

A Model of Systems Management for an Educational System

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I. INTRODUCTION

The Systems Approach

The systems approach is a generic name for a collection of philosophy, concepts, and methods which are based on general systems theory. As modern organizations have grown in size, complexity, and diversity, elements of these units have tended to become specialized in narrow fields. As a result, management faces the difficult problem of integrating the elements into a unitary whole for the accomplishment of organization goals.

The systems approach relates the application of the general systems theory to the process of management. It provides management with (1) a general philosophy, that is, "a way of thinking" which views the system as a unitary whole; (2) a way to organize and transform input into output in a logical way (systems management); and (3) a scientific way to model and analyze complex problems (systems analysis).

Systems philosophy encourages management to look upon an organization as an integrated system within which system elements or subsystems are not treated as isolated units. It permits management to understand the relationship of complex elements and variables involved in the execution of managerial functions and to recognize that organizational activities must be integrated in more effective systems if system objectives are to be achieved.

When a systems philosophy is adopted by management, it acts as a framework for visualizing the organization as a whole and the interrelatedness of the managerial functions, as well as the systems elements and their relationships within the system.

The concept of systems management is a new process of management that is based on the theory of system. In systems management the main purpose is to integrate seemingly unrelated resources in a total system for the accomplishment of system objectives. In other words, actually to plan, design, and operate an organization as a system.

Systems analysis is a technique or a set of rules that can be used to analyze complex problems. In other words, systems analysis is a conceptual and analytical framework for the solution of problems. In a typical process of systems analysis, the objectives of the problems solution is put into operational terms, and the constraints which define the feasible area of solution can be specified.

After a system's problems have been studied, the analysis should indicate alternative courses of "action" or an alternative "system" that might be designed to achieve the specific objectives. Each potential system may involve a somewhat different combination of inputs. The estimated cost and the probable results also will vary from action to action. Some will fit into the general context better than others. The comparative advantages and disadvantages of alternative actions must be evaluated by using proper criteria of selection and trade-offs, and thereby determining the best possible course of action among the alternatives. This process is repeated until the objectives appear to be satisfied and the system is optimized.

The systems approach has gained stature in the field of managing business, and other institutions also are tending to adopt this approach. This study analyzes an educational system and applies the systems approach as a way to improve the effectiveness and efficiency of that institution.

The Need of Systems Approach to Education

The successes and the failure of humanity in this world depend upon its ability to learn. With a slight alteration, the ancient Russian proverb tells it all: eons to live, eons to learn! The antiquity of humans' perception of this truism is borne out by the antiquity of social institutions which are

devoted to explicit application of its meaning. From simple beginnings within families, systems of learning have been propelled by the needs attendant upon the progressive teeming of people on the earth into establishments of enormous size and intensive sophistication. From familial tutorships, we have graduated more or less evenly into structures which ramify vertically and horizontally from prekindergarten units to postgraduate learning in universities.

Understanding the learning (and teaching) process at its initial and, ostensibly, most elementary level is, by itself, complicated enough to discourage quick judgment or facile analysis. Evidently, the job becomes even more difficult as the range of contemplation is expanded. Effective and efficient management of the family's educational system may be achieved with relative ease because knowledge of its characteristics and behavior may be attained through the expenditure of a comparatively small amount of effort. Management of any structure as large and intricate as a full-blown system of education, however, is naturally far more difficult because of the necessity of analyzing the vast number of subsystems and the elements of each. Not only must the characteristics and the behavior of each of the subsystems be investigated and understood on an individual basis, but the interrelationship and interaction among the components of the overall system must also be identified and explained.

For example, when an educational system is analyzed by using the systems approach, it can be viewed as a network of interrelated subsystems, each charged with accomplishing part of the overall task of attaining the system's objectives. In this case, the management of an educational system needs to plan and control inputs of material, energy, and information into outputs which are consistent with the educational goals of the society.

The need of the systems approach to educational problems increases particularly when a society attempts to expand its educational system to serve the mass of people and to use that system as an instrument of national development. One of the problems that appears most often under these circumstances is that many people request more education, but not necessarily the kind of education that may serve the nation's manpower needs. The job preferences are dictated by an hierarchy of prestige or social tradition and students choose their studies accordingly. When there is a

serious discrepancy between the nation's manpower needs and the annual supply of manpower from the educational system, the problem embraces not only the educational system but also the economy.

It needs no belaboring that all modern systems of education feature great size and complexity. These very characteristics, along with the evident need to manage these systems effectively and efficiently, make a scientific investigation of them absolutely mandatory. Moreover, if the investigation is to be truly "scientific", it must look at the entire educational system as a "Gestalt", i.e., an integrated whole, rather than a simple configuration of independent parts.

Knezevich lists ten factors which indicate why the systems approach is imperative for improvement of education. This list includes:

- (1) Clear delineation of long short-range objectives capable of being translated into operationally meaningful activities and subsequent evaluation.
- (2) Recognition of the dynamic nature of objectives and sensing when new ones have emerged or when a reordering of priorities among existing objectives is imperative.
- (3) Recognition of change as normal in viable organizations operating within an environment in ferment and creation of methods to facilitate prudent change.
- (4) Generation of alternative means to utilizing resources to attain objectives.
- (5) Creation of models to study part or all of the system.
- (6) Utilization of quantitatively oriented tools and procedures in analysis of systems.
- (7) Dedication of a high priority in the time schedule of top-echelon administration to planning and programming activities.
- (8) Employment of interdisciplinary teams of specialists in problem analysis, new systems design, operations evaluation and the like.
- (9) Consideration of coordination of the ever growing number of educational specialists within the system as a matter of high-echelon concern.
- (10) Implementation of sophisticated, objective, and scientifically oriented procedure in decision making.⁽¹⁾

The Purpose and Design of the Study

Although it is difficult to measure input, output, and other characteristics of education, health-care, and other such public systems, they are still as adaptive to the systems approach as other profit-oriented business firms and organizations. In the educational area, although there has been growing

