

## CHAPTER 3 : A CASE STUDY IN PROJECT MANAGEMENT

### 1 INTRODUCTION

- 1.1 Tenaga Nasional Berhad (TNB) was incorporated as a government-owned company in 1990 to assume the roles and responsibilities of the National Electricity Board as the provider of electric energy for Peninsular Malaysia.
- 1.2 TNB is now fully responsible for the generation, transmission and distribution of electricity in Peninsular Malaysia, being the core business of TNB, and in 1995 its customer totalled at approximately 4 million, recording a total consumption of 6.381 MW.
- 1.3 Demand for electricity is expected to continue to improve by 12 to 15 percent annually, with the industrial sector alone contributing some 55 percent of the sales revenue.
- 1.4 TNB's electricity is generated by 12 power stations and linked to the National Grid that runs along the north-south parallel of the Peninsular.
- 1.5 The main voltage levels of TNB's transmission system spanning the whole of Peninsular Malaysia are 275kV, 132kV and 66kV. These lines create a closed loop connecting the major load centres to the power stations forming the National Grid. Towards further enhancing the stability of the grid, TNB has now embarked on the construction of a 500kV transmission line which will form the backbone of the National Grid.
- 1.6 Electrical energy is distributed to customers via an extensive distribution system normally at low voltages of 33kV and below. The distribution system

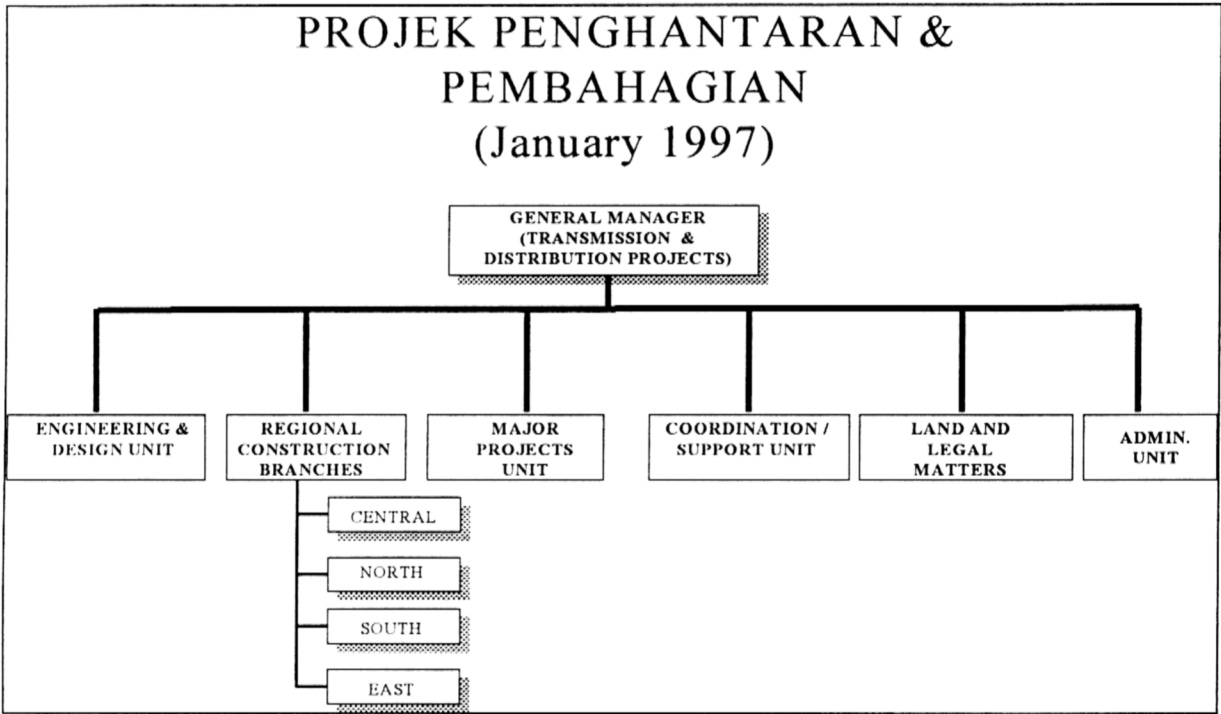
represents the final linkage between the customers and the power stations. For higher voltage requirements, transmission substations are directly linked to major customers.

## **TRANSMISSION & DISTRIBUTION PROJECT DIVISION**

- 2.1 Under the recent re-structuring of TNB in January 1997, a decision was made to integrate the two projects department, Transmission Projects Department and Distribution Projects Department, into a new division called the Transmission & Distribution Projects Division. The Division is headed by a General Manager (Transmission & Distribution Projects), who reports directly to the Senior General Manager (Core Business).
- 2.2 One of the major functions of the Transmission & Distribution Projects Division is to successfully implement transmission and distribution projects (substations, lines and cables of voltages from 22kV to 500kV and HVDC) in accordance with plans to meet their objectives, within schedule and budget and in conformity with sound technical performance.
- 2.3 The services performed by the Division include the following :-
  - 2.3.1 Engineering, design, procurement & construction package
  - 2.3.2 Project management services
  - 2.3.3 Tendering and procurement services
  - 2.3.4 Engineering services
  - 2.3.5 Wayleave and site access
  - 2.3.6 Factory inspection and testing services

### 3 ORGANISATION STRUCTURE

3.1 The existing organisation structure in the Division is based on the basic hierarchical and line organisation structure whereby the structure is a standard pyramid with the General Manager (Transmission & Distribution Projects) sitting at the top of the chart and middle and lower management spreading out down the pyramid. The Division is broken into different line functional units, such as, Engineering & Design, Regional Branches, Major Projects and Coordination/Support Unit, with the line responsibilities clearly defined.



