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DEVELOPMENT PROJECT MANAGEMENT:  
AN INTEGRATED APPROACH TO PROJECT  
PLANNING AND IMPLEMENTATION

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AN INTEGRATED APPROACH TO DEVELOPMENT PROJECT MANAGEMENT  
(Overview)

Graduate School of Management  
Vanderbilt University

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DEVELOPMENT PROJECT MANAGEMENT:  
AN INTEGRATED APPROACH TO PROJECT  
PLANNING AND IMPLEMENTATION

AN INTEGRATED APPROACH TO DEVELOPMENT PROJECT  
MANAGEMENT (OVERVIEW)

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## To Potential Users of AID Project Management Training Materials

These materials were developed by the Graduate School of Management, Vanderbilt University under contract to the Technical Assistance Bureau (Office of Development Administration) of the United States Agency for International Development. The present unit is one of eight units:

### • An Integrated Approach to Development Project Management (Overview)

#### Learning Packages

- Planning Processes for Project Management
  - Volume 1 Narrative and Exercises
  - Volume 2 Readings
- Organizations and Project Organizing
  - Volume 1 Modules 1-2 (Project Organization  
Developing Project Organizational Systems)
  - Volume 2 Modules 3-5 (Staffing the Project  
Influence Processes  
Developing Human Resources)
  - Volume 3 Modules 6-7 (Team Building  
Motivating and Supervising Project Members)
  - Volume 4 Modules 8-10 (Conflict Resolution  
Planning for Acceptance  
Divesting Project Resources)
- Project Management Problem Solving
  - Volume 1 Narrative and Exercises
  - Volume 2 Readings
- Management of the Project Environment:
  - One volume
- Project Management Control Processes
  - Volume 1 Narrative and Exercises
  - Volume 2 Readings
- Technology Assessment, Transfer and Adaptation
  - Volume 1 Module 1 (Managing Development Project Technology)
  - Volume 2 Module 2 (Technological Factors in Development Project  
Generation and Preliminary Design: Narrative  
and Recommended Readings)
  - Volume 3 Module 2 Bibliographies, Cases and Exercises
  - Volume 4 Module 3 (Transferring and Diffusing Project Technology,  
Narrative and Recommended Readings)
  - Volume 5 Module 3 Bibliography, Cases and Exercises

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**Project Management Information Systems**  
**One Volume**

To benefit from these materials, users should recognize the intentions and limitations of their development and intended use. First, the materials were developed to reorient the training that is currently associated with development projects. The reorientation of these materials provides a perspective with an increased emphasis on management as a discipline, implementation of projects rather than improved or increased a priori planning and appraisal, and innovation as a necessary ingredient for successful development projects. A second intention was to supplement areas where other training materials were sparse rather than to add to those areas, such as economic and financial analysis, in which good materials already exist. However, since the areas purposefully ignored by this materials development effort are also crucial to improved project management, references are made to other sources. The intention is that these newly-developed materials would supplement previously existing materials to provide a more comprehensive training program potential.

The materials are not intended for self instruction although the introductory papers and readings in the various learning packages could certainly be used by individuals to increase their knowledge about project management. The materials have been developed for use by trainers who will make selective usage and modification as necessary to meet their specific training needs.

Finally, it is suggested that the overview volume on project management be used to introduce the subject matter of any learning packages that are adopted. The purpose of the overview volume is to provide a conceptual

framework which places the content of a particular package into an overall perspective of project management. This does not mean to imply that the volume must be read by all trainees; it is merely a suggestion to trainers that an overall framework be provided initially by some means since each learning package treats only one of many crucial aspects of project management knowledge and skills.

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AN INTEGRATED APPROACH TO  
DEVELOPMENT PROJECT MANAGEMENT:  
OVERVIEW

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Development Project Management:  
An Integrated Approach to Project Planning and Implementation

Purposes

This overview paper was written as an introduction to materials developed by the Graduate School of Management, Vanderbilt University, under a contract with the A.I.D. Office of Development Administration. The purposes of the paper are:

1. to provide a conceptual framework of development project management which emphasizes
  - a. the implementation or execution of projects,
  - b. a managerial, multidisciplinary approach, and
  - c. the development project as a vehicle for introducing innovation into the development process;
2. to integrate the separate learning packages which contain training materials on subtopics of project management; and
3. to point out areas or topics of project management for which training materials are not provided by the collection of learning packages but are available elsewhere.

Usage

The overview paper is intended for use as an introduction to a single learning package or as a preliminary topic in a training seminar. It may be provided as a preparatory reading to trainees or the framework may be modified and used as an initial lecture in a training program. The overview paper and the introductory papers of the learning packages treat project management as a generic subject matter--that is, the descriptions and suggested concepts and methodologies are intended to be applicable to a wide variety of development sectors and conditions in developing nations. This minimized the opportunity to provide specific

descriptions and recommendations at a very detailed level. Supplementary training materials must be included in any training program to provide the detailed, specific context of project management that is needed by the participants. That is why this material is intended for use by indigenous training institutions who can provide supplementary cases, internships, field studies, and prescriptive methods that are consistent with local mores, values, laws, demography, politics, economic conditions and other cultural aspects.

Semantical differences as well as translation difficulties inhibit communication on the subject matter of project management. Consider, for example, the terms "appraisal" and "evaluation." To some assistance agencies, appraisal means a priori evaluation of projects on the basis of a relatively fixed format (based primarily on economic and financial analysis). To some other agencies and institutions, appraisal means a broad feasibility analysis involving field studies with potential clients, beneficiaries, consultants, and resource providers. Similarly, evaluation often means ex post analysis of project results and effects. It is also used, however, to mean a priori analysis of project feasibility or intermediate status and progress analysis (which is often referred to as control). Because of this varied use of terms, we suggest that users of these materials refer to the glossaries that are provided and recognize in advance the meanings that are associated herein with terms that may have common alternate meanings. It is not necessary to adopt this terminology, but it is essential to agree on common meanings throughout the training programs.

**NARRATIVE**

AN INTEGRATED APPROACH TO DEVELOPMENT PROJECT MANAGEMENT

By

H. Raymond Radosevich\*

The dissatisfaction of international assistance agencies with progress under national development planning and project-by-project investment strategies is resulting in significant changes in the direction of their development assistance efforts. Neither traditional approaches to national comprehensive planning based on macro-economic analysis nor project development based on economic cost-benefit analysis and low risk investment have succeeded in generating the desired conditions for socio-economic progress and the reduction of poverty in less developed countries. World Bank President Robert McNamara recently informed the World Bank Group Board of Governors, "Despite a decade of unprecedented increase in the gross national product (GNP) of the developing countries, the poorest segments of their population have received relatively little benefit."

