slow invasion of all the social sciences by measurement. Thus the methods of discriminant factor analysis and more generally, of variance analysis have recently demonstrated how social phenomena that cannot themselves be directly measured but which possess a large number of caracteristics that can be, could be subjected to an analaysis of causality. It is clear that the field of application of such methods is constantly growing while that area of social science resisting all objective investigation is shrinking in inverse proportion.

3.4 Measurement and the social sciences

The recent development of the social sciences is in fact entirely dominated by the rapid spread of the practice of measurement and of all the instruments for devising and using units of measurement. Econometrics, sociometry, psychometrics--so many terms which call to mind the winds of change that swept through each of the social sciences before bringing about a methodological revolution specific to all the social sciences thus brought together. Not so very long ago, in those countries where these changes began to be felt, the hope came to be shared by men of science and civic leaders alike, as well as by the citizens themselves, that the social sciences were at last going to escape their historical fate and, like the exact sciences, become a source of objective, unified and practical knowledge. This great scientific hope is indissociable from that of certain political scientists, which is that social science will at last permit the 'rational' exercise of all modes of government. If the social sciences, united by their quantitative methods, now make it possible to measure all essential aspects of social reality, they can at last give the authorities what they want, namely, a knowledge of all the economic, sociological and psychological means needed by them to attain their ends. If this hope is shared by the citizens and if the means provided by the social sciences, now all-powerful for having been unified, are made available to them, then democracy might cease to be an ideology and become a reality. For those who had most succumbed to the charms of measurement this goal was 'within a hand's reach'. Or rather, achieving it was but a question of means, not of will. And those least inclined to make this effort were nevertheless bound to acknowledge the allurement of figures, the necessary gratitude shown towards them by the authorities and their tranquil virtue. Some, although in favour of measurement, made it understood that there were some grounds for their apprehensions or, rather, made it clear that there should be limits to quantification. The facts today prove them right.

3. The practical limitations of methods of measurement in the social sciences

3.1 Introduction

As the practice of measurement developed both intensively and extensively in the social sciences, the hope of all those interested in this development--whether scientists, political or economic leaders or the citizens themselves--was that an ever growing number of decisions would be subjected to an increasingly powerful rationality. By the end of the 1970s this modern form of scientism, which had its roots in economics, invaded the entire social field.

As usual, however, doubts were expressed, within the scientific community in particular, concerning what we should really expect to result from this contagion of measurement. Some had never ceased to be sceptical, often moved more by a desire to resist the change of methodology attendant upon this development than by a truly well-founded conviction. But in all disciplines other objections were voiced that were more fundamental and independent of the circumstantial findings of research. They were grounded in a clear-cut analytical position, which was that the systematic pursuit of measurement could not spell the end of subjective decision-making any more than it could limit the reactions of all those affected by such decision-making.

Today those who nurture the hopes born of this social scientism cannot disregard the recent emergence of the three limitations that are clearly inherent in the virtues and capacities of measurement. The first of these limitations concerns the field of measurement; the second, its cost; the third, its modes of utilization.

3.2 The limitation inherent in the field of measurement

The limitations resulting from the evolution of the field of measurement have revealed themselves slowly but more and more clearly. They have three origins which need to be distinguished.

The first is specifically bound up with the shrinking of certain traditional fields where, since the end of the Second World War, the greatest advances had been made in respect of measurement. It relates primarily to economic research. The great wave of widespread confidence in the advantages of information collection has not been sustained but, on the contrary, has fallen off as information has become quantified and come to serve as a source of guidance for action and for the strategies of the social decision-making centres. It is to be noted, first, that the accepted limit of economic and sociological investigation have hardly been pushed back any further than they were immediately after the Second World War. While all the data relating to flows of activities (production, investment, etc.) continue to be collected without there being too much social resistance--although the electoral success of the platform against government bureaucracy and the bureaucratization of information now speaks for itself--over the past forty years social actors have all relentlessly refused to accept the procedures for investigating assets, whether in the case of personal fortunes or of the capital of firms and even the state.

By and large, the measurement of basic economic concepts, which has been seen to have become a worldwide practice, has been focused almost exclusively on flows. It has not made any significant advance in regard to assets whose number, value and, consequently distribution among different individuals or groups of individuals can never be accurately known. The resistance mounted in virtually every country against such attempts at systematic investigation in this field is based on obvious motives, to wit, the feat that a wealth tax will be introduced, fifty years after the introduction of income tax.(25)

All hope of ever arriving at even an approximate measurement of all the different types of inequality to which economic and social development leads has thus been slowly abandoned. The limitation here is a political one, and for this reason, the possibilities of government action have been correspondingly reduced, through lack of information. What is involved, then, is not simply a traditional field of information and measurement that has remained unchanged but, rather, a genuine reduction that lessens the relevance of the most traditional measurements.

The second of the limitations bound up with the field of measurement could not be foreseen, except in abstract terms. It is due to the indirect effects of the use of traditional measurements in an increasingly large geographical area that now encompasses the whole world. The spread of the concepts and measurements specific to the developed industrial economies to other societies has brought to light two of the most palpable shortcomings of our entire system of measurement in the social sciences. One was recognized sooner than the other, from the time when the term 'Third World' gained acceptance in the developed societies. Doubts were very soon expressed as to whether the most significant of our social concepts in economics and sociology could be transposed to societies that were not only radically different at the time when these concepts were forced on them, but also, and most important, were clearly developing along different lines from the developed societies. The denunciation of Eurocentrism has proved to be justified without its implications being as yet fully recognized. The proposals made during the 1960s to the effect that such concepts as growth and development be subject to differentiation were judicious but were not taken to their necessary conclusion.(26) A large number of our concepts were not exportable. Cultural differences were too great for there to be any question of it. And, through seeking to force concepts to be used on the grounds that they were measurable, the result in very many cases was false measurements which are no doubt worse than the

absence of measurement.(27) For true measurement in the social sciences to withstand this extension of its field, it will no doubt be necessary to wait until scientific progress is achieved on an independent basis, in other words within those nations that are at present developing.

But the extension of the field of measurement brought with it a further limitation, the main and most direct cause of which was that all national economies became linked to the world economy. This phenomenon, as revealed by the growing share of exports in national economic activity, the increased number of production units managed by multinational corporations and the systematic transfer of industrial manufacturing works has, purely at the economic level, one essential consequence: the increased dependence of all national variables on a world economy whose evolution has become a key factor for understanding and acting upon social change. There is no political authority today that is insensitive to the importance of this external constraint. The economic position of all the large countries, whatever their degree of development, is closely linked to that of many others and, thereby, to the world economy as a whole. There may be a few differences in the degree and character of this dependence, but any economic trend today has worldwide implications. The political authorities are all the more aware of this in that it is very difficult to overcome this constraint and even more so to give the public a clear idea of it. Understandably, then, these authorities are increasingly inclined to take steps to improve information, which is indeed lacking in this field. It is not possible today to keep abreast of trends in the major industrial commodity markets any more than to assess the value of national products manufactured abroad or to form an accurate idea of the number of subsidiaries of transnational corporations established and to keep track of them.(28) As regards financial activities, this lack of information is a particularly serious cause of concern in view of the strategic role of investment capital and, even more, that of accumulated assets. The amount of currency deposited outside its country of origin (Euro-currency) can be evaluated only in part and there is a constant threat here that new places which elude investigation will be found for the deposit of such currency. The aggregate value of daily transactions cannot be known although it is responsible for fluctuations in exchange and interest rates of decisive importance for a number of economic and political choices.(29) The limitations affecting the measurement of essentially worldwide phenomena today are not confined to the economic sphere.

In so far as national societies have a growing tendency to break up into two subsocieties, one sheltered, in keeping with the time-honoured tradition of respect for political boundaries, and the other exposed to the winds that blow through the world, the more specifically sociological sphere is also affected by the shortage of information. There can be hardly any doubt indeed that the world elites, whatever organization they belong to (firms, states, international organizations), will in coming decades form a social model, as did the purely national elites (senior level personnel and top civil servants) during the generation following the end of the Second World War. But what we do know about the ways of life, the individual or collective preferences and the value systems of these new elites? Very little, and for the same reason that we are unable to collect relevant information regarding the world economy: the absence of a world authority able to impose an information system suited to the present structure of activities conducted on a worldwide scale. To tell the truth, the reason is not purely political. There is no theory today that proposes concepts suited to world realities equivalent to those corresponding to the national realities of forty years ago. But this purely theoretical reason is far from being sufficient to explain the absence of measurements relating to the introduction of this worldwide dimension. There is another reason which is far more important. Measurement depends on the existence of a social and political authority which, in the

interests of efficiency, makes measurement the rule of all societies. Such an authority does not exist however. Although world currencies in the strict sense now represent close on 50 per cent of all the national currencies of six of the countries in the world and although there is talk every day of a better international system, there does not exist a world central bank nor even any organization that in any significant way resembles such a bank. And it is hard to see how the emergence of such a body might be probable or even possible in the near future.

Thus measurement cannot be done because of the absense of information which itself cannot be collected owing to the absence of a political authority corresponding to the present economic state of world society. This lack of a world political authority serves but to perpetuate the lack of awareness, still very widespread where individuals are concerned, of the reality and consequences of worldwide interdependence. It is none the less true and no doubt will remain so that the fact that there exists a worldwide economic system but not a worldwide political system will considerably reduce the relevance of social measurement and the possibility of more or less centralized world programming(30) taking the place of round upon round of negotiations (between states, between enterprises and between states and enterprises), which are now the permanent and common rule.

A third limitation resulting from the evolution of the field of measurement derives more specifically from the novelty of that field or, rather, from all the novel features that it presents. This limitation has even greater consequence in that it involves the modification of all the processes of production and calls into question, even before reducing the significance of social measurements already existing, or yet to be established, all conceptualization in the social sciences. I am referring to the slow but regular substitution of information for energy in all our activities.(31) This substitution is not confined to any specific field of activity. It concerns our leisure activities as well as our labour and even all intermediary activities of socialization in the broad sense. Recent work conducted in this field reveals that almost one person in two, in the developed economies, has a more or less direct part in the production of information. Everyone is a consumer of information and to a growing extent. The trend is such that the very concept of information is becoming highly inadequate for assessing, foreseeing and overcoming all the social consequences of such a phenomenon. We have to describe the various types of subject-matter involved, if only to identify each of the major markets to which the development of information processes gives rise. Three major types of information should be singled out: basic data, processed information and, lastly, information contributing to the development of methods in processing.

On the basis of the use to which information is put, the following can be distinguished: (1) scientific information; (2) information that is central to all managerial processes and to the taking of major social decisions; (3) information that gives daily meaning to our cultural life. In the light of these two criteria together, it is possible to discern the existence of nine major information markets whose evolution is seen to be central to all the major social, economic, sociological and political phenomena.(32) The evolution of the various branches of economics will increasingly depend upon the speed with which information is introduced into industrial processes. Modes of social life will derive their main substance from messages prepared from basic information which will combine in mechanically diversified ways before coming to constitute our cultures. The political authorities themselves will be increasingly subject to the information they put out, and, above all, to the information they receive. One only has to think about it to realize, however, that all social science concepts are suited to modes of activity peculiar to the past century when energy (human or machine labour) was pretty much alone in ensuring the transformation of nature and when, once this was achieved, social relations were determined by consumption

(destruction of the energy stored in things) and by direct personal relations (based on family allegiance and religious belief), i.e. not dependent on any intervening agency. Information, however, in its dual sense of medium and message now informs all our activities as producers and consumers. The economist no more than the sociologist, and even less the political scientist or the psychologist, cannot but consider information, in the general sense, to be one of the most decisive phenomena for our social evolution. Just as econometrics and sociometry came into being as fields of specialized study after the war, the economics of information and the sociology of information are developing today. But there is a notable difference between these two developments. The former merely reflected the new importance given to measurement and its application to existing concepts. The latter is far hazier. It consists not in measuring that is already defined but in knowing how to define in order to measure. For how can information be so defined as to be amenable to measurement and, above all, to a measurement which is consistent with the scales of measurement hitherto used to evaluate social phenomena?(33) How for instance can manual and intellectual work be made comparable? And, assuming that some day they are made so, how can one measure information flows which, more than any others, are fluid, not subject to geographical constraints and easily able to cross political boundaries? The last two limitations just mentioned overlap here. We are still a long way from being able to imagine by what scientific conventions we will be capable of quantifying world information flows. Even before we can do so, we will no doubt find it increasingly difficult to use the quantified information wrested from the reluctant hands of the authorities.

The evolution of the social field amenable to measurement cannot, then, be regarded as a simple intake of air enabling free reign to be given to our passion for measurement. The relations existing between the evolution of this field and advances in social measurement are defined within a highly complex process. Admittedly, the opening up of this field has made it possible to extend all our methods of measurement and to apply them. But at the same time some that were thought to be permanently amenable to measurement have become far less so; others have afforded new openings and could as of now be subjected to measurement if there existed the social authorities that could authorize it. Yet other fields, no doubt the most important for the future, cannot be assailed for the time being owing to their being no concepts that would make any particular social measurement relevant and, most important, consistent with all the other social measurements already existing.

3.3 The limitations inherent in the cost of measurement

Considerations regarding the cost of measurement are no doubt the greatest source of division between scientific circles and those responsible for economic and social life. The former elaborate and propose concepts, worrying, sometimes fortunately, about their amenability to measurement. However, even when they are concerned about this matter, they are seldom aware of all the difficulties involved in the transition from the theoretical concept to the measurement of that concept. And this always involves two successive tasks, collection and processing, which, in those countries that are most disposed towards social accounting, are clearly of a far-reaching character. The cost of collecting the data needed to measure any social phenomenon whatsoever depends, first, on the quantity of information needed for that purpose. The point is that most of these measurements are synthetic. They are established only on the basis of a large number of data that need to be obtained before being combined. It hardly needs to be recalled how much is involved in measuring merely the national product, a public opinion index

or a price or economic index. Social barometers do not unfortunately have the same simplicity as physical barometers. They require a great deal of data in order to provide what is finally no more than a small number of measurements. The cost of collecting such data is, then, always substantial and, what is more, cannot be evaluated in monetary terms alone. Care must be taken in distinguishing between the psychological cost and the financial cost. The former is bound up with the fact that most of these data can be obtained only by means of a questionnaire which the producers of basic information are required to answer. This cost clearly depends on the frame of mind of those producers. Moreover, it can be nil or indeed negative whenever those answering the questionnaire feel that they are participating in social progress which will be of benefit to everyone. But this is seldom the case. The data producers are particularly reluctant to meet the obligation imposed on them in that the volume of information involved is considerable and they feel that it is redundant or, worse, that it is misused or even not used at all. Such today is the most common situation in the developed countries where these producers, the very great majority of whom are recruited within firms, have the feeling that they are at everyone's beck and call to supply information. This feeling is compounded by another feeling, which is that social measurement and bureaucracy are in reality inextricably bound up with one another. From an almost sociological point of view, this psychological cost may be so high that it not only limits the progress of social measurement but also may even have the effect of destroying its relevance. People can be made to answer questionnaires but they cannot be made to answer them well unless a system is introduced to monitor the quality of their answers. But then to the psychological cost must be added the further financial cost of monitoring.

The financial cost of collecting social information is becoming increasingly high. Moreover, it is symptomatic that no research has been specifically conducted on this subject and that we therefore have to make do with evaluations that are either subjective or all too systematic.(34) The too often forgotten fact should, however, first be borne in mind that the first data bank suited to meet the purposes of social measurement is constituted by company accounting systems in the aggregate which, it is unnecessary to point out, have developed along the lines just described, the result being the permanent extension of their field. Social balance sheets are added to financial balance-sheets at the same time as social indicators are added to national accounting systems. These two developments are clearly indissociable. Company accounting, moreover, provides a striking illustration of what has just been said regarding the question of psychological cost. There can be no accounting without monitoring or audit system; and no system of measurement used in accounting as a means of management without specialization (financial management) and, above all, without a system of management control. It is to be noted in this connection, that, in companies, it is difficult to distinguish, though we do so from a more general standpoint, between the cost of collection and the cost of processing. Clearly, the cost of social measurement, viewed in this light, is particularly high as is shown by either the relatively large number of staff engaged in this task in companies or the proportion of the working population which, in the various developed countries, is involved in collecting and transmitting information without even processing it. It is indisputable that the expansion of the tertiary sector in the developed countries is almost essentially due to the progress of social measurement. Whether the concern is, in the economic sphere, with keeping permanently up-to-date accounting data or, in the sociological or psychological sphere, with selecting samples, preparing questionnaires or conducting surveys, experiments and studies in the field or in the laboratory, the cost of collection has steadily increased in absolute value and also no doubt in relative value.

But this cost is but one of the first elements of the cost of measurement. The cost of processing needs to be added to it. There was a time when this cost

was negligible in absolute terms and, above all, in relative terms. For some years the development of the various organizations specializing in this field was determined almost exclusively by the desire to have access to increasingly detailed information. As has already been stressed, however, this information is useful, both scientifically and in terms of action, only in so far as it is processed and makes for the improvement of the causal analysis necessary for public or private initiative. Slowly, then, the cost of processing has become much greater than that entailed by the establishment of a vast social data bank. The programmed management information market has been and no doubt remains one of those where growth is highest.(35) Such at least is the case both in the most developed countries and in the largest firms.

It has continually been observed, however, that the cost of processing has become so high that it is out of the question for a very large number of organizations. In the economic field, it should be pointed out that what is actually achieved in the way of processing falls far short of what is theoretically feasible. Considerations as to cost alone prevent a very large number of countries from joining the very small number of those that are able to construct and keep up to date as simple a conceptual tool as an input-output table. And in the case of systems making it possible to keep under review and anticipate the short-term economic situation, the happy few are even less numerous. This luxury, which presupposes a high degree of scientific and cultural development, can be afforded only by the United States, Japan(36) and a few European countries.

Recent events have done little to make cost less of a hurdle. Far from it. It was realized even before 1973 that the practical value of complex descriptive tables or input-output models was dependent on that of parameters which could be assumed to be constant, at least over a given period. The spread of the practice of model-building, originating in economics, to all the other social sciences was bound to cause all social measurement to be subject to a constraint long regarded as a curse, namely, the dependence of all practical findings on those famous constant coefficients from which the model derived its operational value. In firms as in nations as a whole, processing led to decisions whose soundness clearly depended on the permanent nature of the relations between the objectives pursued and the means employed to attain them. However, model-building brings into play, in the case of any significant social phenomenon, a large number of variables. For a firm, at least fifty of them are used in significant models, and, for the economy as a whole, more than two hundred. The data processing that has to be carried out before the model can be built, involving simulation of that model, which is itself a precondition for its final utilization, has led to a considerable increase in the cost of processing.(37) The ineluctable consequence of this phenomenon was and remains that the constant nature of the parameters has to be regarded as one of the necessary conditions for the building of the model. If the parameters change, data processing loses its operational usefulness. And the scientific capital built up within the system of measurement loses its value even though the scientific knowledge on which it is based does not. Here lies the particular weakness of applied knowledge as compared with scientific knowledge. The permanent nature of the changes affecting the relations of dependence and causality between social variables gives weight to the observation made by a psychologist that 'nothing is more practical than a sound theory'. It should be added that a quantified model which, through its constant coefficients, expressed the permanent correspondence between social reality and the thoery would be even better. But that a quantified model whose coefficients changed every day would indeed be far less useful than the theory underlying it. And this is especially true in view of the fact that the more complex the model, the more costly it is to build. Now it so happens that the events of 1978 revealed that a marked change in economic life in a large number of countries was expressed through a sudden

variation in the nature and intensity of the traditional relations between the representative variables of social life. In many countries work that had demanded a great deal of time, attention and money was suddenly devalued in all fields of social investigation. It was first established that the processing of economic information was subject, far more than real commodities, to the danger of obsolescence. It is therefore easy to understand why it is that there is now a preference for a less elaborate form of processing for a large quantity of such data and, hence, that less and less recourse is being had to programming techniques. This phenomenon is undoubtedly due to the present situation and can some day be expected to be called into question in its turn.