(1) Stephen J. Knezevich, *Administration of Public Education* (2nd ed.; New York: Harper and Row, 1969), p. 547.

awareness of the systems approach by educational administrators, it is observed that:

School administration in 1969 is on the threshold of awareness of the concepts and procedures related to systems. Only limited comprehension of concepts and even less capability in the utilization of systems techniques and procedures presently characterize the field administrators as yet do not perceive systems as a way to define, comprehend, or resolve perplexing educational issues or operation problems.⁽²⁾

The purposes of the research undertaken here are intended to contribute to the application of the systems approach to an educational system and to the development of a number of analytic models for more effective and efficient management of such a system. An analysis of an educational system has been performed by applying the systems approach as developed in the literature of management. The detailed analysis was undertaken so as to obtain better understanding of that system, to facilitate better management of an educational system. In this connection, a model of organization for the effective and efficient management of an educational system is proposed within the framework of the systems management concept. Finally, conclusions and recommendation for further research are presented.

II. Manpower Aspects of an Educational System⁽¹⁾

Education Viewed as a "System"

An organizational "system" is defined by one author as follows:

A system is defined as an array of components designed to accomplish a particular objective according to plan. This definition contains three significant parts. First, the system must have a purpose or objective to perform. Secondly, components are designed (and sometimes constructed) in a meaningful arrangement. Finally, inputs of information, energy, and materials are allocated according to an operating plan.⁽²⁾

Viewed through the system concept as defined above, the educational

(2) *Ibid.*, p. 547.

(1) The term "educational system" is generally used to mean the formal educational system, that is, the hierarchical structure of educational activities from the primary school through the the university. In this study, the term sometimes is used to mean both the formal education and the non-formal education which is conducted outside the formal system.

(2) Richard A. Johnson, William T. Newell, and Roger C. Vergin. *Operations Management: A Systems Concept* (Boston: Houghton Mifflin Company, 1972), p. 5.

system can be seen as an input-output process within a society, as depicted in Figure 2.1. The educational system processes a set of inputs so as to produce certain outputs which are intended to achieve the objectives of the system. The four elements of an educational system, objectives, inputs, output, and the process, are analyzed below:

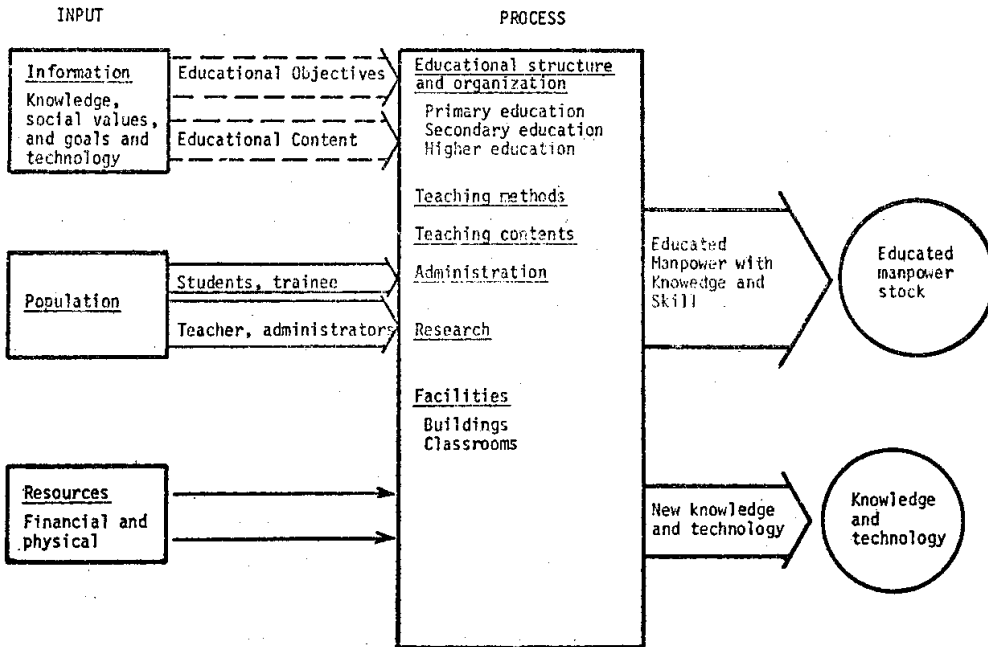


Fig. 2.1. An Educational Input-Output System.

Objectives. An educational system's only warrant for commanding a share of the nation's economic resources lies in its attainment of the objectives which it is assigned. These objectives range all the way from very broad, and sometimes vague, goals—such as “a better life for the people,” “developing the necessary abilities of the people for national development”, or “producing cultured citizens and educated leaders” to the much more specific aims relating to subsystems such as “producing so many engineers, craftsmen, etc.” Many of these objectives vary from country to country.

But it is generally noted by educational researchers that the first and most important weakness in an educational system is the lack of meaningful, measurable objectives. Grieder, et al. observed that:

The typical statement of educational objectives is at a level of abstraction which tends to encourage acceptance of the objectives on a highly general level. This means the objectives serve

a limited role in giving direction...⁽³⁾

In other cases, the application of systems analysis to an educational system will reveal that its actual objectives differ significantly from its stated ones. Whereas the stated goal may be to produce technically trained personnel to be used in the development of heavy industry, the actual goal of one of the system's vital subsystems, viz., secondary education, may be to prepare their students for college examinations.

Thus, it is important that if an educational system lacks clarity in its objectives, the society must first make the objectives clear and meaningful before expecting an improvement of its operation and its future planning.

Inputs. The inputs of an educational system are the various resources required for its functioning. In addition to physical, financial, and human resources, they include the existing stock of knowledge and the information available to the system. The amount, quality, and combination of inputs needed depend on the objectives, the output called for, and the nature of the system's process.

