TRAVEL SURVEY METHODS

TRAVEL SURVEY METHODS
QUALITY AND FUTURE DIRECTIONS

Edited by

PETER STOPHER
The University of Sydney, New South Wales, Australia

and

CHERYL STECHER
Franklin Hill Group, Santa Monica, USA

United Kingdom – North America – Japan
India – Malaysia – China

Emerald Group Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-0-08-046401-5

Awarded in recognition of Emerald's production department's adherence to quality systems and processes when preparing scholarly journals for print

INVESTOR IN PEOPLE

FOREWORD

This book is a new chapter in the ISCTSC's continuing focus on maintaining and improving the quality of data collection in transport surveys. The papers extend discourse on broad topic areas that have been addressed by the ISCTSC in previous gatherings, update us on travel survey initiatives currently under way in many countries, and provide a glimpse into the future in the form of changing contexts, new topics, new technologies, and new standards. However, what these papers really tell us is that there are many ways to improve the quality of transport surveys; too many to be covered in a single book or conference proceedings. There is no set of absolute standards that, if observed, will automatically ensure the quality of a particular research effort or product. However, there are general (and generally measurable) guidelines for high-quality research that are widely appreciated in the ISCTSC community and beyond.

As we pick up the baton as ISCTSC chairs, reading this book reminds us of the importance of the fundamentals of *good* survey design. No survey fully satisfies the theoretical ideals of scientific inquiry. Every survey represents a collection of compromises between the ideal and the possible. For us, the primary goal of the ISCTSC is to help the international community of transport survey researchers arrive at the best possible compromises by facilitating communication among those conducting transport survey research, opening new lines of communication with those conducting related research in different disciplines, and extending information dissemination about survey practice and methods research. *Perfect* transport surveys may never be possible, but *good* surveys can and should be done.

We would like to thank the authors who participated in this volume, particularly those of you who are long-standing contributors to ISCTSC programs. We look forward to working with you over the next several years and commit to stimulating and expanding the ISCTSC roles in collaboration and dissemination. We would particularly like to acknowledge the solid foundation that has been provided for our upcoming tenure by Peter Stopher, Cheryl Stecher, and Peter Jones, and all the Chairpersons of the previous International Conferences on Transport Survey Methods. We would also like to thank Chester Wilmot for his unwavering behind-the-scenes support as Secretary/Treasurer of ISCTSC. We thank them for their diligence in support of the goal of transport survey quality, and hope to carry on that tradition.

Johanna Zmud
Tony Richardson

PREFACE

It is hoped that this book will move the practice of Travel Surveys forward again, as a follow on to the earlier book *Transport Survey Quality and Innovation* (Stopher and Jones, 2003a), published three years ago. It is the goal of this book to make further progress in establishing ways in which the quality of transport surveys can be assessed and improved, as well as to set out some future directions for research in improving travel survey methods. Since the earlier book was published, a significant research effort has drawn to its conclusion, sponsored by the US National Cooperative Highway Research Program (NCHRP), through the Transportation Research Board of the National Academies of Science and Engineering in the US. This research effort was aimed at establishing standardised procedures for personal travel surveys in the US, and the work accomplished in that research forms the basis of the second chapter of this book, which was also used as a keynote paper in the 7th International Conference on Travel Survey Methods, held in Costa Rica in August 2004.

This book is not a conference proceedings. However, the various chapters of the book have been developed from papers that were a part of the 7th International Conference on Travel Survey Methods. All of the papers written for and as a consequence of the conference were reviewed by three referees. Only those papers that achieved the highest ratings from the referees were selected for inclusion in this book. Prior to the conference, a call for abstracts yielded a total of more than forty abstracts. Following a review of all the abstracts, twenty three papers were eventually selected for inclusion in the conference. Seventeen resource papers were commissioned. Following review of these and modification by the authors, sixteen were included in the conference. Three keynote papers were also commissioned, and all three were included in the conference, following extensive reviews of each. Thus, in the conference itself, forty two papers were presented either to plenary sessions or to workshops. Of these, twenty two were selected for revision and inclusion in this book. In addition, the chairs of the fifteen workshops were asked to write papers that summarised the deliberations of those workshops and that could be included as chapters of this book. These papers were also reviewed before being included. Final versions of most of the chapters were completed in May-June of 2005, almost a year after the conference was held.