The trend has not been altogether the same in the sociological sphere where processing has been less frequently envisaged owing to a more belated quantitative development. It has nevertheless been realized that the expenditure in time and money entailed by the very large amount of research work necessitated by the processing of social data was such that the results were of scant relevance for the measures which, when they came to be taken, were meant to apply to a situation very different from that studied. In the United States, for instance, patterns of social behaviour are emerging which are fairly different from those hitherto in evidence. Attention formerly focused on the individual alone is now beginning to be given to the larger groups of which he forms a part. In most of the developed countries the place of work in individual value systems is being called into question.(38)

This precariousness is even more marked in the political sciences where it is clear that forecasting demands so much information that all the political authorities shy away from planning and embarking upon far-reaching action. In recent years states have finally come up against a limit of profitability which, more less implicitly, already explained why a very small number of theoretical proposals concerning the framing of their strategy were tested by firms. The small use made of organization theory stems from the very often justified feeling on the part of management in particular that, in most cases, the advantages they might derive from quantitative social research are uncertain and, hence, small as compared with the cost, about which there is no uncertainty.

An even more general question now needs to be asked about all social measurements. Did they not apply to concepts grounded in the analysis of a situation of high growth and marked social development and are they not therefore ill-suited to a study of this state of virtual standstill or, at least, of this deceleration by which the developed countries will be seriously and lastingly affected in coming years? Even if a number--it is to be hoped a large number--of concepts weather a transition which, it is also to be hoped, will be limited, is it not nevertheless to be feared that a large number of our measurements and models will attest to the fragility of our quantified knowledge?

3.4 The limitations inherent in the way measurement is used

Strategically speaking, the great claims made for the practice of measurement, which has swept through all the social sciences in the last few decades, could not but be founded on the desirability of a new role of social control whose superiority was due indeed to the virtues of measurement and to all the methods of action then made possible. This new mode of social control has been and still remains more often implicit than explicit. It is obvious why it cannot be made explicit without specific reference to the political model used. This political model has itself remained implicit and it is even more obvious why. It is a democratic model of such a kind that a legitimate power system uses the possibilities afforded by measurement in order, on the one hand, to make clearer to all the citizens their possible range of choices and, on the other, once these choices have been made, to attain the objectives by choosing the most favourable

means. The fact that this model has not been explicitly referred to by scientific circles is very understandable. Too many societies are still a long way from complying with this model. But the mere fact of not having done so has no doubt prevented those circles, both in their thinking and, even more so, in their professional activity, from immediately considering what the limits of extensive social measurement should be. The last limitations I should like to emphasize could, like the others, have been foreseen once the fact had been accepted that, in most historical situations, the social authorities would not be spontaneously disposed to make use of this measurement as the scientists hoped and that this particular attitude on the part of these authorities could not but cause all the citizens to react in ways that were themselves foreseeable.

The utilization of measurement by the social authorities, within the framework of a democratic model, would have presupposed on their part a level of education which would have led them to appreciate the relevance and significance of the measurements, together with a sense of political ethics which would have caused them to explain and extend the range of collective choices. However, these two conditions cannot be easily met, have not been so and are not so at present and they are highly unlikely to be met for a long time yet in almost all human societies.

A few remarks must be made about the level of education. Scientists generally make the mistake of thinking that their knowledge can easily be acquired and that those in positions of high social authority should and do in fact have a level of scientific education that enables them to understand the significance of social measurement and, consequently, to be in favour of it. The attitude of the social authorities is, however, far more complex and far more varied. First, there are situations in which these authorities, whatever their level and whatever their status (firms, public authorities, group leaders), occupy their positions without however benefiting from an intellectual and scientific training which would enable them simply to grasp the very idea of measurement and hence to understand its significance. Moreover, it should be noted that there may be very different reasons for this phenomenon, ranging from an unjustified lack of culture to the presence of quite different qualities, far better suited to their situation than scientific training. When such is the case, and it is known to be frequent in the contemporary world, these social authorities have, by and large, two types of attitude. One, of self-justification pure and simple, consists in more or less belittling a measurement they do not fully understand, which leads them to seek to do without it. They then attempt to introduce other methods of decision-making and control, and in this they are sometimes successful. But not often enough for them not then to adopt a second attitude--that of delegating to lower rungs of the hierarchy responsibility for social measurement management and for designing and using measurement techniques. But even in such cases, indicative though they are of a certain lucidity, measurement is often praised when it results in successful decsion-making and blamed or even discarded when policy-making leads to questionable results. Even if, between these two extremes, a middle course is adopted, the fact remains that the use of measurement in the political field is artificial. More and more often situations arise where the growing complexity of the measurement of the major social phenomena enables those in positions of social responsibility to make political use of the various measurements at their disposal. This is increasingly evident in the social sciences and not only in the economic sphere where the same phenomenon can be judged in different ways if a variety of related measurements are used or even if the same measurement is used in different ways. There are too many examples to be quoted here. Let us refer merely to that of inflation. This can be judged in very different ways according to the categories of price referred to. And even for a single one of these categories, the annual inflation rate can be calculated in many ways (39). Another example deserves to be mentioned: that of external exchanges, the results of which have to be stated differently according to the various exchange flows considered(40).

This use of measurement by the social authorities is the most detrimental possible because it calls into question that which is central to the function of scientific knowledge: objectivity. It destroys the value of social measurement for everyone, whether user or consumer. In a word, scientists make the mistake of not foreseeing what is however inevitable: probity is a luxury available only to those who have no social commitment to assume.

The second condition governing the use of social measurement by those responsible for community life--that it serve solely to explain and extend the range of what is socially possible--is not often fulfilled in practice, any more than the first, concerning education. It is not necessary to mention here all those social theories that would have it that all knowledge is used more as an additional factor of power than as a means of giving more to the citizens. This is obviously an extreme view as is shown by history which gives evidence of the slow spread of knowledge to increasingly large groups of people. But history also shows that there are times when the democratization of the accumulated stock of scientific knowledge proceeds at a faster pace than scientific progress itself, times when, to put it another way, the layman acquires knowledge more quickly than the specialist produces it.(41) In terms of the social order measurement there is now a type of language at least as powerful as was language itself when it first emerged. Measurement, through all it entails in the way of sophisticated knowledge, is a new dimension of our language and, as such, is of an essentially aristocratic nature. Hence it cannot be assumed that the custodians of measurement will be content to make it one of the legitimate reasons for their social power and that, if they succeed in doing so, they will use it solely as a means of defining the range of possibilities. Rather than persuade everyone of the existence of a number--a limited number--of choices and, where appropriate, of the existence of a 'best possible choice', those in power may succumb to the technocratic temptation of imposing solutions which they themselves consider most suitable. Do they not hold a monopoly over certain information which vindicates their own feelings?

No better illustration of this mode of behaviour has been provided in the last few years than in the economic sphere, in particular, during that exceptional period when the 'growth rate' was supposed to afford a means of satisfying all individual and collective aspirations. Under such circumstances little needed to be done to make measurement appear to be a way of justifying a certain form of dictatorship or oligarchical design and not merely a means of submitting choices that had remained democratic to objective constraints. Such an eventuality was all the more likely in that people remained unaware of the significance and intensity--the measured intensity--of the various social constraints, because in some cases of the deliberate policy of the social authorities and in others because of inability or laziness. Thus discredited through the use to which it is put by the social authorities, measurement then becomes the chosen target of all those who question the policies being pursued.

Such reactions were foreseeable. They are closely bound up with what in organization theory is called apprenticeship. For some years, in those countries where the idea, and hence the practice, of collecting social information has gained the most ground, there are signs of resistance, unorganized, it is true, but increasingly widespread, to information collection which had previously been regarded as necessary, useful and beneficial to the community as a whole. This development is clearly rooted in a phenomenon of social apprenticeship at the end of which a growing number of people realize that they derive more harm than benefit from the information they deliver. This feeling may be based on purely individual considerations calling directly into question the information supplied (tax evasion). But it may also, as is more and more often the case, derive from a collective tendency to challenge the use to which the information supplied is put by the powers that be, in the private and, especially, in the public sectors, and

give rise to behaviour patterns that call into question the correctness of social data that have become traditional. The official national product is less and less representative of social activity. The fact that part of the output becomes invisible reduces the value of any comparison between different periods and different countries and the significance of policies calculated to result in a particular rate of growth. In the sociological sphere, it is now becoming an established fact that the answers given by individuals to the various questionnaires put before them are less and less spontaneous. It had long been known that these answers were subject to distortion as a result of the social norms to which everyone conforms when making public statements. The pressure of social norms results in misrepresentation. Well-known and increasingly well-calculated precautions, developed by psychologists, are taken at the time of choosing the sample and drawing up the questionnaires. But it is to be feared that the differences between the feelings actually experienced and those expressed now reflect a desire to destroy or at least to limit the significance of social measurement just at the time when the necessary data are being collected. This is no doubt one of the reasons for the lack of success of election polls.(42).

All this widespread resistance may turn into open and outspoken opposition to all social quantification once measurement is regarded as the essential justification for an organization's strategy and for monitoring that strategy, especially when all or most of the members of the organization do not consider measurement to be necessary or are opposed to it. The social authorities should not use measurement as an insidious means of applying leverage and even less should they brandish it in order to justify a policy that does not enjoy the public support which alone ensures its legitimacy. You cannot fall in love with a measurement. Measurement cannot make you like something but merely give you a reason for liking it, assuming you already do.

Thus it is that in some countries the collection of strictly political information is called into question (e.g. polls on voting intentions). There are actually at the present time repeated signs of hostility, of every kind and based on every kind of motive, towards the collection of such information in the developed countries, seized by the temptation of collecting and processing information in a way made possible by computer science. The citizen is frightened of being put on an index card and, indeed, refuses to be for a large number of obvious reasons. In the economic sphere, the fate of information has become indissociable from the price attached to it by the citizens. It is becoming clearly recognized, however, that economic information is understood and, consequently, appreciated only by a very small number of people, even in those societies with a high degree of scientific and cultural development. Hence they do not feel particularly inclined to make an effort which is sure to have no practical repercussions, particularly since they are likely thereby to increase the power of those who understand over those who do not.

Considered in even more general terms, the abuse of measurement by the social authorities, even if there is good reason for it, always suffers from the shortcomings and sins of reductionism. No society can allow itself to be reduced to a series of measurements, even if they form a coherent pattern. Whether or not one likes it or deplores it, all the feelings and practices that constitute the historical heritage of every society, to which it assigns the name of culture, always end up by demonstrating that they have a right to change and they do so, when necessary by challenging figures. Moreover, the persuasive power of the most profound explanations given of unequivocal cases of historical development, affecting not only civilizations but also peoples, has never owed much to figures.(43)

4. *Conclusion*

The development of the social sciences during the third quarter of our century has been marked essentially by the development of all the techniques of measurement. Furthermore, it was not this development itself but rather the major ambitions attendant upon it that attracted the young post-war generation and caused research workers to be divided once and for all into two opposing groups, consisting, on the one hand, of those with a 'literary' attitude and, on the other, of those with a 'scientific' attitude. And all the social sciences came to be marked by this division. As is customary, this young post-war generation submitted its objectives to the perusal of the scientific community as a whole and explained their rationale. The object was to enable societies to move forward by providing them, for the first time in their history, with the means of improving social choices which had, until then, been subject to every form of subjectivity, being unable to benefit from the objective guidance of measurement. This philosophy attained its culminating point in the realm of politics. After bringing social phenomena under its sway by means of theory and measurement, science also commanded the allegiance of the social authorities and at last compelled them to adopt more rigourous standards.

More than a quarter of a century has elapsed since the dawning of this new era in the social sciences. Substantial advances have been made under the impetus of this dominant idea. In those areas of the social sciences where an embryonic system of measurement already existed, such as political economy, virtually all major choices, in respect of both the reasons adduced for them and their results, are based upon theories or minor variations thereof in the form of quantified models. In other areas where measurement has not yet made any inroads, a large number of debates, opinions and hypotheses relatively free from constraints have been transformed by an axiom system and a practice determined by the concern with measurement.

However, as this trend developed, the limitations became apparent, to an extent varying according to the field but ultimately of the same kind and, most important, with the same consequences. Measuring is an individual and social undertaking of which, finally, an account must always be given. This being so, a comparison has to be made between the costs and benefits of such undertakings. By the end of the 1960s there was indisputable evidence that these benefits were increasing at an increasingly slow rate while the costs were mounting at an increasingly fast rate. As measurement became more detailed, so it decreased in force. Its capacity to improve the common lot did not diminish but it became less and less possible to avoid comparing it with the volume of resources that had to be assigned to it. For those who remained confined by their particular fields of study, whether economists, sociologists or psychologists, there was a waning of enthusiasm just at the time when their efforts were crowned with success and, growing accustomed to this success, they were concerned only about their doubts and their unavoidable failures. As the world expanded to take in geographical areas that were very different from those that had witnessed this evolution, and as the prospect of high growth rates became a thing of the past, these doubts and questionings became more persistent.

But it is already clear that the scientific community is capable of resolving them more rapidly and with more enthusiasm than could be hoped. A number of new lines of emphasis have emerged from the awareness of the limitations of measurement. The first is that, within each discipline, measurement needs to be based on a theory which justifies its existence. The second is that a great deal of attention should no doubt be given to the social cost of producing and using measurements. It is becoming clear that all the work involved in the measurement of social phenomena cannot continue to increase at its present rate. It is believed by some that measurement itself provides a justification which, in fact,

depends solely on the relevance of measurement and, even more, on its social usefulness. In view of the decline in the world growth rate, selectivity is beginning to be exercised. The question of what is to be gained by the use of measurement is more frequently asked. The third, which I consider the most promising, consists in a cross-disciplinarity that appears ineluctable. The desirability of measurement within each discipline has decreased. But at the same time the methods and procedures that have to be adopted to establish measurements have created links between the various disciplines. The totalitarian social scientism of the 1950s is now a thing of the past; at the same time, a feeling has emerged that the social sciences possess a core consisting of a small number of theories that may be interrelated and which encompass a small number of social facts formerly considered separately and now viewed together, thereby enabling us to achieve a more general and hence more practical understanding of the evolution of our societies.

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The case of the Sahel

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1. *Introduction*

The Sahel received worldwide attention because of the magnitude of the destruction of an unstable environment and the inappropriate economic policies being followed. The famine and misery which were the result of past human actions may be one of the major calamities of contemporary history.

This group of ex-colonies was hit just at the time when the instruments and structures of national soveriegnty were being formed. The socio-economic catastrophe led at first to a suspension of any basic rethinking. The urgency of the problem was such that many sectors of opinion, both external and within the region, demanded a purely empirical approach to the socio-economic problems; there was no time for reflection. Now the situation has evolved and the populations and decision-makers have the the time to consider in depth the useful role of the social sciences and their potential to reply to the complex questions which the Sahel faces within its fragile natural and international environment. Thus the technicians of development, the decision-makers and the theoreticians are examining and questioning political and economic theories in order to define which conceptual and operational tools can best contribute to the indispensable structural changes required.

The social sciences are currently in a contradictory situation, of both expansion and the recognition of some fundamental weakness. First there has been a division into specializations, with a lack of an overall synthesis. Social science methods have become more complex, with an increase in quantification as if science cannot exist apart from measurement. Thus quality of life is measured in monetary terms, health by a number of hospital beds, well-being evaluated principally by measures of consumption. A positivistic attitude implies the possibility of a separation of ideology and science in this domain, so that researchers are asked to refuse to make any value judgements and to ignore ideological considerations. Too often, the new myths of the social sciences are however found to serve to reassure and to justify a social order of great inequity rather than to identify any scientific truths.

It is increasingly recognized that, if the social sciences are highly developed, their methodological bases are often extremely fragile. Above all, there is an abuse of mathematical methods and quantification, which often leads to both hypothesis and theory separated from concrete reality. Deductions based on such ideas may be logically rigorous but unreal or too complex.

This weakness in methodological foundations in the social sciences is shown by the complexity of many concepts which are totally inaccessible to the non-initiated, and there is a crisis in communication with experts out of touch with the public and exchanging ideas only with one another.

There is also the question of the final use of the social sciences in this form, with an apparent emphasis on empiricism until knowledge no longer serves either practically or ideologically. Fascinated by their efficiency, the social sciences became an arm of the elite in power: the technocrats who present a facade of neutrality in fact elaborate norms and provide indicators to evaluate the performance of men and institutions.

Contemporary economic thought is passing through an extremely profound crisis. The sweeping theoretical concepts have literally collapsed and schools of thought are breaking apart. As in other social sciences, economists develop complicated theories which are completely dissociated from any reality. Social systems lose coherence or disappear totally in mathematical elaborations.

Such a science is totally incompetent to deal with the overall management of economic and social development, or to provide a complete and coherent analysis of underdevelopment. Often an ideological struggle is hidden by a supposedly scientific presentation. Twenty years of research have not solved the problems of underdevelopment nor identified the mechanisms which perpetuate this phenomenon. It is too often forgotten that underdevelopment is the lot of the majority of humanity, that successful development is the exception. Despite an increase in technical progress, despite the fact that there is no theoretical limit to the expansion of capital, famine and misery continue. The Sahel is an example of this; many facts point to a probability of future catastrophe in developing countries. Absolute poverty is increasing while productivity does not improve and external debts expand. As the people concerned do not play any determining role in the political game or the international division of labour, since they have no initiative in the larger decision-making, this menace which threatens them is not taken into consideration.

The structural crisis of the global economy makes the situation even more urgent and reduces the underdeveloped countries' margin for manoeuvre. A reaction to such failures, past and potential, demands a deep reflection on just what is the situation, and on what must be done. The crisis of development is above all a crisis of an economic theory which is incapable of offering a complete diagnostis and proposing an efficient solution. That economic theory is built on a collection of concepts which are now outdated ideologically and therefore inadequate. An 'economyth' has been built up which expresses the beliefs of all the controlling bureaucracies of the industrial civilization. That 'economyth' is becoming global and is wiping out all cultural differences in the West as in the East.

It is necessary to question whether the social sciences have achieved their full potential, and for that an evaluation of the theories behind economic and social political actions is required, together with an understanding of the methods used, in order to comprehend both their values and weakness. Then a judgement on the usefulness of quantification can be made.

In order to explore the possible paths and the theoretical and practical means to bring about structural change in the Sahel, in order to move away from a pattern of patience and endurance, a new universe of economic and social thinking must be built up, starting with a move away from a hopeless scholasticism which is disassociated from a reality that urgently needs to be transformed. New approaches are required to attack those factors which are obstacles to development.

2. *Possibilities and limitations of methods and techniques of quantification*

2.1 Instruments of analysis

The social sciences have less need of complicated techniques than of the courage to tackle, rather than to elude, the central problems. But to require that courage is to ignore the very social reasons which have made the social sciences what they are today.

The controversies of the past several years amongst professional economists about the necessity or not of a general use of mathematics in economic analysis are of considerable importance. Certain authors believe that the degree of advancement and maturity of a discipline is in strict relationship with its capacity for the use of mathematics in the formulation and resolution of

problems. Mathematics bring to economic theory a precision of language, a scientific standing which permits a rigorous treatment of problems, and a formulation of theorems and laws which exclude any value judgement.

The use of rigorous methodologies is however by no means entirely innocent for they provide an elegant and logical means of justification of certain social norms. For that reason such formalization has been severely criticized because of internal inconsistencies and a failure to take account either of reality or of qualitative aspects. The first criticism reflects the extreme fragility of the hypotheses which are basic to such deductive systems. Mathematical economics tend to relegate all important and interesting questions to the level of hypothesis. The second criticism has been voiced by such authors as Joan Robinson, W. Leontief, G. Myrdal and according to O. Morgenstein, the science of economics is proceeding along a false route if it studies hypothetical situations and constructs models with neither realism nor content, leading to refined work but mediocre results.

Once such limitations had been realized, it must be considered whether the instruments of quantification in economics are indeed functionally adequate to evaluate and resolve the questions raised in the economic and social development of the Sahel. Is it really true that 'economic science is fascinating in its efficacity' for the control of an environment which is unstable both economically and socially? Have the approaches, which have served the creation of the industrial civilization, the same capacity to bring about the structural changes required in the Sahel?

