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*for a sustainable future*

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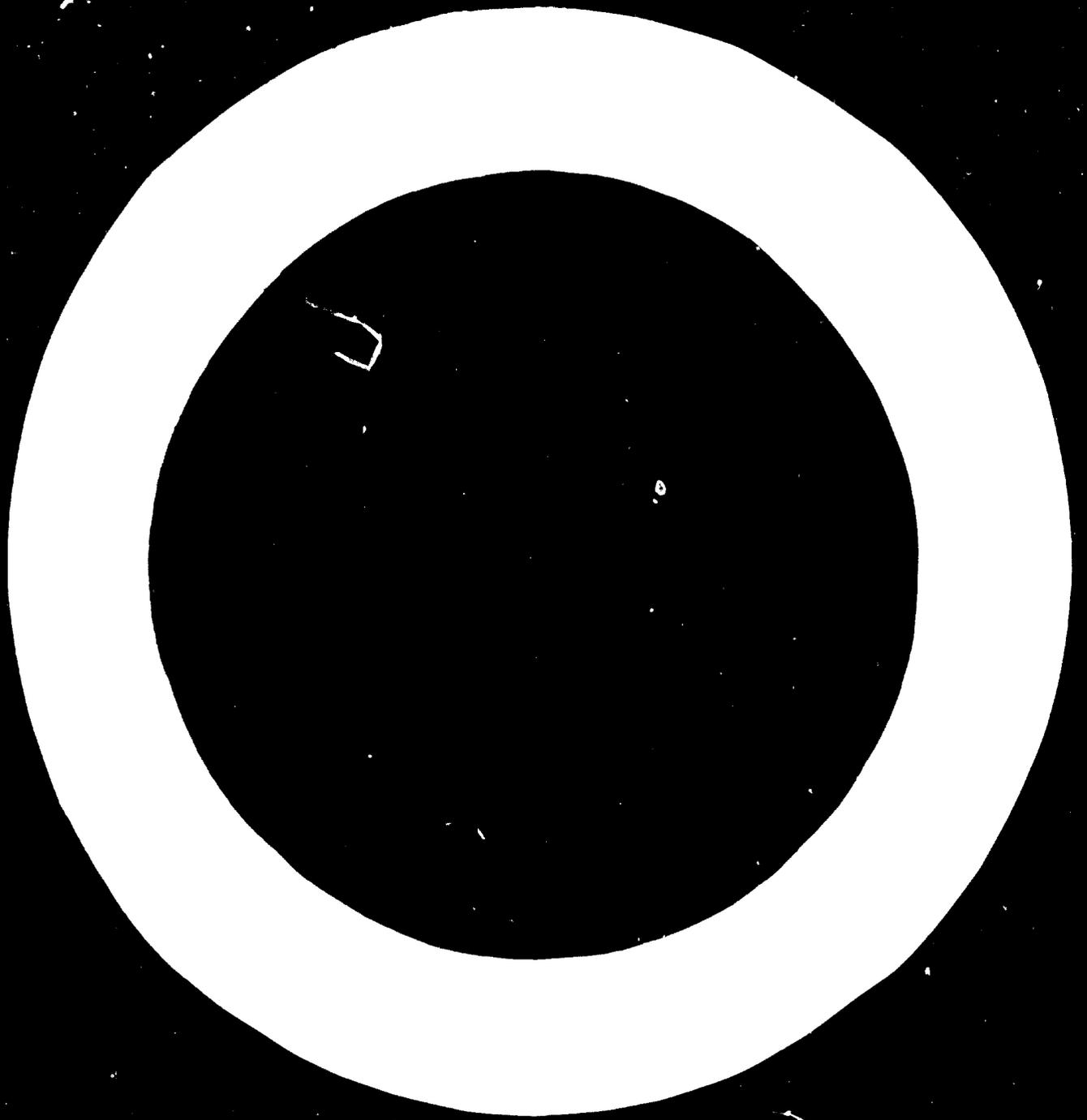
COMPUTERS AND NETWORK TECHNIQUES  
FOR PROJECT IMPLEMENTATION <sup>1/</sup>

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We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.



The difficulty in project implementation is not so much the process of programming at the outset (resulting in the activity scheduling data, earliest start and finish times, latest start and finish times as well as total and free floats), but how to exercise effective project control during the various phases of project implementation - effective feedback and re-programming of the strategy whenever needed once implementation starts. Unfortunately, at the outset project programming is frequently emphasized without equal emphasis being given to project control. It goes without saying, however, that adequate project programming is essential for adequate project control.

Before dealing with the question when to use a computer, a brief explanation of computers is required. Computers add, subtract, multiply and divide numbers as well as store them. These arithmetic processes can be so arranged to produce the required outcome and to perform these processes the computer should be instructed. This takes the form of statements given to the computer as input. The summary of all statements required to obtain certain results is known as the "programme".

