Chapter -6
Chapter 5 presented the concept of integrated performance management and its application for project selection and status monitoring. This chapter describes how the integrated performance management system can be implemented and made available for use by the real life managers.

The integrated performance management system comprises of a set of existing/new paradigm, models & methodologies. Its implementation requires building of various models in the form of a computer software and making it available for use in a user friendly environment. The functioning of the model requires continuous collection and processing of considerable amount of data related to the new and ongoing projects. Also there is a requirement for continuous tuning of the models to meet the sponsors requirements. Keeping these requirement, in view, a decision support system framework has been evolved for implementing the new model. The various models and methodologies are integrated and interconnected with in this framework of the decision support system. The details of the implementation are presented in the following paragraphs.

6.1 BASIC PREMISES AND ASSUMPTIONS

The new model is devided keeping in view certain basic premises/assumptions regarding the R&D environment, management process scenario and utility of the model, which are described below.

6.1.1 R&D ENVIRONMENT

The new model envisages an R&D environment with the following features:

(a) The organisation has a stated vision, various missions derived from the vision, and short and long term goals for the realisation of various missions.

(b) All the operations are governed by a well defined business policy.
(c) All the R&D operations are governed by a overall R&D policy which forms an integral part of the overall business policy.

(d) The R&D resources including R&D budget are annually determined based on the overall R&D policy and forecast estimates. No prior knowledge of the projects that are likely to come up for sanction during the forthcoming year is available while determining the R&D budget. This will lead to all investment decisions being of the nature of 'capital rationing' only, which is a real life situation and true to all the organisations.

(e) The organisation comprises of a set of ongoing projects at various stages of their execution with committed resources and funds at any given point in time and the organisation possesses suitable mechanisms for accurate determination of the present deployment of all its resources.

(f) The organisation continuously receives new proposals for sanction of new projects, requests for additional resources from the ongoing projects and closure proposals for the completed projects. These proposals are generated at various levels of the organisation. Literature survey indicates the presence of multiple levels in the overall R&D administration. However, from the point of view of an organisation, most of the literature indicates the three level structure namely the corporate level, the laboratory level, and the department level. For the purpose of the present model, the three level R&D structure is envisages as shown in Fig.6.1. The first level is a corporate level which is responsible for formulation of R&D policy, guidelines/methodologies, provision of funds, facilities & resources and monitoring review and control of the ongoing projects. The second level is the laboratory level each of which is responsible for R&D in a broad technical area. The laboratory will be responsible for formulation and execution of projects in their respective technological areas. Each laboratory comprises of number of specialist departments, each carrying out R&D in a narrow speciality. The departments contribute in the formulation of projects in so far as they are concerned with their respective specialities. Under such a structure, project proposals originate randomly from different levels and are collated for evaluation and sanction at the corporate level. The present model envisages the corporate level to be the main hub for the evaluation and selection of project proposals as well as the monitoring and controlling of the ongoing projects.
R&D STRUCTURE

CORPORATE LEVEL

LABORATORY LEVEL

DEPARTMENT LEVEL

* R&D POLICY
* GUIDELINES / METHODOLOGIES
* FUNDS, FACILITIES & RESOURCES
* MONITORING, REVIEW & CONTROL

* R&D IN A BROAD TECHNOLOGICAL AREAS
* PROJECT FORMULATION
* PROJECT MANAGEMENT

* R&D IN A NARROW SPECIALITY
* FORMULATION OF R&D PROJECT PROPOSALS

Fig. 6.1 Envisaged R&D structure for the new model
(g) The new project proposals include a very wide spectrum of projects ranging from purely exploratory projects to specific product development projects which owe their origination to a wide spectrum of stimulants including the market demands, perceptions regarding the future technologies as well as need for core competence growth. Ensuring the required portfolio-mix with such a diverse types of projects is a crucial issue. For this purpose, a detailed three dimensional classification model has been developed and incorporated into the integrated model.