The science of economics has, since 1929, been particularly notable for the development of theories of growth which explore the dominant vision of material production. This vision, the demand for regular, continual economic growth at the highest possible level, has become universal, shared by both theoreticians and politicians, and has imposed itself as an imperative objective, no matter what the ideological options and the social system.

For the capitalist countries, the present crisis has led economists to tackle again the problem of economic growth, and the theory is aimed at finding the best adjustments of several essential factors in order to provide for economic advancement. It is within that optic that a multiplicity of analytic models has arisen.

Within the socialist countries, the major preoccupations are almost identical, with the objective of catching up and passing the capitalist world in material output. The development of theory must then relate to that goal and A. Antchichkine has noted that the growth of socialist economies is inseparable from the mathematical modelling of economics.

For the underdeveloped countries, the question is not so much what to do in order to assure a rapid and harmonious growth, but rather how to begin such an economic expansion. All the theoretical analyses rely on an iteration of the same growth models. There is no particular concern for these countries, which are simply expected to imitate the same pattern of economic growth.

The models, which attempt to connect theory and practice, are based on a number of principles: (1) a theoretical base; (2) a collection of structural, quantitative, analytic or provisional parameters; (3) a system of relations between the variables and parameters; (4) a system for the collection and treatment of information, and (5) the specification of regulating agents: the invisible hand, the state or the plan.

The of these principles depends on the options available and on theoretical and ideological biases. Three questions may be posed concerning the conditions of economic expansion. (1) Which problems of structural change must the economic growth resolve ? (2) What conditions of coherence of the economic system will apply during the evolution ? (3) What are the constraints of long-term development ?

For the countries of the Sahel all the tools of analysis and measurement,

like the operational concepts, have come from or are conditioned by the theories of expansion. This suggests a need to analyze these growth theories as they apply to local social conditions. It is necessary to consider whether the theories are valid in the context of the Sahel and whether modelling takes adequate account of the material base and the structural changes needed there. Then an evaluation of economic indicators is required: are the indicators well adapted to the chosen objectives, and can they relate to the basic quality of the phenomenon which they measure?

2.2 The problem of growth in the Sahel: Theory

At the time of African independence there were lively debates concerning the state of these countries which had just achieved international sovereignty, with a central question of how to measure the situation with some degree of precision; the interpretation of their socio-economic structures; and the propositions and direction to be followed in order to resolve the questions raised by the backward state of their basic economies.

From such debates development economics has formed as a specific branch of economic science, and within that new discipline two currents of thought provide opposing concepts of underdevelopment and of the economic politics which should be applied in order to escape from underdevelopment. The first is quantitative and insists that the developing countries are behind and must concentrate on problems of economic growth, of an optimum and coherent use of resources. The second is more concerned with structures. Development is considered to be an extremely important and complex process wherein structural change is needed to set the economy on the path of expansion. The concept of development is broader than that of economic growth alone; the paradigm applied is less quantitative and mechanistic.

The first current has become dominant for a multiplicity of reasons concerning politics, culture, the importance of the methods developed by economic professionals and technocrats, and of course by the fact that it is voiced by the dominant school of thought on the global stage. As a dominant way of thinking, this current has formed the theoretical presuppositions and the methodological techniques on which action is based.

An approach to underdevelopment which is based exclusively on quantitative criteria is claimed to favour decisive action and to be objective and impartial. The goal is to gather facts, to form a collection of certainties. This can then form a base common to all economical theories, no matter what the ideological orientation. (4)

It is claimed that behind an apparent diversity the facts establish a fundamental unity amongst underdeveloped countries, which share the following common characteristics:

- a primary economy dominated by agriculture or mining;
- a narrow industrial base;
- a poverty which is shown by the low average incomes;
- a lack of jobs and massive unemployment;
- and finally, a divided economy in which the two sectors, modern and agriculture, are each connected to a different and autonomous centre of decision-making, with weak monetary linkages.

Since these countries are backward, they must imitate Europe and choose economic growth as their major objective.

Although the countries have wished for the simultaneous growth of national income and an improvement in the distribution of incomes, the first objective has become dominant. Some authors have begun to criticize the traditional methods argued for by international organizations (BIRD, UNRIDO, OECD) and which favour private firms and private investment, which are unsatisfactory when applied to the

realities in the underdeveloped countries. Such economic and financial calculations of cost advantages and pricing systems are based on neo-classical theoretical presuppositions; the invisible hand is replaced by the plan.

Many of the arguments concerning the best methodologies for the evaluation of projects follow the wishes, stated or hidden, of providing often complicated theories to assist developing countries so that once the formulation is expressed, even if it is incoherent, it is set within a flux of doctrines which are exported and may prevent the intellectuals from thinking along alternative lines to find the best solution to the socio-economic situation of their countries.

These criticisms have led to a search for other methods which can deal with the global impact of policies in underdeveloped countries, including not only the impact on the incomes of different groups, but also the impact on non-quantifiable objectives and the use made of rare resources. This method requires a more complete planning methodology than an economic calculation of cost-benefit advantages.

2.3 The problem of growth in the Sahel: politics

In the Sahel countries, which were once colonies, the problem of growth, of expansion, dominates other alternatives of social and economic development. Several reasons explain this:

- this is the dominant paradigm in the metropolitan areas and is automatically transferred by technical assistance;
- it derives from the organizational and mechanical character of the politics of economic growth;
- the problem of economic growth forces the Sahel countries to stay within the pattern of the international division of labour.

At the time of independence, the countries were faced with a multiplicity of problems, the most urgent of which was that of the technical competence to act within the structures of development. Those who had the task of organizing the concepts of development had been trained in the metropole, with a bias towards technical solutions, and because of this training in metropolitan universities and institutions they copied, often mechanically, the theories, political ideas and structures current in those countries. From that time on, the countries of the Sahel continued to form their own administrations and preoccupations in a manner identical to those of the former colonial powers. The dogma of economic growth which is dominant there has been automatically transferred to the ex-colonies.

The essential aim of the politics of development has been to find an optimal use of investments, taking into consideration several local constraints. The plan is then required to take account of all opportunities for public investment and to follow the engagements of the private 'partners'.

Finally, the politic of economic growth has been encouraged, implicitly or explicitly, because it ties the countries of the Sahel into the international division of labour and reinforces the development of exports and an openness to the outside world.

It is necessary to save in order to invest. In the Sahel the incomes of the poor are very low and there is no possibility of saving. Savings must then come from the state or from private companies which trade on the world market, and thus the formation of investment funds in the Sahel is strongly linked to international economic relations. The more investments required, the more it becomes necessary to develop activities linked to international commerce. A policy of economic growth then implies the reinforcing of relations with the international system.

These linkages are in part responsible for the ecological imbalances of the region, due to a too great intensification of trade and a concentration on traded goods. Thus one cause of desertification has been the extension of the area used to grow peanuts. The subsequent famine was exacerbated by the reduction in the amount of land available for cultivating foodstuffs for local consumption.

3. Economic indicators

3.1 General considerations of planning

The politics of growth define the instruments and means of quantification of the objectives. The question of the degree of planning in developing countries is a dominant factor in social organizations. From both practical and theoretical points of view planning is of soviet origin. The practical use of planning began with the first plan of 1928. In the new Soviet Republic, in the process of full structural change and completely cut off from the international capitalist system, it was necessary to find a rational method for the optimal use of national resources in the service of clearly defined socio-economic objectives. Planning then provides an instrument for the definition of tasks and objectives as well as the means and methods to achieve those goals. The plan defines the resources to be mobilized and the time scale of the development, becoming the fundamental instrument for the regulation and direction of the socio-economic system.

However, the theoretical foundations of planning are extremely restricted. It is a discipline in which practice has moved ahead of theory. The scientific works of Marxism do not contain a solid, complete and coherent exposition of the process of planning of a national economy.

After independence, the Sahel countries opted for a policy of rapid economic growth in order to overcome their economic backwardness, to modernize their productive systems in all sectors and to resolve questions of employment and manpower. Planning was accepted after vigorous discussion.

Two quite different opinions on planning were expressed. The first was totally hostile, considering that planning was a technique which it was impossible to apply in the Sahel, within the setting of economic and social underdevelopment. The statistical data and the scientific models were lacking. Also the economies were dominated by an openness to world markets, which would define the ultimate decisions. Finally experiences of central planning often showed a tendency for the creation of inefficient and costly bureaucracies, together with a multiplicity of sterile procedures which act to kill any initiative. To all that is added the lack of trained personnel to carry through the plan.

The second point of view held that the actions of a society in an unstable and hostile environment should not be determined by the turbulent forces of nature. Techniques of planning must lead to a control of the process of development in that uncertain environment.

In addition, this was the only alternative to the anarchy inherited from the colonial era. Only in this way could the collective effort be directed to achieve, the required objectives of social and economic advancement. Consequently, the plan must indicate not only the actions to be taken but equally must define a set of social values and a philosophy concerning the human condition.

These controversies centred on ideological and political beliefs. Thus a pessimism concerning the use of western planning techniques does not imply a move to the other extreme, a copying of socialist planning methods. The methods and techniques of planning must be adapted to the historical, social and economic situation of each country. While taking inspiration from other experiences, planning in the Sahel must balance universal scientific factors with particular national traits.

The theoretical debates have led to the evolution of hybrid planning systems in the Sahel, with a mix of methods taken from capitalist countries and the central planning of the socialist countries. The methodology in such a situation is midway between pragmatism and econometrics.

Pragmatism is based on the facts that there is a free market which determines prices, the means of production are not public even though a public sector does exist, and the economies are tied to the international division of labour which prevents an autonomous development.

The means of action available to the planners are extremely limited. The plan is a conglomeration of public and private projects and links the various economic agents only weakly.

At the level of methodology the planners of the 'second generation' appreciate clearly the problems to be tackled:

(1) research on the social conditions in the Sahel, the systems of production, the forms of consumption and the philosophical visions of the world;
(2) the development of long-term economic thinking which can provide both an element of certainty and an overall coherence to the plan;
(3) the establishment of instruments of quantification such as parameters of consumption and income distribution, the rates of investment in various sectors, indices of foreign commerce;
(4) the development of social indicators and some measure of quality of life, and;
(5) the areas and forms of state intervention.

Decision-makers and planners are realizing that the problems of the dynamics of development, both social and economic, demand a long-term analysis. This will allow the consideration of different scenarios of development which can clarify the possible range of choices.

On the political level it may be noted that each country in the Sahel now has a Minister of Planning. This is an important step forward as in the past planning has often been left to the Minister of the Economy. Most important there is a tendency towards a regionalization of planning. This is perhaps the most positive concept in the second generation of planning. Planning can now aid each region in its economic development and in the resolution of the structural dualism and the distortions inherited from a colonial economy. This is a difficult task which will require a careful organization, and the definition of (a) the links between the national and regional plans, to prevent a local autonomy prejudicial to the total economy, (b) methods of distribution of the means of development, of factors of production and of infrastructures, (c) the criteria of rational and efficient regional development, and (d) contact between national and regional planners.

3.2 Limits to planning in Sahel economies

One particular limit to planning is a theoretical weakness which leaves the plan as a more or less complex registration of projects which are organized completely autonomously by private agents or by the state. The criteria used in the decision-making process are then out of the hands of the planners whose job is only to verify whether any one project contributes towards the total policy.

If the theories and practices which aim only at economic growth are rejected, the only alternative is a development strategy which is based on: a development of agriculture to satisfy the fundamental needs of the population, a model of industrialization based principally on the development of agricultural products and the introduction of modern methods into agriculture, and a calculated opening to the global economy.

Three weaknesses of planning in the Sahel derive from the insufficiency of their methodological base, which is formulated around the logic and structures of the free market inherited from the former colonialists. Thus, (1) the plan is based on iterative techniques, (2) the choice of investments is not determined by the central planning organizations, and (3) the further development of the economic and social systems has not been defined.

It is only now, after a major catastrophe, that it has been acknowledged that the Sahel has been insufficiently studied or analyzed and that little is known of the ecosystems, the relations between agriculture and the climate and the water system. That lack of knowledge hampers any planning of rural development, and the

activites of more than 80 per cent of the population which provides more than half of the national resources.

The countries have inherited from the previous colonial regime a state apparatus which is inflexible and which concentrates principally on administration. The new rulers thought at first that the essential task was to reorganize the system, to replace the functionaries. However, now it is realized that a fundamental rethinking is needed with considerable basic changes in organization. This has been brought about by the realization that for twenty years, planning has been at the service of development strategies which are fundamentally incorrect.

3.3 An independent national economy

Economic independence is an objective necessity in order to counteract the socio-economic consequences of vulnerability to world markets. All of the economies of the Sahel are linked to the unequal international division of labour by the activities of multinational companies, colonial-type firms (as import-export) and national capitalists. A pattern of dependency is formed, with the continuing growth of internal structural distortions. Each country remains on the periphery, delivering agricultural or mineral primary products while importing equipment and consumption goods. This commercial dependency implies at the same time a financial dependency. In fact, the outward flux of profits is greater than the inward flux of investment capital, with the result that the countries' debts grow. This phenomenon is worsened by the increased demand for imports which follows the rapid increases in urbanization. The response to a growing foreign debt has been an increase in export-oriented activities which brings an expansion of market agriculture to the detriment of internal food production. In sum, the insertion of a country into the global economy is the principle cause of the structural distortions which characterize underdevelopment.

Instead of an improvement, the living standards and social conditions of the rural and pastoral peoples has deteriorated. It is absolutely miraculous that there has not been a massive explosion of violence in the countryside of the Sahel, as was experienced in Europe during a similar phase of development.

The mechanisms which are, in the final analysis, responsible for the misery and the famine are the unequal exchange mechanisms, the transfer of value, under official or hidden forms, from the periphery towards the centre. They represent the tributes of dependence, the tax of subjugation.

3.4 An unstable environment

Even though it is central to many economic questions, the environment has not been the subject of any particular attention on the part of planners in the Sahel. However, the success of policies which rely heavily on agricultural productivity is dependent on the generosity of nature. The problem of the environment is too central to be made the subject of an analysis detached from the economic policies which have too often ignored it. It is important then to consider why there has been such an ignorance and to consider too the consequences.

Social science literature admits that the Sahel is characterized by a considerable instability of the physical environment. Of the environmental imbalances, the best known is that of drought. Droughts occurred in 1931-1932, 1943, 1951-1952 and 1958, and each time produced both reversible and irreversible consequences. The irreversible consequences are:

- loss of human life;
- damage to mental and physical health; and
- ecological transformations such as reduction in humidity, destruction of micro-organisms basic to life, plant destruction.

As to reversible consequences, which proper policies can correct, these concern the impact on:

- agricultural production which implies a drop in exports, an increase in imports and a worsening of foreign deficits;
- the loss of livestock (about one-third in 1973) because of lack of water and feed; and
- the effect on the total economy of the foreign debt and thus on the finance available for development.

Droughts are not accidental phenomena. They occur in a quasi-cyclical pattern and the heavy losses associated with such a well-known, repeated occurrence should lead planners to consider them as given, as limiting factors which must be taken into account. Consequently, the natural character of such instability of the environment must not be used as a pretext for inactivity. After all, one role of planning is to deal with uncertainty.

Environmental instability is a geographic reality which demands an economic response. Droughts are affected by human activity, by the environmental destruction of a growing population, by an expanding agricultural system. It is then important to find the most viable forms of agriculture which are not dependent on the purely hypothetical generosity of nature. The plan must deal with the realities of the natural world, and for that it is necessary to study the hydrological system and its implications for policies and to take into account the changes or cycles in water and vegetal resources. The policies of a development agriculture must be such as to minimize the risks and to maximize production.

4. *Towards a new planning system*

4.1 Endogenous development and basic needs

The failure of the free-trade of development has led the Third World to move progressively towards an alternative strategy and to add economic independence to their political independence.(5) The new model is based on the following premises:

- a modification of relations with the international division of labour and a reorientation of production towards the satisfaction of basic needs and the elimination of poverty;
- a systematic diversification of agricultural production, to move away from the mono-cultures adapted to the international market;
- the creation, of a complete economic system based on the first priority of a fundamental transformation of the agricultural sector;
- a choice of technologies appropriate to internal economic structures;
- the taking into account of the environment, and of the lifestyles of individual and society; and
- a systematic intervention of the state, not only as a co-ordinating agent but to counteract any inequitable situation.

This must be a collective strategy. The policy of free-trade in all the various phases of the evolution of imperialism has effectively benefited the dominant privileged classes who form alliances with the monopolies.

It is essential to find to control investment, to control commercial relations with the exterior and to provide some control of prices which may become a means of distribution of resources. The new theory must deal with the social and economic realities of underdevelopment.

The policies of economic growth, where they have succeeded in increasing productivity, have always been accompanied by increasing inequalities, the destruction of physical and human environments and the consumption of goods by a minority, leaving the basic needs of others unsatisfied. The result of economic growth has not been an easing of famine or misery.

The standard measures of economic performance do not take into account the fact that the goods are consumed by a privileged minority. The basic needs approach is then an alternative to a policy of growth which lacks any precise definition of intended results, and which has had such deep social consequences.

Within an economic theory the concept of basic needs may provide three advantages: (6)

- it allows the establishment of an order of priorities;
- it allows for a planning system to overcome tendencies towards compartmentalization; and
- it makes possible the establishment of a precise programme of future development.

4.2 Applied planning

Planning does not exist for its own sake. It is used to resolve precisely determined socio-economic problems and for this reason, it is important to consider the human and social aspects of planification. It is necessary to ask explicitly who plans and for whom ? (7)

The elaboration of a new strategy requires a planning effort which is vigorously organized as to its methodological base, its elaboration and its execution. The strategy must be linked to a coherent political framework.

Forms of organization must be found which can guarantee a democratic formulation in order to work in the general interest. Democracy requires the active participation of producers in decision-making and implementation. The organization must be such that there is not only a responsibility towards the higher authorities but also towards the base, towards the masses. The form of organization is all the more important in that is should prevent the creation of bureaucratic class in a socialized sector, a bureaucratic class which may take the surplus for itself. However, it is also important to include a wider vision and to take account of the general interest in making fundamental decisions. In practice, there is always a contradiction between the interest of a specific, limited group and those of the total society. The central organization must then act at times as arbitrator in order to protect the overall balance of interests.

4.3 Indicators

The new strategy of development suggested implies a new form of planning including a re-definition of indicators. After all indicators are always a measure of the economic policy which they serve, quantifying the goals and the performance.

An endogenous and autonomous plan must then specify: (1) socio-economic indicators which quantify the objectives, (2) the instruments needed to quantify the progress made in the achievement of those objectives, and (3) the means of collection and analysis of the information.

It must be recognized that the professionals in the Sahel have already established methodologies which rely on traditional indicators of development which may be partially or totally irrelevant to the new objectives. Some changes must be made. It must be considered just what is to be measured and which indicators will be the most functional.

Amongst those indicators must be some which relate to basic needs, to food supplies in relation to the demographic evolution, to the health of all with a system accessible to all without any discrimination, to an education system available to all social classes and conforming to both culture and technical competence, and to the provision of adequate and appropriate housing.

In particular for the question of nutrition, research must determine for whom, how and what to produce, must provide a model of consumption with considerations of maximum and minimum levels of consumption and must establish the potential of the agricultural system, the investments required.

5. *Conclusion*

Our analysis has shown that the politics of economic growth: (1) rely on methodological theories based on a set of uncertain hypothesis, (2) have led to mechanisms which create structural distortions which form obstacles to the improvement of the standard of living of masses, (3) leave to planning a limited regulatory role so that the plan becomes a simple catalogue of projects, and (4) lead to the development of tools and indicators which cannot be used to measure the level of development, the quality of life or the well-being of the population.

Such policies have proved incapable of organizing an unstable environment or of solving the problems of famine and misery which characterize the Sahel. Thus an alternative pattern of development must be found, to provide for an endogenous development which will be at the service of human needs. For this two actions are required: the improvement of the analysis in order to better define what must be known and what must be done, and a re-evaluation of the instruments of quantification and decision-making in order to adapt to the new strategy.