GOALS OF THIS BOOK

The goals of this book are twofold. First, this book seeks to extend the discussions of the Costa Rica Conference and its two predecessor conferences on the topic of survey quality. Second, it sets out to create a research agenda for travel surveys for the coming

years, recognising where some of the most critical areas are for future developments and innovations. To set the stage for these goals, the first chapter of the book presents an overview of travel surveys in South and Central America. The second chapter offers a series of proposals for possible standards and guidelines that could be considered for adoption on a national or global basis.

In the area of survey quality, discussions began with the 5th International Conference on *Transport Surveys: Raising the Standard* in 1997, held in Germany. While that conference raised many issues relating to survey quality, no consensus was reached on measures of quality, nor the applicability of those measures to the global transport survey community. The debate continued in 2001 in the 6th International Conference on *Transport Survey Quality and Innovation* that was held in South Africa. While the sixth conference began with a more concrete list of possible areas of standardisation, it was noted that 'Few recommendations of specific standards emerged from the conference, although many of the proposals for standards…appear to be supported by various workshops' (Stopher and Jones, 2003b). In the meantime in the US, a research project was undertaken under the funding of the NCHRP to develop standardised procedures for personal travel surveys, as noted above. The list of possible areas for global standards that was put before the 2001 Conference came from the early work on this project. For the 2004 conference, the set of proposed standards, detailed in chapter 2 of this book (Stopher *et al.*, 2006), was developed from the findings of this research project and put forward as a starting point for consideration.

Chapters 3 to 18 cover this area of survey quality, standards, and guidelines. The chapters address various broad areas of survey design and implementation. The six broad areas covered by this part of the book are:

- Survey Design;
- Sample Design;
- Instrument Design;
- Survey Implementation;
- Processing, Analysing, and Archiving Survey Data; and
- Quality Assessment.

With respect to a research agenda, the International Steering Committee for Travel Survey Conferences (ISCTSC) developed a list of topic areas that appear to be among the most pressing research areas for the continued development of travel surveys in the beginning of the 21st century, to assist in the guidance of transport policy and investment in the next few years. A subset of topic areas were selected for the conference to consider. Each area was described in a one-paragraph synopsis, and the workshops in the 7th International Conference were asked to consider these topics and to develop a research agenda for these areas. Chapters 19 to 37 cover these topics, which are:

- Stated Preference (SP) surveys;

- Panel surveys;
- Freight surveys;
- Investment Quality surveys;
- Process data;
- New technologies (not web based);
- New technologies (web based);
- Emergency events surveys; and
- Simulated travel survey data.

Several of these topics have not appeared before in one of these conferences, while others have appeared frequently but often without resulting in a clear forward direction. This is particularly the case with the area of freight data, which, like freight modelling, appears to suffer from some considerable lack of clear direction within the profession. New topics to this conference include those of panel surveys, investment quality surveys, emergency events surveys, and simulated travel survey data.

The final chapter of this book consists of a summary of the conference and of the chapters of this book, and is intended to provide a quick overview of the overarching conclusions that can be drawn from the various chapters of this book. The final chapter also provides one paragraph descriptions of each of the workshops, which readers may find to be a useful starting point for selecting those portions of this book to read. In addition, the reader will find it helpful to refer to the previous books in this series (Stopher and Jones, 2000; Stopher and Jones, 2003a), to gain the greatest benefit from the material herein.

Cheryl Stecher
Peter Stopher *January, 2006*

REFERENCES

Stopher, P.R. and P.M. Jones (eds) (2003a). *Transport Survey Quality and Innovation,* Pergamon Press, Oxford, 646 pp.

Stopher, P.R. and P.M. Jones (2003b). Summary and Future Directions. In: *Transport Survey Quality and Innovation* (P.R. Stopher and P.M. Jones, eds), 635-646, Pergamon Press, Oxford.

Stopher, P.R., C.G. Wilmot, C.C. Stecher and R. Alsnih (2006). Household Travel Surveys: Proposed Standards and Guidelines. In: *Travel Survey Methods – Quality and Future Directions* (P.R. Stopher and C.C. Stecher, eds), 19-74, Elsevier, Oxford.