There are small and large electronic computers such as the IBM 1620 and IBM 360 respectively. The difference between them lies in the fact that large computers have more capacity, are faster in operation, capable of providing output in a variety of forms and more expensive than smaller ones. However, for some specific problems utilization of large computers might be cheaper than small ones due to the aforementioned features. A great number of computer programmes have been developed to date and the majority of them satisfy general needs. However, for more specific or sophisticated needs, special programmes are to be written up.

Network input to computers mainly consists of activity numbers, activity descriptions, activity durations, resources and costs. In addition, information on the department or division of the organization or agency responsible for the accomplishment of each activity can be added. This information could be put in some computer programme input form as well as punched into cards.

Output of computers - the print out, could include time data which mainly gives total as well as free floats by activity. Computers are capable of sorting the output of a variety of orders as required; for instance, sorting activities by total float according to their degree of criticality in ascending positive float order. This would show the most critical activities first, then those less critical and finally those with the biggest positive total float. Moreover, results of resource and cost scheduling of resource and cost programmes could be also obtained on additional lists. Such data can be produced and shown in bar chart or histogram forms.

For departmental control, computer output, in addition, could be given by a department or division of the organization. Follow-up reports on different degrees of detail for various levels of project management can be produced by sorting and selective printing of necessary information.

For project management to use an available programme at, for instance, a computer service centre, it has to develop the project network diagram and prepare a list of project activities with their descriptions, numbers and durations. This data should be punched into cards and the punching should follow the pattern indicated in the programme. Then these cards are given to the computer service centre for processing, which in turn will provide project management with the output.

#### When to use computers?

Despite the fact that much has been said on the importance of computer application and network techniques, there is no definite or concrete answer to this question. However, the following factors are to be considered:

1. Number of activities included in the network.
2. Duration of the project and frequency of progress reporting for project control.
3. Availability and cost of computers.

#### 1. Number of activities included in the network

If the network includes a small number of activities, say 100 to 200, scheduling computations can be made by hand. For networks having a

greater number of activities, particularly those of 1,000 or more, computer application provides faster computations and avoids errors that might otherwise occur when manual methods are used.

2. Duration of the project and frequency of progress reporting for project control

A project of a short duration in the order of six months, for instance, with follow-up reporting every two months, can be dealt with economically by manual methods. The same could be said for relatively small-sized projects where all the activities are the responsibility of one department in an organization or one person and are well known to him.

Most of the industrial development projects in developing countries have a duration of two to five years and, in addition, they are complex in nature. This partly stems from the fact that the project is new to a country where prior relevant experience is lacking and where managerial and technical personnel having different training and background are required. A more elaborate organization of work accomplishment is needed so that the various project components can be chronologically carried out at the right time and in the right place. Furthermore, as conditions change in the course of implementation, frequent collection of data and information, periodic evaluation of progress and revision of strategy seem to be imperative. Progress reporting and periodic revision may be necessary every two weeks if not weekly. All too often this calls for collection and processing of a considerable amount of data and for speed and reliability of control and re-programming.

With large projects a decision might be taken at a certain level in the organizational set-up, concerning some part or portion of a project, which might not be based on sufficient knowledge of the situation in other parts of the project. Such a decision, which may be effective for this particular part of the project, may have detrimental effects on other parts of the project or on the speed and cost of completing the project as a whole. Therefore, it is essential to determine the impact of individual decisions on the various activities in the network. Computer utilization in this respect is of great help.

On the other hand, not every manager of a part of the project is interested in following up the progress of the entire project. Follow-up

reports should contain only the information needed by the recipient of the report. Such information should arrive at the right person at the right time so that effective control can be achieved. In this regard computers can be used to great advantage as they are capable of processing huge amounts of data and arranging the results in a great variety of orders. As previously mentioned, sorting and selective printing of information and various follow-up information required by different people can be produced faster and more reliably than with manual methods. Furthermore, alternative solutions to problem projects which are behind schedule can be more easily and rapidly simulated and compared by computers, than by manual methods.

### 3. Availability and cost of computers

The aforementioned has cited the superiority of using computers under certain conditions in the process of implementation of projects. A vital factor also to be considered is the availability of and cost incurred in using computers. As is well known, not every organization, corporation, etc. in developing countries, sponsoring the implementation of one or more projects owns a computer or even has access to some nearby computing facilities in other organizations or computer service centres. Even when computer availability is not a problem, many organizations and development agencies cannot afford the cost of using one. It is also worth mentioning that when considering the cost of computer utilization, not only has the cost of buying time at one of the computing centres to be taken into account, but also the cost to be incurred in preparing the necessary data for computer and related organization. Computers located thousands of kilometres distance from the projects are costly to use and of no value for day to day control, particularly if data forms have to be mailed.

Finally, a point to be emphasized is that computers cannot be substituted for the judgement of project personnel, which is based on training and experience of many years.





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