

A Billion Trips a Day

Transportation Research, Economics and Policy

VOLUME 1

Editorial Board

Yossi Berechman

Department of Economics & Public Policy, Tel Aviv University, Israel

Peter Nijkamp

*Department of Regional, Urban & Environmental Economics,
Free University, Amsterdam, The Netherlands*

Kenneth Small

Department of Economics, University of California at Irvine, U.S.A.

The titles published in this series are listed at the end of this volume.

A Billion Trips a Day

Tradition and Transition in European Travel Patterns

Edited by

ILAN SALOMON

*Department of Geography,
The Hebrew University of Jerusalem,
Israel*

PIET BOVY

*Transportation and Traffic Research Department,
Ministry of Transport and Public Works,
The Netherlands*

and

JEAN – PIERRE ORFEUIL

*INRETS,
France*

A Collaboration of:

Members of the NECTAR group on Supply and Demand Behaviour in Transport and Communications, the European Science Foundation.



Springer-Science+Business Media, B.V.

Library of Congress Cataloging-in-Publication Data

A Billion trips a day : tradition and transition in European travel patterns / edited by Ilan Salomon, Piet Bovy, and Jean-Pierre Orfeuil.

p. cm. -- (Transportation, research, economics, and policy ; v. 1)

Includes bibliographical references and index.

ISBN 0-7923-2297-5 (alk. paper)

1. Transportation and state--Europe. 2. Transportation--Europe. I. Salomon, Ilan. II. Bovy, Piet H. L., 1943- III. Orfeuil, Jean-Pierre. IV. Series.

HE242.B54 1993

388'.094--dc20

93-15477

ISBN 978-90-481-4278-1 ISBN 978-94-015-8118-9 (eBook)

DOI 10.1007/978-94-015-8118-9

Printed on acid-free paper

All Rights Reserved

© 1993 Springer Science+Business Media Dordrecht

Originally published by Kluwer Academic Publishers in 1993.

Softcover reprint of the hardcover 1st edition 1993

No part of the material protected by this copyright notice may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without written permission from the copyright owner.



The European Science Foundation is an association of its 59 member research councils and academies in 21 countries. The ESF brings European scientists together to work on topics of common concern, to co-ordinate the use of expensive facilities, and to discover and define new endeavours that will benefit from a co-operative approach.

The scientific work sponsored by ESF includes basic research in the natural sciences, the medical and biosciences, the humanities and the social sciences.

The ESF links scholarship and research supported by its members and adds value by co-operation across national frontiers. Through its function as a co-ordinator, and also by holding workshops and conferences and by enabling researchers to visit and study in laboratories throughout Europe, the ESF works for the advancement of European science.

This volume arises from the work of the ESF Network for European Communications and Transport Activities Research (NECTAR).

Further information on ESF activities can be obtained from:

European Science Foundation

1 quai Leazy-Marnésia

67080 Strasbourg Cedex

France

Tel. 88 76 71 00

Fax 88 38 05 32

Dedicated to
Prof. Shalom Reichman (1935-1992)
for whom NECTAR was the sweet essence
of European mobility research

Table of Content:

List of Figures	xi
List of Tables	xiv
Preface	xix
Acknowledgment	xxi
List of Abbreviations	xxi
List of Contributors	xxiii
Part I: European Mobility Patterns	1
1. Introduction: Can a Billion Trips be Reduced to a Few Patterns? <i>Ilan Salomon, Piet Bovy and Jean-Pierre Orfeuil</i>	3
2. European Mobility is Different: A Global Perspective <i>Jean-Pierre Orfeuil and Piet Bovy</i>	13
3. Europe: A Heterogenous 'Single Market' <i>Piet Bovy, Jean-Pierre Orfeuil and Dirk Zumkeller</i>	21
4. Travel Patterns of the Europeans in Everyday Life <i>Jean-Pierre Orfeuil and Ilan Salomon</i>	33
Part II: Dimensions of European Mobility	51
5. Taming the Peak: Time and Timing as Travel Moderators <i>Ilan Salomon and Mart Tacken</i>	53
6. Car: Increasing Ownership and Decreasing Use? <i>Wim Korver, Jeroen Klooster and Gijsbertus R.M. Jansen</i>	75
7. Commuting: Home Sprawl, Job Sprawl and Traffic Jams <i>Gijsbertus R.M. Jansen</i>	101
8. Public Transport in Europe: Requiem or Revival? <i>Eliahu Stern and Terje Tretvik</i>	129
9. Travelling Across Europe: Going for Pleasure and Profit <i>Francoise Potier, Ali Turel and Jean-Pierre Orfeuil</i>	149
10. Transport Policy: The European Laboratory <i>Peter Jones, Piet Bovy, Jean-Pierre Orfeuil and Ilan Salomon</i>	167

