

## Report on Workshop #4 Planning and Analysis

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This workshop concentrated on five questions: why travel? where to travel to? what means of travel to use? what routes to use? and lastly what types of transport organizations should be supported? On reflection, the workshop realized that the first four questions were essentially the four stages of the trip planning process, namely trip generation, trip distribution, mode split, and route assignment. The fifth question focusses on the delivery mechanisms required to make the trip planning process work.

**Keith Lehrer's** paper emphasized the sociological, psychological, and physiological factors that influence people's decisions concerning whether to travel, where to travel to, and how to travel. Particular emphasis was placed on the enhanced power and status increased mobility brings. As an example, it was shown that the means of transport used (tricycle, bicycle, public transport, car) varies with age which in turn is correlated with power and status. Similarly, the car an individual drives is inextricably linked with his or her power and status. The conventional view of travel is that it is a derived demand, that is to say that people only travel to gain access to other socio-economic activities (work, shopping, visiting friends and relatives etc). In other words, increased travel is all about increased accessibility. By contrast, Keith Lehrer's paper suggests that travel has some attributes from which people gain intrinsic pleasure and thus travel has some properties that are similar to any other economic good. This viewpoint suggests that increased travel leads to increased mobility but does not necessarily lead to increased accessibility, at least for society as a whole. In attempting to manage the world wide explosion in transport demand, a distinction between trips that are due to increased mobility and trips that are due to increased accessibility may be one that is worth making. (Editor's Note: Unfortunately, Keith Lehrer's paper was too lengthy to be included in this volume.)

To understand transport demand, we need to be able to measure it. This was the focus of **Nariida Smith's** paper. We are repeatedly told that we live in a new era of information technology. However, despite (or in spite of) this, events on the ground conspire to make data collection more difficult. An example is provided by urban bus systems, where the greater use of travelcards makes it increasingly difficult to know where people are travelling to and from. Happily, old technology can come to our rescue: in this case, an administered, on-bus, self-completion questionnaire on which the points and times of boarding and alighting are recorded was used. Such a method was tested in Sydney and was judged to be successful, providing response rates of between 95 percent and 99 percent.

**Helen Battalino and David Hensher's** paper addressed the problems of the transport disadvantaged and considered whether they should be provided by mainstream transport suppliers or by specialist community transport groups. The paper thus focussed on the issue of mode choice, that is should these people's transport needs be met by car sharing, by minibuses, or by conventional buses? Based on case study data for services in New South Wales, regression analysis was used to determine an operating cost model and simulations were then undertaken to determine the most cost-efficient modes for a range of transport demands. This showed that conventional buses were being under-utilized and more effective use of mainstream transport (for example through the establishment of a brokerage system that enables community groups to access the most cost-effective mode of transport) may be desirable.

**Avi Cedar and Yechezkel Israeli's** paper might be classified as dealing with route choice. In particular, it looked at ways that bus and crew scheduling could be integrated with bus route design and timetable production by using the latest operations research techniques. The method developed was given the

acronym TROPT (Transit Route OPTimization) and was believed to be more user-friendly than other packages such as VIPS (the Volvo Interactive Planning System). However, given multiple objectives (in this case minimize social costs — or a proxy for it — and minimize fleet size) the well known problem of determining the optimal solution arises, although a technique known as the compromise set method may assist here (Zeleny, 1973).

The three remaining papers presented to the workshop concentrated on delivery mechanisms. **Khalid Abbas's** paper developed partial productivity measures (such as vehicle kilometers operated per vehicle or per member of staff) for four publicly owned intercity bus companies in Egypt. Significant differences were detected but difficulties were encountered in making an overall assessment (i.e., in determining total factor productivity). This is an area that has been of past concern to this Conference series (see, for example, Talvitie and Obeng, 1991) and one where there have been recent theoretical advancements (for a review, see Hensher and Waters, 1993). **Toshi Mizutani's** paper compared public and private urban railways in Japan. A problem emerged in comparing like with like in that the public railways were predominantly underground (U-bahn) systems whilst the private railways were mainly suburban (S-bahn) systems. However, a Cobb-Douglas based production function was developed that took into account most of these differences and found that the private companies were 30 percent more productive than public firms, a figure that seems to be in line with recent studies elsewhere (for example, Domberger et al., 1986 and Heseltine and Silcock, 1990). However, a key question is to what extent these differences are due to ownership per se and to what extent they are due to regulation and competition. **John Preston's** paper compared 13 state owned railways in Western Europe through the development of partial productivity measures and through the use of a translog cost model to determine returns to scale and density. As with Khalid's paper large variations in performance were detected, some of which (but by no means all) could be ascribed to network size and utilization. From a cost minimization point of view, it was found that for the largest railways the networks were too large and for almost all railways the networks were underutilized.

At least three themes emerged from this workshop. The first was that of turning data into knowledge. Nariida's paper reminds us of the quote by Sir Josiah Stamp: "Public agencies are very keen on amassing statistics - they collect them, add them, raise them to the nth power, take the cube root, and prepare wonderful diagrams. But what you must never forget is that every one of these figures comes in the first instance from the village watchman, who just puts down what he damn pleases". Improved knowledge can only be achieved through good quality data. As a rider to Sir Josiah's quote, we might add that we detect a tendency for private agencies to be reluctant to amass statistics or, at any rate, to make them available to academics. From Avi and Yechezkel's paper and the three papers that made use of statistical cost analysis of varying degrees of sophistication, the need to make mathematically complicated methodologies understandable to the lay person was emphasized. From the four papers that were essentially case studies, the need to convert them into clinical studies was emphasized. In other words, there is a need to synthesize individual studies in order to produce a more general, holistic viewpoint.

The second theme was that of making the traditional four stage trip planning process model more realistic. Some of the discussion was involved with making improvements to the existing structure, for example with respect to the ordering of the individual stages of the process. However, a greater amount of the discussion was involved with overhauling the traditional model. Keith's paper showed the need to develop transport models that do not treat transport solely as a derived demand; factors other than time and cost need to be included in the trip planning process. Furthermore, for those trips that are a derived demand, the feedback between transport and land use needs to be taken into account. It was also interesting to note that many of the paper's treated transport demand as fixed, and then attempted to determine the optimal level of supply. This is clearly unrealistic as we know that the level and quality of transport supply affects the level of demand. Demand is endogenous not exogenous to the trip planning process and the feedback

between demand and supply needs to be taken into account. Lastly, nearly all the papers were static and concentrated on states, whereas there is an increasing realization of the need to be dynamic and look at processes (see, for example, Goodwin, 1993). Examples of this might be to include choice of travel time in the trip planning process and rather than concentrating on either a base or design year, looking at changes year on year over a number of years. It is interesting to note that many of these ideas are being incorporated in to the tranche of strategic or integrated models currently being developed in the United Kingdom, such as the model developed by Bates et al. (1991) for Edinburgh.

The third theme was that of making models prescriptive as well as descriptive and predictive. That is models should be capable of telling us how things should be as well as how they are and how they will be. In particular, this was the gist of the three papers on delivery mechanisms which were attempting to determine the optimal form of regulation and ownership in order to make the trip planning process efficient. This in turn begs the question what do we mean by efficient and optimal. The emphasis of the papers in this workshop was on technical efficiency rather than on allocative efficiency, in other word on minimizing producer costs rather than on maximizing welfare (that is the net benefits to producers, consumers and third parties). A more rounded view may put greater emphasis on allocative efficiency.

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