The Process. The inputs are transformed by the system to produce outputs. The transformation process includes the means of educating students, curricula, and other organizational and managerial components.

Outputs. The principal outputs of an educational system are educated people or the new knowledge they gain. The basic presumption is that the educational system helps its subjects to develop values, attitudes, abilities to appreciate, and to gain an understanding which will equip them to achieve for themselves and society a "better life". The system attempts to achieve this by transforming the individuals who pass through it by broadening and deepening their knowledge, by generating or sharpening their intellectual and manual skills, and by strengthening their powers to reason and to criticize.

Although the quantitative production of an educational system is relatively easy to assess, the output of such a system surely goes far beyond the number of graduates or the scores of standardized examination. How well the actual learning of graduates fits the express objectives of the system

(3) Calvin Grieder, Truman M. Pierce, and K.F. Jordan, *Public School Administration* (New York: The Ronald Press Co., 1969), p. 246.

and how well those objectives match the real needs of the graduates and their society are difficult to determine.

The final outputs of an educational system, educated manpower and new knowledge bear a close connection with the development of human resources. Whether an educational system is effective is ultimately evaluated on the basis of how well it develops the human resources for the society because the flow through the system is composed of people, i.e., students and the output is in the form of educated manpower who possess new knowledge and technology.

An application of systems analysis, which treats the educational system as a dynamic integrated entity in a society, relates its objectives, inputs, outputs, and the process to evaluate the system's effectiveness and efficiency. By so doing, it analyzes the various constituent elements of human resource development and thereby gains a better understanding of the process by which a society pursues education. It helps in deciding whether or not the output, educated manpower, can be made more relevant, effective, and efficient within the context of the particular society. Systems analysis of an educational system can identify major problem areas in human resource development in operational terms and promote an examination of the critical interrelationships of various manpower and educational programs so as to discover whether or not they are properly balanced.

Education, Manpower, and Development

Generally speaking, the prime role of education is to educate people and to develop human resources for a society. Education seeks cultural and moral enrichment for its people as well as social and economic development. An educational system cannot be fully justified unless it embraces concerted and protracted efforts at the economic, cultural, social, political, and moral betterment. Furthermore, an educational system is the sole source of educated manpower for operating other systems in a nation. Figure 2.2 portrays that role.

The diagram depicts the provision by the educational system of the manpower needed in the operation of the economic, cultural, and political systems. At the same time, it shows how goods and services are produced by a combination of new technology, capital equipment, tools, factories,

and educated manpower. The consumption of these goods and services is demonstrated to take a financial form which results in a flow back into the system. This balanced flow represents national life.

Figure 2.2 also shows that one of critical factors for the development of a nation is the need to balance the systems or components which make up the life of the society. It requires for example, a matching of the output of the educational system with the requirements of the other systems for manpower of varying degrees of education.

During the 1950's and 1960's, most of developing countries experienced a vast expansion of their educational systems. A progressively swelling number of countries have sharpened their awareness of the indispensability of education if their social and economic goals are to be attained. The outburst of interest in this concept among economists, as well as educational researchers, has brought an increasingly larger share of national resources to education, and has fostered the belief that education contributes significantly to economic growth-or, at the very least, that the lack of it can seriously restrain that growth.

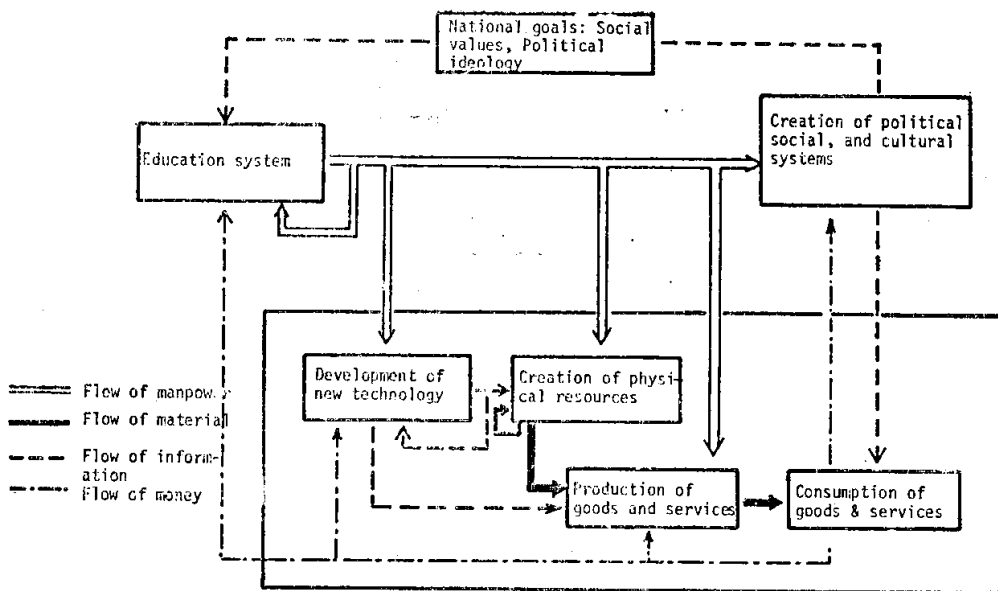


Fig 2.2. Relationships of Educational and Other Systems in a Society.

Despite such expansion, most developing countries continuously faced problems in the training or allocation of human resources in one form or another. In this case, the important point is that the quantitative expansion of the educational system often overlooks the issue that the quality and spirit of education is also of great significance. Not only may a simple increase in the number of educated people result in imbalance in other parts of society, the educational system can also bring unbeneficial results in other respects. It may, for instance, create cultural expectations in its products which surpass the actual possibilities of the immediate society to satisfy. Balogh noted, "An unemployable, but educated class can be the cause of uncertainty and risk prejudicial to economic activity, and young people brought up to despise manual work can reinforce the resistance to development."⁴⁾

If an educational system is not effective and fails to make the economic contribution to the recipients of the education and the development of the society in general, the economic return from the investment in education is little, except that people gain experiences in humanistic study. Most of developing countries can afford this gain the least. They need effective educational system in the context of economic development.