Part III: National Perspectives	189
11. Austria: Something is happening between East and West <i>Gerd Sammer</i>	191
12. Belgium: Mobility at the Political Heart of Europe <i>Hilde Meersman and Eddy Van de Voorde</i>	211
13. Finland: Mobility on Top of Europe <i>Lassi Hilska and Veli-Pekka Kallberg</i>	227
14. France: A Centralized Country in between Regional and European Development <i>Jean-Pierre Orfeuil</i>	241
15. Germany: A Review at the Verge of a New Era <i>Claus Heidemann, Uwe Kunert and Dirk Zumkeller</i>	257
16. Greece: Growing Slow, Travelling Fast <i>Kostas Petrakis</i>	275
17. Israel: Transport in a Small Turbulent "Island-State" <i>Ilan Salomon and Eran Feitelson</i>	291
18. Italy: A (Motorway) Bridge to the South <i>Giancarlo Del Sole and Massimo Pazienti</i>	313
19. The Netherlands: Ground Transport Below Sea-Level <i>Wim Korver, Gijsbertus R.M. Jansen and Piet Bovy</i>	329
20. Norway: Crossing Fjords and Mountains <i>Arild Hervik, Terje Tretvik and Liv Øvstedal</i>	349
21. Sweden: Moving towards a Safer Environment <i>Krestin Westin</i>	367
22. Switzerland: Neutrality at the Center of Europe <i>Rico Maggi and Massimo Filippini</i>	385
23. Turkey: Coping with High Transit Demands through Entrepreneurship <i>Gokhan Mentesh, Ali Turel and Turgay Gunal</i>	403
24. United Kingdom: Deregulated Transport in an Over-regulated Continent <i>Sharon Cullinane</i>	421
References	437
Appendix A: Currency exchange rates table (31.12.1988)	448
Appendix B: Purchasing power parities (1989)	449
Index	451

List of Figures

2.1: The European difference: Cars and motorways	15
2.2: Gross Domestic Product per capita and population density	16
2.3: The European difference: Modal shares	16
2.4: The European difference: Volume and price for mobility expenditure	18
3.1: Motorization in Western Europe	23
3.2: Relative prices of car purchase and fuel, (1989)	24
4.1: Mobility indicators by car availability, Norway, (1985)	39
4.2: Weekly distance travelled by population group, UK, (1985-6)	42
4.3: Distance travelled per day, Switzerland, (1984)	43
4.4: Relationship between modal shares and income, Paris and the Netherlands	44
4.5: A conceptual framework for car traffic and public transport growth and decline	50
5.1: Prototypical activity - travel of families with pre-school children	60
5.2: Temporal distribution of trips in the Netherlands (1978-88)	63
5.3: Temporal distribution of trips in France	64
5.4: Working hours per week in Europe	67
5.5: Temporal distribution of work trips in Ankara, Turkey	69
5.6: Temporal distribution of work trips in Paris	70
6.1: Comparison of actual developments and Shell forecasts of car ownership in West-Germany	76
6.2: Car ownership levels in selected countries (1960-1989)	77
6.3: Number of passenger cars per 1,000 inhabitants (1989)	79
6.4: Distribution of households by car ownership in selected countries (1987-8)	80
6.5: Annual car/km per car and car/km per inhabitant (1987)	81
6.6: Development of annual average domestic kilometrage per car, (1970-1987)	82
6.7: Factors influencing car ownership and their relation with policy measures	85
6.8: Car ownership versus GDP per capita (1988)	86
6.9: Car/km per capita versus GDP per capita (1987)	87
6.10: Price of an 'average' new car in several European countries (1987)	90
6.11: Taxes on motor cars and fuel per km. driven	91
6.12: Distribution of car fleet by engine cylinder capacity, (1987-1989)	95
6.13: The relation between fuel efficiency and car fuel tax	96
7.1: Development of employment, labour force commuting in Amsterdam	104
7.2: Factors affecting commuting	105
7.3: Employment/population ratios by sex in selected countries, (1989)	109