Another approach is emerging which emphasizes the essential role of project planning and management within a broader framework of sectoral programming. The World Bank, for instance, has expanded broadly the scope of its project lending. Both the number and types of sectors for which project proposals are considered and the concept and definition of projects themselves have been broadened. Lending priorities have been expanded from traditional physical infrastructure and industrial projects to agriculture, education, population planning, tourism, transport, housing and urban development. More emphasis will be placed on policy and institutional change to insure that the capital

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investment aspect of projects is as effective as possible in generating economic development and widespread distribution of project benefits. While sectoral planning and programming is not new, there appears to be a marked increase in the emphasis in promoting projects which fit into an integrated scheme of sectoral development.

Similarly, the U. S. Agency for International Development (USAID) has turned to a sectoral programming and planning framework for its assistance activities. USAID will place increased emphasis on innovative activities, utilizing a more collaborative style of assistance, with developing nations placed at the center of aid efforts. Programs and projects will be chosen through sector analysis. Assistance funds will be concentrated on a few major human problems within three key sectors: food and nutrition, population planning and health, and human resource development. Selected development problem sectors will also receive attention: transportation, urban and regional development, and science and technology transfer. Projects and programs will focus more clearly on the goals of income redistribution and reduction of unemployment in developing countries. Projects will be designed to reach the least prosperous groups within developing societies. Both USAID and the World Bank are concentrating on the better integration of technical and capital assistance in sectoral project planning and implementation. Similarly, regional funding agencies -- the Inter-American, Asian and African Development banks -- are adopting sectoral frameworks for project investment.

This shift in emphasis results from a growing recognition that previous development efforts have suffered from the fragmentation of project activities and from a lack of indigenous management capability. Economic and financial appraisal of projects has improved considerably in the last decade in many less developed countries. Yet these appraisals, regardless of how well they are

performed, are only part of the required planning process. Good planning facilitates implementation, but project implementation requires highly competent indigenous project managers. Development of effective project management capability in less developed countries must accompany improved utilization of economic and technological resources. Traditional approaches to managerial training -- based on legalistic, centralized, regulatory procedures and techniques which promote efficiency and economy in organizational operations -- are not adequate to deal with the dynamics of change. Increased change and rates of progress are required to satisfy national needs in a wide variety of development sectors.

Sector and program-based project development points the way for an integrated strategy for project planning and management, both in the design of operational systems for project implementation and in the training of indigenous project managers. If future sectoral and program objectives are to be achieved, institutionalized, formal processes must be developed for linking and integrating the project management functions -- project generation, resource mobilization, project formulation, preparation and appraisal, coordination, control and evaluation. A new type of project manager must be developed who perceives projects as complex systems of activities and functions, and who has the managerial capability to guide these functions toward attainment of sectoral objectives.

An integrated approach to project planning and implementation will require the formulation of new management guidelines that are adaptable to specific conditions and environments of a wide variety of sectors in less developed countries. Much work must be done to develop management concepts that are appropriate to projects for improving subsistence agriculture, water

supply, health care, and other diverse development activities. These concepts may be borrowed and adapted from project management theories and practice in developed countries if the user in the less developed country modifies them properly. This modification process will require experimentation by LDC project managers whose experiences can guide the adaptation to sectoral and local conditions. Training programs, methods, and materials must be developed to improve the concepts and utilize them with better management applications of knowledge and skills. This paper will examine the nature of sectoral project planning, the managerial implications of the trend toward sector and program-based project development and the managerial functions of sectoral project planning and implementation. The aim is to describe the elements and functions of development project management and to summarize the managerial knowledge, skills, techniques and procedures that are required to operate an integrated project planning and implementation system.

### The Nature of Sectoral Project Planning

The emphasis on sectoral project and program investment implies substantial changes in project planning, management, and evaluation procedures. The new approach will be more complicated than traditional project administration because it more realistically recognizes the complexities of the development process. Characteristics that are of marginal importance in project-by-project development will be critical to the success of sectoral analysis and program planning. Sectoral project management will be characterized by:

1. Increased complexity;
2. Increased difficulty in measuring costs and benefits (since increased emphasis is placed on indirect effects of the project);

3. Increased importance of non-financial selection variables and non-economic outputs;
4. Sharing of reduction in project management organizations' control over essential inputs, resources and powers;
5. Increased importance of spillover effects, interdependencies and linkage relationships;
6. Increased sources of risk;
7. Multiplicity of goals and purposes in program and project initiation and selection;
8. Increased importance of recognizing cultural differences in program design and project execution; and,
9. Greater need for decentralized procedures of coordination and integration, expansion and diffusion of managerial capability, and project management institution-building.

The selection, appraisal, and implementation of sectoral development projects is more complex than project-by-project investment. The expansion of the number of sectors open for project funding requires new analytical techniques and administrative procedures. Present techniques are most appropriate for relatively narrow and well defined fields of physical infrastructure and industrial development rather than the less easily bounded sectors of social and human resource development. Appraisal and selection can no longer be based merely on economic costs and benefits of the projects themselves, for analysis must focus on the impact of projects on political, social and organizational change, and on sectoral and regional development. The inaccessibility and unreliability of data and information for project appraisal in social and human resource development sectors make calculation of cost-benefit measures more difficult. Yet non-financial criteria become increasingly important as the demand for socio-political and behavioral outputs, such as increased literacy and health standards, receive higher priority. The functions of project planning and implementation will continue

to be divided among a wide variety of organizations both within the governments of developing nations, and among external technical and financial assistance agencies. As more projects are generated and appraised on the basis of their potential contribution to sectoral development, and as the number of sectors eligible for project funding increases, project managements' influences over needed resources will also become more fragmented and difficult to control directly. Complexity, fragmentation, and uncertainty increase the spillover effects and interdependencies between project organizations and their external environments, among projects within sectors, and among sectors within developing nations. If projects are to make tangible contributions to national growth and modernization, sectoral program and project planning must reconcile priorities in the development process. As sectoral plans evolve in a wide variety of geographically dispersed areas, planning and analysis must account for cultural differences in program design and project execution. This complex administrative environment creates the demand for new and innovative procedures of project management, coordination and integration. The emerging system of sectoral project planning highlights the need to expand and diffuse managerial capability in developing nations and to create institutions capable of planning, appraising and executing sectoral projects.

#### Creating Sectoral Project Managers

The pursuit of an integrated approach to sectoral project planning and implementation makes necessary the creation of a new breed of project manager. Sectoral project managers must be selected from indigenous managerial resources

who exhibit the potential for institutional entrepreneurship and the capability of coping with complexity. In many less developed countries, experienced managers are a scarce resource. Not enough managers exist who have formal training in project management. Training programs to remedy this problem are also in short supply. If sector-based projects require immediate talent beyond that which is available locally, counterpart indigenous managers must be provided in order to use the project as a training experience. In this manner, the supply of experienced indigenous management will increase. This will be necessary for future expansion of the development process. The nature of sectoral project development will require both new styles and techniques of management and new means of developing and diffusing managerial capability. Traditional management approaches based on central direction and control are generally ineffective in complex administrative environments. These approaches must yield to a collaborative, problem-solving approach in which project managers and other administrators seek integration of activities through mutual cooperation. Because uncertainty is high and knowledge of sectoral development is low, highly authoritarian management styles and practices will be less effective in project planning and execution. The new breed of entrepreneurial managers can bring new and essential knowledge and skills to the process of project management as it is practiced in less developed countries; they can be change agents in the project management process.