Within this perspective, Unesco has a role to play in the research and reflections on interdisciplinary methods, on planning for endogenous development and on a re-evaluation of the planning process in countries in unstable environments and in the midst of a process of structural change.

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The case of Tanzania

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1. *Introduction*

Human life is characterized by the struggle against nature for man's basic needs: food, shelter and clothing. These achievements have never been uniform to all mankind. Some have gone beyond the level of bare or minimum attainment while others (the majority in fact) are either at the base-line or beneath it. Pauperization and polarization are household terms and no great effort is required to understand them. Most of the Third World countries belong to the latter category. It is not intended here to make an analysis of these diametrically differing world conditions. Suffice it to point out that while the developed world is characterized by affluence and can thus comfortably afford expensive ventures in space and even an arms race, the Third World finds it difficult even to feed itself. It is thus neither accidental nor coincidental that these countries have voiced concern whenever the opportunity arises in such international forums as the United Nations Committee on the Common Fund for Commodities, the North-South Dialogue as proposed by the Brandt Commission and many such others.

The ability of man to master the surroundings depends much on the way in which he perceives the environment, the devices, and tools he possesses to harness it and the methods he uses.

Mastery over the environment is also dependent upon the extent to which certain magnitudes are known, or can be known. We can, for instance, control floods more effectively if we are able to know the pressure or strength of a current or the resistance of the ecological base and other such factors.

The world we live in is also divided as far as knowledge is concerned. Some know the exact day, hour, minute and second of the occurrence of a given phenomenon like the eclipse of the sun; or the hour, minute and second at which a space shuttle launched from the earth will join up with another space craft orbiting in space launched several days and even months ago. Some do not even know and cannot find ways of knowing their own body temperature. Science and technology in this case are still at a crude level. While some can say precisely how many tons of corn they wish to produce and produce them, others lack precision. The consequences for the latter is a world of uncertainties, where each decision made is like a leap in the dark--because of the difficulty of predicting its outcome.

Precision in the realm of human knowledge was previously the exclusive copyright of the natural sciences--physics, chemistry and the like. In the social sciences--economics, history, sociology etc. precision was less necessary. Thus for instance, while a natural scientist would say the weight of a table is ten kgs., a social 'Scientist' would simply say that the table is heavy. Such a subjective qualification creates a number of problems as far as understanding and action are concerned.

Developments in science and technology, especially after the Second World War, led to a wide application of scientific knowledge. Specification, precision and measurement, spilt over from the natural sciences to areas dealing with human relations between individuals and things--the social sciences. It became fashionable not only to explain that supply exceeded demand, but also to specify the magnitudes: for example not only do we plan to increase the life span but to

increase it by ten years; or that we want the economy (GDP) to grow at an annual rate of two per cent and the like.

Studies by Alain Cotta(1) and by others indicate that especially after the Second World War the social sciences adopted 'measurements' in many fields like economics (econometrics), sociology (sociometrics), social-psychology, etc. Quantification in social sciences and particularly in the context of its practical application has been a focus of heated debate in socialist countries where state planning and physical management of the national economy have replaced the 'invisible hand' in the allocation and utilization of the economic resources.

Contrary to the views expressed by Mises(2) and later Robbins,(3) Lange(4) and Lerner(5) have shown that, the social ownership of the means of production and state planning does not impede rational calculation in the socialist economy. In the case of the developing countries which are in the process of building socialism (like Tanzania), Hayek's(6) contention that it is not the possibility of planning as such which ought to be questioned but the possibility of successful planning might appear to be the more relevant issue. Viewed in this way, the issue of quantification is not only limited by the capacity of the computer which replaces the market as Lange has advanced but also by the absence of such a computer or the technical capability to man it.

This chapter will attempt first to give an account of the problems associated with data insufficiency as it affects planning and decision-making in Tanzania. Second, it will highlight the problems and scope of quantification in economics in the context of its practical application to the national planning process in Tanzania.

2. *The problem*

State planning and management of the national economy in Tanzania is carried out on the basis of three different time horizons: the Annual Plan, the Five-Year Plans and the Long-Term (15-20 year) Plan. Annual planning has been established in Tanzania since independence (1961). Tanzania has also implemented three (3) Five-Year Plans. The planned periods for the First, Second and Third Five-Year Plans were: 1964/1965-1968/1969, 1969/1970-1973/1974 and 1976/1977-1980/1981. The country is now on its Fourth Five-Year Plan (1981/1982-1985/1986). The First Long-Term Plan lasted from 1961 to 1981 and the second one will go up to the year 2000. Besides the Annual Plan other short-term economic management tools include: the Quarterly Budget, the Foreign Exchange Budget, the Annual Finance and Credit Plan and the annual Price Reviews by the National Price Commission and the Economic Committee of the Cabinet.

Despite such an elaborate set of economic management mechanisms, there are certain structural and institutional factors that inhibit the generation of meaningful and consistent planning parameters in Tanzania. We will here look at two problems: (a) Data insufficiency as a constraint on planning and decision-making in Tanzania. This section provides background information of the data situation in the country; (b) the lack or insufficient use of mathematical quantitative techniques in the planning process. This will be the major theme of discussion.

3. *Data insufficiency as it affects planning and decision-making in Tanzania*

Planning in Tanzania is difficult. This is true in ministries, parastatals and even in private enterprises. Most of the planning process is carried out by relying heavily on inadequate and inaccurate data. On the other hand decisions are made without taking due cognizance of even the poor data available. The combination of the two breeds misnomers in planning and plan-implementation.

A few examples will show the undesirable effects of planning and decision-making without the use of adequate data. Though schools and hospitals are built, they unfortunately lack the necessary personnel and facilities. Industries lack the necessary infrastructure and thus are running at undercapacity throughout the year. The cashewnut processing factories, dairy and textile industries are cases in point. In addition, the distribution of goods is haphazard. Excess goods pile up in one place while the same commodity is in great demand in other areas. The transport system, which is in bad shape, is partly responsible for this.

Despite the outcry of managerial inefficiency, lack of foreign exchange, qualified personnel, raw materials and discipline on the part of the workers, it is more true to say that, these problems are magnified because of planning without realistic facts and figures.

It is possible that some of the decision-makers and planners have the relevant qualifications, but do not use reliable facts and figures. The situation is worsened by the unsatisfactory nature of the current data system in the country.

In the following paragraphs the problems of data as they affect planning and decision-making are discussed by using the following examples:

- National level: Population data.
- Sectoral level: Agricultural and transport data.

3.1 Population data

Information on population is considered useful in Tanzania's planning process. The important data in this case relate to population size, population growth rate, death rate, birth rate, population distribution and the data on migration.

Most of the data is made available through surveys, government records and censuses. Four censuses have so far been carried out in Tanzania. The first was in 1948, the second in 1957, the third in 1967 and the fourth in 1978.(7) A demographic survey was carried out in 1973.(8) As a result of the censuses and the surveys, the country has almost all the important data it needs. The problem which arises is whether the data provided the socio-economic characteristics of the population at the required time. The 1978 census records were, even after three years,still being processed.

Obvious problems as regards population data in Tanzania are those which are related to births and deaths. These data are inadequate for planning purposes because they refer to a few selected towns in Tanzania and omit the question of internal migration. The problem of internal migration raises serious questions if there is to be proper planning and decision-making.

Data on population is important for estimating the demand for goods and social services. Closely related with the population size is the data on age distribution which is important for estimating the total labour force in the country and the total number of school-age children.

3.2 Agricultural sector data

This sector is the backbone of the country's economy. It is the source of food for the nation and raw materials for the industries. About 80 per cent of the foreign exchange earnings are generated from this sector and it contributes about 40 per cent of the GDP.

Data deficiency in this sector greatly affects the planning and decision-making processes. This deficiency is noticeable in the following areas:

(i) total arable land;
(ii) total farm holdings, their size and ownership, etc.;
(iii) total livestock population, its distribution, type, etc.;
(iv) area cultivated and planted;

(v) total harvest;
(vi) yield per hectare;
(vii) total production per year and per crop such as: maize, rice, wheat, sorghum and millet, coffee, cotton, sisal, cashewnuts, etc.;
(viii) production costs, producer prices and market prices for each crop.

Planners and decision-makers have, to a great extent, to rely on the 1971-1972 agricultural census. The absence of up-to-date data on the above-mentioned variables makes it difficult for planners to compare the growing rural population and the amount of arable land available, as well as to suggest new areas of cultivation.

As a result of irregular agricultural censuses, planners and decision-makers have to rely on annual reports from parastatals and sample surveys. However, the reports and surveys cover only a small section of the country, so that the problem of sectoral data still remains unsolved.

On the other hand the absence of such valuable data makes it impossible, for example, for producers of agricultural inputs such as, improved seeds, fertilizers, pesticides to plan the production and distribution of such inputs. In addition, lack of information on production costs means that the annual price review exercise relies for the most part on guesswork. More recently the Marketing Development Bureau (MDB) of the Ministry of Agriculture has been attempting to review crop prices on the basis of a few case-studies it undertakes.

In general, it can be concluded, that the collection of agricultural data in Tanzania is unsatisfactory. Although the Ministry of Agriculture, crop parastatals, Central Statistical Bureau and other institutions are carrying out the exercise of data collection, some of the data collected is of very little help in the planning exercise or decision-making. This is due to lack of proper co-ordination between institutions which are involved in data collection.

It is true that, data collection is a tedious exercise. However, in order to implement meaningful agricultural plans and decisions, integrated, comparable and reliable data are a necessary prerequisite. This is more so in a country like Tanzania, which depends wholly on the agricultural sector.

3.3 The transport sector

Transport is an important sector in socio-economic development, especially for a relatively large country like Tanzania. The importance of this sector is closely related to the agricultural sector, because it has to ferry, farm and/or industrial produce to the final destination--the consumers. Failure to carry the 'goods' to the consumers makes the whole production process meaningless.

Although the importance of the transport sector is theoretically known, still the farmer in Tanzania is not sure that he can get the produce to the market. As a consequence, certain farmers limit themselves to producing food for household consumption rather than producing for the market. At this juncture, transport data becomes crucial. For the purpose of agricultural transportation and industrial location, the following data is necessary:

(a) length and type of roads/rail;
(b) total number and type of aerodromes;
(c) total weight and type of freight loaded and unloaded in different stations in the country by type of transport;
(d) the carrying capacity of the vehicles and roads;
(e) total number of transport vehicles.

This information though available in various administrative records, needs to be compiled and analyzed; an exercise which is not regularly done.

We have so far attempted to discuss briefly the problem of data, as it affects planning and decision-making in Tanzania. Though the discussion has centred on population, agriculture and transport sectors, this does not mean

underrating the importance of data in other areas of the economy such as employment statistics--prices, industries, trade, expenditure and revenue, health, education, income and earnings, GDP, construction, consumption and nutrition statistics. Technical and methodological problems relating to data collection and availability will be discussed under the section on limitations.

4. *The lack/insufficient use of mathematical techniques in the planning process*

We fully recognize the fact that given the complication and interdependence of economic problems in modern production and distribution processes the use of quantitative tools is necessary to ensure consistency in plan formulation. However, it is also of prime importance for the effectiveness and applicability of a particular mathematical model to understand the initial premises (assumptions) used in its construction. Thus it is not merely the question of using mathematical quantitative techniques but also the question of whether the underlying socio-economic characteristics conform to the underlying premises of the model. To import any of these devices and employ them blindly would render the planning process less meaningful.

4.1 *Quantification at the macro and sectoral levels*

4.1.1 *Scope*

Quantification at the macro-level of planning in Tanzania is still in a crude form, employing simple methods of growth projections. Although two input-output tables have been drawn up since independence (one for 1961 and one for 1970) and despite current efforts being directed at constructing a third one, according to Dev-Plan officials, these tables have not been incorporated into planning.

Variable quantification methods at very low levels of sophistication have been applied in the drawing up of the four different Five-Year Development Plans in Tanzania. During the First Five-Year Plan, the targets were compared to estimates of the projected capacity of the economy. The overriding criteria was the testing of sectoral production against domestic and demand conditions. This method however created inconsistencies, and target evaluation was largely determined by demand pull conditions resting heavily on the assumptions of increasing access to the East African Common Market.(1)

During the Second, Third and Fourth Five-Year Plans sectoral targets were drawn up based on projections from historical data. For example livestock needs are known to grow at an annual rate of 15 per cent. Hence this percentage is used whenever computations involving livestock arise. Growth coefficients or percentage changes of certain variables are also historically derived based on 'good years' which may not be very typical of the Tanzanian experience over the years. Manpower and employment levels are also derived from past trend of the relationship between the rate of increase of employment to output. Annual sectoral manpower needs are then derived by multiplying the elasticity coefficients against the projected growth rate of output.(2)

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(1) Stein, H. (1981). 'Planning and Crisis in Tanzania', Dar es Salaam, (mimeo), p. 14.

(2) Thus employment in a given year (E_t) can be derived from:

$$E_t = E_o \sum_{t=0}^{T} (er)^t$$

where:
- E_t = employment in a given year (t)
- E_o = employment level in the initial year of the Plan
- e = historical elasticity coefficient
- T = final year of the Plan
- r = planned growth rate of output.

The problem with this methodology is that it assumes that good years will always prevail throughout the Plan period. This has been proved wrong in the case of agricultural crops where a series of droughts and floods (1973-1974, 1979, 1981) substantially disrupted the agricultural output. Nor does this method take into consideration effects of technological progress and productivity differentials.

The methodology used at the sectoral level is almost similar to that used at the national level. In fact the sectoral aggregates and the sectoral target growth rates are determined at the macro-level. Once the overall GDP growth rate is determined, the sectoral estimates of investments needed to sustain the overall GDP growth rates are calculated next. Subsectoral growth projections are normally based on historical trends.

However, in the case of the industrial sector, recent subsectoral projections were not based on historical trends. This is because according to the long-term industrial plan (1975-1995) a structural shift is to be made in favour of the capital goods subsector; this subsector is expected to grow faster than the historical record while the consumer goods subsector is expected to decline.

Consequently the manufacturing industry was the most intensively studied sector during the preparation of the Third Five-Year Plan and the subsequent Long-Term Industrial Plan (1975-1995). Data collection, analysis and alternative strategy formulation occupied five man-years of the planners' efforts. As Roemer notes, "the planning effort for one sector was perhaps more intensive than is typical for a country in Tanzania's circumstances and the range of choice is correspondingly wider than is typical." (1)

Even then the planners found their efforts circumscribed as data were spotty and often did not exist for key sectors and in many cases the margins of error were too wide to permit safe comparison between industries.(2) Despite this intensive survey of the manufacturing industry, no complicated quantification technique was used. To measure the capital constraint a relatively simple model of the Harrod Domar type was used. To establish estimates for other variables planners used historical performance. Monetary income assumed a historical growth rate of 6.6 per cent, national savings was envisaged to continue growing at 23 per cent while aid was projected to continue flowing in at a rate of 3 per cent of monetary GDP.(3)

The above exercise indicates to some extent the difficulties involved in using quantitative techniques as tools for planning purposes in an underdeveloped economy. It was not spotty data alone that made the exercise difficult to operationalize but also criteria for selecting appropriate weights to match different plan objectives and the devising of appropriate proxies for some of the non-quantifiable objectives.

4.1.2 Limitations

4.1.2.1 Limited manpower capability

Besides the cost considerations (in terms of collecting and processing information or data) even the small extent to which quantitative techniques are employed is plagued by a number of problems. Prominent among these according to the officials of the Ministry of Planning is the problem of understaffing.(4) Although there are

(1) M. Roemer *et al*. 'The Range of Strategic Choice in Tanzania Industry', Conference Paper at the University of Toronto, on Development in Tanzania since 1967, 22-24 April 1976, p. 2.
(2) *Ibid*.
(3) M. Roemer *et al*. op. cit., p. 4.
(4) It was disclosed during the discussion with Dev-Plan officials that less than half of the technical posts in the Dev-Plan were actually filled.

only two broad divisions--Macro and Sectoral planning divisions--various subdivisions have been created such as Budgeting, Programming and Control, National Economic Policy and International Economic Co-operation.

Given the weak national economic strength, data collection and processing which could easily be done by modern methods with computers have to be done by the staff, using simple tools such as calculators, adding machines, etc. The low level of staffing and the absence of computerized programmes limit the extent to which quantitative tools can be used, given the 'heavy load work pressure'. Thus planning tends to employ simpler methods so as to meet certain 'deadlines' for submitting the plans to higher bodies like the Economic Committee of the Cabinet (ECC).

Moreover, it is not merely the problem of understaffing which frustrates the employment of quantitative techniques but also the level of training. There are few (of the already few employees) who can handle more sophisticated quantitative devices in the planning exercise. As one official noted, it would involve the one knowledgeable person available to do 'almost the entire work by himself' if a greater number of quantitative techniques is to be applied. Thus it appears more rational to employ techniques which are manageable by the majority such as growth rates, averages, and simple ratios.

4.1.2.2 Weak statistical base

A second problem of almost equal magnitude is that of a weak statistical base.

First there is the Statistics Ordinance of October 1961. Under this law it is the Central Bureau of Statistics (CBS) which has the responsibility of collecting and disseminating data. However, the law neither prohibits other organizations/institutions from collecting data nor does it give CBS power to control the activities of data collection which are carried out by other institutions or individuals.

The result of this situation is the production of data, which are neither comparable nor technically reliable.

Related to the above problem is the question of the untimely reporting of the data. This is mostly caused by the non-response in the case of postal questionnaires. In the event of a full response, questionnaires total thousands, so that processing requires a computer. Since the computer used is that of the Treasury, which is usually busy processing salaries, National Provident Fund (NPF), pensions, income tax, water bills, etc., it becomes increasingly difficult to get computer time for data processing. The situation is worsened by frequent breakdowns since the computer is almost obsolete. After having struggled to process the data, the printing of the data is also a problem. Because of these problems, the data available is never up to date; so that its immediate use for planning purposes by using mathematical tools becomes difficult. Indeed, the Ministry of Planning relies much on the questionnaire form for soliciting information from respondents like ministries, industries (especially for the Central Statistical Bureau) etc. Respondents' replies are often disappointingly poor in terms of data quality. Many columns of the questionnaire forms are left blank. Given the insufficient number of staff to follow up the data, gaps have to be filled in by guesswork if the time schedules of the planning processes are to be observed. These gaps inhibit the use of quantitative techniques, and of more complex models.

Related to the problem of data gaps is the problem of accessibility of data. Some data are not available even to the Ministry of Planning itself for various reasons which may include state security, fear of taxation of personal capital gains and the like. For instance, when the Ministry of Planning was amalgamated with the Ministry of Finance, the CBS and Income Tax Department used questionnaire

forms which carried the same letter heads, that is 'Ministry of Finance and Planning'. Although the information solicited from the respondents was different, most them could not tell the difference. Since most of the respondents would like to avoid being heavily taxed, they tended to understate their incomes and overstate their expenditures. Although their situation does not inhibit the use of quantitative techniques, it obviously renders the planning process difficult and less meaningful.

Furthermore, Tanzania, like many other developing countries, depends much on agriculture. Agricultural production especially in countries which depend almost entirely on the 'mercy of nature' is prone to vagaries of weather such as droughts and floods.

Closely connected with this problem is that of data reliability. This problem is best explained by the following example. Data on crops are usually received from Regional Offices, which estimate regional production on the basis of regional purchases from farmers. However, the farmer does not sell all the crops, since part of it is used for household consumption. This part is difficult to estimate, though CBS attempts to make adjustments on the basis of the household budget surveys. In many cases these adjustments lack a proper basis.

In addition the First Five-Year Plan and the first long-term plan (1965-1980) were calculated on the basis of a 2.2 per cent annual population growth rate. However, the actual 1967 census reveals the growth rate to be 2.7 per cent. Calculation of GDP figures are also suspect because of the existence of a large subsistence sector which has been growing at a rate of about 9.9 per cent per annum for the period 1976 to 1979. As a result of all these problems, inconsistencies and data gaps, even the available statistics are likely to give a misleading picture of the nature and volume of the country's development. Also these uncertainties and lack of data reliability weaken the employment of quantitative tools in planning in that their quantification is difficult. Macro-planning in Tanzania is also eroded by these problems.

