

## Abstract

This thesis is concerned with two aspects of telecommunication industry in India. First, it generates business and technology scenario to the year 2010 AD. Second, this scenario is used for the selection of the type of switching technology appropriate to the network to the year 2000 AD.

The Delphi and a revised SMIC (Cross Impact System of Matrices) techniques, that use the knowledge and judgments of experts through structured questionnaires are employed in this thesis to assess the likely occurrence of events. Thirtythree significant events considered for the Delphi exercise pertain to five categories viz. technological, political, economic, social and cultural, demographic. A questionnaire comprising of these events is designed to conduct the Delphi study. Two hundred telecommunication professionals from India and abroad have been selected as experts. The forecast of events obtained after two rounds of Delphi.

A revised method of cross impact analysis using the SMIC has been proposed to generate this complex scenario. Here, the events forecast in Delphi study are divided into three sub-periods. The cross impact analysis using the revised approach is applied to generate a reliable scenario for each sub-period. A questionnaire for the proposed SMIC method is developed and the impact probability estimates are collected from the same panel of telecom experts. Then the problem was solved as a quadratic programming problem for which necessary computerised models have been developed and tested to generate scenario for each sub-period. The scenario thus generated separately for each sub-period are combined to get the overall scenario of the whole period. The evolved scenario comprises of events like, provisioning of ISDN services, introduction of cellular mobile telephones, telecom services by multiplicity of enterprises.

For the selection of switching technology to the year 2000 AD, five alternative technologies and nine criteria of selection have been considered. Delphi and AHP (Analytic Hierarchy Process) approach are followed to structure this Multiple Criteria Decision Making problem. The valued opinion of experts required for application of AHP are obtained through a questionnaire. These are then used to predict the switching system technology appropriate to the Indian telecommunication network. The selected technology is based on components developments of 1990s. Some important components on which it would be built are 128-bit microprocessor operating at 200 MHz, use of more than 15 layered PCBs, use of multichip modules.

Key words: AHP, Delphi, Scenario generation, SMIC, Technology selection, Telecommunication.