Stopher, P.R. and P.M. Jones (eds) (2000). *Transport Surveys: Raising the Standard*, Transportation Research Circular E-C008, Transportation Research Board, Washington, DC.

ACKNOWLEDGEMENTS

The chapters in this book were originally prepared either for or as a result of a conference that was held in Costa Rica in August 2004. That conference was conceived and directed by the ISCTSC, under the co-chairmanship of Cheryl Stecher and Peter Stopher. The ISCTSC was set up in 1997 to '...organise periodic international conferences dealing with research subjects relevant to the conduct of transport surveys that support planning, policy, modelling, monitoring, and related issues for urban, rural, regional, intercity, and international person, vehicle, and commodity movements'. The ISCTSC was assisted in organising the local arrangements and logistics by a Local Organising Committee in the US and Costa Rica, under the co-chairmanship of Carlos Arce and Carlos Contreras Montoya. The conference co-chairs would like to acknowledge the hard work put in by these two committees, the members of which are shown in Tables 1 and 2.

Table 1: Members of the International Steering Committee for Travel Survey Conferences for the Costa Rica Conference

Name	*Affiliation*	*Country*
Carlos Arce	NuStats	USA
Patrick Bonnel	ENTPE	France
Werner Brög	Socialdata, GmbH	Germany
Carlos Contreras Montoya	Ministerio de Obras Publicas y Transportes	Costa Rica
Lee Geisbrecht	Bureau of Transportation Statistics, USDOT	USA
Peter Jones	UCL	UK
Ryuichi Kitamura	Kyoto University	Japan
Martin Lee-Gosselin	University of Laval	Canada
Jean-Loup Madre	INRETS	France
Arnim Meyburg	Cornell University	USA
Elaine Murakami	US Department of Transportation, FHWA	USA
Juan de Dios Ortúzar	Pontificia Universidad Católica de Chile	Chile
Tom Palmerlee	Transportation Research Board	USA
Alan Pisarski	Consultant	USA
Tony Richardson	The Urban Transport Institute	Australia
Gerd Sammer	Universitat für Bodenkultur	Austria
Cheryl Stecher (co-chair)	The Franklin Hill Group	USA
Peter Stopher (co-chair)	The University of Sydney	Australia
Orlando Strambi	Escola Politecnica da Universidade Sao Paulo	Brazil
Harry Timmermans	Eindhoven University of Technology	The Netherlands
Mary Lynn Tischer	Virginia Department of Transportation	USA
Klaas van Zyl	Stewart Scott	South Africa
Manfred Wermuth	Technische Universitat Braunschweig	Germany
Chester Wilmot (Secretary)	Louisiana State University	USA

Table 2: Members of the Local Organising Committee for the Costa Rica Conference

Name	*Affiliation*	*Country*
Carlos Arce (co-chair)	NuStats	USA
Carlos Contreras Montoya (co-chair)	Ministerio de Obras Publicas y Transportes	Costa Rica
Rafael Chan Jaen	Ministerio de Obras Publicas y Transportes	Costa Rica
Jose Manuel Hernandez Monge	Ministerio de Obras Publicas y Transportes	Costa Rica
Minor Rodriguez Barrantes	Ministerio de Obras Publicas y Transportes	Costa Rica
Juan de Dios Ortúzar	Pontificia Universidad Católica de Chile	Chile
Juan Carlos Soto Vindas	Eurobus, SA	Costa Rica
Orlando Strambi	Escola Politecnica da Universidade Sao Paulo	Brazil
Olman Vargas Zeledon	Colegio Federado de Ingenieros y Arquitectos	Costa Rica

We would also like to acknowledge the workshop chairs and rapporteurs, who contributed substantially to the success of the conference as well as contributing to chapters in this book and to the refereeing process for various chapters. We would also like to acknowledge Andrea Hernandez Torres and Adriana Hernandez Torres of the University of Costa Rica and Olman Vargas Benavides and Samanta Solorio Murillo of the Colegio Federado de Ingenieros y Arquitectos who assisted the LOC and staffed the conference registration desk throughout the conference.