Source : Transmission & Distribution Projects Division, TNB

- 3.2 The Division has over 500 employees, inclusive of support staff (labourers, technical staff and administrative/clerical staff) and executives (engineers, administrators and accountants).
- 3.3 Regional branch offices are being set-up to improve the coordination with the TNB district offices.

3.4 Before the re-structuring exercise, the Transmission Projects Department was operating based on the same basic functional structure, i.e. Design.

Construction and Support Services. Transmission Projects Department has undergone a few re-structuring or re-organising exercises before 1997.

including the introduction of a matrix structure in March 1993 to October 1994. (The organisation structure changes through the period up to 1997 is attached as appendices)

3.5 The introduction of the matrix structure was to promote multi-skilling and to overcome the problems of responsibility for following a major project right through all its stages and coordination between functional groups. This was done by the setting up of self-contained Project Teams, headed by a Project Manager. However, conflicts over priorities and dual responsibilities surfaced which lead to another re-structuring exercise, back to the original functional structure of Engineering & Design, Project Management & Construction and Support Services.

3.6 There is no perfect structure in existence for managing projects. However, there should be a careful definition of authority and responsibility and an esprit de corps be developed through an understanding and focus on a single objective of achieving successful project implementation.

## **4 CONTRACTUAL APPROACH**

4.1 There are two main contractual approaches, the Traditional approach and the Design-Manage (Turnkey) approach.

4.2 The traditional approach is implemented by calling contracts for the supply-only of major electrical equipment, and installation to be undertaken by the

Division's own technical support staff. Separate contracts are called, whenever needed, for common materials and civil works, with the help of appointed professional consultant services.

- 4.3 As the number of projects increases, more complicated and early completion becoming increasingly important, more projects are being implemented in the Turnkey basis. Contracts are called for design, manufacture, testing, installation, commissioning and 12-months maintenance for the complete work. The responsibility of the Engineering & Design section is to undertake preliminary engineering and design for the preparation of drawings and specifications. The management of the project upon award of contract is the responsibility of the construction section, which include project planning and control.
- 4.4 For the year 1996/97 up to year 1999/2000, the Division will be implementing a total number of about 1,100 projects, with a budget total of about RM 13.74 billion, (averaging about RM 3 - 4 billion per year).

<i>SUMMARY</i>	<i>SUBSTATION (MILLION)</i>	<i>CABLE (MILLION)</i>	<i>O/H LINE (MILLION)</i>
<i>TRANSMISSION (1996/97 - 1999/2000)</i>	<i>RM 7,096.24 (273)</i>	<i>RM 1,431.21 (53)</i>	<i>RM 2341.80 (188)</i>
<i>DISTRIBUTION (1996/97 - 1997/98)</i>	<i>RM 1,371.16 (283)</i>	<i>RM 843.13 (263)</i>	<i>RM 653.12 (44)</i>

Source : Transmission & Distribution Projects Division, TNB

## PLANNING AND CONTROL OF PROJECT

## OPERATIONS AND RESOURCES

- 5.1 The technical aspects of the projects have successfully been implemented in the past, however, the wider scope of project management functions that

include planning, scheduling and control have not been adequately addressed.

This has resulted in project delays and cost overruns.

- 5.2 The techniques used in planning and control of projects varies from one project to another, with bar charts being the most common. However, in view of the increasing complexity in the activities involved in project implementation, PERT charts and CPM are being used more extensively by the appointed Turnkey contractors. (An example of a Turnkey project schedule is given as appendices).
- 5.3 The role of the construction section as Project Managers, upon developing the work plan, include cost control, controlling sources of delay by establishing clearly defined approval action and decision making channels, controlling defects in design, monitoring quality of equipment and construction works, providing for adequate in-progress reviews or monitoring systems, controlling potential outside interference, controlling shipping and delivery delays, risk management, examining schedule estimates for realism and controlling changes in scope and resource allocations. Further, the Project Manager periodically assess project status and progress trends and review the estimated project completion date, as corrective action are taken to bring any time overruns back on target. (The activities and process flow-chart for project management is attached as appendices).
- 5.4 Project Managers also interact with persons or agencies, outside the project organisation who are involved in some part of project implementation, such as other contractors, subcontractors, local authorities and other departments in Tenaga Nasional Berhad ; District Offices, Maintenance, National Grid

Control, Finance, Legal & Contracts, the actions such persons or agencies may be essential to the success of the project.

- 5.5 There is no standard form of communication established within the division, in terms of, for example, reporting progress of projects physical and financial status, site supervision records, documentation : in the form of letters, drawings or manuals and in dealing with requirements from various authorities.

## 6 SUMMARY

- 6.1 The existing system has the following shortcomings, which have caused project delays and cost overrun :-
- 6.1.1 No standard form of planning and control techniques for controlling projects.
  - 6.1.2 Project Managers may not be clear of their role in project management, and with the amount of projects to be handled and the shortage of manpower, both engineers and technical support, this task of controlling projects is even harder for them.
  - 6.1.3 No standard procedure for the various processes involved in project implementation, for example, project reporting, interaction with other parties, data management and documentation.