6.1.2 MANAGEMENT PROCESS SCENARIO

Figure 6.2 depicts the basic R&D management process and interaction between various elements of the R&D system as envisaged by the new model. The interaction between various elements are given below:

(a) The new model proposes the concept of 'sponsor' with a well defined role of formulating the overall business policy for the organisation in a sense synonymous to that of the 'owner' of a private enterprise. The sponsor identifies, develops and communicates a vision for the whole organisation, identifies the resources needed to translate the vision into reality, implements various initiatives required to acquire these resources and the way they will be aligned to support the overall organisation, conceptualizes and designs an organisation to align people and the resources to facilitate the accomplishment of the vision.

(b) Sponsor determines the overall business policy and the overall budget. For this purpose sponsor utilises the corporate memory, which is a store house of all the knowledge and experience accumulated by the organisation over the years. The new model extends the concept of 'corporate memory' to include a 'knowledge base' pertaining to the continuously changing policy guidelines as well as the experience gained during the process of project selection and execution as a whole. The new corporate memory, with the knowledge base incorporated into it, will transgress the existing limitations on the application of past experience for the future decision analysis and extends the horizon of the planning process into the 'knowledge based management'.

(c) The overall R&D policy which is an integral part of the overall business policy forms basis for the determination of the R&D resources as
well as formulation of guidelines for project evaluation, classification, risk allocation, and portfolio allocation.

(d) It is envisaged that the sponsor, through the overall R&D policy determines the required portfolio-mix of the projects to be maintained in the overall business interest of the organisation. Classification model provides the means for defining the portfolio-mix and the R&D budget is allocated according to the required portfolio. This will provide basis for selection of project in different category. Hence the first step in the processing of a new proposal is the classification into various categories that represent the portfolio-mix. After classification, projects in each category are screened and evaluated for selection of projects. The sanctioned projects will go for execution by the respective work centres. The work centres execute the projects with the help of a set of developing agencies and production agencies working together in a development-production concurrent environment, and delivers the end product to the sponsor. During execution, the projects may encounter various technological and managerial problems and results in various decision events. The new model envisages an explicit mechanism for the evaluation of all the data pertaining to the decision events and for determination of an appropriate solution which includes a portfolio of projects to be approved, proposals to be deferred for future decision making, proposals to be rejected, ongoing projects to be continued, and ongoing projects to be closed.

(e) The new model envisages explicit feedback mechanisms and communication channels between the project execution, work centres, sponsor and the corporate memory. This will bridge a large gap existing in the current models and adequately represents the real life coupling between the various elements of R&D system which are hitherto considered isolated.

6.1.3 UTILITY OF THE NEW MODEL

In the above environment, decision making becomes a continuous process and will be triggered by various decision events. Also, the decision making is based on the progress of various activities that are distributed at various levels. The present model is expected to be utilized for decision support under such an environment, at the corporate level of the organisation.
6.1.4 DECISION EVENTS

The important decision events considered for the purpose of the present model includes the following:

a) Receipt of a new proposal for sanction.

b) Receipt of a new resource/funds for allocation, either as a result of a new allocation or due to the completion of an ongoing project.

c) Receipt of a request for additional resource allocation for an ongoing project.

d) Receipt of a closure proposal for an ongoing project.

e) Receipt of an extraordinary event report within the overall domain of the organisational responsibilities.

f) Decision events arising out of periodic review of the ongoing projects and allocation of resources/funds/priorities.

6.2 FUNCTIONING OF THE NEW MODEL

6.2.1 EVALUATION & SELECTION PHASE

a) Classification

As soon as a new proposal arrives, based on its characteristics it will be classified into one of the 27 categories as defined by the three dimensional classification model. After classification each category of projects will be processed for the screening and selection separately.

b) Evaluation

The evaluation of the projects include computation of its merit rank, risk rank, index of managerial effectiveness, index of production preparedness and the index of user commitment. Using this the integrated performance index will be computed which will form basis for the screening and selection of the projects.
c) Screening

The screening process involves elimination of projects in each category with the integrated performance index lower than the performance limit specified by the sponsor for that category.

d) Selection of the projects

After the screening the model contains 27 list of projects corresponding to 27 categories of projects. The model carries out sorting of these list in the descending order of the integrated performance index such that the projects with maximum value of the integrated performance index will be on the top of the list. Selection of projects will be made from the top of these rank ordered list of each category until the resources allotted in for that particular category are completed.

