ABSTRACT

A Methodology for Public-Sector Investment Programming

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This research thesis outlines a methodology for use in developing countries to facilitate the selection and scheduling of the large engineering projects which invariably constitute the major part of public-sector investment programmes. The application of this decision-making framework is demonstrated using data from the energy-based sector in Trinidad and Tobago, a small developing country in the Caribbean.

The proposed methodology requires the decomposition of the public-sector investment programming problem into the following phases:

1. PROJECT SELECTION ... *in which a linear goal-programming model is utilized to select an optimum mix of public-sector projects from a list of feasible candidate projects.*

2. PROJECT SEQUENCING & SCHEDULING ... *in which heuristic algorithms are utilized to construct the best project implementation schedule.*

In the project selection phase, the decision-maker's influence on the project portfolio selected is demonstrated by varying parameters such as the priority structure and the level of availability of key resources. In the project sequencing and scheduling phase, alternative sequencing heuristics are incorporated into a schedule construction

heuristic algorithm to determine the appropriate sequencing and timing of the implementation of the selected projects.

A conceptual design is developed of a hierarchical planning system to support this systematic and quantitative approach to public-sector investment decision-making. The proposed system utilizes a predictive computer-based management information system with a central database and appropriate decision models to facilitate co-ordinated decision-making at the national, sectoral and project planning levels.

The decision-making methodology proposed using goal-programming and heuristic programming provides a robust and flexible investment programming model to complement the traditional short-term macro-economic planning models and long-term development planning models used by public-sector project planners.

Further research can be directed at developing the synergistic fusion of the various public-sector planning models into an integrated public-sector planning methodology and addressing the detailed design of supporting hierarchical planning systems.