The term "project management" has been defined in practice and in the literature to include both the process and the physical entity through which project management functions are performed. Project management is defined here as a process -- the activities that are performed in project planning and implementation such as problem identification, feasibility analysis,

resources mobilization, work scheduling, progress evaluation and control and output transfer. The entity through which project management processes are performed is composed of human elements (project managers and staff) and tangible physical components that contribute to performance (equipment, budgets, reports, studies, and facilities) within a project management organization.

Project management encompasses all the tasks necessary to bring to the planned activity the point where the more or less routine production of goods or services takes place. Once the project is in routine operation, the project can be said to have terminated and turned over the "Management." This dichotomy between Project Management and Management must be hedged in three respects.

First, project management or the project manager is deeply concerned with making suitable provision for the full life of the project. The project is designed to "operate" and the appraisal of its flows are in terms of both the installation of the project and production and utilization of output. Thus one designs a steel plant for conditions that are projected for the next 20 or 30 years of operation even though the project manager may terminate his activity in five years.

Second, the point at which the project manager terminates his activity is not always the same. The transition from build-up of facility to "steady state" operation is often a long one, so that it is not unusual for the project manager to stay on to ease the transition. In the case of a steel plant, it may take two to five years from the start of operation to reach full capacity production.

Third, for some projects innovation, uncertainty and multiplicity of goals and purposes may be characteristic for virtually the entire life of the project. An agricultural project may require considerable innovation to accommodate new varieties and other changes arising from research, coping with pests and changing market conditions.

The way in which the project management process should be performed depends upon a number of characteristics of the project. Some aspects of the process are common to most projects and it is the purpose of this paper to establish those general aspects. However, the differences must also be noted, and trained, experienced project management capability should be developed to respond to the particular circumstances of each project. The development of the concepts and training programs to meet this need will require many more comparative studies of the projects. In the meantime, some of the obvious dimensions of projects which would suggest altering the general project management process include the sector (as previously discussed), the size of the project, its importance and urgency, the expected time duration, the technological complexity, and the stage of the project. The term stage refers to its being either an experimental, pilot, demonstration or capacity expansion project. These types of projects are described below. Projects that are small in size or of short time duration will often be formed as a task force with personnel borrowed from more permanent organizations, perhaps on a part-time basis. Few formal management systems and procedures will be developed; plans and budgets will not be established with great detail. Conversely, very large projects or those expected to last several years or more, will tend to develop very formal organizations and management systems. A project that is viewed as extremely important or urgent may

have plentiful resources assigned to it so that considerations of cost become less crucial than assuring early completion or satisfactory performance. A project with high technological complexity will require management skills in utilizing expertise from various disciplines and may require the transfer and adaptation of foreign technologies. The management process may be facilitated if managers have some training in the technical areas that are most important to the project.

In an analogous fashion, the project management organization is likely to be configured in a manner that best fits the peculiarities of the management process. For example, if a project is large and extends for a significant duration, formal policies and procedures, job descriptions, and communication channels are likely to be established in the project management organization.

The creation and training of sectoral project managers must focus on five major functions: project identification; project formulation, preparation and appraisal; project activation; project implementation, coordination and control; and project termination and output transfer. Each of the functions will be discussed later in more detail.

#### Creation of Project Management Organizations

A common cause of failure in the execution of development projects is the lack of a project management organization to integrate and coordinate project management processes. Currently, development projects are often administered through the transfer of responsibilities and functions between individuals and organizations. A planning ministry staff, for instance, might identify the project through analysis of regional or sectoral needs, while the staff of a multilateral donor prepares economic and financial feasibility studies for funding, and passes the approved project on to one or more

government agencies or private sector organizations for implementation. Without a project management organization, project coordination takes place through the formal or informal transfer of authority, information, and funds across organizations, departments and agencies as the project progresses. Often there is a lack of commitment to the process as a whole; individuals and institutions are concerned only with specialized fragments of the project, resulting in loss of direction, confusion, and dilution of efforts in achievement of project management objectives.

Establishment of a project management organization can facilitate proper integration and coordination even if many institutions are involved in project management activities. A project management organization can vary in size from a single individual manager for small projects to a team of managers and staff for larger, more complex ventures. Sufficient managerial talent must be provided to create a permanent nucleus of managerial capability, which can be reinforced by expertise and support from other organizations during the life of the project. Either a single responsible official or a team of indigenous project managers must be assigned to the project at the conception stage. The project management team can be the core of managerial resources drawn from a variety of specialized institutions and constituencies. A cadre of sectoral project managers possessing general knowledge, skills, and experience in the project management process as well as specialized knowledge applicable to specific development sectors, must be recruited and trained. They must know and understand the people and institutions within particular regions or sectors that can provide or withhold the support, legitimization, and funds required for project completion, as well as the needs and expectations of those who are affected, directly and indirectly,

by project outputs. Sectoral project managers must be organizational entrepreneurs, capable of identifying and mobilizing dispersed resources, and integrating and coordinating diverse individuals, institutions, and activities to achieve desired objectives.

#### Development Projects and Programs

The implementation of sector planning for national and regional development depends, ultimately, on the design and execution of programs and projects. The terms "project" and "program" are used diversely by international assistance agencies, national development banks and agencies within developing countries. The fundamental differences between programs and projects are in their scope and objectives. Projects may be defined as investments to develop new capabilities for the provision of goods and services. Projects are usually selected to meet identifiable development needs, to satisfy the existence of domestic demand for products or services, to exploit for productive purposes locally available natural and human resources, and to produce goods and services for export. In addition projects are a means of creating social overhead capital (physical infrastructure) that allows productive activities to be performed more effectively or efficiently. Development projects are viewed as special types of investments related to minimum size, specific location and the expectation that further development will follow.

Programs, on the other hand, have a somewhat broader connotation. They are sets of socio-economic activities generally involving the expenditure of funds to establish or improve the quality and quantity of services and goods. Programs may include both capital investments and operating outlays made by a single organization or by a number of agencies from a single

budgetary allocation. In other cases, programs may receive financial support from a variety of budget sources and encompass a set of organizational actions directed toward attainment of a mission set by broader national policies.

Regardless of organizational and budgetary structure, programs are implemented in large part through the execution of development projects. Projects, as subsets of program activities, are usually more narrow in scope and subordinate to program purposes and objectives. But projects cannot always be differentiated from programs merely in terms of size and complexity: single projects in one sector may be larger and more complex than entire programs in another sector. Similarly, because of their complexity and interdependence, projects or programs undertaken to achieve specific goals may have positive or negative spillover effects on other programs and sectors.

