

Chapter I

INTRODUCTION



Statement of Problem

The economies of developing countries almost always depend on agricultural activities. To serve agricultural needs, transportation becomes a necessary tool to be developed. Road transport is an important means of transportation because of the rapidity of travel and the ease of access which it can provide. Whether the provision of a road is to act as a catalyst for development, or as one of the inputs that need to be present to stimulate development, investment in road transport has become an important part of the national plans for developing countries. Whether traffic data and socio-economic factors indicate that a new road should be built, or an existing road upgraded, engineering and economic decisions must be made with regard to the location and the standards of design for the road in relation to the expected economic return from the investment. Alternatives of type of road to be provided in the investment area are considered to obtain the best route which will provide the maximum economic and social benefits for the least cost. To investigate a large number of alternatives, the sum of construction, maintenance, and road user costs and

the various options of stage construction over the life of every alternative have to be considered to select the best solution. A complete analysis of the many combinations of these would be extremely time-consuming and costly to perform. So there have been many studies of methods to overcome these problems. One promising result has evolved in the form of a computer program called the "Road Transport Investment Model" (RTIM). This Model was developed by the British Transport and Road Research Laboratory to aid decisions within the roads sector in developing countries.

Literature Review

In 1968, the first move towards producing a model of the form of RTIM was made by the International Bank for Reconstruction and Development (IBRD) when draft terms of reference for a 'highway design study' were proposed for internal consideration. Shortly after this, the Transport and Road Research Laboratory (TRRL) was approached and invited to participate in the proposed study in partnership with IBRD. IBRD then awarded a research contract to a group from the Massachusetts Institute of Technology (MIT) to conduct a literature survey and to construct a model based on the information already available. MIT produced the 'Highway Cost Model' which was an advance over methods existing at that time but

some of its relationships were inappropriate to a developing country. Therefore, more research was needed to replace the inappropriate relationships and to provide additional relationships where they were needed.

In early 1970, TRRL and IBRD agreed to undertake a field study in Kenya to remedy these deficiencies and to produce a model built directly from data collected in the field. Kenya was selected for this work because its topographic and climatic conditions are typical of a large part of the developing world. Field work started in April 1971 and was finished in July 1973. From then until the summer of 1975, data were analysed, relationships derived and a new computer model called the "Road Transport Investment Model" (RTIM) was produced. Testing of the Model continued until the end of 1975. The results of these studies are described in three reports¹, and later a supplementary report² was published.

The research team from TRRL, the World Bank and the MIT look forward to observing and taking part in this application, and the Overseas Unit of the TRRL has expressed its willingness to provide advice and assistance to those wishing to employ the Model. By personal contacts, the RTIM Model was made available

¹TRRL Laboratory Report 672, 673, 674

²TRRL Supplementary Report 224 UC

for study and testing in Thailand.

In 1975 research titled "Application of the TRRL Road Transport Investment Model to the Saraburi-Lomsak Highway" was undertaken by SINTHUSARN (1976) of Chulalongkorn University. His main purpose was to examine the performance of the RTIM Model when applied to a real highway already constructed in Thailand and to determine whether the costs indicated by the Model were close to the actual construction contract amounts. The results were as follows.

- 1) The total construction cost estimated by the Model was found to be in good agreement with the actual construction contract.
- 2) Vehicle operating costs calculated by the Model were high when compared with the values used in Thailand.
- 3) Road maintenance costs calculated by the Model were low when compared with the actual maintenance costs expended on this highway by the Thai Highway Department.

Purpose, Scope, and Limitations

The purpose of the present research was to attempt to overcome certain difficulties arising from application of the RTIM Model to a feeder road which had not been constructed. Descriptions of the input data included some adjustments and

approximations which became necessary because of the unsuitable or inadequate data which were available. Some of the significant limitations of the RTIM Model which make difficult its use in Thailand are discussed.

Plan of Investigation

Development of the initial version of the Road Transport Investment Model has been concluded by the Overseas Unit of the Transport and Road Research Laboratory and a user manual for the Model has been prepared. Therefore, it was necessary to study the basic input requirements and the constraints of the Model which required the following information:

- 1) Route location,
- 2) Road design standards,
- 3) Terrain information,
- 4) Properties of construction materials,
- 5) Construction unit costs,
- 6) Environmental factors,
- 7) Vehicle operation unit costs,
- 8) Traffic volumes,
- 9) Traffic composition,
- 10) Vehicle loads and equivalence factors,
- 11) Maintenance policy,
- 12) Maintenance unit costs.

Data which were available from the Reports of VALLENTINE, LAURIE & DAVIES (1976), Consulting Engineers of Bangkok, were presented to the Model on cards punched in fixed format. Adjustments and approximations had to be made to get reasonable results because there was more than one type of roadway pavement in any single run of the computer program.

Sources of Data

Data were gathered from the final reports on investment alternatives in highways in the corridors between Ban Bung and Ban Khai (VALLENTINE, LAURIE & DAVIES, 1976). When data were lacking, information had to be assumed, based on reasonable values. In addition, it was occasionally necessary to revert to the default options of the Model.

Uses of the Research

The Road Transport Investment Model was developed to assist transport planners in carrying out feasibility studies of rural roads. However, the Model can also be used at the pre-feasibility study stage and can also be of use at the detailed design stage. This Model is extremely flexible and with little effort can be used to investigate a large number of routes. It increases the speed and accuracy of road feasibility studies, minimizes the total cost of transport on a set of alternative

road investments, and represents a major advance in road planning that can lead to lower transport costs and thus assist in promoting economic and social betterment in the developing world. As a result, it is a powerful tool to aid the transport planner in making decisions. The present research serves to introduce practical methods of using the Model and has led to an understanding of some variables which would otherwise have been the cause of termination of the computer program before the end of the analysis period. The study has provided experience in using and adjusting the Model for the conditions of Thailand, and established what should be done to remedy the unsuitable parts of the Model.