Another problem which needs to be mentioned here is that of lack of direct communication between CBS and the data users at either sectoral or production levels. This is necessary, in order to promote effective utilization of the data and to avoid collecting data which is not for immediate consumption. If modern planning techniques are to be employed then this problem has to be given due consideration.

As regards data inadequacy, it is true that there are certain areas of the economy where data is not easily available. Such areas are: internal trade, internal migration, and construction activities. Even that data which is available has several gaps. For example the GDP data does not show the National Wealth Account and the Flow of Funds Account, while data on industries do not show commodity production and the index of industrial production.

The last Business Profit Survey was carried out in 1967. Even the 1976 Household Budget Survey is yet to be processed leaving the 1969 Budget Survey as the most recent operational one. The Annual Survey of Industries takes four to five years to process and one cannot rely on the annually published Economic Survey because this document does not give output figures save for export crops. It is obvious then that quantification based on such scanty data is likely to be faulty. Moreover the Central Statistical Bureau has neither the resources nor the mechanisms to monitor and clarify such discrepancies in the data. Some of these problems reflect the lack of systematic accounts, delayed audits at the firm level and an absolute lack of internal consistency.

This problem of data timeliness is aggravated by the fact that data gathered from different sources and statistics are neither comparable nor sufficiently comprehensive. This is due to different methodologies adopted during data compilation.

The problem of non-comparability of data usually occurs, when two different

institutions, such as the Ministry of Agriculture and CBS present data on crops. Although a certain margin of error (± 5 per cent) could be tolerated, the margin is sometimes too wide.

Another example concerns industrial output figures derived from the National Accounts Statistics. These statistics are quite different from those of the Annual Survey of Industrial Production. Sometimes one may get different figures for the same variable supplied by different departments (say marketing, accounts and production) of the same establishment.

One is also struck by the absence of up-to-date data. The most recent data on immigration in Tanzania is that of 1970. The employment situation is determined by the 1974 data; industrial development studies heavily depend on the 1978 survey; and the most recent statistical abstract is that of 1973.

Other data which are problematic are those related to employment. These are data which are collected annually. The problem which arises is that the data which is available is that of registered establishments only. Employees in the informal sector are not counted. This lack of data is an obstacle to the use of modern planning techniques. The use of scientific samples instead of postal inquiries may improve the existing data situation.

4.3 Quantification at the micro-level

The Annual Finance and Credit Plan forms the principal link between the micro-financial exercise represented by the project-by-project breakdown of the Annual Investment Plan and the macro-economic considerations of price stability and permissible liquidity growth. Thus 'consistency' in Tanzania's short-term planning is more a matter of financial consistency and less one of material balances.(11)

Quantification at the micro-level has been used extensively in Tanzania. In fact even before the Treasury approves local funds a feasibility study is required from an impartial body such as the Tanzania Industrial Studies and Consulting Organization (TISCO).

However, a number of conceptual problems arise from the application of quantitative techniques at the micro-level in Tanzania. One is that the criteria used for public project selection has not been consistent with government stated plan objectives. For instance whereas government objectives stress the use of low-cost, labour-intensive technology, in the 1974 decision to expand the textile industry the two most expensive, most capital intensive textile mills were selected.(12)

Coulson(13) points out other cases of inconsistencies in project selection. He questions for instance the economic viability of the SIDA sponsored Silo project in the early 1970s. He also points out that the SIDA financed automated bread factory (SIHA) is inconsistent with government objectives. Besides its being relatively capital and import intensive, there existed alternative smaller bread factory units which are less foreign exchange intensive. The Tanga Fertilizer Factory is another sad case. Coulson(13) notes that the project appraisal for the factory did not make any allowance for uncertainties in the price of the raw materials. Neither possible changes in the demand for fertilizers nor the alternative costs of different sites were taken into account when the project was appraised.

Thus even at the micro-level poor appraisal methods and a lack of consistency with the nationally set objectives have made the use of quantitative techniques as planning aids less effective. This problem might possibly be explained by the lack of experienced project analysts at the firm level. However the fact that such projects are approved by the Treasury indicates on the other hand the general malfunctioning of the investment planning and the budgetary process in Tanzania.

There is lack of an effective control over project selection in the country. For instance the Treasury is always reluctant to turn down an offer of foreign aid for a particular project even if the proposed project is of low strategic priority or has a low prospective rate of return, possibly for fear of offending the foreign donor.

4.4 Planning at the regional level

The regional planning methodology pursued during the First Five-Year Plan (1964-1969) was essentially that of disaggregating of the Plan to the regional level. The sectoral investment targets were set at the national level on the basis of sectoral gross incremental capital output coefficients. Then, as Karmiloff writes:(14)

> 'As a first approximation to the minimum contribution to the national target increase in GDP of the various regions during the Plan period it is proposed to set them at the same sectoral growth rates as for the nation as a whole... The regional gross product estimates for recent years are extrapolated forward by applying to the regional sectoral aggregates the target growth rates taken from the national plan... Estimates of investments needed to sustain this target expansion of regional output are calculated next... Gross incremental capital output ratios for each sector of activity explicitly or implicitly stated in the national plan are applied to the target increase in regional sectoral output that have previously been calculated to give annual levels of investment that regions can aim at'.

But as this author admits such 'levels of sectoral investment calculated in this manner must necessarily be viewed as orders of magnitude since they in no way reflect actual regional productive relations or their particular factor endowments'.(14) Being crude approximations they could only provide a basis for discussion for the planners. A similar methodology was also used in 1975 to draw regional food crop production guidelines for the period 1975-1980. These were drawn up on the basis of centrally determined growth rates so as to achieve national self-sufficiency in food by 1980. The target of each region had to be proportional to its share of production in the single base (1975) year. However Belshaw (1977) notes, 'The base-year estimates of production were even less reliable than usual (a large part of the estimates relates to the unmeasured subsistence sector) because of the black market for food grains over much of Tanzania in the final half of the year reduced the reliability of the official estimates of the marketed surplus'.(15)

Furthermore the empirical validity of such targets is questionable because they do not reflect actual regional productive relations.

The regional planning methodology adopted during the Second Five-Year Plan 1968/1969-1973/1974 and Third Five-Year Plan (1976/1977-1980/1981) was that of decentralization. By decentralization it was meant the devolution of decision-making power from the centre (ministerial levels) to lower (regional) levels in the political and administrative hierarchy. Among the salient factors of decentralization was the creation of regional planning machinery to prepare Annual Regional Plans on a two-year rolling plan basis and finally the formulation of regional plans for the Third Five-Year Plan. This exercise was to be done under the direct guidance of the Prime Minister's Office as the direct links with the respective ministries were severed.

Despite its emphasis on strengthening regional planning capabilities, decentralization has so far failed to do so and in fact this failure may have reduced the scope for the use of quantitative techniques in planning. The failure of decentralization may be attributed to various factors. One conceptual problem has been the lack of guidance on the procedure to be followed for integrating the sectoral plans into a multi-sectoral regional plan and for spatially

differentiated development strategies adjusted to local conditions.(15) So regional planners are faced with the problem of how to translate sectoral targets into their specific regional targets. This procedure is still at the moment arbitrary and ad hoc.

The second factor which has diluted the impact of decentralization has been the continued sectoral dominance of the centre (ministries) which has meant less funds flowing into the regional development budgets. Ideally, under decentralization it is stipulated that 40 per cent of the national development funds be spent on the regions. This proportion was 7 per cent then 14 per cent and 10 per cent for the period 1972-1973, 1975-1976, 1976-1980 respectively. This might have reduced the regions' flexibility in terms of manpower development, plan formulation and implementation. Third, elegant and elaborate quantification at the regional level has been particularly frustrated by data and manpower constraints. Professional skills for carrying out regional research inventories, evaluating regional sectoral performance, identifying choice of technique for resource inventories, assisting in land classification systems and establishing priorities in terms of specific investments are in scarce supply. As a result central planners and information relating to regional differences in environmental potential, resource availability and potential and alternative land use systems. Manpower shortages have also resulted in the absence of very limited area/village, baseline surveys and impact studies. Almost no villages in Tanzania have sufficient trained manpower who can institute self recording systems of economic performance and strengthen the planning capability at the basic planning (village) unit. The result of this is that planners at the regional level fail to relate village needs to the higher level regional needs.

Conceptual data problems also arise when trying to estimate the magnitude of the subsistence sector and other unregistered informal activities. Closely related to this is the problem of accounting for the black market deals. This is particularly critical in the agricultural sector where black market sales tend to siphon off crops from the national marketing channels. This makes it difficult to tell whether the difference between estimated production of output and marketed output is domestically consumed or sold in the black market. Illicit commodity trading is very significant in Tanzania and survives for the following reasons:

(i) the relatively low levels of official producer prices prevailing amidst commodity deficit markets nationally;
(ii) the failure of the state marketing institutions to provide efficient transport services and prompt payments to the peasants; and
(iii) the over-valued domestic currency which has accentuated the volume of illegal trade with the neighbouring countries.

As a result the subsistence sector has been overestimated and household incomes tend to be underestimated by the planners. Thus even rudimentary quantification using simple methods such as incremental capital output ratios, average growth rates, etc., suffer significantly from measurement errors and conceptual problems at the regional level.

5. *Potential application of quantitative techniques*

5.1 *Input-output analysis*

Despite the unreliability of the statistical data base used in planning in Tanzania, more use could be made of slightly more advanced quantitative planning techniques adjusted to local conditions. Introduction and wider experimentation with a tool such as input-output analysis would, in the light of Delange's assertion, play an important role in the improvement of the statistical data since it is by itself a means for achieving consistency.(16) Indeed it could also

clearly reveal some of the major statistical shortcomings which need to be eliminated.

The history of input-output goes back to the 1920s. The earliest national accounts describing inter-industry relationships were compiled by the USSR Central Statistical Administration in the 1920s. It was however, Professor W. Leontief in the United States of America who developed and popularized the input-output technique.(17)

Conventionally, input-output analysis begins with a vector of planned final demands and then projects the gross outputs including intermediate output levels required to sustain these final demands. A check is then made to see whether there are sufficient resources to produce the gross output levels required. To do this, a number of aggregate resource limitations (e.g. for labour, capital and other inputs such as foreign exchange) are identified.

Thus although the crucial step in input-output analysis is the delineation of the final demand targets for each sector to be achieved by the end of the plan period, the technique also provides the planners with a powerful tool to test whether the target levels are consistent with resource availabilities.

Initially the application of this technique (particularly in the United States), was in the field of managerial planning. It is now widely used in the national planning activities of many nations particularly in the planned economies.

One potential use of input-output technique in Tanzania remains in the planning of the industrial sector. The general consensus in the country is that any rational socialist oriented strategy should ensure the provision of basic needs (health, food, education and shelter) as well as restructuring the economy towards self reliance. Such industries have been named as 'basic industries' in the Tanzanian literature. An essential feature of the basic industries is the capability to generate substantial inter-industry linkages both forward and backward. Input-output techniques could then be useful in identifying the vector of key industries with strong linkage effects.

This aspect has been stressed by C. Thomas who argues that, 'An examination of the input/output matrices of industrialized countries would show that the raw materials content of the products are skewed in favour of a narrow range of basic materials. Two basic materials alone, iron and steel and textiles, form the backbone of modern industrial consumption. If to these are added paper, plastics, rubber, glass, leather, cement, wood, fuel and industrial chemicals, then we can account for the overwhelming bulk of basic materials used in industrial consumption. The bulk of the value added in industry is derived from this range of industries. As a result it is these industries which constitute the empirically verifiable range of strategic linkages and form the cornerstone of an industrialization programme'.(18)

Thus by either using a statistical Rasmussen(19) measure suggested by Chenery and Watanabe(20) the relative performance of a particular sector in generating linkages could be gauged.

Secondly input-output analysis could be used as Kim has shown to assess 'the existing structural characteristics of the Tanzanian economy in relation to her basic industrial strategy'.(21) In particular to assess whether this 'strategy conflicts with the more immediate policy objectives to increase national output, income and employment or to minimize the negative impact on foreign trade balance'.(21)

In the third place, the input-output technique could be used to supplement other sectoral projections based on good years. However, the direct application of the input-output model is likely to be limited (particularly in a country like Tanzania with excess capacity, underemployment and an unreliable sketchy data base). One limitation of input-output technique is that it is valuable only if growth is based on the expansion of domestic demand for manufactured products and

not prominently on exports of primary commodities or import substitution of relatively simple industries(22) as is the case in Tanzania.

A number of other operational limitations of input-output have been noted in the literature. One such limitation relates to the assumed strict proportionality between inputs and outputs. The set of direct (technical) input coefficients are in particular assumed to be stable. In this respect input-output technique may fail to capture the impact of technological progress on the economy. This may be a severe limitation in an economy such as Tanzania which is experiencing drastic structural changes in the sectoral composition of output.

Another problem of input-output analysis is the failure to take into consideration other alternative efficient production techniques. The assumption of fixed factor proportions rules out any other possible factor combination in a given technology. Input-output technique proceeds as if there were only one technology available for each sector. Thus input-output analysis does not address itself to the problem of the choice of technique.

Yet the question of the choice of appropriate technique is one of the central issues that Tanzanian planners must address themselves to. This is because the import substitution industrialization which was pursued as an engine for growth between 1961-1975 favoured technologies that are both import and capital intensive. Thus the use of input-output analysis would tend to perpetuate the use of capital intensive technologies. It is highly questionable whether such techniques with high capital-labour ratios are appropriate in the labour abundant economy of Tanzania.

The perpetuation of such capital intensive technologies would have serious undesirable structural consequences for the economy of Tanzania. As observed by White(23) and Rweyemamu(24) the growth of capital intensive production worsens the already critical employment problem (hence narrowing a mass-based domestic market) and intensifies the inequalities which exist between those employed in this sector and those working in the marginalized sector. These unduly capital intensive processes not only stifle the development of capital formation among the existing labour force but may also foster the development of a small industrial elite.

Although input-output analysis would, at the end of the exercise, provide planners with a set of aggregate projections that are mutually consistent and feasible, it fails to indicate ways and means of achieving these targets. Input-output analysis therefore, provides targets but does not offer guidance or directives to ministers and production managers with regard to investment, production and pricing decisions. To be of some practical relevance these aggregate projections, however feasible they are, would have to be linked with day-to-day decision-making.(25)

Furthermore, the use of the input-output technique is likely to be restricted to national planning. This is because the goods relate to output of final demand of the various productive sectors of the economy. Thus the usefulness of input-output analysis is effectively restricted by the nature of the aggregated sectoral data which the planners have managed to put together in the form of input-output table.(26) This technique is therefore not useful for micro-level planning.

The usefulness of input-output tables also depends on the degree of reliability of the data. For example, Rasul's comparison between output predictions based on a twelve sector input-output table for Pakistan and actual output, found that in a quarter of the sectors the percentage discrepancy was greater than 40 per cent and in another quarter the discrepancy was between 20 and 40 per cent.(27) With such sketchy data the input-output table could be of little use to the planners.

Commenting on the 1954 input-output table for Tanzania (then Tanganyika) Peacock *et al.*(28) observed that 'one has only to make a cursory glance at the structure of the industry to see that wages and profits almost entirely account

for the costs. On the output side, export industries usually figure prominently in these countries and they obviously sell to one sector which is outside the production sector'. Thus the usefulness of the (14 x 14) 1954 table was severely limited; for besides the above problem only 11.7 per cent of the cells were filled in and the overall interdependence ratio was insignificant at 0.055.(29) Both the (17 x 17) 1961 and (45 x 45) 1969 input-output tables for Tanzania suffered from erroneous aggregation: for example, rubber, petroleum and chemicals were combined as one category.

Some studies on input-output in Tanzania point out other weaknesses besides erroneous aggregation and lack of sectoral interdependence. These weaknesses include the arbitrary distribution of inputs and poor coverage. Furthermore the input-output tables did not provide for self consumption and the data they were based on seem to be highly unreliable.(24)

One can also be skeptical about the precision of using an input-output table drawn up in terms of values as the case is in Tanzania. Such values are affected by the arbitrary prices and gross margins in the markets in which goods are sold. An input-output table in physical units would be more useful but is difficult to construct given the Tanzanian conditions.

Finally it is important to point out that the usefulness of the input-output technique will depend on the nature, composition and interests of the planning agency which designs and uses this technique and the society in which it is to be used. In the case of Tanzania the planning agency consists of a small group of technocrats. Ideally this group is supposed to reflect the views of the government. In practice however, this group may have its own interests which may diverge from those of the people. One cannot therefore assume homogeneity in the interests of both groups.

It is important, therefore, to ensure that the planning agency draws up plans in the interest of the mass of productive workers. In particular, it should not assume that the physical, human and capital resources are available and given. Rather, the planning agency should devise resource mobilization procedures and enforcement mechanisms if the planned targets are to be realistic. In the socio-political setting of Tanzania and despite the limitations mentioned above the input-output technique could still act as a guide to decision-making. This, in our opinion, can only be true if technological considerations are merged with socio-political considerations: that is involving the people in plan formulation.

The present planning mechanism in Tanzania seems to have recognized the above difficulties. Both the First Five-Year Plan (1964-1969) and the Second Five-Year Plan (1969-1974) were largely prepared by foreign experts with minimal political input either from the people or their leaders. Ever since the Third Five-Year Plan (1976-1981) mass participation and political considerations have become an important input in plan formulation.

Indeed as Malima argues 'the regional programmes were actually drawn up at the village, district and regional levels before being submitted to the Centre for inclusion in the Plan. Thus not only have various party organs, at the national level and below, been involved in considering the Third Five-Year Plan but the people's representatives through the Planning Commission, village, district and regional committees, have also had the opportunity to take part in plan formulation and preparation'.(30)

Thus the above problems do not invalidate the use of input-output techniques in Tanzania. Rather, they suggest a more refined approach in the construction of the input-output table. The method would thus be useful in the identification of the basic industries and would help the planners to direct their attention to the interrelationships of the different sectors particularly in terms of direct and indirect input requirements for a given output.

5.2 Linear programming

Linear programming is the most popular branch of mathematical programming. Linear programming was developed by George B. Dantzig in 1934 initially as a technique for planning military operations.(31) The technique had earlier been developing independently in the Soviet Union. It was however L.V. Kantorovich who developed it and popularized it in Soviet literature.(32)

The linear programming technique essentially involves the maximization of a linear function subject to a set of linear constraints. The solution to a linear programming problem yields the best (optimum) output of the alternative input combinations given the resources available. One can also derive (from the dual of the problem) a measure of the opportunity cost of different combinations of outputs and inputs.

The first large-scale application of linear programming was in the United States particularly in the fields of production and transport. In the Union of Soviet Socialist Republics it was also applied in production scheduling but more extensively in investment planning. Linear programming is now widely applied to solve well-defined economic planning problems.

Since the main thrust of planning literature prescribes 'that goals (the objective function) be identified, quantified and weighted; constraints be measured; activities be identified, and then the objective function and constraints be used to select activities that form the strategy or plan',(33) linear programming could become a policy aid to planners in the 'optimum' allocation of scarce resources, given a number of feasible alternatives.

In a country like Tanzania, where underemployment and excess capacity is rampant, linear programming could ideally be useful as a planning tool because the constraints do not require that they all be fulfilled exactly. Rather, excess capacity or unutilized inputs can exist.(34)

Another added advantage of linear programming in a country like Tanzania characterized with market imperfections is that the dual of the primal problem could generate the optimum value (shadow price) of the resources. Unlike market prices (which are distorted), shadow prices are said to reflect objectively real opportunity costs of the resources, because they incorporate external factors. Shadow prices are therefore seen as the ideal valuations of resources as far as efficiency computations and investment selection are concerned.