In the following sections, those problems surrounding the development of human resources and effective educational system in developing countries are analyzed.

Problems in Developing Countries

Some of the major problems in developing countries are related to the following: (1) population growth and its trend; (2) shortages of skill in the presence of labor surplus (unemployment); and (3) job bias. The analysis of the growth of population and age distribution is naturally a fundamental step in planning the development of human resources. Statistics, such as the annual rate of growth in population, age distribution, the size of the economically active population, and the rate of the growth of the economically active population in both the agricultural and nonagricultural sectors, are essential for consummation of any analysis. Such statistics will reveal whether the population is increasing, decreasing, or remaining stable and

(4) Thomas Balogh, "The Economics of Educational Planning: Sense and Nonsense," *Comparative Education Review*, Vol. 1, No. 1 (October 1964), p. 9, quoted in D. Adams and R.M. Bjork, *Education in Developing Countries*, p. 43. (New York: David McKay Company, Inc., 1969).

whether or not the composition of the population is changing. They can also show how the population is divided between the developing and more traditional sectors of the economy.

In most developing countries, the average rate of growth of the population has usually exceeded two percent. Those between five and fourteen years of age have been growing in number more rapidly than the population as a whole because of the reduction in the rate of infant mortality as the result of improved medical care. Furthermore, it is generally expected that the rate of growth among the young will increase even more rapidly in the future. This means that, in most of the developing countries, youth, not to be included as a part of the work force, will constitute at least two-fifths of the population. The school-age population will consequently expand ever more rapidly.

In a country that is undergoing rapid economic growth and is utilizing its labor force, an increase in the economically active segment of the population is very likely to have a smoothing effect on the labor supply and thereby to catalyze economic development. In a country with a population which exceeds the sustaining capacities of its natural resources, population control can directly contribute to raising the productivity of labor. One of the serious manpower problems which afflict developing countries is the frequent appearance of a high rate of unemployment in the seemingly contradictory company of a shortage of skilled labor. This phenomenon is particularly observable in the nonagricultural or "modern" sectors of these economies. It is attributable to the attractiveness of the relatively high wages in the "modern" sectors together with the high rate of participation in primary education that tends to change the aspirations of rural youth in such a way as to cause many of them to move on to nonagricultural parts of their countries. Indeed, the congestion of cities so common in developing countries has resulted from this shift as well as from the decline in the death rate caused by wide improvement in health care, general industrialization, and the development of various urban facilities.

The distribution of population in the Republic of Korea exemplifies these tendencies. In 1966, for example, 57.9 percent of its population lived in the "traditional" or agricultural sector, while 42.1 percent lived in the urban sector. In 1971, the urban population had risen to 51.5 percent,

whereas the country dwellers had dwindled about 9 percent to a total of 48.5 percent. The urban explosion was well illustrated by the trend in Seoul, the capital city, where the population grew from about four million in 1965 to about six and a half million in 1972, approximately one fifth of the entire population of the Republic of Korea.

In terms of employment the "absorptive capacity" of an economy is the extent to which it can provide some kind of useful employment to persons of varying degrees and types of qualification. In other words, "manpower requirements" may be regarded as the minimum level of persons whose employment is essential for operation of the economy, while "absorptive capacity" represents the maximum level of persons who can be employed without resulting in overemployment.

Another facet of economic development of emerging nations that merits an important place in the systems analysis contemplated here is the psychological side of work, especially the incentive to work. In all countries, traditions and values contribute to the generation of job bias. Job preference, job status, and pay acceptability are often more powerfully related to tradition, social custom, and political position than they are to questions of productivity, national development, or supply-demand conditions with regard to personnel with specific skills. Job bias tends to create shortages of skills which are crucial for some phases of national development. It also tends to inflate social demand for education on particular levels especially that of the university which may be termed excessive in relation to the country's "absorptive capacity". Systems analysis will aid in the spotting of these problems and should point the way to overcome the job bias against certain jobs that are important for the economy.

It almost goes without saying that the foregoing problems involved in the development of human resources are deeply interrelated. Their kinship is such that isolated solutions to isolated problems are not feasible; consequently, systems analysis is mandatory so that problems may be treated simultaneously and altogether.

Problems in the Educational Systems of Developing Countries

During the 1960's, the educational systems of most developing countries underwent a vast expansion. Unfortunately, however, a great deal of this

growth occurred without the benefit of proper planning and preparation. By 1970, as a result, the problems that issued from this semi-anarchic style of expansion had snowballed into a worldwide crisis in education.⁵⁾ This crisis continued as late as 1974 and gave promise of persisting for some time to come.

Among the problems that figured in the crisis, the following are those characteristic of the educational systems in most developing countries: (1) horizontal and vertical imbalances; (2) social demand for education far in excess of capacity; (3) rising unemployment among the educated; (4) irrelevant education; and (5) inadequacy of financial support.

The rapid mushrooming of the educational systems naturally resulted in imbalances. Horizontally, disharmony among such components as students, teachers, classrooms, and textbooks was common. Students without classrooms or textbooks, classrooms or textbooks without students, and other imbalances occurred frequently. At the same time, vertical imbalances have been features of many systems. In Nigeria, for instance, the government introduced a university system of high quality only to discover that the secondary schools were incapable of providing the necessary scholastic background in mathematics and science for those graduates who wanted to study science or engineering at the university level. The upshot was a great deal of vacancy in higher educational institutions because of the lack of qualified candidates from secondary schools. Virtually the opposite sort of vertical imbalance has also occurred, namely, secondary preparation has become such that the universities have not been able to accommodate anything like all of the well-qualified applicants. In the Republic of Korea, for example, universities have customarily received four applicants for each place available in their student bodies. The waste of precious resources attendant upon both horizontal and vertical imbalances can only be avoided through well-coordinated and carefully planned educational programs.

