Application of Systems Analysis to Health Management

Report of a
WHO Expert Committee

hnical Report Series

World Health Organization, Geneva 1976

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WORLD HEALTH ORGANIZATION

TECHNICAL REPORT SERIES

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ISBN 92 4 120596 2

PRINTED IN SWITZERLAND

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WHO EXPERT COMMITTEE ON THE APPLICATION OF SYSTEMS ANALYSIS TO HEALTH MANAGEMENT

Geneva, 16–22 December 1975

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APPLICATION OF SYSTEMS ANALYSIS TO HEALTH MANAGEMENT

Report of a WHO Expert Committee

INTRODUCTION

A WHO Expert Committee on the Application of Systems Analysis to Health Management met in Geneva from 16 to 22 December 1975. The meeting was opened by Dr L. Bernard, Assistant Director-General, who welcomed the participants on behalf of the Director-General. The Committee was composed of experts from many disciplines and from the fields of practice, research, and teaching.

Dr Bernard connected the general purpose of the meeting with the need to advise national health administrations and WHO on appropriate ways to rationalize planning and other management processes, taking into account both political and social factors and the relationship between health and socioeconomic development. He requested the Committee to consider the possible applications of systems analysis in meeting this need, using as a basis its assessment of the Organization's five-year research and development effort in which a systems approach has been used to stimulate and support a number of national health developments.

The Committee was asked to pay particular attention to (1) the diffusion of knowledge on systems analysis, the adaptation of the technique to local needs, and its integration into health systems, (2) the coordination of health activities with related development activities, and (3) technological developments.

1. HEALTH MANAGEMENT NEEDS AND SYSTEMS ANALYSIS

Health administrations, whether in developed or developing countries, are faced with a broad spectrum of managerial problems ranging from the provision of the most basic health and sanitary measures to the best use of finite resources in elaborate medical care systems. All countries, however, have one basic problem in common—how can one best improve the health status of the population? This problem has become more

pressing owing to changes in the needs and expectations of communities, to developments in health and other technologies, and to the urgent need to link health improvement with socioeconomic development.

At the same time, the systems approach to problem-solving has been developing into a separate science. It has become well established in various fields of scientific and economic enterprise and is increasingly being applied in governmental planning and decision-making.

1.1 The systems approach and systems analysis

" Systems approach " is a generic term that covers a body of theory and practice of which systems analysis forms one part.

Basically the systems approach is concerned with natural or man-made entities perceived as sets of interacting parts. A system is not merely the sum of its parts ; it includes also the interaction between the parts. Thus, in systems terms, a human being is not just a collection of organs but a certain arrangement of organs with defined interactions. Similarly, an organization consists not merely of the boxes of an organogram but also of the pattern of interrelations between them and within them. It also involves the clientele served and the resources consumed (which are inputs into the system) and the services and products (outputs) resulting from the organization's activities.

However a system may be conceived, it is important to know how the interrelationships operate, how they are managed and how information flows through the system to facilitate management. While all these properties may be observed in natural systems such as a flower or a forest, they are equally discernible in man-made systems such as those affecting human health and wellbeing.

Systems analysis may be defined as methods of making practical use of such views of the nature of the world. In general, these methods seek to define the relationships existing in a system (and between it and other systems) and to calculate the effects of altering either the elements of the system or the ways in which they interact.

That systems analysis permits the use of a common logic and vocabulary across organizational and disciplinary lines is no small part of its usefulness in the practice of management in situations where interdisciplinary and intersectoral collaboration in development and problem-solving is needed. In relation to health and health management, however, more specific uses may be identified.

A number of international agencies are already engaged in application of the systems approach in various sectors. Among them are the Inter-

national Institute for Application of Systems Analysis, the World Bank, and the United Nations Development Programme.

1.2 Health and systems

As the health of the population is but one of the needs and desires of a community and as alternative means of attaining health exist, there is inevitable competition for resources between health and other social objectives.

The health sector thus has wide and varied relationships with other sectors of the social system. Individual and community health depends on a multiplicity of factors, such as nutrition and other basic biological requirements, personal and psychological security, culturally supported behaviour patterns, legislation, education, opportunity for participation of the community in planning and implementation, protection against exposure to pathogens, and accessibility of treatment to reduce the impact of disease. Indeed, it is hard to think of a community activity that has no relationship to health. This view makes health the result of occurrences in many sectors of the social system; it implies that what occurs in those sectors may support, negate or offset the preventive and therapeutic interventions of the health sector.

These considerations enlarge the objectives of health management from the mere provision of health services to the improvement of community health by all available means.

1.3 Systems and health management

The application of systems analysis is useful in health management in that it provides for:

(1) consideration of all variables, over and above the biological and technical, that affect health intervention programmes;

(2) a planning approach that relates input to output;

(3) an emphasis on quantification;

(4) rigour in analytical methods;

(5) orientation towards health problems rather than towards categories of service;

(6) communication with key governmental decision-making centres that utilize comparable methods;

(7) early attention to planning and priority setting;

(8) improved interdisciplinary collaboration ; and

(9) the use of a wide range of analytical models and methods of considerable power.