Furthermore, mathematical programming can be used at all levels of the planning process: macro, sectoral or micro. It could provide useful algorythms for the efficient allocation and utilization of certain tasks particularly in the field of transportation, distribution and production. It is also a tool that could be useful as a criterion for allocating investments to various sectors or in the selection of projects and processes.

However, the construction of optimal prices and an optimal plan in Tanzania by using mathematical programming is practically impossible at the moment. It is important to note here, that the preoccupation of some socialist economists (such as Nemchinov, Kantorovick and Novozhilov)(35) with issues of optimization and marginalism arose at a time when these socialist economies were already transformed, industrialized and their output had become highly differentiated.(36) These developments were also helped by breakthroughs in computer technology.

In Tanzania, the present preoccupation is that of structural transformation and structural adjustment. It is not therefore rational to concentrate energies on programming techniques that are essentially aimed at short-term problems. Moreover, 'even at the theoretical level, such optimality can only be achieved... if the economic system is already transformed and that efficiency of given resource use is taken to be the dominant form of expanding material output. Clearly, such a situation is completely unrelated to the prevailing context of underdevelopment in the country'.(37)

Yet as in the case of input-output analysis, when planners have gone through the whole exercise of programming, they will still have no clear idea of how to obtain the optimum. If programming is done on the national level what planners will have at their disposal is a series of aggregated sectoral projections--constituting a plan but without projects. Neither the ministers responsible nor the production managers have any clear indication how exactly these projections are to be used.

Potentially however, mathematical programming has an important role to play in the future economy of Tanzania. There are factors that favour its wider application in the future. First is the government policy of decentralization and independence among regions and parastatal enterprises. As output become more and more differentiated and with parastatal enterprises mushrooming, decision-making tends to become complex thereby requiring optimization and rationalization techniques for its handling. Secondly with the present government emphasis on science and technical-oriented subjects and wider experimentation in computer services the problem of technical and manpower capability in handling multitudes of equations will be resolved.

Even then, programming techniques will find more room at a micro-level where improved data collection techniques are likely to be more easily established than at a macro-level, where aggregation problems will still have to be overcome.

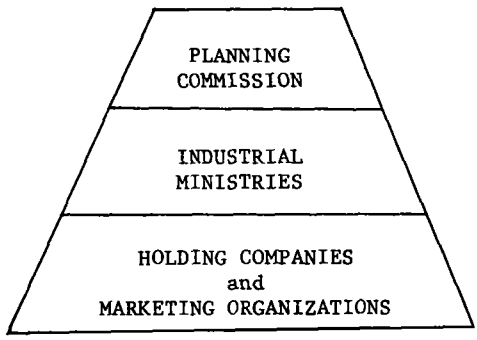
5.3 Material balancing

The method of material balancing is commonly used in almost all centrally planned economies. It is a major component of planning and an important tool of decision-making in socialist countries.(38)

Material balancing is a technique which attempts to put the existing material resources (the sources' side) and the actual utilization of these resources (the users' side) in equilibrium. In other words, the method tries to ensure that plans for each commodity are consistent.

This technique demands in the first place the classification of all the spheres of production (sources) and the kind of products produced for the users. In addition it involves the drawing up of balance sheets for particular commodities representing the economy's existing resources and potential output on the one hand and the economy's demands for each product on the other.(39) Indeed material balancing in socialist countries involves a heavy bureaucratic and administrative operation.

The following is a simplified structure of the administrative flow of information and data in planning by material balancing.(40)



At the level of Holding Companies, a wide spectrum of balance-sheets is considered. This level of balancing prepares 'product range' and individual product balance sheets.(41) At the level of ministries only a few balances are

treated. They are identified as product groups and indicate a high degree of aggregation. The Planning Commission balances and decides on a very few, but highly aggregated, product groups which are of the utmost economic significance to the nation. This is a simplified description. In practice, the administrative network is much more complex. It is the administrative machinery which decides on: output orders, what is to be imported and exported and by how much, the change of inventory and allocation of materials to various consuming groups or sectors, etc.

Until recently not much was known about this method which tries to balance the supply and demand for commodities and inputs needed for production. In most socialist economies, material balances are drawn for the short-term plan as well as for long-term plans commonly known as 'perspective plans'. However, short-term balances appear to be much more feasible and operational than long-term balances. This is because long-term balances are subject to unforeseen changes. As a consequence of this, they are only valid as estimates. Despite this criteria, socialist economies consider long-term balances important, because they indicate the possible track along which the socialized sector can travel. However, this function can only be fulfilled in strong and well organized socialist economic systems. In an economy like that of Tanzania, where troublesome obstacles always emerge in the economy, such long-term balances may not be plausible. At the same time, errors in forecasting may cause certain industries in the economy to cut down output below their productive capacity or even to collapse.

In practice, material balances are arranged as input-output in physical quantities.(42) The only basic difference between material balances and an input-output table is that the balances are expressed in physical units, such as tons of steel. The technical coefficients which are important in socialist economic planning usually indicate that to produce a given quantity of a particular article one needs a certain quantity of inputs, for example tons of coke per ton of pig iron. However the level of technology in production decides the quantity of input required per unit of output. Technical coefficients of material balances are in a way different from the coefficients in a Leontief matrix, because the Leontief matrix provides a synthetic and lucid picture of all processes which are directed to production and distribution. In addition, the coefficients indicate the costs of inputs required in producing a unit (shilling) worth of output.(43)

The ultimate purpose of using material balancing in planning and decision-making is to end up with an adjusted supply and demand of each commodity produced and utilized in the economy. This enables planners to match the sum total of allocations which are earmarked for different consumption groups with the total supply generated from all sources planned for the year.(44)

Soviet planners are of the opinion that a plan can only be internally consistent through traditional bureaucratic methods. All in all, material balancing is a method which entails complex approximations to attain consistency. It is definitely a cumbersome and time-consuming method which at times has to work with an insufficient number of variants in order to draft long-term balances.

Since 1982 the Tanzanian Ministry of Economic Affairs and Development Planning has been trying to prepare some groundwork so that material balances can be part of the Tanzanian planning and decision-making process. Though the idea might appear good, there are probable obstacles which might impede the successful use of material balances in Tanzania. For instance, if material balancing is to follow the same bureaucratic procedure as in the socialist countries, it is likely that, with the present administrative structure and discipline, a smooth flow of information to the higher authorities might prove difficult. This would in turn constrain timely decisions on what is to be produced by each individual producer. In addition the frequent errors and failures made in the process of fulfilling annual and Five-Year Plans would invalidate the whole system of material balancing. This failure is more likely in an economy which is just preparing the

basis for a socialist society and is still largely influenced by the private sector. This statement can be supported by the following observations.

In 1980, total public sector contribution to Gross Domestic Product (GDP) was only 21.5 per cent. In 1979, the contribution of public industrial sector to total industrial production was about 25 per cent. In 1978 only 47.3 per cent of the industrial sector employment was employed by the public sector.(45) The contribution of the public sector in the total agricultural production is equally insignificant. The following percentages for a few selected crops show this:(46)

Crop		Public Sector
Maize	(1976-1977)	1.0
Paddy	(1976-1977)	8.0
Wheat	(1976-1977)	30.0
Sorghum and Millet	(1976-1977)	0.4
Coffee	(1982)	10.0
Tea	1982	40.0
Sisal	1982	60.0

Yet this is the sector which dominates the entire national economy. Despite the fact that the private sector utilizes national resources in its operations, its production activities are neither controlled nor incorporated into the national plans.

On the other hand, the availability and reliability of basic data in Tanzania is a problem. This means that requests to both private and public industries for usable information (input-coefficients) about production for the ministries, and further to the Planning Ministry, might not be fully answered. In addition, in the process of balancing other unforeseen shortcomings may upset production and consumption. This is more so in Tanzania where peasant agriculture contributes more than 90 per cent of the total agricultural production and whose foreign trade is at the mercy of the world market. In such a situation where internal consistency is fragile, production and consumption may easily be destabilized. At the same time, if commodity markets collapse unexpectedly, the whole method of material balances becomes deficient. The final outcome of such a deficiency is a complete upset in the structure of the balances.

Despite the expected problems in using material balances in planning in Tanzania, this method might induce planners to catalogue technological norms for the existing industries. Some kind of standardization, especially in industrial production, needs to be worked out if the method is to operate efficiently. Standardization in material balances is necessary because production activities differ from one industrial plant to another. Also, some plants use newer technology than others and some plants use different raw materials from others. Some plants are integrated and others are not. These categories will have to be made known to planners, but it will take some time. However, standardization is important in order to minimize unnecessary constraints which might develop out of the heterogeneity of plants and products. On the other hand, the introduction of material balancing at the plant level will enable planners to obtain more reliable and exact data more quickly. This would, to some extent, minimize some of the present weaknesses in the planning process and policy decision-making.

This section has only attempted to discuss very briefly some aspects of material balancing. We have not attempted to relate material balance sheets to some composite balance sheets of financial flows which are used in socialist planning to balance the aggregate supply and demand of the necessary consumer goods.

5.4 *Regression analysis*

Conventionally regression analysis is a statistical method used in measuring the degree of association between two or more variables. When such relationships pertaining to economic variables can be quantified and specified mathematically, the activity is known as econometrics.(47)

Multiple equation regression models could be useful in deriving estimates of certain macro-economic parameters(48) and have been used in providing short-term forecasts. However the efficiency of regression analysis as a guide to policy-makers has been questioned particularly in those countries such as the Netherlands, Pakistan, Argentina and Liberia where it has been used as an aid to planning.(49) Regression analysis can only be meaningfully applied if data abound and the interval in question is relatively short. Since both medium- and long-term planning in Tanzania seeks to restructure the economy (i.e. to change its parameters) while regression analysis assumes stability in the system, the two seem to be incompatible. Furthermore, by failing to incorporate constraints, regression analysis cannot help Tanzanian planners in identifying some of the teething bottlenecks facing the country.

Regression analysis could however be used at the micro-level to analyze the impact of certain economic, social or cultural variables on other variables. It could for instance test whether the decline in say cotton production in a given area is due to the insufficient application of fertilizers or not. Such micro-oriented problems have a bearing on the overall macro-planning policies. For instance, if fertilizers significantly affect cotton yield, the government might decide to subsidize fertilizer prices so as to encourage a maximum application of fertilizers by the peasants.

One of the advantages of regression analysis is that it can even handle variables that are not easy to quantify. Regression analysis, by creating dummies or proxies, can capture the influence of such qualitative variables as differences between times of war or peace, male versus female, ownership, location and other such variables.

Regression analysis could also be used to provide short-term forecasts. However the accuracy of such forecasts has always been poor because of unforeseen events, omission of relevant variables or inclusion of an irrelevant variable. Such forecasts however could supplement the rule of thumb forecasts based on 'good' years.

5.5 *Project evaluation*

The technique of project evaluation is normally used to check the feasibility and economic viability of an investment project. Conventionally, in the market economies, the goal guiding the dominant (private) group of entrepreneurs is that of profit maximization. The rationale of this goal has become increasingly questioned, particularly when related to the socio-economic conditions of the developing countries.

Theoretically the goal of private profit maximization can only be pursued in perfect competitive conditions where marginal rates of transformation in the production of commodities are equated with their marginal rate of substitution in consumption while for all industries the marginal rate of substitution between factors are also equalized.

In other words in a perfect competitive market a project analyst assumes market prices of goods and factors of production to be equal to their marginal social cost and their marginal values. Observed reality however reveals that developing countries are characterized by market imperfections. Such imperfections arise because of such factors as the existence of monopoly and oligopolistic structures, trade protectionism, price controls, external factors, factor market

distortions and all forms of government intervention. In cases of market distortions, commodity and factor market prices are said not to reflect their real (social) costs and values to the society.

In order to cope with some of the distortions and also to incorporate some objectives other than private profit maximization, cost benefit analysis has been developed. Cost benefit analysis is said to be more realistic in such situations because it normally utilizes shadow prices instead of the distorted market prices.

The literature on cost benefit analysis has become very extensive. In the context of the developing countries initial emphasis was placed on distortions arising particularly from labour, capital and foreign exchange. Such were the pioneering works of A. Kahn,(50) H.B. Chenery,(51) Galenson and L. Leibenstein(52) and O. Eckstein.(53)

As a second development of cost benefit analysis some authors developed programming models whose solution could generate shadow prices. These shadow prices could then be used in the investment analysis instead of the distorted market prices. These shadow prices, however, are essentially for the resources rather than for the commodities. These programming problems therefore do not solve completely the problem of distorted market prices. Among the notable contributors in the field of programming are such authors as: M. Bruno,(54) Clark and L. Taylor(55) and A.S. Manne.(56)

In another development, project evaluation methods take into consideration both elements of efficiency and other socio-political considerations. The central theme underlying the important works of Little and J.A. Mirlees(57) and the UNIDO Guideline(58) is that of income redistribution.

In the context of planning in the developing countries the general prescription that is advanced in relation to this technique is that a meaningful investment planning in such countries should therefore consist of ranking a number of individual projects in accordance with their benefit cost ratios. Then, projects should be undertaken in the descending order until savings are exhausted.(59) Aggregation of the selected projects constitutes the 'optimal' investment plan. Thus the whole planning exercise is almost reduced to a priority listing of projects and the need for macro-economic exercises virtually disappears.(60)

As noted earlier, this is almost how the annual investment plan for Tanzania is drawn. This procedure, however, breeds serious flaws in the planning process. Since the selected projects need to be financed, the planning exercise is constrained and governed by the amount of investment funds at the disposal of the state. The dominance of foreign funds in the overall investment tends to dilute, in a sense, the rationale of the planning exercise. In most cases foreign funds tend to be 'closely geared to particular projects, which are in turn dependent on the provision of local counterpart funds. The net effect, therefore, is that projects which have been prepared locally merely constitute a shopping list for aid and the choosing of the project--i.e., the actual detailed composition of the plan itself--is largely influenced by aid donors.(61)

Besides this specific problem related to the Tanzanian planning environment and other technical flaws,(62) there are other general weaknesses inherent in the technique of project appraisal.

One such limitation is that being essentially a micro-economic, partial and marginalist approach, project evaluation fails to capture the interdependent nature of projects. Thus the failure to incorporate external and complementary factors implies that costs and benefits cannot be measured accurately and projects capable of generating substantial structural changes in output cannot be handled with such tools. One will have to resort to a more general equilibrium analysis for solutions. Project appraisal therefore is not ideal in selecting projects within the basic industries in Tanzania. Basic industries are characterized by strong sectoral interlinkages and complementarity. Moreover, the objective

function is not just profit maximization but maximization of a set of goals like structural change, growth, employment, equitable distribution of income, more equal regional development and greater participation of workers in the management of their firms. Furthermore, some of these goals cannot be measured easily and hence their benefits and costs cannot be correctly quantified. There is also the problem of attaching precise weights to the different objectives.

Project appraisal however can be useful in providing very specific operational and useful information at the microplanning level. Since the technique analyzes projects at the micro-level, it can be seen as being in line with decentralized decision-making policies. This technique is in principle capable of soliciting the relevant information about the project from those who are familiar with the local conditions where the project is to be implemented and those who will have to implement the project. Thus project appraisal appears to overcome one of the problems mentioned in relation to both input-output and linear programming techniques: that is, it avoids the situation where planners come up with a series of feasible targets but with no clear idea of how to attain them.

However while linear programming is capable of generating an optimum plan without projects, project appraisal is capable of generating a series of feasible projects but without the optimum. This aspect raises the question of using a combination of different planning techniques as a package.

The possibility, for instance, of using linear programming and project appraisal has always been discussed in the planning literature.(63) Linear programming may first be used by central planners to generate an approximation of an aggregate optimum plan. Through the dual valuations, shadow prices for the scarce resources could then be derived. These prices could be used by planners at the project level and by using project appraisal a series of feasible projects could then be drawn up. This information is then fed to the central planners who could then use it to refine their initial estimate of the optimum.

The operational difficulties surrounding this type of planning methodology is that if the planning horizon exceeds one year the optimization process has to be dynamic. The iterative procedure also demands sufficiently disaggregate data if it is to be successfully operational (i.e. to yield meaningful shadow prices). The first difficulty makes the procedure computationally cumbersome while the second makes it unnecessarily costly. Given the existing conditions in Tanzania such a methodology is out of question. In practical terms however these problems imply that although the iterative procedure is computationally cumbersome there is a need to realize the fact that information from the application of one technique can be used to further refine the application of another technique. Another implication is that pragmatic planning should not rely on the use of planning techniques alone. Planning, therefore, should be preceded by a clearly defined development strategy.

6. *Conclusion*

Our conclusion is that even where quantitative methods could be meaningfully applied, they should be regarded as guiding tools for policy formulators--they are not so to speak a substitute for planning. Planning techniques should be encouraged on the ground that they play a secondary role in decisions regarding the allocation of scarce resources. This is particularly true in the country like Tanzania where all forms of economic backwardness still persist.

Thus, any attempt to use quantitative planning techniques to override other socio-political criteria in the planning process is likely to result in inconsistencies. Planning techniques on their own may be capable of generating projects or plans that are technically efficient and economically viable. Yet such plans or projects may not meet the criteria for <u>social</u> acceptability and hence may

be very difficult to implement. To be operational a plan should not only capture the economic and technical aspects within the economy but should also reflect the social and cultural needs of the users. Such cultural, social and religious taboos and values should therefore be incorporated as an integral part of the planning process.

The importance of incorporating social or even political objectives in planning models is of immediate concern for a developing country like Tanzania. This is so, because the economic and technical criteria used in most of the planning techniques assume, for instance, tastes as given. Yet such tastes may simply reflect the preferences of a small group of bureaucrats or an elite. A progressive government may therefore wish to restructure the consumption pattern of its society in such a way that it reflects the consumption needs of the people. In this case, luxury projects that are technically efficient and economically viable under the quantitative models of planning may be socially undesirable.

The latter point is closely related to the whole idea of meeting basic needs. The Basic Industry Strategy (BIS) adopted in Tanzania was formulated in exactly this light. The BIS recognizes the fact that although efficiency does matter in investment planning at the early stages of development it should not be the overriding criteria of project selection. The BIS therefore gives priority to structural change. It is only when such changes have brought about ample social reforms that quantitative techniques can be used with emphasis on the efficiency criterion.

It is our strong contention therefore, that quantitative planning techniques should play a tertiary role in the planning process. This however presupposes that the planning agency has a well conceived development strategy guiding it. Such a strategy in turn calls for an articulation of a specific ideology to guide the planners. Only when the planning agency is guided by a specific ideology and only when it has a well conceived development strategy can the planning techniques take a back seat to politics.

In the Tanzanian context not any type of ideology or politics will do. The government has already articulated a socialist ideology and a development strategy that will ensure the attainment of socialism and self-reliance. In principle, this strategy also emphasizes that the politics will be controlled directly by the productive workers and peasants. This is why any planning model to be used should ideally reflect the politically determined needs of the workers and peasants.

We should however realize the fact that planning is basically a means of imposing discipline on resource allocation and utilization. In this context we still see that various quantitative planning techniques either singly or in combination have a role to play in the planning process. They may help planners in identifying appropriate techniques which can be used to generate both direct and indirect inputs to be used in production of the basic (mass) goods. Once a political decision has been made on the nature of the products to be produced, planning techniques can help planners to identify the logical production and distribution system for providing such goods or services at the least cost to the people. Government parastatal organizations such as the transport firms and other firms involved in the distribution of essential commodities can, for instance, use linear programming to identify the most economical routes in reaching the different rural villages. Equally it may be useful, once the planners have identified the basic industries, to use relevant planning techniques to identify appropriate production techniques that maximize goals already laid down in the plan.

But all in all the role of planning techniques must only act as background input to the political discussion and never a substitute for it. It may be expected as development proceeds that a wider application of such techniques could take place as they become widely understood not only by planners, elite and administrators, but also by the majority of the masses, and particularly by the working class.

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The case of Peru

Bruno Podesta

1. *Introduction*

It is almost impossible to know, in depth, all social problems and processes because of the complexity of their nature. For this reason, social scientists have, from the beginning tried to rationalize social phenomena into the most widely accepted concepts and indicators. Thus, during recent years, an ever-increasing and intensive effort has been made to develop instruments of measurement to help understand these phenomena.