The demand for education in excess of capacity has risen at an accelerating pace in recent years. This rise has been explained by Philip Coombs as follows: "A population that suddenly starts getting more education soon

(5) See Philip H. Coombs, *The World Educational Crisis: A Systems Analysis* (New York: Oxford University Press, 1968); also Philip H. Coombs, *What is Educational Planning?* (Paris: UNE SCO/International Institute for Educational Planning, 1970).

wants still more.” “...Even if a parent gets no further than primary school, he will insist that his children do better.”⁽⁶⁾ He goes on to point that “the social demand for education is inexorably compounded, regardless of what may be happening to the economy and to the resources available to education.” In many instances, this rising demand has made education into one of the most profitable “business”.

The primary inspiration of the proportionally large investments in individual education is, of course, the prospect of better employment for better pay. In most newly independent countries following the Second World War, the need for educated manpower was generally very strong in the opening phase of their development. In most cases, however, little time elapsed before the level of the economy lagged behind the rate of production of educated persons. This phenomenon, “unemployment of the educated”, first appeared in the more populous of the developing countries, such as India, the Philippines, and the United Arab Republic, but it quickly spread through the others as well.

In India, for example, it has been predicted that the number of unemployed educated persons in 1975—76 will approximately equal the total stock of Indian intellectuals as of 1960—61.⁽⁷⁾ In 1965, it was estimated that about seventy percent of the university enrollees in the United Arab Republic belonged to the faculties of arts, law, or commerce and that the demand for graduates from these faculties was far below the supply, so that swelling group of persons with skills unsuited to the occupations to which they were forced to turn had resulted.⁽⁸⁾ The situation has been much the same in the Republic of Korea, where the percentage of employment among the 17,430 college graduates of 1961 was only 46.7. By 1971, the percentage had risen to 71 and the gross size to 34,235 graduates. The sharp increase in the Korean rate of employing graduates was described as being mainly due to the high demand for teachers at the primary and secondary levels.⁽⁹⁾

(6) *Ibid.*, p. 20.

(7) Institute of Applied Manpower Research, *Working Paper No. II* (New Delhi, India, 1965), part IV, p. ii.

(8) Malcolm H. Kerr, “Egypt,” in James S. Coleman, ed., *Education and Political Development* (Princeton, N.J., Princeton University Press, 1965), p. 187.

(9) Republic of Korea, Ministry of Education, *Statistical Yearbook of Education: 1971* (Seoul, 1971).

Gratification that the educational system itself, in the Korean case, has been able temporarily to ameliorate the hiring situation for the educated must be tempered by two recognitions: (1) that most of the graduates accepted employment as primary or secondary teachers only as a last or next to last resort because of the low salaries afforded such teachers and because of the relatively low social status assigned to those positions; and (2) the rate of absorption of graduates by this means is inherently short-lived unless the economy expands greatly because, after a short delay in the process of production, the added teachers will result in a larger output of graduates, which will accordingly strain the society's absorptive capacity vis-a-vis educated persons.

When an economy is afflicted by unemployment of the educated while being confronted by shortages of various types of skilled labor, questions must be raised about the congruency of the design of the educational system's output and the country's manpower requirements. Truth to tell, many if not most of the countries generally classified as "developing" have tended to pattern their educational systems too slavishly after the forms utilized by fully industrialized countries. Such dislocations must be put back in joint as speedily and efficaciously as possible. The pairing of national needs and educational remedies is best consummated through systems analysis.

Specific instances of educational misplanning-or nonplanning-are abundant in the "developing" economies. The so-called "modern" education in many of these areas tends to prepare its students for life in the city, whereas the overwhelming facts of their existence future as well as past-are rural. This unrealistic bias is commonly aggravated by the sort of preparation received by the majority of those countries' students who go abroad for their education. Once again, only too many of them are trained in methodologies and intellectual manners of other sorts that have much more pertinence to "western" problems and way than to the actualities of their homelands.

Another serious awkwardness often characteristic of schools in the "developing" countries is the direction of their teaching at the secondary level toward qualifying the students for success in college entrance examinations. In Korea, Japan, and Taiwan, for example, certain courses amount

to rote drills which are almost entirely geared to passing such tests. At best—and it is to be parenthetically wondered whether this sort of teaching amounts to much more than a curiously prevalent parasitism of extremes inhibition to healthy national progress—such instruction readies students for niches in the cities, whereas few of the graduates of secondary schools in the rural regions have enough of the components requisite for goint to university. Many of those who do not attend the colleges none the less gravitate to the cities where they tend to become the unemployed. In the meantime, in most of these couries, where the need to elevate agricultural productivity is extreme,” fewer than four percent of the graduates have studied the field of agriculture (and there is cause to believe that most of these become administrators).⁽¹⁰⁾ So that the trend is toward maldistribution of students with respect to major fields of study and also with respect to specialization within those fields.

The financial limitations often peculiar to “developing” countries inevitably make allocative decisions more difficult. A strategic posture must be consciously adopted that favors spreading educational opportunities and benefits thinly and widely or favors concentrating on the formation of an elite group which will serve as the “critical mass” for national growth. In the long run, and even in the short run, reliance must be placed upon systems analysis to furnish the essential insight into the problems of developing human resources that will clearly suggest “best” solutions. Once the solutions are in hand, they must be implemented by personnel well imbued with managerial techniques and supported by effective organization. These agents of educational change and growth will be most efficient and effectual if they seek to realize the concepts of systems management.⁽¹¹⁾ In this study, an application of those cofncepts will be made in the design of a system of management for the administration of an educational system.

III. A MODEL OF SYSTEMS MANAGEMENT FOR AN EDUCATIONAL SYSTEM

The Functions of Educational Management

(10) Coombs, *op. cit.*, p. 77.