We are also grateful to the following organisations that provided financial support and sponsorships for the conference, without which this book would not exist:

- The US Department of Transportation, Federal Highway Administration;
- AVV Transport Research Centre, Dutch Ministry of Transport;
- NuStats of Texas;
- Ministerio de Obras Publicas y Transporte, Costa Rica ;
- Colegio Federado de Ingenieros y Arquitectos, Costa Rica;
- Morpace, Inc. of Michigan;
- Resource Systems Group, Inc. of Vermont; and
- Eurobus, S.A. of Costa Rica.

The sponsorship of these organisations enabled a number of scholarships to be awarded to delegates, primarily from South and Central America, but also to Africa, the latter also using funds that were generated by the previous conference held in South Africa in 2000. None of these delegates would have been able to attend without this assistance. Their presence in the conference enriched the conference discussions greatly, and has also contributed to the dissemination of good practice in travel surveys in a number of countries.

We would also like to acknowledge the assistance provided by Carmen Stopher in reading and checking the manuscript for this book. Her help has been invaluable. We would also like to thank the publishers, Elsevier Science, and especially Chris Pringle, for their encouragement and support of this venture.

DEDICATION – PATRICIA VAN DER REIS

This book is dedicated to the memory of Patricia van der Reis, who died unexpectedly in October 2005. Pat had been associated with the International Travel Survey Conferences for more than twenty years. During this time, she made major contributions to the profession, as well as providing strong representation of the African subcontinent in this international setting. In the Second International Conference on New Survey Methods, held at Hungerford Hill in Australia in September 1983, Pat contributed a chapter on 'The transferability of rating scale techniques to transport research in a developing country'[1], which drew the attention of the conference delegates to special issues in asking people in Africa to use rating scales to assess aspects of transport service. At the Third International Conference on Survey Methods in Transportation, held in Washington, D.C. in January 1990, Pat chaired one of the workshops on the topic of New Technologies in Surveys, where the primary new technologies seen then as applying to transport surveys were lap-top computers, use of computer assisted telephone interviewing, audio and video taping, and the potential for obtaining data from vehicle on-board computers.

The next in this series of conferences that Pat attended was the Fifth International Conference that was held in Eibsee, Germany in May, 1997. In this conference, Pat presented a landmark paper on issues of illiteracy and semi-literacy in travel surveys[2], as well as contributing to the two workshops she attended during the conference. When it became apparent that there would be further conferences in this series, Pat proposed that the next conference should be held on the African continent and volunteered herself as the chair of the Local Organising Committee. Over the next three years, she worked tirelessly to ensure that the conference that would be held in 2001 in the Kruger Park in South Africa would be an even greater success than its predecessors. She formed a Local Organising Committee, helped obtain local sponsorship funds, organised the location of the conference, and assisted in a vast number of ways to ensure that conference participants would have a rewarding and also enjoyable conference. For many of those who attended, this was their first visit to Africa, and Pat made it a memorable one for all those who attended. She also worked extremely hard to ensure that various professionals from all over sub-Saharan Africa would have an opportunity

---

[1] Van der Reis, P. (1985). The transferability of rating scale techniques to transport research in a developing country. In *New Survey Methods in Transport*, (Ampt, E.S., Richardson, A.J., and Brög, W. eds), 273-287, VNU Science Press, Utrecht, Netherlands.

[2] Van der Reis, P. (2000). Transportation surveys among illiterate and semiliterate households in South Africa. In: *Transport Surveys: Raising the Standard*, III-G/1-11, Transportation Research Circular E-C008, Transportation Research Board, Washington, DC.

to attend the conference. She did this both by finding ways to publicise the conference and also in helping to find funds that could be used to provide scholarships for those who would otherwise be unable to attend. In total, of 106 delegates to the conference, forty one were from thirteen African countries, with the remaining delegates coming from Europe, the US, Australia, Japan, and South America. This afforded these African delegates an opportunity to interact with an international group that they would rarely have the opportunity to meet. Pat also arranged for a keynote address from a prominent survey specialist in Africa, which added immeasurably to the success of the conference and to setting an appropriate stage for the balance of the conference. Notwithstanding all of the work involved in organising the conference, Pat still found the time to contribute, with her friend and colleague Marina Lombard, an important resource paper on multi-cultural and multi-language transport surveys[3]. Pat took part in the deliberations of the two series of workshops, while also continuing to ensure that the conference ran smoothly and that all delegates' needs were met.