The social sciences, as a scientific activity, face a special situation: the proximity between the subject and the object of study sets specific limitation to the achievement of the objectives, which should characterize all scientific work. They have been justly called 'soft sciences' to underline the supposedly relatively precarious findings. However, the social sciences have developed considerably over recent decades and, according to the social, economic and cultural differences which have become increasingly evident, in both developed and developing countries, there has been an ever increasing need for their contribution. Moreover, the various approaches have come closer to the real problems.

One of the most important efforts made in this regard is that of evaluating some of the wider aspects of social phenomena through quantification.

This report aims to examine critically, in the Peruvian context, the system of quantitative concepts and techniques used in the planning and decision-making process; to identify the needs for new quantitative methods for better planning and decision-making and suggest approaches for new methods; and lastly to indicate, besides the cost problem, the factors which have prevented or inhibited the development of such quantitative approaches.

Two general conditions are necessary for the study of the problem:

(a) the existence of a socio-political and institutional framework for promoting and using these concepts as criteria for policy-making; and

(b) the existence of a minimum infrastructure of human and material resources for the proper definition, collection, processing and analysis of quantitative data.

This is important because one way of proving that quantification is exact, assuming that there are no technical errors during the whole elaboration process, is just to see whether it is a useful determining element for making correct decisions. For this reason, we begin this study with a summary review of the development of the social sciences in Peru, in order to examine afterwards the relation between such development and the requirements of the state. It must be remembered that the state has been, and continues to be, the principal employer of social scientists, especially sociologists and economists.

Later, we shall analyze the most important indicators in the processes of policy-making, examining the conceptual framework and technical quantification actually in use. We shall follow the outlines utilized by planning and statistical organisms themselves; that is to say, first of all, economic indicators and secondly social ones. Among the economic indicators, after the Gross National Product, we shall look at the quantified information produced by sectors, since this is where part of the problem lies.

The possibilities and limits of quantification as an aid to policy-making depend, in each country, on the characteristics of the state, the importance given to planning and to the real demand of the state for this type of quantified information.

The information used as a basis for this study, was accumulated in the author's professional work and complemented by the written sources available on this subject. In Peru the author carried out a series of interviews with fifteen officials from various government offices who are responsible for tasks directly related to the subject-matter of this study.

2. *Social sciences, quantification and policy-making*

2.1 *The development of the social sciences and their contribution to policy-making*

Although the concept of social sciences(2) covers a wide number of subjects with a common object of study objective, we shall refer here more specifically to sociology and economics.

Alain Cotta(1) analyzes the contributions of sociology, economics and social psychology to the field of quantified evaluation of indicators. However, if we wish to take this proposal as a starting-point we must make it clear that the development of social psychology has been very limited in Peru and that the few results from psychology are related rather to the field of industrial psychology.

Taking into account the specific characteristics of Peruvian society, other social subjects such as, for example, anthropology, may have made an important contribution to the quantitative knowledge on some social problems. However, the task of the anthropologists, especially concerning indigenous populations, which are numerous in Peru, has developed on the basis of a methodology which only obliquely includes quantitative evaluation.

Anthropology has joined other social sciences in a common concern to approach the real, concrete problems that development has to tackle in Peruvian society: unequal and unfair distribution of wealth, acute lack of housing and health care, glaring inequalities in general education, etc. However, Peruvian anthropologists have continued to maintain a social-anthropological and cultural-anthropological approach.

Political science which might also offer some help in this field of quantitative evaluation, has not developed appreciably in Peru. There is certainly no university training in this field and there are very few professionals working in this speciality.

Sociology and economics are then the social sciences that have contributed most to the quantification of some indicators.

Of these two, it is economics that has made and continues to make the widest reaching contribution, due mainly to two reasons:

(a) the development of economics itself as a science at the international level; and

(b) the features that have characterized the development of sociology in Peru.

Although it is true that a university career in economics has only been possible during the last twenty years in Peru, from the beginning professionals have been trained in the handling of concepts and techniques of quantification and in statistical understanding of problems. Leaving aside for the moment the distortion which frequently confused quantification and objecivity, this type of professional training imparted by the universities, as well as by the Central Bank of Peru (which for more than two decades has organized courses during the summers) has given a certain tone to the handling and technical understanding of those national problems to which economists usually pay attention. If we review, for example, the

academic theses of economists and sociologists, the contrast between them in this sense, is clear.

Sociology has had a somewhat varied development(3).

In the early 1960s university courses were introduced in this subject under the influence of the so-called American sociological functionalism. This school emphasized the collection of information through sampling surveys and took into account the necessary methodological and statistical aspects. Thus, the training received by professionals in the field of sociology in those first years prepared them for an understanding (albeit somewhat repetitive at that time) of the quantification of social indicators.

Changes occurred throughout the Third World at the beginning of the 1960s and some of the experiences of this period in Latin America, and in Peru in particular, have not ceased to have repercussions on the Peruvian universities, especially in the field of the social sciences. These courses--economics and sociology--which were designed to work together on development tasks, were troubled in university classrooms and in intellectual and professional debate by these changes and problems dictated by the reality of the times. In the field of sociology there was a strong reaction against sociological functionalism (especially the methodology) and historical-social studies began to predominate leaving aside the more specific or sectoral problems, and hoping thus to give emphasis to the deeper roots of the problems of Peruvian society.

This 'historical-social tendency' influenced economics, although to a lesser degree. Among the students and researchers in the field of economics there was also a tendency to abandon analyses of figures and problems in favour of hypothethical new plans, theoretically solid but closer to the historical-social view further from the work tradition which was a part of the economics practised previously.

This process leading to a predominant historical-social view (very heavily politically motivated) was detrimental to the theoretical and technical development of the quantification of social problems.

From 1968 onwards the Peruvian Government introduced a series of important changes which broke radically with the past. The government increased its influence on the economy and on the social life of the country, at the same time implementing a series of changes which were aimed at overcoming some of the most urgent social, economic and cultural problems.

With the expansion of the state interest there arose a need for professionals trained in the social sciences to contribute to the tasks of implementing the reforms. In those years this occupational demand on the part of the government resulted in a notable increase in the number of students and graduates in sociology. There appeared to be an impressive number of professionals trained in the field of sociology, but whose training in reality had been historically socially oriented so that they lacked the training necessary to be able to contribute effectively to the quantified evaluation of social indicators.

This bridge which was established for the first time between the social sciences and government machinery, had enormous repercussions at the level of ideological and political debate, but, on a much lower level affected the more specifically technical fields.

In contrast with past eras, planning became of central importance in the handling of national problems. In this context, the efforts made to achieve the most objective idea possible of the social problems which had to be corrected stand out. Nevertheless, due to the very features of the development of the social sciences which we have pointed out above, the planning and the planners did not receive from the Peruvian sociologists the contribution of a more technical nature that they needed for fluid and proper policy-making.

The economy, although developing along the more scientific and technical lines, did not escape this historical-social tendency.

From 1975 onwards the plans and political and ideological debates gave way to

the economic crisis which began to show alarming figures. At that time, the Peruvian Government began to dismantle some of its dependencies which, in previous years, had required the massive presence of sociologists; in exchange they now called urgently for an increased number of economists to understand, analyze and solve the problems which, domestically and abroad, had been raised by the economic crisis.

From this moment on there coincide a series of factors of the greatest importance. In the first place it was decided to fight the economic crisis with a neoliberal type planning. This presupposed an ever-lessening importance in planning for the government as well as for society in general. In the second place, and running parallel, the new economic policy (in contrast to that which had predominated between 1968 and 1975) planned a slow reduction of government involvement in the social and even more the economic life of the country.

After a period during which the government required a contribution from the social sciences in order to carry out its planning tasks and to achieve policy-making based on adequate knowledge of the social problems, planning has now come to be less important (especially since 1980). The result is that the whole problem of the relevancy of quantitative evaluation for policy-making has also dropped to a lower level. In mid-1980, a National Plan should have been drawn up to order the actions and activities of the government over the short, medium and long term. To date there is still no National Plan.

Meanwhile, it is clear that during the last two decades technical charts have been drawn up and an appreciable amount of experience has been accumulated concerning quantification in the social sciences. This has come basically from inside the agencies participating in policy-making and, to a lesser degree, from the universities. But before the state could mature and consolidate its planning machinery (and thus its need for proper definition, collection, processing and analysis of quantitative data) planning, as such, had ceased in real terms, to be of importance.

2.2 Quantification and infrastructure

Two decades ago, in the middle of full 'developmentism' the National Planning Institute was created as an expression of the need which had made itself felt in the preceding years. Based on the French system, it did not in the beginning have a major role to play. It was only in 1968 that the National Planning Institute had a central role, since it constituted one of the main bodies of policy-making. Sectoral offices were created in all the ministries and regions of the country, with a view to establishing a nationally integrated system.

However, from 1975 onwards the importance of the National Planning Institute began to diminish and by 1980 it was merely a formality.

In mid-1975 the National Statistical System was created, based on the pre-existing National Statistics and Census Office (ONEC). The creation of this system was an attempt to ensure that official statistics developed in an integrated, co-ordinated way, using a common standard.

The National Statistical System is fundamental to any policy-making process in which planning and the presence of the government are of importance. It is made up of the following offices:

- the National Statistical Institute (INE in Spanish);
- the Statistical Sectoral Offices and the Statistical Offices in the Ministries;
- the Statistical Offices in Public Bodies;
- the Statistical Offices of Local Governments.

It is necessary to underline one of the principal aims of this complex and ambitious structure, pronounced when it was created: 'to ensure the production and broadcasting of trustworthy and up-to-date statistics'. As indicated in this

Decree, it was thus hoped to contribute to a better knowledge of national reality, to integrate development planning and to achieve proper decision-making.

On the other hand, it was hoped to achieve integration and rationalization of official statistical activities in order to make the best use of resources, and to avoid duplication and waste of effort. It was hoped, finally, to promote the people's interest in statistical activities and thus to obtain their participation and collaboration.

Unfortunately, due to a series of reasons which will not be mentioned here, this main objective has not yet been achieved. And while the present policy-making plan continues in force, we see no reason to suppose that the concepts and techniques of quantification will be constantly revised and improved, due partly to unchanged demand.

Although the planning and statistical bodies have developed in the way that we have briefly touched upon, there is no centralized information, which means that a constant evaluation of the national problems in the socio-economic field is unthinkable.

On the other hand, the great majority of quantifications are made on the basis of the latest available census figures since surveys which would contribute new data, are very costly. The latest available census was carried out in 1972. It is easy to see the constant technical limitations that this creates.

Another problem arising in the case of Peru, is that all primary statistical information from the regions must be sent to Lima for processing. This, added to other administrative difficulties and scanty resources, means that the processing is extremely slow and that quantification rarely serves an up-to-date purpose in policy-making in the regions which they cover.

After more than two decades of work in the field of quantification, there are now experienced technical teams, some with university training in social sciences and others trained by daily practice in their own government offices. Nevertheless, the basic limitations which have been described above determine in advance the poor success which the secondary quantifications are going to have. And this is aside from the importance that planning may or may not have, or the economic running of a society which is exposed to market laws. It simply indicates a deficient primary basis upon which to elaborate subsequent quantifications.

3. *Economic indicators*

We shall now critically examine the main economic indicators. In general terms it can be stated that quantifications are constructed according to available techniques, beginning with a framework accepted by specialized institutions as well as by specialists. The problem is rooted in the inadequacy of the initial data which is subsequently refined. We may assume that the validity of projections made on the basis of figures collected ten years ago is not very high, especially taking into account the behaviour of the economy during the last decade. However, in some cases of economic quantifications (and also social ones), national projections are drawn up on the basis of figures collected in Lima, where it is comparatively easier and cheaper to collect data.

3.1 *Gross National Product (GNP)*

The general procedure for estimating the GNP in Peru is based on the following methodology:

(a) GNP by type of expenditure at real and constant prices, and
(b) GNP by productive sectors.

The sources of basic information for the estimate of the GNP by class of economic activity are those corresponding to each specific activity, since the figure of the

GNP is obtained by a summary of sectoral products. However, from an overall point of view the quality as well as the availability of adequate sources of information for these estimates vary from sector to sector. Only a few sectors of economic activity have continuous statistics available. This is the case for agriculture, the mining industry, electricity and some subsectors of transport. For the remaining sectors there is only fragmentary information available covering some years or one year only. This is the case for commerce and construction, for example, for which there exists only data taken from the Economic Census of 1973.

The quantification limitation of the GNP consists in assuming--whatever the methodology used in the estimates--that the sectoral structure does not change over time, as long as there is no change in the basic or reference year. Indeed, estimates are made on the basis of the sectoral structures existing in 1972. For example the increase in the participation of construction in the total productive activity of 1981 was not considered in the estimates for the GNP, which continues to consider this as constant, as though it had not varied over the preceding nine years. Something similar can be said for the trade and commerce sector which has also notably increased its active participation in recent years.

On the other hand, it is increasingly difficult to quantify the handicrafts and cottage industries sector because of the widespread diversity of activities covered. It is important to remember that the small-scale, unofficial economy is very important in Peru, from the point of view of jobs, as well as of production of goods and services; however, it is impossible to draw up even rough estimates on the basis of the data available.

It is not necessary to underline the importance of adequate estimates of the GNP nor that a correct quantification of it is absolutely necessary for planning. For example, forecasts concerning the availability of the work force and domestic investment are based on estimates of the GNP.

We shall go on to examine the problem of quantification of indicators in a number of sectors which gives us an overall view of the difficulties faced by economic quantification in Peru.

An aggregate of the most important indicators has been used. Each sector, of course, has hundreds of indicators, some of regional or local importance, which it has not been possible to consider here.

3.2 Sectoral indices

3.2.1 Agrarian sector

In the agricultural sector, in spite of limited budget resources and the scarcity of personnel for collecting data and the difficulties in communication, the organization of the statistical system of the sector has produced statistical information on the types of agriculture, animal husbandry, agro-industry and merchandizing of cattle and of the principal agricultural agro-industrial products.

However, the collection and sorting of data for agrarian statistics is in general greatly limited due to the following factors:

(a) Resources assigned to statistics are not sufficient to obtain the proper information.

(b) Information is collected through informal talks with producers and merchants, with no way of checking the accuracy of the data.

(c) Statistical concern is centred principally on products grown for export, and those of the coastal areas, thus neglecting products grown for daily needs and in the mountains.

(d) In spite of the progress in recent years, systematic statistical techniques are still not applied in collecting information.

These inadequacies do not apply in the case of some products such as cotton, rice and sugar cane.

On the other hand, the programming of the sector's production requires a series of indicators, such as the necessary imported raw materials and capital goods for the sector and the policy for production prices. These indicators have not yet been developed because of technological problems and lack of financial resources.

3.2.2 Fishing sector

In the Fisheries sector, the statistics present the fishing activity according to the stages of the catch, processing and trading of fish with specific variables per species, ports, final destination, etc.

Regarding quantification there are some limitations such as the fact that not all the establishments provide the required information. For example, in 1978 out of 369 establishments 105 provided the information required. They represented 33 per cent of the total production of the sector. The activity of the remaining companies is estimated based on the information given by the others.

The estimation of the activities of the missing establishments presents difficulties since the overall field is not clearly defined. In 1979, for example, 357 small industries engaged in catching anchovy for direct human consumption were registered. The anchovy caught by these firms supplied 116 companies which produced fishmeal. On the other hand, there were also a number of independent fishermen engaged in catching fish for direct human consumption. This type of catch supplied seventy-one establishments engaged in canning, and thirty in freezing. The number of these independent fishermen and the magnitude of their activities are difficult variables to estimate satistically. Here, then, are basic difficulties which influence the validity of succeeding statistical data.

3.2.3 Forestry and hunting

The coverage of hunting, forestry and logging activities is also inadequate. For hunting activities only the information on products destined for export, which are controlled by the customs (wild animals, wines, hides and skins) is available.

In forestry the only data available refers to controlled production of wood carbon in the woods and forests and some data from the Trade Census of 1973. Data on logging covered only the volume of timber controlled by agrarian zones, and that which is sent to the sawmills.

In order to carry out a more precise survey of this sector, it is necessary to collect data such as:

(a) extraction and exploitation of natural and artificial forests, broken down according to volume, quantity, number of licences and value;
(b) extraction and exploitation of wildlife, according to number of licences, number of animals, value, total species;
(c) merchandizing of forestry and wildlife products broken down according to volume, quantity and value;
(d) lands with forestry possibilities, classified by use made of them and by geographical regions;
(e) re-forestation according to the type of replacement of extracted resources to restore the ecological balance.

There are in fact no conceptual or technical deficiencies: there is simply an insufficient base. It is clear that if the sectors furnish inadequate figures the GNP indicator will suffer as a result.

3.2.4 Industrial sector

The programming for industrial production is part of the knowledge and quantification of the productive structure.

For example, from this quantification it can be seen that the national industrialization process, given the free substitution of imports, is highly dependent on imports. For this reason, the availability of foreign exchange becomes a constraint on industrial expansion; on the other hand, the close link between industrial production and domestic demand creates a dependence on the level of the consumers' income in the domestic market.

On the other hand, industrial statistics do not cover the whole manufacturing sector, only the so-called factory strata. The handicraft strata is introduced into the calculations through the drawing up of a growth rate for this strata, based on the evaluation of the retail trade, services and some other indicators. In this respect, it would be necessary to collect information on the quantity and value of the principal handicraft products by UIIC (Uniform International Industrial Classification for economic activities) at the national, departmental and local levels.

Industrial statistics present the following important limitations:

(a) there is no proper control of establishments which are no longer registered but which are still considered as active;

(b) there is no quantification of handicraft activities which are of great importance in the generation of jobs;

(c) there is a very high degree of omission in the list of companies.

These three limitations are sufficient to indicate that the figures supplied by the sector are not representative of the whole field.

From another aspect, that of forecasting and planning, there are difficulties in estimting the behaviour of the different industrial branches. In order to forecast the behaviour of each branch it is necessary to know the expectations and programmes of the most important firms in the private sector, and this is not always possible. The greater part of the assumptions made come therefore from a consideration of global demand: imports of raw materials and intermediate products, behaviour of domestic demand and prospects for exporting manufactured products. Nor does there yet exist a detailed forecast which would permit a determination of the sector's financial requirements.

3.2.5 Construction sector

The quantification of this sector is basically determined by the levels of public and private investment.

The estimate does not give a breakdown into subsectors or groups. The only internal classification corresponds to the division between public and private construction. The absence of adequate statistical registers for this sector, as well as the difficulties of statistical observation due to the particular nature of this activity--as is the case in the construction of private housing for an individual--makes it necessary to have recourse to methods of indirect calculation. For this reason, the following indicators are used:

- consumption of cement;
- production of iron rods for construction;
- number of building permits authorized;
- housing credits authorized by mutual companies; and
- degree of execution of public investment.

These indicators give a reference framework but are not integrated functionally, that is, formalized mathematically to explain the evolution and prospects of the sector. Moreover, the complexity of the indirect methods used increases the possibility of error.

3.2.6 Transport and communications sector

The best quantification of this sector is in rail and sea transport and services related to air transport and communications.

However, the quality of the calculations is diminished due to a lack of or poor sources of basic information. Less than precise methods of calculation are used in the following activities: passenger and cargo transport by road, services related to land transport, transport by internal waterways and air transport. Here the deficiency is easily identifiable: lack of or poor basic information on which to base estimates.

3.2.7 Trade and commerce sector

The evaluation of this sector is problematical, since at present it is carried out indirectly through the behaviour of the productive sectors and the development of imports.

At present studies are being carried out on trade margins with the objective of achieving better estimates for this sector.

Existing indicators refer principally to foreign trade activity, that is to say, exports and imports. There is a total lack of basic statistics for domestic trade, although in recent years several surveys have been made of the wholesale and retail trade based on a sampling of companies. The weakness of these surveys lies in the fact that they were carried out only in Lima.

3.2.8 Mining sector

For estimates of mining activity (very important in the Peruvian economy) there is a diversity of sources so that the control and accuracy of data is very good. This, together with a certain methodology in the calculations permits us to count on an efficient quantitative source.

