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Book review

Forecasting Urban Travel: Past, Present and Future. David Boyce. University of Illinois at Chicago and Northwestern University, USA and Huw Williams. Cardiff University, Edward Elgar Publishing, (£126.00 (Hardback), £32.00 (Paperback and eBook), ISBN: 978-1-84844-960-2 (Hardback), ISBN: 978 1 78471 360 7 (Paperback) ISBN 978-1-78471-359-1 (eBook))

This book provides an account of the development of the practice and associated research in forecasting urban travel over 40 years. Whilst its title might suggest that this is a book for scholars who are interested with the science of forecasting travel, it is much more than that. I found it to be a rich description of the evolution of a discipline more akin to a science studies approach. Through the author's own direct experience of and discussion with a wide range of experts in the field they remind us that the pathway of the development of forecasting techniques has been, and will continue to be, strongly influenced by the questions of the time and the resources made available to innovate. Many of the advancements were driven by cities seeking to plan better and to commission more effective, more elaborate (where computing power allowed) and more policy relevant models. The book traces pathways of technical development which seemed promising but stopped or failed as well as those which have grown to form the foundation of the models in place today. They lift the bonnet on critical decisions which needed to be taken on model structures and relationships which still matter yet which were by no means guaranteed to emerge as the 'right' or only way forward.

The book is, at 529 pages (before references), a mammoth undertaking by the authors and, therefore a hugely significant resource for the field. However, this equally makes the book a daunting task to engage with. It is not written to be a teaching resource but there are certainly sections of it which would be effective resources for critical reflection on current techniques. To really engage with the content it felt like it would be better to be engaged in the practice of running or using models or learning how to do so. This suggests more of a Masters to PhD level resource. It should certainly have a place in every University library and should be the reading for month one of anyone studying a dissertation in urban transport modelling. It is written by technical experts but can be read by people with a phobia of formulae as, where important, these are provided at the end of the Chapter which works well.

The book is structured in 12 Chapters. The first is an Introduction to the book structure and the seven themes which run through it. These are: the role of institutions (which is not necessarily what the book title might lead one to anticipate as a core theme); the planning context in which the tools are being developed; the role and relevance of theory; data requirements; solution of models; validation and performance of models; and practical compromises. The structure of the book follows a broadly chronological approach drawing largely on UK and US experience, reflecting the experience and the greater networks of the authors.

Chapter two charts the development of what is described as the traditional or four step model, identifying how issues such as ordering of model processes had to be developed on the fly and without an associated theoretical position at times. Given the amount of critical discourse that exists around the limits of urban modelling, this is hugely important background.

Chapter three charts early UK experience, noting the influence of the Transport and Road Research Laboratory and the studies emanating from London, West Yorkshire, Birmingham and Glasgow which drove much of the innovation. Issues which developed included the use of generalised cost and the shift to understanding behaviour at a household level. Disaggregate behavioural modelling was proposed but not fully adopted and Alan Wilsons' field defining work on entropy maximisation emerged. Network analysis and assignment procedures also developed and these are described alongside the debates about whether to model trip distribution and model split together or separately and, if so, in what order. The behavioural science lagged behind the practical needs of the time.

Chapters four and five chart the rise of individual level disaggregate behavioural choice modelling, including the Nobel prize winning work of Daniel McFadden. Chapter four pays particular attention to the gap between some of the ground breaking theoretical work and the demands of practice. It provides a very accessible introduction to decision trees and choice structures. Chapter five takes the developments further towards the current day covering multi-nomial logit and probit models and the deployment of stated preference methods. This is an area where the field is advancing very rapidly and where the state-of-art felt somewhat dated.

Chapter six reviews the rise of activity-based travel analysis and forecasting. Whilst the theoretical qualities, research methods and computational efficiency developed in the individual behavioural choice approach, concern raged (and still does today) about whether trying to infer behaviour of the population from data on choices in individual and constrained contexts was appropriate. The chapter looks at activity modelling within the household and different approaches to incorporating scheduling constraints over time and space. Again, the complexity of the issues to be faced is laid bare and the various threads and leading lights in the field are clearly set out.

Chapter seven tackles transport network equilibrium. By necessity, the chapter covers the whole period from the 1960s and the authors cross reference to the parallel developments described in Chapters five and six. Chapters eight and nine continue the work on describing the environment in which the models were developed in the US (eight) and UK (nine). For example, the growing tradition of economic evaluation and the requirements to report welfare gains shaped the way models were assembled and different tour based models were applied in some places but not everywhere. Freight continues its place as the Cinderella of urban transport with comparatively little resource devoted to understanding how it changes.

Chapter 10 looked at the changing computing environment in which the field has evolved. As a taster, the IBM S/360 of 1964 introduced an

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8 bit byte, byte addressable memory. However, the authors reflect not just on the change in computing power but on the extent to which that power has been used up in representing greater complexity or increased demands for runs of different sorts.

Chapter 11 gives the authors license to set out their views on achievements, current challenges and future prospects. They underline just how far the science and practice (sometimes together and sometimes separately) have advanced but remain concerned that the gap between academia and practice. The set of critical questions which they set out should be of interest to anyone who commissions a model or who relies on its results. Whilst one hope for the book might be that it closes the gap between users and developers of models in reality this will perhaps only be done by research oriented practitioners. Whilst the authors did tackle the issue of forecast accuracy, this was a curiously small part of the book. More than anything, I feel the field lacks a systematic reflection as to whether the effort invested in increasingly sophisticated modelling is worth it, given the nature of the uncertainties which influence the actual outturns. It was a shame that the book was not more definitive here.

Chapter 12 concludes the book with a reflection on the process of studying the development of the field and about how ideas emerge and how they come to be accepted. As people who dedicated their careers to this field they are both humble in terms of the merits and limitations of the tools we have today as well as optimistic but realistic about what and where next.

The book is a fascinating dive into the socio-technical system of transport modelling and the co-evolution of science, technology, practice, institutions and policy. As well as being a foundational resource for more advanced scholars and practitioners developing an interest in modelling it should also, in my view, be a compulsory read for those engaged in policy research who want to critique models or modellers. This is a hugely well informed reflection on not just how but why models are put together the way they are. In a number of different ways, there will not be another book like this!

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