After the conference was over, it was decided by the International Steering Committee to purchase fifty copies of the resulting conference book and to distribute these to delegates and universities in sub-Saharan Africa. Again, Pat provided addresses of many universities in Africa, to which books were subsequently sent, as well as ensuring that all delegates from Africa received a copy of the book.

The next conference in the series was held in Costa Rica. Pat assisted from the outset, first by documenting carefully what she had done as Local Organising Committee chair and sharing this with the incoming Local Organising Committee chair, and then in accepting a role as a workshop chair of the workshop on Survey Implementation Standards and Guidelines. In her inimitable fashion, she was one of the first workshop chairs to submit her workshop report, which appears as a chapter in this book[4], as well as getting reviews done promptly of the papers in her workshop and providing recommendations to the editors.

Pat will be remembered by the many international delegates to these various conferences as a gentle, self-effacing, and highly professional contributor. She showed remarkable ability in the area of travel survey design and implementation and led the way in innovations to allow such surveys to be done in the very different contexts to be found in Africa, from where most travel survey techniques have been developed in Western Europe and North America. Pat contributed in more ways than most of us are probably aware, not only in innovation in travel surveys, but also in championing the

---

[3] Van der Reis, P. and M. Lombard (2003). Multi-cultural and multi-language transport surveys, with special reference to the African experience. In: *Transport Survey Quality and Innovation*, (P. Stopher and P. Jones eds), 191-208, Pergamon Press, Oxford.

[4] Van der Reis, P. and A.S. Harvey (2006). Survey implementation. In: *Travel Survey Methods – Quality and Future Directions*, (P. Stopher and C.C. Stecher eds), 213-222, Elsevier Science, Oxford.

development of her fellow Africans and assisting the international community of transport and travel survey professionals.

On a personal note, I had the privilege to work with Pat in the organising of the past three conferences. I came to depend upon her in many ways. She was always responsive, providing replies to questions and solutions to problems more rapidly than any of us had a right to expect. She was extraordinarily diligent in all that she took on to do, and was always cheerful in the execution of whatever task was before her. I also had the pleasure of getting to know Pat personally, and enjoyed enormously a trek into Kruger Park with Pat and her husband Gunther, where we saw many fabulous sightings of African wildlife. We also spent pleasant African evenings talking in the moonlight, and planning the conference, and talking of other matters of mutual interest.

Pat's presence in and contribution to her profession and to these conferences will be greatly missed.

Peter Stopher
Sydney, Australia

1

TRAVEL SURVEY METHODS IN LATIN AMERICA

Juan de Dios Ortúzar, Pontificia Universidad Católica de Chile, Santiago, Chile

REGIONAL ENQUIRY ABOUT TRAVEL SURVEY METHODS

Because practically no publications about official travel survey guidelines or reports of experiences and/or results are available in the majority of countries in the region, we had to resort to an Internet-based enquiry. This took the form of a simple request for information sent to a large number of scholars and officials in most of Latin America[5]. In some cases, this produced minimal information, whilst in others it produced a sizeable amount of information, in yet others a link to another person who was known to be knowledgeable in this subject, and so on. At the end (the enquiry lasted for some two months), we obtained fourteen responses from eight countries; in addition, published data from Chile was obviously available. In what follows, we summarise this information in the simplest possible way.

Argentina

This country has a fairly long tradition of conducting medium-scale origin-destination (O-D) surveys for the purposes of direct transport planning. However, the main efforts seem to have occurred in the past decade, with one-off household O-D surveys con-

[5] The e-mail request was sent to all professionals known to have been involved in the design, analysis or commissioning of a large scale travel survey in eleven countries; a similar request but emphasising the need to get names of people with experience in large travel surveys was also sent to active academics and consultants in the same countries. A total of forty five messages were finally sent.

ducted in several cities between 1994 and 1999 using the standard methodology at the time (Richardson *et al*, 1995). However, we could only obtain one survey report, for the city of Rosario in 2002 (Adjiman, 2004), where three percent of the city's households were interviewed. In general, the surveys have been conducted by professionals typically working at a university centre. Although sample and questionnaire design follow usual practice, in some cases the zoning systems defined have been too aggregate (i.e., forty five zones for a city of over one million inhabitants). The surveys have included socioeconomic and travel information; in some cases, respondents' opinions about public transport service quality, transport needs for the physically handicapped, and willingness-to-use alternative transport modes, such as the bicycle, have also been asked (Petrone, 2004). Interestingly, in this period, no survey was done in Buenos Aires although one, to be conducted by foreign consultants in 2001 with World Bank support, was aborted mid-way due to financial and legal difficulties.