Thus, projects are usually limited in scope and aim to achieve specific program and sector objectives. They are designed to be completed within given periods of time and are generally limited to a specific location or geographical area. The need for scarce social, physical, economic, and human resources imposes additional constraints on the scope and size of the projects. Defining proper project scope, and redefining it at various stages of the project life cycle, are critical functions of project management.

#### Types of Projects

Development projects, by their very nature, are risk ventures which commit investment of scarce financial, human, and physical resources to uncertain results. While effective planning and management can anticipate and reduce some of the uncertainties, they cannot eliminate them; thus the need for a problem-solving, resource mobilizing, collaborative style of management. Projects, aside from their expected routine production

activities, perform other critical development functions; they are often experiments -- attempts to discover unknown factors affecting socio-economic development. They can serve as instruments to test new processes, procedures and techniques on a pilot basis and to demonstrate the effects of innovation in such a way as to encourage diffusion and adaptation of the more productive methods. It is on these roles -- projects as vehicles for the generation, testing and diffusion of innovation, rather than as routine production facilities -- that this paper focuses its major emphasis and concern.

This does not imply that all projects require substantial innovation. The majority of financial and physical resources for development are allocated to projects which reproduce and add to physical productive capacity of a country. Innovation is emphasized because even routine projects can be implemented more creatively and, secondly, because much less is known about how to manage those projects in which innovation is an essential ingredient. This lack of knowledge is reflected in current management practices which stifle creativity in those projects which need it most.

Projects which promote innovation in the development process may take three basic forms: experimental, pilot, and demonstration. Sectors such as health, education, or nutrition that are primarily concerned with the "quality of life" or development of social infrastructure have many projects that are one of these types. A fourth type of project, less concerned with diffusing social change, is discussed below under the title of capacity incremental projects.

#### 1. Experimental Projects

Experimental projects attempt to define problems and to isolate and assess alternative possible solutions. Experimental projects are particularly

appropriate when problems are not well articulated, elements of the problem have not been clearly identified, solutions have not been widely explored and tested, and when the results of action cannot be easily anticipated or predicted. Experimental projects evaluate alternative possible solutions either simultaneously or sequentially and allocate resources to alternatives that exhibit the highest probabilities of success. Sectoral projects have many elements that are experimental in nature. Conditions rarely can be controlled, variables identified and tested, and outcomes isolated in the same way that laboratory experiments examine physical problems. If technical or economic uncertainties are the major obstacles to development, then projects which transfer and adapt methods tested in other countries and sectors on an experimental basis may speed the development process. If problems arise from unique cultural or ecological conditions, as is often the case in agriculture, population planning and manpower development sectors, experimental projects focus on the search for new solutions that are especially suited to constraints imposed by local conditions.

Experimental projects are generally small in scale, demanding a large degree of freedom of action; project managers and sponsors must be flexible. Experimental projects must be allocated resources that are free of demand for short term, and direct, economic returns. Because experimental projects attempt to develop and evaluate alternative methods of reaching a given set of objectives, stimulating the diffusion of results is left to follow-on pilot and demonstration projects. Experimental projects may involve a few sponsoring or participating organizations and a relatively small sample of potential beneficiaries. They often require only a minimum financial investment, but may command a strong commitment of scarce professional and skilled manpower.

## 2. Pilot Projects

The purpose of a pilot project is to test the applicability of a new method or technique under a novel but precise set of circumstances and to take what was seemingly the best solution from an experimental project and test it in a variety of environments. The pilot project may test selected alternatives with new combinations of inputs, the substitution of local resources, or modified output specifications. Thus, pilot projects are designed to achieve two goals: to test the applicability of possible problem solutions under a set of varied conditions, and to define the limitations of experimental solutions in applications.

In carrying out an experimental project, one makes use of personnel, techniques and procedures which could not be used in regular large scale projects. For example, a new crop variety might have been tested in an experimental project in experimental stations using irrigated land in order to achieve better control over variables and to save calendar time. Having gained a knowledge of the potential of a crop under varying moisture, fertilizer and tillage practices, one would want to test the variety under conditions that more closely approximated the conditions under actual large scale applications such as dependence on rain, farmer operation, etc. Those designing the pilot would attempt to use the same kind of cadre personnel and other conditions that would exist in a large scale project.

Because a pilot project has a high overhead in relation to its coverage, taken by itself the value of outputs may not be large enough to justify its inputs. As in the case of experimental projects, an important output is knowledge that will be useful in a large scale project. Difficulties revealed in a pilot project often indicate a need for further work so that "bugs can be worked out."

In addition pilot projects often perform valuable political functions in developing nations. They allow the testing of new ideas or methods under local conditions without committing national leaders to large-scale, uncertain ventures, the failure of which would threaten their political status and support. Foreign methods, innovative techniques, radically different social or behavioral patterns, or organizational reforms often can be tested on a small scale without incurring massive resistance or obstruction by those benefiting from the status quo.

Effective pilot projects often require a substantial period of time to exhibit definitive results. They may be used, however, to train both managerial and operational staff and as instruments for building support and sponsorship for more widespread demonstration and adaptation if pilot tests prove successful. It is often easier to attract competent professional manpower to pilot projects which are executed under more flexible conditions and allow professionals to play a more direct role in implementation and management.

### 3. Demonstration Projects

Demonstration projects aim to exhibit and diffuse new methods, techniques or activities that have proven to be superior to traditional approaches or that have solved similar social and economic problems under similar conditions in other nations or sectors. They may be used to diffuse methods and techniques that were explored in experimental stages and tested in pilot projects and found workable on a limited scale. Demonstration projects may also serve to generate additional information, facilitating replication under appropriate conditions at different locations or on a larger scale. The problem of scale is critical in diffusion of methods and techniques that were found to be feasible under experimental and pilot conditions, for the increase in scale in itself often generates problems that could not be anticipated or tested in pilot projects. Many development ventures such as the miracle rice projects that formed the basis of the Green Revolution in Asian agricultural development go through quite distinct experimental, pilot, and demonstration phases. It is not unusual to find drastic changes in operations, sponsorship and management as the projects evolve from one stage to another. Some large, multinational donors are primarily interested in financing projects that have already reached the demonstration stage and are conducive to widespread replication, leaving the support of experimental and pilot projects to indigenous governments, research institutes or a few international foundations. In other cases, elements of all three phases are combined in a single project. Combination of phases may result from time pressures to solve urgent problems or from the need to satisfy political demands.