(11) See, for example, Richard A. Johnson and others, *The Theory and Management of Systems*, 3rd ed. (New York: McGraw-Hill Book Co., 1973).

Every system has one or more objectives to achieve, and the achievement of objectives requires management. The prime goal of management is to make the system effective, and this objective should be achieved with efficiency, i.e., by optimizing the relationships of input to output. This means that the system must be planned, organized, directed, and controlled and with constant attention to fresh evaluation and adjustment.

In the case of an educational system, the problems of management are made extremely difficult by the hugeness of the system and by the complexity of relationships among its various components. In fact, these difficulties led to the application of a model of systems analysis to the problems of the KES.

When a system is huge but nevertheless consists of only a few components, the problems of management may not be too difficult. Problems of management become serious when a complex relationship develops within the system. The complexity of relationship within an educational system stems from the characteristic division of an educational system into various levels and the further division of each level into many small and scattered parts. Furthermore, as was pointed out earlier, an educational system must maintain a close relationship with political, social, economic, and other systems of society.

The systems analysis of educational problems makes it apparent that one of the salient features underlying those problems is the imbalance between the educational system and its environments. In discussing the world's educational crisis, Coombs stressed that: "These relationships, now badly out of line vis-a-vis each other, must somehow be restored to a better balance and to mutually compatible rates of movement."⁽¹⁾ Coombs went on to point out that the inadequacy in education management has often hindered the advancement of the system itself:

The managerial arrangements typical of educational systems are grossly inadequate to deal with a crisis-ridden set of new challenges and are, themselves, a crucial part of the educational crisis. The main features of these arrangements were cast during an earlier era when education and the world outside were moving slowly by today's pace, and when the size and diversity of education's tasks were much smaller. They were not designed for planning in today's sense of term, or for implementing such planning, or for a rigorous promotion of innovation. The needed

(1) Coombs, *The World Educational Crisis op. cit.*, p. 166.

solution in education must begin with educational management.⁽²⁾

The foregoing makes it clear that the critical functions of educational management are to plan, to design, and to organize the education system so that, first, the series of relationships within the system as well as between the system and its environments are improved and balanced, and, second, the system is flexible enough to its changing environment. At the International Conference on the World Crisis in Education held in Williamsburg, Virginia in October 1967, educational leaders from fifty-two countries agreed on the necessity of integrating the structure of an educational system as follows:

Management and planning take place through educational structure. Good management must go hand in hand with structures designed to perform the specialized tasks that education now faces. Structures must always respond to functions; as the function of education diversify in response to changing needs, structures must be kept flexible to receive new curricular changes, new levels of education, and pressing specialized tasks in agriculture, science, or technology.⁽³⁾

The educational leaders at the conference thus recognized the importance of planning at different levels of management.

The first level of planning is to determine the "functions" of an educational system in response to society's changing needs. The second level of planning is to design the structure of an educational system that will carry out the "functions" determined at the first level of planning. The third level of planning is to pattern the actual operation of the educational structure so as to promote maximum efficiency.

The educational leaders also recognized the importance of system review and evaluation in educational management. These are undertaken, first, to see whether or not the system's output matches the society's needs and, second, to see whether or not the educational structure is properly designed to perform the educational "function", and third, to check whether or not the actual operation is performed at maximum efficiency. Implicitly, the educational leaders agreed that educational management should emphasize the educational structure's interrelationships and the integration of the educational activities toward the accomplishment of the system's objectives set by

(2) *Ibid.*, p. 120.

(3) *Ibid.*, p. 177.

the shifting requirements of the society.

Then the modernization of educational management requires a new management concept that is based on the theory of systems. This new concept of management should have two indispensable features in the planning, design, and operation of the educational system. First, the management must be 'goal-oriented' with focus on the accomplishment of the objectives of the system. This is why planning is such an important function in educational management. The second feature of educational management would emphasize the total system. It must seek to direct the various levels and parts toward the optimization of the system as a whole. In other words, the management must be 'total-system oriented'.

The Concept of Systems Management

In management literature, a new management concept that is based on the theory of system is developed and is called systems management.⁽⁴⁾ In systems management, management is defined as "the process whereby these unrelated resources, *such as manpower, facilities, and systems technology*, are integrated into a total system for the accomplishment of objectives the functions of management *such as planning, organizing, control, and communication* are performed in conjunction with the operation of the system and its objective and not as a separate entity."⁽⁵⁾ (Italics mine.)

Furthermore, the four principles underlying the systems management concept have been described as follows: "(1) it is goal-oriented, with continual emphasis on objective achievement (effectiveness); (2) it is total-system oriented, because decision criteria stress optimization of the total system...; (3) it is responsibility-oriented, because each manager is given a specific assignment with measurable inputs and outputs; and (4) it is people-oriented, because workers are identified with output."⁽⁶⁾

It is apparent that if the systems-management concept were to be utilized properly in educational planning, it would satisfy the functional requirements of educational management as conceived by the educational leaders

(4) For a detailed exposition of systems management, see: Richard A. Johnson, *et al. The Theory and Management of Systems*, 3rd ed. (New York: McGraw-Hill Book Company, 1973); also Richard A. Johnson, *et al., Operations Management: A Systems Concept*, pp. 503-511.

(5) Richard A. Johnson, *et al., Operations Management: ...*, p. 506.

(6) *Ibid.*, pp. 503-504.

at the Williamsburg conference mentioned earlier. Application of this concept to the KES will exemplify what effects it might have on educational management and what benefits could be thereby obtained.

A Model of Systems Management

Figure 6.1 contains a model of systems management as applied to the KES. The diagram is divided into three parts: the spheres of planning, control, and execution. The sphere of planning has three levels. The first planning level is concerned with the determination of broad social and educational goals of a system. At this level, decisions are made with regard to the objectives, the products to be produced, and other basic functions of an educational system. The second level is concerned with the design and creation of the system. At this level, the educational system is designed in order to achieve the objective of the system; it is created to perform the function specified at the first level of planning by combining such necessary inputs as manpower, resources and systems technology. If the system already exists, this phase will deal with the revision of the systems structure. The third level of planning, in essence, deals with how to perform the tasks assigned to the system at maximum efficiency. Each operating system introduced at the second level is made effective.