Moreover, the level of data breakdown for the mining sector is very high and this allows for a good overall view of the sector.

One clarification is necessary: the statements made in the preceding two paragraphs are valid for medium-sized and large mining companies. The small mines (of secondary importance at the economic level) are very difficult to cover due to their geographical dispersion, being frequently located in places difficult of access. Moreover, in many cases, their activities are developed alongside the hidden or informal economy.

3.3 Consumer Price Index

The Consumer Price Index shows fluctuations and changes suffered by prices of goods consumed and services supplied over a certain time by a well defined group of persons. For this reason this is the indicator most used to measure inflation.

The total of goods and services constitute a family 'shopping basket', for which products and services representative of the traditional consumption of the social group covered by the Index are selected.

The following criteria are used in the selection of goods and services for the family basket:

(a) that the goods play a significant part in the family budget;
(b) that the goods or services be easily obtained at their prices;
(c) that the goods or service give a true picture of total price movements for all similar goods.

One important characteristic of the family basket is that it includes consumption of different strata of the population of Metropolitan Lima, which are established according to income:

- low-income families represent 49 per cent;
- middle-income familes represent 35 per cent;
- high-income families represent 16 per cent.

To obtain information about the expenditure of these families, representative

family baskets are drawn up for each strata in order to be able to estimate a family basket representative of the whole. The family basket used to estimate the Consumer Price Index of Metropolitan Lima is therefore representative, in average terms, for the whole population of that area.

The main limitation of the level covered by this index is that it expresses only the spending level of families in Metropolitan Lima. The variations in prices in the capital are not necessarily the same as those in the cities and towns in the rest of the country. These have a completely different behaviour pattern, since there are cities in which local products play a more important part in the respective family basket while in others, such as Iquitos, for example, a large part of the articles consumed must be imported. For this reason the inflationary indices vary enormously from one city to another, and especially between Lima and the rest of Peru.

For a better idea of the inflationary level in the country it is necessary to prepare an index of average consumer prices for each of the principal cities in which these indices are drawn up. There are thirteen cities for which these estimates are being made, although we have not been able to carry out observations in the field, and in Lima there is no detailed information about the sampling utilized and the procedures followed. The hypothesis we started with, that there is a constant in the structure of family consumption, makes the accuracy of the results a relative matter, in so far as it does not recognize a possible difference between the base period with respect to the present period. Moreover, the index is only representative of the family group for which the consumption structure has been defined.

3.4 Salary index

The index of real consumption in Peru is calculated, taking into consideration the non-governmental establishments for ten or more workers in different branches of economic activity, with the exception of the agricultural and animal husbandry, mining and energy sectors. To this end annual surveys are carried out among a sampling of 2,700 establishments in Metropolitan Lima, which have provided information about 234,424 salaried workers in the private sector.

The sampling selected is probabilistic and planned with different rates of selection, one-fifth for companies of from ten to twenty-four workers, one-half for companies of from twenty-five to forty-nine workers and one from companies of more than fifty workers.

Changes over time are calculated by dividing the nominal wages and salaries by the Consumer Price Index.

From the above it can be seen that for this indicator only the larger companies whose unions have some negotiating capacity to press for better pay are considered. Thus the Salary Index does not take into consideration the wages paid in companies with less than ten workers, and which, in Peru, accounts for more than 50 per cent of the total. These wages, in the majority of cases, are rarely above the basic wage.

To obtain a better quantification of this index wider coverage is required. It would be advisable to take into account the salaries of small companies and to carry out surveys in the main cities in Peru. This is not done at present mainly because of the high cost involved.

The Salary Index and, equally, the Consumer Price Index are two economic indicators with special repercussions in the field of social policies, in so far as they are a basis for decisions in the policy-making process relating to subsidies, taxes or improvements undertaken by the government. But since these too are constructed by inadequate methods (the exclusion of the lower-income groups in the case of the Salary Index), the image which results does not correspond to the reality of the country.

4. Social indicators

In Peru and in developing countries in general, the imbalance between economic and social indicators is constantly increasing from the point of view of the information itself and the use made of it.

Numerous factors have favoured the progress of economic indicators. Economics was accepted and recognized as a science in Peru as well as in the rest of the world, before sociology; many of the theories have been structured and have matured in historically short periods and some of the concepts have been utilized in the public domain. Thus economic phenomena require attention from the politicians, and the evaluation of economic phenomena has become routine.

In Peru, a country with an enormous disparity of social conditions, social concern, as well as the search for data to document it tends to be concentrated in a small sector of the urban population which has major access to well established social services. The registering process for this group of persons is also easier from the administrative point of view, but the total result represents a serious distortion in any evaluation. Social statistics have been concentrated on the 'modern' sector and, do not therefore adequately represent social reality. The 'traditional' sector, primarily rural and agrarian, is frequently omitted from this quantification, which means that the indicators in this area cannot really inform decisions which touch all strata of the population. And this is, without a doubt, a general limitation, which remains true for all social indicators.

4.1 Education

Educational activities and services constitute an important statistical area in Peru. Apart from the fact that educational planning is considered from the point of view of social demand and human resources, it is necessary to generate a certain minimum amount of data for the whole field.

In Peru many of the series of possible indicators about the level of instruction may present serious problems due to the scanty statistical base, particularly when chronological data is required. These data often only exist and are up to date for the intervals corresponding to the frequency of census operations; and in these there is no information concerning such themes as the educational composition of the industrial work-force. Information on years of education and level of education attained is highly uncertain. These data, however, could be gradually filled out using a combination of data from sample surveys and data supplied on titles and qualifications granted by the teaching system, to complement and augment census data, concentrated especially in the 5 to 24 year age group.

On the other hand, evaluation of the decrease in the number of students or of drop-outs, which are especially numerous in the low-income levels and rural zones, is a problem which demands immediate statistical attention. As a result of this it is difficult to evaluate the effectiveness of teaching costs. Moreover, there is rarely a sufficient degree of accurate knowledge concerning the total time employed in accomplishing a particular stage of education, that is to say, the number of times a class is repeated.

In order to calculate school drop-outs, as well as years repeated, better studies must be made, derived, for example, from a system of data based on individual registers or reliable probabilistic models. The estimates obtained from these studies, combined with demographic data, would give an idea of the retention rate at selected points. It would also give an idea of the average time needed to attain a certain level of education.

Information on costs per student-year is another important statistical area that needs developing. For this the following should be established:

(a) the number of educators--full time or equivalent--who teach in different grades in order to estimate the number of students per teacher;

(b) the final expenditure at each level, in order to estimate costs per student; and

(c) the gross costs of fixed capital for education.

The 1979 Political Constitution of Peru states that 20 per cent of the National Budget should be devoted to education and in 1980 the present government called these years the 'five-year education year'. Nevertheless there are no sufficiently reliable figures to determine what progress has been made here.

On the other hand, it is increasingly evident that the education system must be adapted to the needs of the economy and to the demands of the work market, for which statistics on demand for university education and for graduates should be drawn up. Thus the content of education can be better adjusted to the needs of the productive machinery, of the market and of the country. The statistics necessary for planning actions in this field are not available. Over the last decade the National Council of Peruvian Universities, today called the National Inter-University Commission (CONAI), has collected primary information, which is not always up to date and which lacks the necessary processing. The present and future manpower needs of the economy are not known since there are no figures covering this field.

4.2 Housing

Data on housing in Peru are far from satisfactory, due to inaccuracies in calculating rents by type of housing in both the urban and rural areas, and the classification of housing according to size and construction material which is used to estimate the availability of private housing.

Data on housing is collected by housing censuses carried out in relation to the population census, which, in turn, is greatly hampered by the lack of knowledge about rural housing.

In order to obtain a true outline of the housing situation in Peru, it is necessary to collect data on investment in housing, type of housing and length of holding. Moreover, a more accurate calculation of the lack of housing, must look at the qualitative as well as the quantitative aspect (through the construction of indicators which estimate the essential services which a housing unit should supply). This requires a review of some of the conventional concepts used to determine the existing housing deficit. In this context, attention should be paid to semi-permanent and marginal housing units, since a large part of the population live in this type of unit.

On the other hand, since housing plays an important part in the overall capital system and government and home spending, it is advisable to have an estimate of the overall amount of fixed capital in housing and the sources of financing for it.

Peru is one of the Latin American countries with the greatest deficiencies in housing. Although important housing construction programmes have been started by the government, because of the distortions in information collection all the housing programmes are intended for the sectors where the data is collected. These are predominantly urban and do not cover the lower income groups. Thus, in this, as in other cases, there are figures which refer to concrete social problems but which are not representative of the overall picture so that even if we consider these figures when policy-making, they give a distorted view of the whole. We can assume that decisions taken on the basis of figures not representative of the real problems at the national level, will not furnish an adequate solution to the problems.

4.3 Health

The health sector, is, perhaps, one of the most deficient in the quantification of indicators.

The first problem is the lack of uniform procedures for collecting and processing information. No rationalization has been made of communication channels which, frequently, results in duplication of effort or insufficient use made of resources.

Existing statistics, in chronological series, refer to the death rate, number of health centres and number of health personnel. Many other items of information necessary for a complete view of the sector can only be obtained by sample surveys, which are not generally carried out due to lack of funds.

On the other hand, the information coverage of the health sector lacks 30 per cent of the information necessary at the national level. This, in turn, is due to many factors including bureaucratic inefficiency and the lack of recognition of the importance of good quantified information at the national and regional level.

Since health is one of the most important of the social indicators, it demonstrates the series of problems which in the case of Peru tend to surround the quantification of socio-economic indicators, their processing, their evaluation and their ultimate use.

4.4 Economically Active Population (EAP)

Estimates of the figures of the Economically Active Population are drawn up on the basis of data from the Population Census.

Estimates of the EAP are subject to considerable inaccuracies since they incorporate data from the Population Census of 1972. These inaccuracies arise moreover from the lack of sources of appropriate data for a reliable calculation. The sources which exist have their own deficiencies, as is the case of the Population Census; and the remaining sources, which only serve as indicators of tendencies and to verify breakdown structures, have limitations due to the sampling on which they are based.

Apart from the Population Census, the data obtained are subject to considerable biases and errors due to the lack of care taken by some of the census takers, insufficient field work, incorrectly answered questionnaires and the very few 'filter' questions contained in the census forms. The greatest errors and distortions are to be found in the EAP data on independent workers, unpaid families and number of working women. Errors increase for certain economic activities for which there is much less information and which, in turn, is very mobile between sectors; this is the case for agriculture, construction, trade, transport and principal services.

The case of agriculture is one of the most difficult where information about the economically active population is concerned. There are no statistical sources in the country which give regular and reliable figures on employment and unemployment in this sector.

The correct quantification of the EAP is very important for determining the gross national product per capita, income per capita, sectoral income, etc.

One way of determining these indicators more precisely is by carrying out frequent surveys. However, the lack of personnel, which in turn is determined by the lack of funds, makes this impossible.

4.5 Employment and unemployment rate

Quantification here is also based on the census figures. There are technically competent teams who could carry out this task efficiently and with a clear view that what is needed is an index to reflect the behaviour of the economy in manpower terms. However, not being able to count on surveys except in special cases (and then only in some cities), a truly representative quantification of the social reality is an impossibility.

To the above must be added the fact that in some productive sectors, such as

agriculture and animal husbandry, there are no statistical sources furnishing reliable figures on employment, unemployment, number of labourers and number of independent workers. The unreliability of these figures is due to the nature of the activity itself, the seasonal factor in employment, and the enormous geographical area covered by workers throughout the whole country.

5. Summary

After reviewing the economic and social indicators, we present here an overall synthesis of the main technical characteristics of each one of them. The following table sums up the characteristics of each of the indicators for each of the following aspects:

- Work wholly or partially based on the 1972 Population and Housing Census. This is an important factor because one of the main limitations in the building up of quantification is precisely the fact that work is performed according to information obtained from the census and not in surveys (which would certainly be preferred) and based on a census carried out ten years ago.
- An Economic Census was carried out in 1973, and it is also taken into account in the table, since some economic indicators are based on this census.
- We have also included the 1972 Agrarian Census, which is used as a basis to elaborate the quantifying indicators both for the agrarian sector and the forestry and hunting sector.
- The table also indicates if surveys are often or occasionally carried out, as this information is very important. It should be taken into account that in many cases, for various reasons, even when surveys are done they are badly carried out mainly because they do not really cover their sample.
- In the case of the national context, we also point out whether it is partially or completely covered, or not covered at all. This coverage is due to the fact that generalizations made at a national level are based on samples obtained in Lima and some other cities. This problem, mainly caused by the specific characteristics of Peruvian society (considerable plurality of the social, cultural and economic situations and the fact that the majority of the population develops activ ities in unconventional sectors) is a very serious limitation.
- It is also indicated if basically they cover the statistical context of Lima.

We need to clarify some points in relation to the following table.

The problems of lack of co-ordination and lack of centralization (for procedures and results) have been confirmed while carrying out this work. In order to obtain information about each indicator or group of indicators, it was necessary to go to each sector, particularly if there was a need to know the technical aspects referred to in this table. At the National Institute of Statistics there is no concrete and specific understanding of these aspects, even those related to the indicators or groups of indicators, most important for policy-making (which are those referred to in this work). Under these conditions, there is no real understanding of the type of technical problem to be discussed and overcome in order to provide more effective quantification.

In the table we do not consider problems related to the technical personnel as such, which range from the people gathering the basic information in various parts of the country to those in charge of the more sophisticated tasks of processing and analysis. However, we would like to point out that this represents part of the prob lem, specially regarding the technical personnel of lower categories. They do not have adequate training nor are they aware of how important it is in the development of a society for it to be able to rely on valid quantification of the economic and social indicators.

Finally, it should be taken into account that each sector handles a consider-

Summary table. Conceptual and technical characteristics of the economic and social indicators: Peru 1983.

	Work on the basis of the 1972 Population and Housing Census		Work on the basis of the 1973 Economic Census	Work on the basis of the 1972 Agrarian Census	Surveys made ad hoc		Cover national context in real terms			Basically cover context of Lima	
	Wholly	Partially			In some cases	Always	Completely	Partially	No	Yes	No
ECONOMIC INDICATORS											
Gross National Product		x			x		x				
Agrarian Sector				x	x		x				
Fishing Sector			x		x		x				
Forestry and Hunting Sector				x				x			
Industrial Sector			x		x			x			
Mining Sector			x		x		x				
Construction Sector					x			x			
Transport and Communications Sector					x			x			
Trade and Commerce Sector					x			x		x	
Consumers Prices Index						x			x	x	
Remuneration Index						x				x	
SOCIAL INDICATORS											
Education		x			x			x			
Housing	x							x			
Health					x					x	
Economically Active Population	x		x						x		
Employment and unemployment rate					x			x		x	

able number of indicators of differing rank and importance. In this table we are mainly referring to those investigated in this report. We have used these indicators as a basis to show the prevailing trends.

6. *Final comments*

Having looked at the development of the social sciences in Peru and more specifically their contribution to the quantification of indicators, we have examined what demand there was for professionals in these fields on the part of government bodies. We have seen that especially in the last fifteen years the presence of social scientists in the policy-making process has been on the increase.

We then examined critically the principal economic and social indicators as they are handled in policy-making process in Peru. In the following pages we wish to make a few final comments and at the same time to outline what we believe to be the most important aspects concerning the quantitative concepts and techniques actually in use and their possibilities of improvement in order to be able to offer a better quality product.

Although Unesco has stated in the terms of reference that serve as a basis for the present work, that in the evaluation of the quantification problem it is unnecessary to insist on the problems of cost, we must not forget that since this refers to developing countries with government bureaucracies of low professionalism, the limitation of funds appears again and again as one of the main causes of problems.

(a) Concerning the evaluation of the quantification of socio-economic indicators; in Peru this has constantly been hindered by a lack of qualified personnel (in some cases) and by insufficient material resources.

We have found repeatedly that we have not been able to count on qualified personnel for the processing of figures produced. This lack is even greater at the level of information-gathering which is in the hands of personnel who are not sufficiently trained in these tasks. We know that badly collected information will have a negative impact on the later processing, even though this is carried out in optimum technical conditions.

The insufficiency of material resources often leads to an insufficient number of people to make the surveys or to a lack of paper on which to print or process them. In our interviews with government officials in Lima, we understood that they are aware of what processing quantified information under these conditions means, but at the same time they admit that they have no choice but to work under these conditions.

(b) The fact that those requiring indicators (the bodies charged with policy-making) have changed their priorities and that planning is no longer as important as it was in the past, has had a negative influence on the conceptual evolution and the quantification of economic and social indicators.

There was constant pressure on the part of functionaries responsible for policy-making for the best quality quantified information. This served as an impetus to respond to these needs in the most professional and creative way possible.

We have seen how the sociologists, trained theoretically and methodologically within a historic-social framework, were not trained in the handling and production of figures with which to judge important aspects of economic and social problems. However, faced with a demand from the planning and policy-making mechanisms they had to respond to it.

(c) In Peru, no real and effective measures have been taken to standardize concepts and variables, nor do the figures reach the necessary breakdown level. At the same time, there is a problem of coverage, and the timing has not been defined. If the question is 'what must be done to improve the quantification processes technically?' then these deficiencies which cause such serious limitations must be remedied.

(d) Another important deficiency is that caused by not having continuous chron ological series covering an acceptable period of years, which would show the evolution of the phenomena observed and which could be translated into to models for analysis and later projections.

(e) At the regional level, the production of basic statistics is insufficient for the diverse aspects that planning requires for the regions of the country. It must also be remembered here that planning has ceased to be a determining factor in the government's actions and in the consequent policy-making, and that even when the National Planning Institute plays a secondary role.

(f) At the regional level, too, there is a lack of integration in the statistical activity. The scanty information produced is not sufficiently co-ordinated at the regional level to avoid incoherent and repetitious data, and is frequently left to the initiative of any functionary who may realize the importance of having good quality statistical information.

These serious deficiencies at the regional level must be corrected within a short time in order to be able to envisage reliable quantification of economic and social indicators, representative of the reality of the country.

(g) The publication and dissemination of primary information gathered in the different regions of the country is done in Lima, at the headquarters of the respective sectors. This means that the process is slow. One must go from sector to sector to obtain quantified information on each region of the country. We have no information on how much time it takes for all this information to return to the regions from which it came but we are sure that it is, without a doubt, excessively long.

(h) In addition, the austerity measures dictated by the National Public Sector during recent years have limited the possibilities of disseminating quantified information. This has caused problems to the users in the public as well as the private sector, since they can no longer count on the relatively up-to-date information they were accustomed to, nor on the breakdown level necessary (which was also sacrificed as a result of the austerity measures and reduction in public spending).

(i) The material facilities for printing the survey forms and documents for the gathering of basic information are often inadequate.

(j) Although it is true that the methodology employed in the estimates of the indices referred to in this work is correct, this is not necessarily so everywhere. Many of the indicators drawn up are based on data collected only in Lima and, in some cases, in other large cities throughout the country. When it is necessary to collect information at the regional level, then we run into the problems and deficiencies indicated above.

(k) Both the economic and social indicators have the following deficiency in common: limited level of coverage because of a lack of statistical offices with the necessary financial and human resources in the regions.

(l) A large part of the data for estimating economic and social indicators comes exclusively from the census which, in Peru, is carried out every ten years or so.

The surveys, a basic element in the gathering of data, are not carried out with the necessary frequency nor in all sectors or regions of the country. Here the fundamental problem is the lack of funds to which should be added, when it comes to the level of the personnel a lack of technical training.

(m) The fundamental problem is a lack of co-ordination and exchange of statistical information among the sectoral offices of the representative ministries and the National Statistical Institute.

The following recommendations may be made on the basis of the above comments:

- improvement of the technical level of the lower level personnel responsible for gathering and storing primary information;

- improvement of co-ordination in order to avoid duplication of efforts and expenses and to comply with the objectives of the National Statistical System;
- stimulation of an awareness of the importance of quanitified economic and social indicators at all levels which are involved in policy-making.

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