As "packages of innovations" demonstration projects must possess certain distinctive characteristics in order to make the desired sectoral impact. They must yield significant social and economic returns, be novel in the sense that they contain at least one key innovation, and be complementary

in that they include all of the practices required to support the key innovations. They should also generate strong appeal among those who are expected to adopt the projects' outputs and among change agents such as agricultural extension service personnel who are responsible for disseminating and facilitating their adoption. The outputs of demonstration projects should be compatible with existing cultural conditions and simple enough to be managed and utilized with a minimum level of skill. Knowledge, materials, and credit required for adoption must be readily available. Effective demonstration projects should involve low risk for those expected to adopt and utilize outputs or replicate the project, have a short payoff period and be expandable. Finally, the results of the demonstration project should be easily visible, communicable and reliable if it is to be replicated in other locations. In the dramatic shift from project-by-project funding to sectoral project investment, it is precisely these types of projects -- experimental, pilot and demonstration -- that will be critical to the success of international development assistance efforts and most particularly in those projects that contribute to social programs.

#### 4. Capacity Building Projects

Projects whose primary purpose is the building of capacity to produce goods and services are distinct from the previous types of projects because the main outputs are neither information or demonstration effects. Examples of capacity building projects would be a large scale rice growing project, a bicycle plant, extension of a section of an existing road or the creation of a network of health clinics. Most development projects are capacity building projects.

As compared to experimental or pilot projects, capacity creation projects have fewer uncertainties and are less innovative. But this is only comparative. Many capacity creation projects will be an increment to an existing system. In that case, experience from the existing system helps to identify potential problems and bottlenecks in the early project planning stages. Even if the activity is entirely new for the country, the technology is likely to be a proven one so that the experience elsewhere in the world is helpful.

Nevertheless there will still be considerable innovation, uncertainty, complexity and pressure to start producing output at an early date -- factors that point to the need for aspects of project management espoused in this paper.

Capacity projects can differ with respect to a number of characteristics:

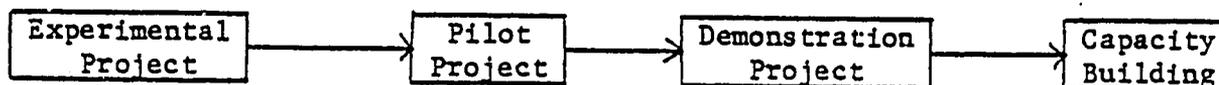
Market vs. Non-Market Orientation -- Depending on the nature of the project and government policy, projects can be oriented to a market or cater to a non-market oriented need. Indicators of success are more straightforward for market oriented projects, but both require careful controls.

"People" Component of Projects -- Projects will differ to the extent to which people are involved in projects. Some projects (such as agriculture projects) involve motivating large numbers of people so that the behavioral component bulks relatively large.

Complementarity -- Projects will differ to the extent to which they are complementary with other projects. Some projects have meaning and payoff mainly in relation to a synchronized timing with other projects (e.g., cement for a road building project). Other projects are extensions of existing systems and make sense only in relation to an enlarged system (extensions of water system, communications, electricity, etc.). The proposed project in such cases is highly complementary to past projects presently in operation and must be judged in relation to the enlarged system.

Services vs. Hard Goods -- The form of the output can be services or hard goods. In the case of services, quality considerations can be important and difficult to control.

The sequence will ordinarily be:



Since going through such a sequence is relatively costly, it will pay to do so only where it is reasonable to expect that the capacity building project will be sufficiently rewarding to warrant the cost of the entire sequence. There are relatively few cases where the full sequence has been carried out. One could argue that the scope for such sequences is much greater than what has taken place in the past.

Most development projects are capacity creation projects. Fields that are particularly suitable for the sequence are those involving agricultural breakthroughs, potentially large new industries like lumbering or fisheries, and important fields of endeavor that are very sensitive to cultural variables such as family planning, health or education. These are projects with considerable uncertainties that can be reduced by experimentation and pilot operations. Even in such instances, it may not be necessary to go through the entire sequence.

In actual practice the sequence is not followed as smoothly as the above diagram indicates. One may start with an agriculture pilot project based on previous experience and find that some aspects require an experimental project and the results of the experimental project may feed into a capacity building project. Industrial projects will generally start off as capacity building projects based on industrial experience elsewhere due to the relevance of such experience and the advantages of scale.

A summary of the purposes of the four major types of projects described above is provided in Figure 1.

<u>Type of Project</u>	<u>Purpose</u>
Experimental Projects	Definition of problem. Determine desirability (efficiency, timing, quality or whatever value is desired) of promising alternatives under controlled conditions.
Pilot Projects	Test alternatives under operational conditions that will be encountered in larger scale operation.
Demonstration Projects	Exhibition of the usefulness (superiority to traditional approaches) of innovative methods chosen as most promising.
Capacity Creation Projects	Building capacity to provide more goods or services.

Figure 1. Various purposes of development projects

## Project Management As A Complex System

Project management is a complex system of functions and activities aimed at producing measurable outputs for achieving specified development goals and objectives. The project itself is a complex system of elements and facilities that must be managed within an integrated planning and implementation framework. Because projects are complicated systems, the nature, characteristics and components of project management can best be explained in the language of systems analysis. A system can be defined as a set of interrelated elements and subsystems whose state is conditioned by and dependent on the state of other couples elements. Any system is composed of a set of boundaries that describe the scope, that is, the environment as compared to the internal portion of the system. The structure is composed of specific subsystems and elements or components aimed at attaining well defined purposes through processes linked by a set of dynamic relationships. Projects and project management, as complex systems, may be described in terms of their boundaries, structures, elements, purposes, processes and relationships.

Defining system boundaries addresses the difficult issue of deciding on the configuration of the project, its internal components, and the scope of the elements to be excluded from direct consideration. Those components or elements not included within system boundaries become a part of the project's external environment. Most development projects are open systems (with fluid boundaries), consisting of a set of dynamic relationships between

internal and external components of the project.