As a result, systems analysis enables health planning at the policy, strategic, and operational levels to be seen as a continuum of interrelated processes, usually phased in the policy-programme-project sequence.

While the application of systems analysis to health management has far broader scope than the planning aspects of management on which the Committee concentrated, such an initial focus is justified on several grounds. It has been recognized that the most crucial managerial problems in national health sectors are precisely those of defining objectives, setting priorities, and designing strategies that will make best use of limited resources to attain health improvement. Until these problems have been solved, the application of systems analysis to directing, controlling and day-to-day administration could result in doing excellently what should not be done at all. However, the Committee believed that systems analysis methods that have been successfully used in other fields can be more readily adopted in the management of on-going health activities than in the planning of new ones, which is so intimately connected with the analysis of existing health problems and intervention programmes.

Concentration on health planning does not signify a lack of belief in the applicability of systems analysis to other aspects of management. Indeed, the Committee expects that if systems analysis applications to health management can be developed to their full potential they will provide a scientific foundation for the practice of health administration. In other words, the Committee foresees a time when, as epidemiology has become the scientific basis of public health, systems analysis will become the scientific basis of health administration.

2. PROJECT SYSTEMS ANALYSIS : AN EXAMPLE OF COLLABORATIVE DEVELOPMENT OF METHODS

In keeping with its terms of reference, the Committee extensively reviewed the history, accomplishments and problems of WHO's work in project systems analysis. A detailed statement on this subject is given in Annex 1 of this report, and only the main points are presented here to provide the reader with a basis for understanding sections 2.4 and 3 following.

2.1 Origins and events

The systems analysis project was established in WHO as an inter-regional project in 1970. It was conceived as a development effort to improve national and WHO capabilities to respond to certain health management needs, using a systems approach. Among the concerns that led to the project were :

— WHO's long-standing desire to improve country capabilities in health planning ;

— the need to develop means by which such health planning could be better linked with socioeconomic development ;

— the need to improve health management practice so as to make more effective use of resources, with priorities based on systematic analysis and evaluation, by means of simple and powerful methods that would enhance managerial capabilities ; and

— a wish to make WHO assistance to countries (largely dispersed in numerous small projects) more effective in helping governments to improve the health status of their populations.

After the quick development of a preliminary project formulation method, the strategy of the systems analysis project was to conduct its research and development effort in the field. Its staff worked with fairly large teams of national personnel to solve actual country problems of project formulation, in response to requests by Member States. After each application the method was modified and progressively refined, the " learning " process being supplemented by several interim evaluations. The methods used and developed in this field-work have been described by Bainbridge & Sapirie.[a]

Meanwhile, the spectrum of concerns quickly broadened beyond the methodology of project formulation. Since the problems used in country applications were real ones, national authorities requested guidance on implementation, and methods (described by Bainbridge & Sapirie) were developed in response to this demand. Further, while the applications themselves were a way of diffusing systems analysis technology, it was felt necessary to refine the methods of diffusion through the development of a workshop strategy. Staff of the WHO regional offices were invited

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[a] BAINBRIDGE, J. & SAPIRIE, S. *Health project management: a manual of procedures for formulating and implementing health projects*. Geneva, World Health Organization, 1974 (Offset publication No. 12).

to participate in the country applications so that they would acquire the ability to promote the diffusion of knowledge in other countries of their respective regions.

As experience increased, it became apparent that project approval and implementation were suffering from inadequate national political commitment to strategic objectives. This realization helped to stimulate WHO's related effort from 1973 onward to assist national administrations in carrying out country health programming—the identification and selection of priority programmes and development projects for the health sector. To this assistance effort the systems analysis project contributed staff, procedural guidance, and its strategy for collaboration between WHO and Member States. Most of the country health programming experiences resulted in subsequent project formulations using systems analysis methods.

A final important aspect of WHO's work in systems analysis was the development of methods that would enable health planners and administrators to evaluate more efficiently the prospective outcomes of alternative objectives and strategies, using practical computer methods of simulation. The results obtained were promising.

2.2 Elements of systems analysis

A project involving systems analysis contains seven main elements.

(1) *The system.* Viewed in terms of the system, health status may be seen both as a result of and as a contributor to a social and environmental complex. The health sector, the health services, and health planning and management may be regarded as progressively smaller subsystems.

(2) *A development process.* Development, which must be distinguished from growth, is a process of socioeconomic and environmental improvement, in which health is a key component. The improvement of managerial abilities in the health sector is another aspect of development.

(3) *A national setting.* Applications of systems analysis are made at the country level, which is the focus on which effort must be concentrated, as distinct from, say, the organizational or international levels.

(4) *A set of objectives.* Planning, implementation, and evaluation must be oriented towards the chosen objectives rather than towards resources and activities.

