Computer-aided regional planning

Applications for the Perth and Helsinki regions

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Abstract. The ISP computer system for interactive spatial planning was originally developed as a part of a project concerning land-use planning in the Malmö region of Sweden. In its first versions it was set up for use on mainframe computers. Land-use models were developed using this version of the computer system for Stockholm and Perth. During the last few years the system has been redesigned for a sun workstation environment. The background for this redevelopment has been the use of the system for the preparation of a land-use plan for the metropolitan region of Helsinki. The philosophy of the ISP system is to develop an interactive work environment for the generation and evaluation of land-use plan alternatives. The focus is on man-machine interaction and flexibility of model development. The current paper outlines the properties of the current version of the ISP system and the traits of the models designed for Perth and Helsinki planners. The paper uses the Perth application to demonstrate the modelling capabilities within the system. The Helsinki application is used as a means to illustrate some traits of the graphics interface.

1. Introduction

Modelling exercises for forecasting and scenario construction in regional land-use and transport planning have had varying levels of popularity over the years. The early efforts were encouraged by the rapid developments in computing technology which enabled the solution of large sets of equations and the use of iterative solution techniques that were not previously available. In most instances, the underlying forecasting and planning models were relatively crude in their theoretical outlook, or so narrowly framed, that their relevance to practical planning problems was limited.

Our experience with planners and planning agencies has led us to a number of conclusions concerning the use of analytical techniques in plan-making situations. The first conclusion is that detailed knowledge of the future of specific parts of the regional system, generated by mathematical models, can contribute
valuable input into the planning process. On the other hand, the final integration of this information into the decision-making processes is still very much a human endeavour. The second observation is that there is a necessary balance to be achieved between the computer-based analyses and the human decision-making processes if the performance of both aspects are to be optimized. A further conclusion is that there is still considerable scepticism amongst planners as to the value of sophisticated modelling systems in forecasting and scenario construction, particularly where the planners and their political clients cannot fully understand the market processes involved and the way that the analyst creates model abstractions of these. The fourth conclusion is that there is a growing need for planners to be able to better document the state of their study regions to be able to effectively develop policy, and to apply alternative planning scenarios to study the likely impacts of these policies. There is an urgent need for planners to place claims on modelling and computing to accommodate the specific problems that pertain to regional land-use and transport planning.

These conclusions do not indicate that any particular forecasting techniques or models are likely to be more acceptable than any other. What is indicated, is a need to develop flexible and theoretically well-founded computer systems which provide the necessary knowledge about restrictions and options for the planner. Such systems might be considered as decision support systems or expert systems depending on the level of scientific or experience-based knowledge included, see also Newton et al. (1987), Kim et al. (1989) and Kim and Han (1991). We prefer to use a more general notion of CARP (Computer-Aided Regional Planning) systems to express the bias towards improving the decision-making abilities of the user. In this way we presume, at the outset, that the user should be firmly in control of the computer system and be required to make most of the important decisions in design and manipulation of the forecasting techniques and models. The tools should be adapted to the context of the decision-making at hand.

Our objective in designing CARP systems is to provide the planner with a set of tools to support practical work in the planning process. The man-machine relationships must therefore be carefully designed and implemented in a way that is appropriate for the level of skill and knowledge of the prospective users.

One attempt to formalize these ideas into an operational system has been under development by the authors for some time and is currently being used by the State Planning Commission, Perth, Western Australia, the Office for Regional Planning and Urban Transportation, Stockholm County Council, Sweden and the Regional Planning Authority, Helsinki, Finland. The operational aspects of the ISP system are described elsewhere, see Snickars et al. (1981), Roy (1982), Roy and Snickars (1983) and Roy (1986). For the current paper, the intention is to discuss the formulation of the Perth and Helsinki models and to show how they are integrated into the ISP system, see also Roy (1986) and Eerola et al. (1989).

2. Background to the Perth application

The development of the Perth metropolitan region is probably not substantially different from most other large Australian cities. Perth is characterized by low