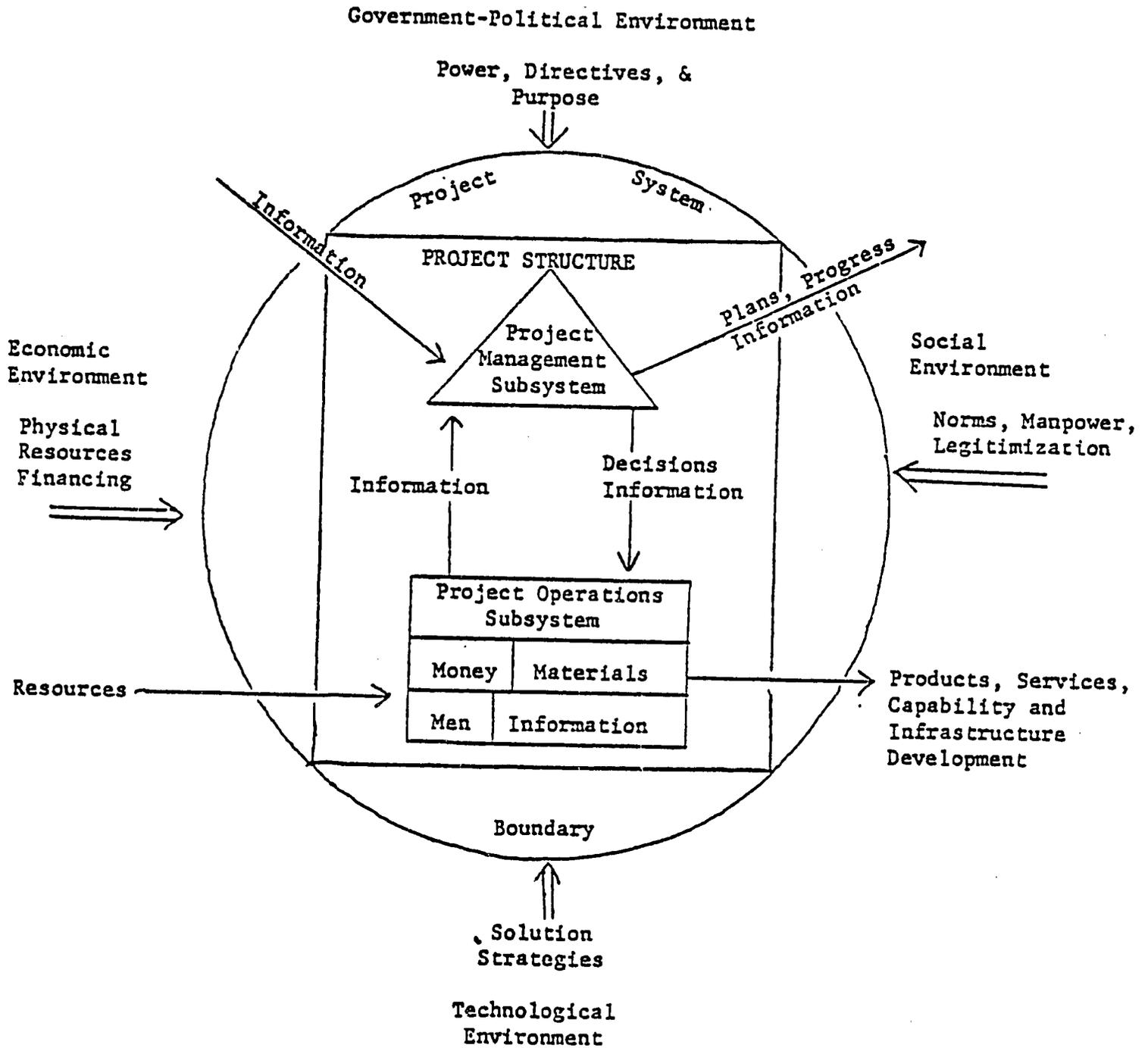
The structure of a system is the arrangement of its elements or components; structure defines how pieces of the system are linked together. Structure is affected by and in turn affects, to differing degrees, the boundaries, components, processes and relationships. Where relationships change quickly the structure is considered dynamic; less rapidly changing structures are steady-state; and structures that are insensitive to linkage changes are considered static. All changes over time in resources, information or elements within a system are processes. A process is the means by which resources are transformed within a project or program to produce final outputs.

A detailed description of a system requires the identification of its elements or components, which combine to form subsystems -- those activities or units which carry out distinct and separate processes within the system. The number of elements specified depends on the purpose of the model. The purpose of a system is its mission or objective, that is, the goal it is seeking to attain.

The system relationships are interactions among elements within the project and among internal elements of the project and those in the environment. Relationships are formed through internal and external linkages.

A simple abstraction of a development project system is shown in Figure 2. Project operations subsystems are a series of project activities that are necessary to accomplish the project mission. In an irrigation project, for instance, these activities would include construction of levees, ditches, and pipelines, purchase and installation of pumps, and organization of a flow-regulation authority. The project management subsystem within the project structure receives information both internally from project operations

Figure 2 : The Development Project as a System



subsystems and externally from the environment. The project system's environment creates the parameters within which internal operations must be conducted: authority, directives, and purposes are often set or strongly influenced by government or other organizations within the political arena. Physical and financial resources are supplied, or constrained, by the level of the development of the national economy. Norms, human resources and social legitimization of project activities are provided through linkages with the social system. Alternative solutions to development problems are determined in many cases by the state of technological development. Thus, some mix of political, governmental, economic and technological influences outside of the project system's boundaries form the environment within which project management functions must be performed. The boundaries of project systems are usually quite flexible and subject to change as the project implementation progresses. Just as environmental factors influence the operation of the project management system, successful projects produce outputs that change the environment. Through mobilization, transformation, utilization and recombination of financial, material, human and information resources, projects produce goods and services, increase decision-making, managerial and technical capabilities of participants, and improve the environmental infrastructure that allows developmental growth.

#### Project Management Functions

The success of development project systems depends, ultimately, on the successful performance of project management functions. Within the broad systems framework that envelops a project structure, is a specific set of components, processes, and relationships that must be planned and coordinated. Internal decision-making and operating processes must be integrated, through the management of complex linkages, with the environmental pressures and

forces exerted on the project organization. Project management functions include both highly analytical and quantified processes of planning, appraisal, programming, scheduling and controlling of material and financial resources and production activities, and, more ambiguous and less quantifiable functions of problem solving and of organizing, motivating, leading, coordinating and redirecting human resources and social and political influences.

