NASA TECH BRIEF

Probabilistic Approach to Long Range Planning of Manpower

The technological advances in such areas as electronics and aerospace engineering have been phenomenal since World War II. Formalized long range planning, however, has not kept pace with this general technological growth. In the last several years, papers on the application of "scientific approaches" to corporate long range planning have been published. All of these scientific approaches have been directed at only one phase or portion of the long range planning process—forecasting manpower requirements, allocation of available resources, project selection, etc. There has not been, however, any single effort which develops a total model for the complete long range planning cycle or integrates the work of others into a total model.

The problem generally encountered in long range planning is the development of a total system which encompasses all areas of the corporate structure. Associated with this problem is the proper identification of the factors which bear on the various sections of the planning agency and upon which estimates are made. In many instances, a major difficulty arises in selecting the proper data base and in gathering all this necessary information. Too often, problem areas are attacked on an individual basis without consideration of the resultant consequences.

A detailed study has been made of this problem and presented in: *A Probabilistic Approach to the Long Range Planning and Other Related Elements,* by Richard Andrew Lejk, Texas A&M University, May 1967. The problem presented in this publication is the formulation of a long range planning model for project oriented organizations. The total model consists of:

1. A planning system which originates at the project level and consolidates into an overall plan. This includes:
   a. The development of appropriate techniques for forecasting the number of personnel required for each individual project.
   b. The development of the distribution functions for the forecasted personnel requirements over the time span of the projects.
   c. The presentation of a method of consolidating the individual probabilistic forecasted manpower requirements into a total manpower plan.
   d. The presentation of a method for determining the associated totals for personnel and material costs, and acquisition, termination, and requirement schedules.

2. A planning system which orginates from a budgetary ceiling or objective and allocates to the individual projects. This includes:
   a. The development of the appropriate model(s) to forecast and allocate the total dollar value of the budget into budgetary limitations for each project.
   b. The translation of the project budgetary limitations into manpower and support requirements.
   c. The development of the distribution functions for the allocation of the manpower over the time spans of the projects.

3. Analysis of the results from (1) and (2) above so as to furnish management with the data necessary for appropriate decisions for project realignment and selection.

manipulation of the majority equations to fit the operation of the circuit elements. Minimum propagation delay through the network (elements in series) is stressed. Given nine inputs, an implementation has been devised which gives a "true" output when any five or more of the inputs are "true". Figure 2 shows a block diagram of 5-out-of-9 majority circuitry.

Note:

Inquiries concerning this invention may be directed to:

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Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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