Brazil

Brazil has a long tradition in this area and, apart from Chile, it is the country in Latin America where most care and interest has been put into transport survey methods. Many cities have conducted large-scale household surveys in recent years. These are usually conventional one-off O-D surveys, with face-to-face interviewing and asking about trips the day before. Generally, walking trips of less than 400 metres are not recorded (except in the case of compulsory trips which are recorded irrespective of distance). Trips by children under five have been recorded in some cases and validation seems to be more an exception than a rule. Finally, in most cases intercept surveys at cordon and screen lines are also conducted. Some further details are as follows (Strambi, 2004):

- Since 1967, São Paulo has conducted large-scale household O-D surveys every ten years and the methodology has been almost the same since 1977; large samples (i.e., 20,000 to 30,000 households) have been selected, based on some sort of stratification; the more recent by energy consumption levels, in addition to the conventional stratification by zone. In 2002, a smaller complementary survey, with a sample of just 6,000 households, was conducted using the same approach (DM, 2003).
- The most recent survey in Brazil was completed in May 2004 for the southern city of Porto Alegre. The project was undertaken by a pool of firms including TIS, from Portugal; this is expected to have added quality to the traditional O-D survey approach in the country, because TIS has much experience in Europe in this field, but no details were available when this chapter was written.
- Rio de Janeiro has also conducted two or three surveys since the 1970s and the last one concluded in early 2004. At the time of writing this chapter, consultants were discussing the processes of correction and expansion.

- Although several other cities have embarked on surveys of this type, it is interesting to mention an important and sobering exception: Curitiba, universally considered an example of good land use and transport planning practice, has never conducted a household O-D survey.

Costa Rica

The most recent household O-D survey in this country was carried out by the Ministry of Public Works and Transport between 1989 and 1991, for the Greater Metropolitan Area (GMA). This area is in the centre of the country and comprises some 1,967 sq. km. (roughly 3.8 percent of Costa Rica's land area); the GMA integrates four provincial capitals: Alajuela, Cartago, Heredia, and San José, and, at the time of the survey, had about 1.5 million inhabitants (about fifty percent of the country's population). Almost 13,000 households were interviewed and the zone system consisted of 388 zones. The only previous O-D survey had been conducted in the 1970s in San José. Unfortunately, it was not possible to obtain further details and no reports seem to be available.

Ecuador

According to our sources, the most recent household O-D survey in the country was done in Guayaquil in 2000, by the university, but no report is available, and it is fairly obvious that it was conducted by a team of non-specialists. The most recent O-D survey for Quito was conducted in 1977. It is interesting to mention that the prevalent approach in this country is to use intercept rather than household surveys; subsequent transport modelling is based on rather simplistic assumptions. For example, the interesting and successful bus development projects in Quito and Guayaquil were both based on simple on-bus surveys, and used the local knowledge, experience and ingenuity of seasoned planners.

Colombia

In spite of the difficulties associated with the general perception of insecurity, it has been customary in Colombia to conduct urban mobility surveys in the main cities of the country. Notwithstanding, it is not easy to get access to data; in particular, there seems to be no recent mobility data for the capital Bogotá. In the old days, the procedures used in each case were defined by the local administrations who would hire consultants to do the job, but, since 2000, local governments are supposed to follow the official guidelines set up by the Ministry of Transport (MTC, 1999). However, this manual has been heavily criticised on items such as sample size, questionnaire design, and for the requirement to collect seemingly redundant information (Cárdenas and Colomer, 2003). Although we could not obtain official reports, it is obvious that current methodology is not in line with the state of practice in the developed world.