The sphere of control also has three levels. The lowest or third level concerns control of each operating system. At this stage, the control function seeks to ensure the efficient performance of each operating system and makes certain that the activities of each system are directed at accomplishing the tasks allotted to them. Thus, it involves to identify and assess system capabilities under the given human and material resources. The second level of control is dedicated to review and evaluation of the educational system. On the basis of feedback information from the third level, each operating system is reviewed and evaluated with an eye to possible redesign in the system. Then, the control is to identify defects in the system design and to revise the design for system effectiveness and efficiency. The highest level of control has to do with the achievement of the system's objectives and fulfillment of the designated functions of the educational system. Specifically, this control function involves to compare the goals with the outputs of the system, and to identify new objectives or needs in the

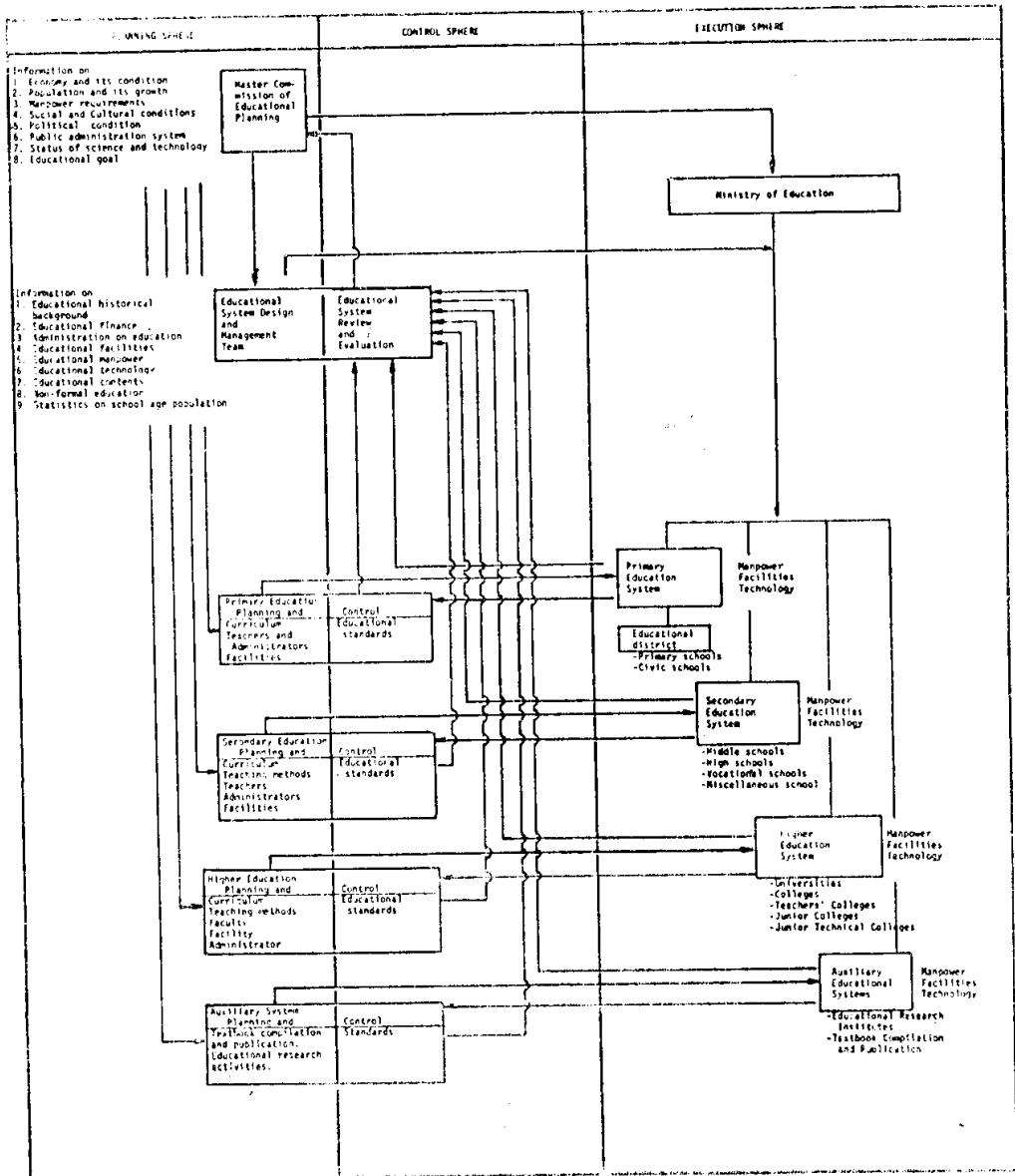


Fig. 1. A Model of Systems Management for the Korean Educational System

educational system in association with the society.

The sphere of execution contains the system of educational production which have been designed and created by the educational system's planners and management. These systems can be divided into operating systems which actually engage in educational production and auxiliary systems which fill supporting roles in relation to that production.

The execution function also has hierarchy. The highest level is the Ministry of Education and the lowest level is each operating schools. In the middle of the two is the educational district which is divided by province.

Throughout the spheres of planning, control, and execution, information flows vertically and horizontally. Each level of planning and control is connected by operational information as well as by feedback information. Both operational and feedback information flow horizontally through the three spheres. All three spheres are connected through the communication network, an essential part of systems management. The educational system is structured around the network and is integrated through it. Information also flows from the environment of an educational system into the communication network. The flow of information through the network facilitates the determination of systems, systems design and creation, systems operation and control, and systems review and evaluation.