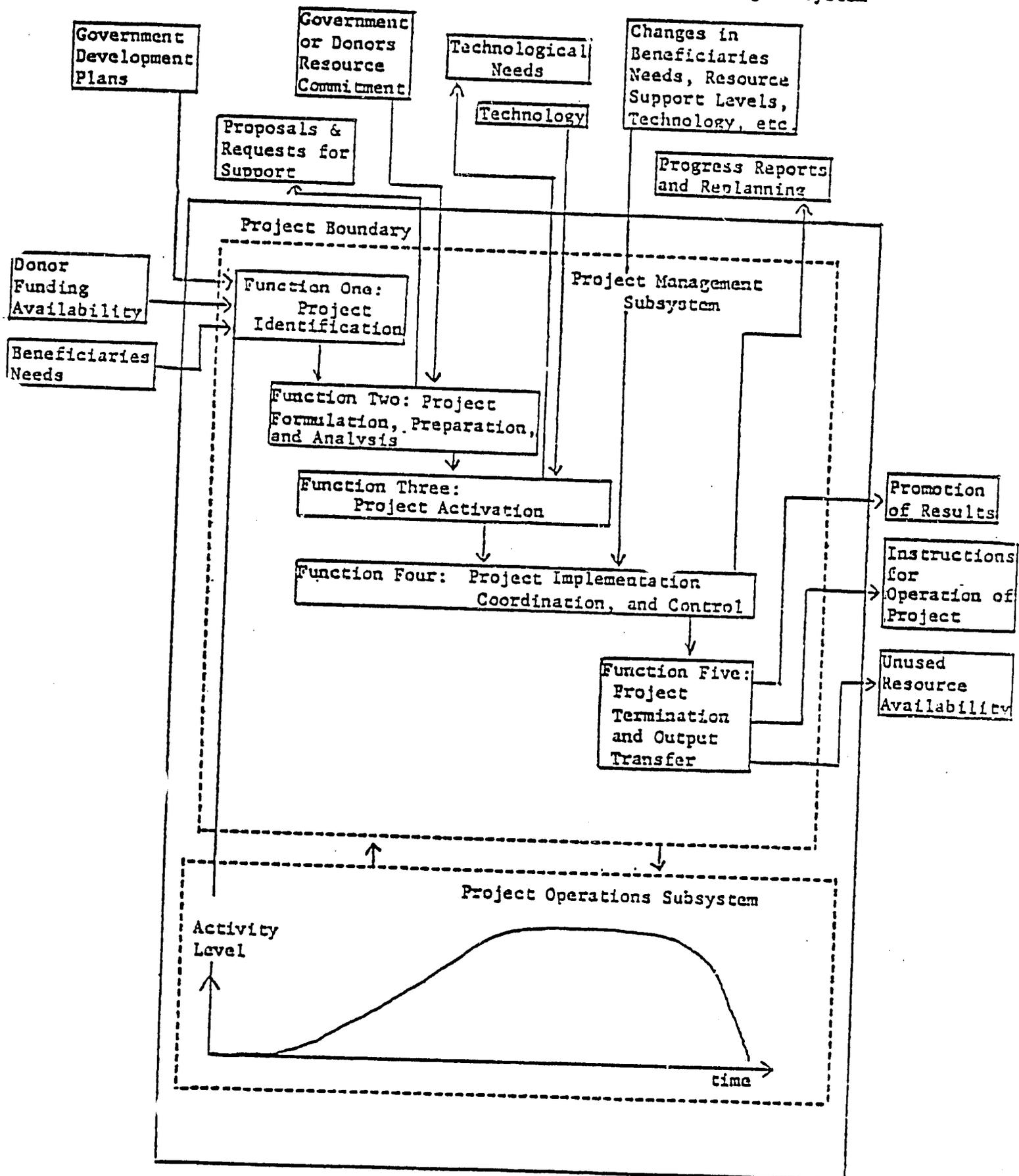
An essential aspect of management of any project, therefore, is the combination and proper balance of functions, integrated in such a way that project organizations can be guided to achieve their purposes and objectives. Project management involves five primary categories of functions and a subset of associated managerial activities. (Figure 3) The functional categories of project management described below imply a sequential relationship. Yet, in reality the sequence may not be strictly linear; the functions are inevitably and inextricably interrelated. Some functions may permeate the entire project management process; others may be iterative. Some may arise in a few aspects of project management and not in others. Still other functions depend on a set of prerequisites and cannot themselves be performed until a sequence of events has occurred.

An integrated approach to development project planning and execution involves five phases or categories of management functions:

1. Project Identification

Project identification is the analysis of needs and unmet demands and the transformation of those needs and demands into problems sets that can be solved through the successful implementation of development programs and projects. Projects may be identified and defined through a search of the

Figure 3: A Functional Description of the Development Project System



project environment or through the response to a set of political, economic, social or technological pressures.<sup>1</sup> Project managers must translate broad needs-analyses into definitions of project purposes, boundaries and relationships, and define alternative means of structuring linkages in such a way as to provide a base of support for project formulation and preparation. In this phase of management, project planning is initiated at a general and highly aggregated level, but project planning, control and replanning imbue the entire set of management functions and activities that follow.<sup>2</sup>

## 2. Project Formulation, Preparation and Appraisal

This phase of project management is the first firm step toward building a project structure and testing its economic and social feasibility. If a project is to be successful, it must have adequate resources. Once a potential project is identified, it must be formulated into a preliminary proposal and initial steps must be taken to mobilize necessary inputs. Funding sources must be identified, controllers of human, financial and physical resources must be advised of the project purposes and their interests and support must be tested. Organizations and individuals indirectly controlling social, economic, and political resources that influence the success or failure of a project, as well as its potential beneficiaries, must express at least a preliminary willingness to provide legitimization. Once resources are tentatively committed, the project proposal can be prepared in greater detail and appraised by funding agencies, by supporting and legitimizing groups, and by potential beneficiaries.

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<sup>1</sup>For an amplification, the reader is directed to the learning package entitled "Management of the Project Environment."

<sup>2</sup>The learning package entitled "Project Management Planning Processes" describes the planning processes that are initiated in the first function and continued throughout the project life.

### 3. Project Activation

The third set of management functions involves the mobilization and transformation of appropriate technological resources so that a solution method or logic and detailed project strategy can be designed. Because the purpose and problems of most sectoral projects are novel, solution strategies must be developed in a creative fashion, using a wide variety of creative technical problem-solving methodologies.<sup>3</sup> If external technologies are available and applicable, project managers must engage in technological search and assessment that may lead to the discovery of solution strategies that are more useful and less costly than experimentation and development of new technology within the project.<sup>4</sup> Once solution strategies are developed, project organizing can continue in more detail.<sup>5</sup> Solution strategies are translated into project activities through detailed project planning. Personnel recruitment, selection and staffing can be tailored to specific tasks. In this phase of project management initial administrative procedures and programs, financial and budgeting systems, information systems, auditing and evaluation procedures and output specification plans are established to activate the project.<sup>6</sup>

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3. Methods of increasing the creativity of both the project design and responses to daily unanticipated problems are discussed in the learning package entitled "Project Management Problem Solving."
  4. The process of technology utilization is elaborated in the learning package entitled "Technology Assessment, Transfer, and Adaptation."
  5. The learning package entitled "Project Organizations and Organizing" examines both the relationship of the project to the larger organization structure and the process of organizing the project resources for the effective pursuit of project goals and activities.
  6. Because information is the "raw material" of management, its value (validity, accuracy, and timeliness) strongly influences the quality of managerial decisions, plans, and evaluations. For this reason, a separate learning package is devoted to "Project Management Information Systems."

#### 4. Project Implementation, Coordination and Control

Project implementation, coordination and control functions assign project tasks and activities to organizational subunits and assure that proper resources are simultaneously made available. Program procedures and production facilities are established to generate output. Progress is measured by control systems that evaluate the performance of project activities and the likelihood that project outputs will adhere to preliminary plans and specifications. This aspect of management requires coordination of project activities internally -- and of support activities from outside the project organization -- through plan reviews, joint problem-solving meetings and project progress reviews. Control and evaluation processes provide the basis for guiding project activities and redirecting them toward sectoral planning objectives.<sup>7</sup>

#### 5. Project Termination and Output Transfer

Project completion involves the scaling down of project activities, the transformation of experimental, pilot and demonstration project organizations into institutionalized programs and production units, the transfer of outputs to beneficiaries and the diffusion of project results so that the project can produce outputs as planned, or in adjustment to current needs. This phase of project management also includes planning for user training and the reallocation of unconsumed or excess resources. The completion of a project is a gradual process of diffusing results and returning excess resources to various supporting constituencies. In successful development projects the final assets to be redeployed, especially improved managerial capability and new technologies, may exceed the initial resource investments, and thus, should be wisely reassigned for full utilization in other development activities.