7.4: Part time workers as a percentage of total workers by sex in selected countries	110
7.5: Distribution of commuting distances in EC member countries, (1975)	115
7.6: Mean lengths of work trips in various European countries, (1980–1988)	116
7.7: Trip length distributions of work trips in various countries	117
7.8: Flows of commuters between urbanization levels in France, (1984)	120
7.9: Modal distributions of work trips in selected countries in the 1980's	124
8.1: A conceptual framework of the factors affecting demand and supply of public transportation	130
8.2: Operation structures of public transport by type of service	134
8.3: Modal split of work trips in Stockholm (1986/87) and Trondheim (1990)	137
8.4: Train use in Europe, (1988)	140
8.5: Trends in the number of buses, (1970-1987)	141
8.6: Trends in rail patronage, (1970-1987)	141
8.7: Trends in the number of rail passengers/km, (1970-1987)	142
9.1: Total arrivals in six Mediterranean countries, (1976-1989)	153
9.2: The share of the main destinations—all trips abroad made by Europeans (1989)	155
9.3: Distribution of international trips by purpose—(1989)	155
9.4: Relative share of originating countries, (1989)	155
9.5: Temporal distribution of international trips	156
9.6: Distribution of international trips by mode (1989)	158
9.7: Distribution of international trips by mode and purpose (1989)	158
9.8: Number of stays abroad per inhabitants, by country (1989)	159
9.9: Average length of stays abroad	161
9.10: Distributions of international trips by mode and country (1989)	163
10.1: Relationship between patronage and bus service increases in Besancon	186
Austria	
11.1: Austria: rail and road networks	203
11.2: Daily time expenditure of persons above 6 years old, weekday, Salzburg region (1982)	206
11.3: Development of motorization and forecast for 2011	207
11.4: Automobile availability for Austrians (1983 and 2011)	208
11.5: Weekday travel distances of the mobile population for (1983 and 2011)	213
11.6: Distribution of trip distances by purpose	214
11.7: Average door-to-door travel speed, (1983 and 2011)	215
Belgium	
12.1: Belgium cities and districts	222

12.2: Expenditures for different consumption categories	224
12.3: Real petrol price in Belgium	228
12.4: Passenger-kilometres per year by mode	230
Finland	
13.1: Finland	238
13.2: The distribution of public transport by mode	242
13.3: The distribution of daily trips by purpose	246
13.4: Energy consumption in domestic traffic, (1987)	248
France	
14.1: France	253
14.2: The distribution of the population by settlement size	254
14.3: The geographical patterns of urban trips	262
Germany	
15.1: Germany	269
15.2: Public transport trips by purpose, (1976-1986)	274
15.3: Car trips by purpose, (1976-1986)	275
15.4: Passenger kilometres by mode, (1976-1986)	276
15.5: Number of trips by mode in urban areas, (1976-1986)	276
15.6: Number of passenger kilometres travelled by mode in urban areas, (1976-1986)	276
15.7: Distribution of trip length by mode, (1982)	278
Greece	
16.1: Greece major cities, (1981)	286
16.2: Distribution of trips by purpose, Athens (1983)	294
16.3: Daily trips by mode, Athens (1983)	294
Israel	
17.1: Population by District, (1989)	303
17.2: Division into Districts	304
17.3: Selected Transportation Parameters, (1944-1987)	309
17.4: a) Development of Road system, (1947-1984)	
b) Development of rail system, (1947-1984)	313
Italy	
18.1: Rail and motorway networks	324
18.2: Growth of vehicle fleet, (1980-1988)	330
18.3: Modal split in urban areas, work and school trips	333

The Netherlands

19.1: Municipalities of over 100,000 inhabitants and railway networks in the Netherlands	341
19.2: Number of trips per capita by hour and purpose	346
19.3: Car ownership, driver's license holders and car use (1970-1988)	349

Norway

20.1: Average number of trips by all modes, by time of day	362
20.2: Private and state investments in National Highways	364
20.3: Total number of vehicles by year	365
20.4: Person trips and person kilometrage of work trips, by car (index)	367
20.5: The air network	369

Sweden

21.1: Major cities in Sweden and population (1989)	378
21.2: Interurban trips by transport mode	390

Switzerland

22.1: Map of Swiss rail network, (1988)	397
22.2: Price indicators for Switzerland	400
22.3: Road network length and car use growth in Switzerland	403
22.4: Map of the Swiss national road network (1988)	405
22.5: Average daily traffic volume by month through the St. Gotthard tunnel, (1988)	410

Turkey

23.1: Annual daily traffic on state roads, (1989)	414
23.2: Number of road motor vehicles by type and use, (1990)	419
23.3: The modal distribution of freight and passenger transportation, (1989)	421

United Kingdom

24.1: The United kingdom	432
--------------------------	-----

List of Tables

2.1: The European difference: Safety, environment and urban modal split	19
3.1: Mobility differences within Western Europe	22
3.2: Mobility differences within Eastern Europe	23
3.3: GDP and personal mobility: Annual growth rates (1970-1987)	26
3.4: Decomposition of average annual growth in total car and train travel	28