(5) *The project*. This may be defined as a time-limited set of activities designed to bring about a specified change in the operation of a health system or subsystem.

(6) *A procedure*. In order to formulate and implement plans it is necessary to establish a procedure consisting of an explicit sequence of steps.

(7) *A learning process*. The implementation of a project yields valuable practical experience, which can be used to refine the project and to improve future planning. " Learning by doing " facilitates the diffusion of knowledge of systems analysis and may be regarded as a form of research and development.

2.3 Protocols

The elements described in the preceding section have been made the basis of three protocols.

(1) *Formulation*. A proposal that is to be placed before decision makers must be formulated according to an explicit series of steps that leads logically from a need (or an opportunity) for an innovation, through various analyses and syntheses.[a] In the course of the process specific interactions occur between the planners and the decision makers.

(2) *Implementation*. Procedural guidance must be given for project initiation, work analysis, organization, resource mobilization, control, direction, and termination.

(3) *Technology diffusion*. The learning of new techniques occurs when projects are carried out in country situations by national staff advised and assisted by WHO staff. Training includes a pre-formulation workshop and a formulation experience over a period, on average, of eight weeks. Diffusion to other elements of WHO—except for invited participation of regional office personnel in country applications—has not been so structured, but a certain amount of diffusion has been achieved both through staff training and through incorporation of the concepts and methods of systems analysis into several programme development areas such as family health and environmental health.

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[a] See Annex 1, page 51.

2.4 Achievements in individual countries

Three members of the Committee described the experience gained when using the methods of project systems analysis in their own countries. The Committee also heard accounts of field experiences from the staff of the systems analysis project.

2.4.1 *Summary of experiences*

In general, looking at the entire range of country experiences,[a] one can discern a number of improvements resulting from the application of systems analysis to health management. Scheduling is now more realistic, and in some countries there have been significant increases in government funding and/or international assistance allocated to the project being formulated. In half of the countries the concepts and procedures used by WHO staff were subsequently modified and reapplied by the national planners either to a different problem or at a different level of planning (i.e., in preparing national or provincial health plans). Where planning has been undertaken jointly by national and WHO staff, the national staff have been in control of the process and the WHO staff have provided methodological support—a different arrangement from that customary in the past. In one country the project formulation process led to a subsequent request for WHO assistance in country health programming. In another country an effort is currently being made to institutionalize the method for programme planning purposes. Through "learning by doing" some 500 nationals and 100 WHO staff have acquired experience in applying systems analysis to health management.

Unfortunately there have also been a number of significant departures from expectations. In three of the countries the proposals were not significantly implemented. In most of the countries the systems analysis concept has not been strictly applied in establishing the organizational responsibilities for implementation, and project schedules have not for the most part been adhered to. These failures may be partly ascribed to the political insensitivity of project formulators, to insufficient involvement of decision makers, implementers, and other interested groups in the formulation process, and in some cases to overemphasis on training and underemphasis on the quality of planning itself.

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[a] See table in Annex 1, page 44.

In addition, although the " learning by doing " approach has resulted in isolated pockets of national and WHO staff who now have the ability to apply, teach, and further develop systems analysis in health management, it has not yet been institutionalized to any significant degree, even within WHO itself. Furthermore, both within WHO and in individual countries there is a persistent tendency to disseminate concepts and procedures through workshops without any subsequent commitment to application. There is evidence that the mere diffusion of knowledge and skills does not necessarily create the motivation to apply them.

The following illustrations in Kenya, Scotland and Malaysia amplify some of the points made above.

2.4.2 *Specific country illustrations*

(1) *Kenya*

In Kenya, project formulation was undertaken in 1972 on the development of the rural health service and on a postbasic training system for the staff and supervisors of this service. The resulting proposal for the development of six rural health training centres and extension of the rural health service was produced in August 1972 and was subsequently approved by the Ministry of Health, the Ministry of Finance and Planning, the Norwegian Agency for Development, UNICEF and WHO.[a]

By August 1974 the project had fallen about two and a half years behind schedule, and concerted efforts were made to build up the management of the project in support of implementation (scheduling, organizing, setting up the monitoring and control system) and to initiate scheduled activities (construction of facilities, preparation of curricula and rural health unit manuals), again with managerial support from WHO. About one-third of the project has thus far been implemented.

The proposal had a major impact on the health sector of the Kenya National Development Plan 1974-75. The rural health unit concept has been accepted by the Ministry of Health and is outlined in the National Development Plan. Foreign aid for the project has been obtained, and the proportion of the Ministry of Health budget devoted to rural health services has increased, from approximately 17% in 1971-72 to 20% in 1975-76. The proposal was subsequently utilized in framing Kenya's maternal and child health and family planning programme, which in

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[a] Republic of Kenya, Ministry of Health. *Proposal for the improvement of rural health services and the development of rural health training centres in Kenya.* Nairobi, 1973.