6.2.2 EXECUTION PHASE

a) Baseline planning

All the selected projects are planned in detail with the help of the baseline planning model provided by the PACT. This will set a frame of reference for comparison of the project progress during the execution phase.

b) Performance monitoring

The status evaluation is carried out with help of the PACT and the integrated performance index. The PACT provides the true cost and progress deviations on real time basis which will give a first cut assessment on the project performance. Further to this, the integrated performance index is periodically computed wherein the merit rank, risk rank, managerial effectiveness, production preparedness and the user commitment are reassessed and combined with the project status. Thus the integrated performance index indicates the project performance both in terms of its status as well as its desirability. Thus the integrated performance index provides the guidance and decision support to the project manager.
c) Closure evaluation

Unlike the conventional closure evaluation, the new model provides the real time and instantaneous evaluation of the projects. Further to this the complete history of the project performance in terms of the variation of its merit, risk, progress and cost deviations, managerial effectiveness, production preparedness and the user commitment will be available in the model. A great deal of information can be derived from this history and many lessons can be learned for the future projects.

6.3 FRAMEWORK FOR SOFTWARE IMPLEMENTATION

The model can be implemented as a computer based decision support aid for the real life managers with the help of a decision support system framework. The following paragraphs describe the possible implementation strategy.

6.3.1 DECISION SUPPORT SYSTEM MODEL

A decision support system is a computer based information system that helps a manager to make decisions by providing him with all the relevant data and models in an easily understandable form. Fig.6.3 shows the generic decision support system model. The user formulates the problem using an interactive user interface the system then access the required data from the database, assess the requirements for solving the problem, selects the appropriate model from the model base, applies the data to the model and produces information required by the user. The user can explore several "what if" scenario in order to arrive at a decision. Thus a DSS helps the manager to make a decision, it does not make the decision for the manager. DSS is a relatively new addition to the ever expanding realm of computer science.

6.3.2 INPUT OUTPUT PARAMETERS

Based on the above requirements the input-output parameters for the new model are shown in Figure 6.4. The model provides for three separate interfaces for the decision maker, direct dynamic data update and the for the dynamic reference update as shown in the above. The decision maker
Fig. 6.3: Generic decision support system model.
Fig. 6.4: Input-Output parameters for the new model
is expected to interact with the model on the new project proposals, evaluation of ongoing projects and closure proposals. It is envisaged that the model will have two more interfaces, for the dynamic update of the reference in the form of new data, new models & new knowledge, and the other for the direct dynamic update on the ongoing projects.

6.3.3 CONCEPTUAL FRAMEWORK

The conceptual framework for implementation of the new model is shown in Figure 6.5. As shown in the figure, the models for classification, evaluation, screening, ranking & selection of the new projects and baseline planning, status evaluation and closer evaluating of the ongoing projects can be integrated into a unified model. It can be seen that the new model integrates the data, models and the knowledge with in the framework of a decision support system provided with special interfaces. The model may be comprises of a knowledge base, model base, database and a kernel.

Separate user interface may be provided for dialogue with the system concerning the problem parameters and the solutions. A knowledge builder/editor facilitates continuous update of knowledge base through a special interface. Similarly a model builder/editor facilitates update of model base through an interface.

The data base comprises of two types of data, pertaining to the reference data such as the organisational goals, resources, etc., updated through a special interface as well as the data pertaining to the new project proposals, closer proposals, status of the ongoing projects in terms of technical performance, time, cost, resources, facilities, etc., continuously updated through the direct dynamic update interface.

As shown in the figure, upon arrival of the new proposals the Kernel carries out the classification, evaluation, screening and project selection. The model also provides for baseline planning, status evaluation for the ongoing projects as well as the closure evaluation for closed projects. Hence, conceptually the model integrates all the functions spread over the life cycle of a project into a unified model.
CONCEPTUAL FRAMEWORK

Fig. 6.5 Conceptual framework for the new model