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<sup>7</sup>Control processes are viewed here as continuous from initial appraisal of the project through ex post evaluation. They are also treated as intimately related to planning but are discussed in a separate learning package entitled "Project Management Control Processes."

## 6. Output Creation

This phase refers to the production and use of the product or service that the project is designed to yield. It is of concern to project management only to the extent that project managers must prepare for it even though they may not have any direct participation. Thus, the project manager would arrange for and carry out the training of staff. The actual use of such staff would take place when output is created and disposed of. While creating the output requires less innovation than project management, this is so only on a relative basis. The manager of the output creation phase will still have to adapt to changing circumstances.

### The Development Project Management Cycle

If a development project is viewed as a systems process, managerial functions are inextricably related to a project's management cycle. Figure 3 depicts a typical configuration of project activities on a time scale. Starting with the project investment subsystem, the growth in level of activity is plotted against the time dimension to illustrate a typical management cycle of a development project. The general shape of the project management cycle suggests that project management is primarily concerned with building and dismantling project organizations. Yet, as suggested earlier, the size and composition of a project organization is rarely stable for long periods of time because project activities are novel and unique. Once the operations become standardized and routine they are, within the definition of projects used here, transferred to an institution capable of producing outputs on a continuing basis.

Of particular note is the long period of time required to build up project operations to their peak level. Underestimation of this time period is often a deficiency resulting from ineffective project planning and scheduling. In fact, a substantial portion of the first two functions of project management -- identification, and formulation, preparation and appraisal -- must be performed well before operational activities can be established and expanded and are concerned with the full planning horizon including the output creation period. Another noteworthy aspect of the project management cycle is the pattern of gradually diminishing activities as the project approaches termination. Experienced project managers are well aware that terminating a project management cycle is one of the most important and difficult phases of project planning and execution. Yet the literature on project management virtually ignores the project termination and output transfer function. Because project management termination is much broader than ex post facto evaluation and organizational dismantling, the terminal shape of the life cycle is not as abrupt a decline in operations as is commonly imagined.

### Conclusions

In brief, the shift in strategy by international assistance agencies and national governments of less developed countries from project-by-project investment to sectoral project development will create a new administrative environment for project planning and implementation. This shifting emphasis will, if the complex objectives of sectoral development are to be achieved successfully, mandate an integrated approach to planning and management of development projects. A new type of project manager will be needed in developing nations: one who perceives projects as complex systems of activities and functions and who has the managerial capabilities of coordinating and integrating those functions and activities, guiding projects toward the attainment of sectoral development objectives. The sectoral project manager must be trained in a wide variety of strategic and managerial skills, knowledge, and techniques, and in the methods of acquiring and integrating a broad range of dispersed resources. He must interact with a complex set of economic, political, technical, social, behavioral, and administrative forces and influences from his project organization's external environment. At the same time he must be capable of guiding and directing the operational and managerial functions of project management organizations: project identification, project formulation, preparation and appraisal, project activation, project implementation, coordination and control, and project termination and output transfer. He must organize and staff a project management structure, establishing planning and budgeting procedures and providing for project supervision, coordination and problem-solving. Sectoral project planning and implementation will require the creation of new project management organizations staffed by organizational entrepreneurs, who can integrate and coordinate diverse, and often fragmented, management activities in order to achieve national and sectoral development goals.

**GLOSSARY**

## Glossary

Capacity Creation Projects: projects that increase the national, regional, or sectoral productive capacity in order to provide an increased flow of goods and services to the developing society.

Demonstration Projects: projects that promote the diffusion of innovative methods by exhibiting their superiority when compared to more traditional methods. This exhibition must demonstrate the usefulness under the variety of conditions that are likely to be encountered wherever the methods are to be adopted.

Experimental Projects: projects that define development problems and explore, test and generate possible alternative methods of solution.

Implementation: the execution of project activities to accomplish project goals (which may be revised in the course of implementation). Implementation involves development of the project organization and managerial capability to provide, allocate, and coordinate resources to the project activities.

Output Generation Period: The period of time for which goods and services of the project are expected to be produced and distributed.

Pilot Projects: projects that test the applicability of alternate methods or technologies under conditions that are as controlled as possible.

Planning: the analytical functions of objective setting, alternative generation, environmental assessment, capability analysis, and alternative appraisal and selection that occur at national, sectoral, or programmatic, or project levels. As used here, the term refers to a continual process that occurs throughout the time span of the project. Contrary to some conceptions of planning as an activity which precedes implementation, the term refers to a process that starts before implementation but continues throughout the implementation phase, providing redirection to project activities whenever control processes signal the need, continuing for the full time horizon of the project.

Project Management Cycle: the stages that a project goes through from inception to termination; project identification, formulation, appraisal, implementation, evaluation and transfer to entity in charge of output generation.

Project Life: The entire time horizon of the project including the output generation period.

Project Management: a process of performing project planning and implementation (and the integration of the two) which includes activities such as needs analysis and problem identification, appraisal, feasibility studying, resources mobilization, work scheduling, progress evaluation and control, and the transfer of project facilities to users. Frequently the functions of the project management process are divided between several institutions particularly during the planning stage.

Project Management Organization: a physical entity through which the project management processes are performed and coordinated. This project management organization is composed of human elements (project managers and staff) and tangible nonhuman physical components (equipment, data and reports, studies, budgets, and facilities) that support the management process. This is the management organization to perform the management processes as distinguishable from the project organization which performs the project operations activities. The project management organization may be a single individual working part-time on a project or a large group of managers and supporting staff.

Project Organizing: the process of forming a project organization through staffing, team-building, and the formation of intraproject structure, systems and procedures.

Projects: Development activities that create a capability to produce, deliver or distribute goods and services and the actual generation and delivery of such goods and services over a given time horizon. Thus the project covers both the project management period and the output generation period.

Sectoral Project Managers: managers who are trained and experienced in implementing sector-based projects. This type of manager will have a broader development perspective than the existing managers of project-by-project development processes. They will also employ new techniques and skills in adding to traditional project planning and appraisal methods and serve as active change agents in promoting innovative approaches to development.

Sector-based Projects: projects which are identified and appraised on the basis of their direct benefits and costs and their interdependencies with their external environments, other projects within the same sector, and other sectors of the national and international development process.