In systems management of the KES, the highest level of organization is the Master Commission of Educational Planning. The main function of this commission is to make broad educational policies, to set goals, and to make decisions in a persistent effort to meet popular demand for education, to supply the manpower requirements as forecast, etc. For these purposes, the Commission seeks and receives information related to its environment, such as the economy and condition of the country, the population and its growth, manpower requirements in the future, social and cultural conditions—including the demand for education— political conditions, the country's system of public administration, the status of science and technology; it also receives information related to the educational system itself, such as the current structure of the system, the resources currently available to the system, and so forth.

In view of the importance and breadth of its function, the Commission needs to be composed of leaders in all walks of society. In the same reason, that should be placed at above the Ministry of Education, so its decision will be forwarded to the Ministry of Education for implementation.

Once the general policies and decisions regarding the educational systems have been made, design and creation of the system are in order. Inasmuch as no society is so underdeveloped as to lack an educational system alto-

gether, this means that structure and organization of the existing system must be revised so as to implement the new policies and decisions. The function in the KES is carried out by a team called "Educational System Design and Management". Part of the Ministry of Education, it consists of delegates from the ministry, educational researchers, school administrators at various levels, and representatives from other groups directly related to education. The team needs information such as the finance of education, educational administration system, educational facilities, educational manpower, educational contents and other nonformal educational system. With this knowledge, the team allocates the resources within the educational system to each operating or auxiliary system for the accomplishment of their specific tasks.

In the design or revision of the educational system, the team can apply modern analytic models developed in management such as linear programming, Markov chain analysis, planning-programming-budgeting-system (PPBS), cost-benefit analysis, simulation, and other quantitative analytic methods. But an important point is that an application of these techniques requires a comprehensive information system which can provide data for use in evaluating the existing system, measuring alternative resource allocation or assessing the return to investment in specific system design. Thus, the extent to which these techniques can be utilized will depend upon the information system in the educational system.

After the educational system is created or revised, the actual operation of each system must be planned. This operational planning deals with the development of curriculum and teaching methods as well as with the utilization of facilities, teachers, and other resources within each operating system. In addition to the operating systems, the KES must be supported by auxiliary systems such as educational research institutes, a bureau for the compilation and publication of textbooks and others. Naturally, all of these helpers are needful of planning for effectiveness.

The planning function may be further divided into operational planning for each school at all of the levels of education. This detailed planning for operation of a school is not considered in this program.

The outputs of the operating systems are known to the agents of the control function at the third level, i.e., the operational level and the control

function is performed in conjunction with the operational plan. At the same time, operational control sends information back to the Educational System Design and Management team, so that the team can review and evaluate the overall performance of each operating or auxiliary system. If the review and evaluation conclude that the educational systems are not effective, the system will be revised so as to improve the effectiveness. This information is fed back to the Master Educational Planning Commission for further consideration at the policy-making level.

Under systems management, the functions of planning, controlling, and operating the KES are directed toward the accomplishment of the objective. The KES is managed as a total system because the planning and controlling performed at each of the three levels are closely related, thus making the educational system goal-oriented and total system-oriented. Even though the prime goal of systems management is to achieve effectiveness, it is also directed toward obtaining maximum efficiency through operational planning and control.

Implications of Systems Management Model for an Educational System

It has been already stated that the utilization of systems management model in an educational system will satisfy the managerial requirements perceived by the educational leaders for more effective and efficient management of the system.

The effects of using the systems management model in an educational system are greater on the planning and control aspects than on the execution side.

The use of systems management model, first, will expand the scope of educational planning. In the traditional sense, educational planning is confined to the forecasts of such categories as enrollments, rates of academic advancement and graduation; needs for buildings, teachers and equipments; educational expenditures. This type of analysis is a necessary but not a sufficient basis for the establishment of the educational goals. Educational planning must seek to address questions about education itself; for whom, for what, and where, when, and how to do it. The systems management model will direct the planning focus toward these questions about education as well as the traditional ones. The model will

also change participants in the educational planning. Traditionally, the educational planning has been performed by experts. Instead, the educational planning under the model is performed by both the multiple publics who are affected by it, and the educational experts. Furthermore, the merits of systems management is that it clearly defines the hierarchy of educational planning according to its nature and who is to participate, at what levels, and in what activities. Also the planning process of the model will and result educational plans which are comprehensive and well integrated with general economic and social policy.

In conclusion, the systems management model will be most important managerial instrument to find solutions for the following questions about the management of education asked by an educational researcher.

What future, whose future? Education for what purpose, for whom, where, when, how? Who will decide the answers to those questions, in what process, on what grounds, by what means? These questions are universal, continuing agenda for planning. Unless the interdependences of these questions and issues at the global level are confronted, efforts to revitalize processes and strategies of planning in the 'seventies will fall short of their claimed purpose: to promote quality of life.'⁽⁷⁾

Some Other Requirements

The concept of systems management is a relatively new process for educational management. But the modernization of educational management requires many other developments. First, educational systems cannot succeed without the use of well-trained managerial personnel. The hospital system, for example, had suffered from problems of management until they were able to recruit and employ well-trained hospital administrators. Nowadays, educational systems have become so complex that they need professional administrators for the management of systems. Second, because of the complex problems and tasks that face educational administration, the system needs not only professionals who have skill and knowledge in management, but also many able educational researchers and analysts. When professional administrators are properly supported by a "team" of educational researchers

(7) Maureen M. Webster, "Converging Concerns of Futurists and Planners: Changing Viewpoints in Educational Planning in the the OECD Area." in Michael Marien and Warren L. Ziegler, Ed., *The Potential of Educational Futures* (Worthington, Ohio, Charles A. Jones Publishing Co., 1972), p. 62.

and analysts, they will be able to manage the complex systems effectively and efficiently.

Some of most critical educational decisions that require intensive research by educational analysts have been presented in Chapters II and III. The needed revolution in educational management will be materialized when a team of educational administrators can apply such scientific models of analysis to their educational system.