4.1: Daily mobility of Europeans according to mobility surveys	40
4.2: Total distance travelled per weekday by residential location	46
4.3: Level of service of public transport by population of area of residence (Switzerland)	46
5.1: Changes in time expenditure in various countries	58
5.2: The temporal patterns of work in European countries	65
6.1: Density of car ownership	80
6.2: Median car lifetime	93
6.3: Average car fuel efficiency and composition of the car fleet by fuel type	94
6.4: Number of driver licenses per car (1987)	98
7.1: Development of commuting and modal split in France	102
7.2: Number of commuters and modal split by residence-work relation in Germany	103
7.3: Number of work trips and distance travelled per inhabitant, selected countries	112
7.4: Share of work trips in total distance travelled in Germany, all modes; (1965-1986)	113
7.5: Distribution of employment and population by urban class in France and the Netherlands	118
7.6: Annual changes in population and employment in selected metropolitan areas	119
7.7: Distribution of employment (and population) within selected metropolitan areas	121
7.8: Commuter flows in Amsterdam Metropolitan Area (1985)	122
7.9: Commuter flows in Ile de France, Paris (1982)	122
7.10: Tax deductions and travel allowances for work travel in various countries	125
8.1: Supply indicators for railway and bus services	132
8.2: The provision of paratransit services in European countries	136
8.3: Rail (1988) and bus (1990) annual patronage	139
8.4: Performance of urban public transport in selected European countries	144
8.5: Performance of European national passenger railways	147
10.1: Increases in inter-urban travel demand arising from provision of higher quality inter-urban links	182
10.2: Changes in levels of trip making by different modes in inner city areas	183
10.3: Comparison of changes in personal travel in Germany and U.K.	184
10.4: Expert views on the contributions of various measures to alleviate congestion	187

Austria

11.1: Population forecasts, by age and employment, (1988-2011)	202
11.2: Distribution of the population according to educational level (1988)	204
11.3: Costs and taxes in Austria per private car (1985)	209
11.4: Network lengths, vehicle kilometres offered and passengers (1988)	209
11.5: Mobility of Austrians by car availability per household, weekday traffic, (1983)	212
11.6: Kilometrage of the resident population, by mode (1983 and 2011)	216

Belgium

12.1: Relative importance of gross added value at factor cost and of employment	224
12.2: Total private expenditures on transportation, (index)	225
12.3: Government support for public transport (1988)	227
12.4: Fiscal revenues for passenger cars (1988)	229

Finland

13.1: The age distribution of the labour force in Finland	239
13.2: The distribution of the employed persons by economic sector (1988)	240
13.3: The distribution of household consumption in Finland (1987)	241
13.4: The distribution of daily trips by mode (excluding air traffic)	247

France

14.1: Annual growth rates of the population by settlement type	255
14.2: Urban public transport, (1989)	257
14.3: The French road system	258
14.4: The patterns of daily mobility (1984)	259
14.5: The main characteristics of trips (1982)	261

Germany

15.1: Population size, and household distribution, FRG (1950-1987)	270
15.2: Employment and establishments growth (1970-1987)	271
15.3: Length of roads and streets by type, FRG (1951-1989)	272
15.4: Vehicle ownership, FRG (1950-1989)	272
15.5: Urban and interurban travel demand, FRG (1985)	277
15.6: Passenger travel modal split FRG (1976, 1986)	280
15.7: Transport system features, FRG and fGDR (1989)	282
15.8: Key parameters of passenger transport, FRG and fGDR (1970-1989)	283
15.9: Motor vehicle and car ownership, FRG and fGDR (1970-1989)	284

Greece

16.1: Participation in labour market by age and sex, (1971 and 1981)	287
16.2: Economically active population by type of occupation	288
16.3: Development of economic indices	289
16.4: International travel by transport mode—Annual arrivals	292
16.5: Interurban travel by public transport modes (1986)	292
16.6: Supply/demand characteristics of ground transport	293
16.7: Daily mobility: average number of trips/day/person Athens, (1983)	295
16.8: Average travel times by trip purpose & mode Athens, (1983)	296
16.9: Modal split by trip purpose on interurban mainland trips (1987)	297

Israel

17.1: Population growth in Israel, (1948-1990)	302
17.2: Daily activities and trips per person	316
17.3: Modes of travel	318

Italy

18.1: Labour force by age and sex (1990)	325
18.2: Evolution of ex-urban mobility by transport mode	327
18.3: Investment in infrastructure and transport	329
18.4: Use of transport capacity in major cities	334
18.5: Intercity travel development and modal split	335

The Netherlands

19.1: The participation in the labour market by age and sex	342
19.2: Distribution of employment by different economic sectors	343
19.3: International and inland transport of goods (1987)	344
19.4: Supply and usage of public transport in the Netherlands (1988)	347
19.5: Supply of public transport in the four major cities in the Netherlands (1988)	350
19.6: Trips, kilometres travelled and average trip length for different purposes and urbanization classes (1987)	351
19.7: Modal split of trips for different urbanization classes, (1987)	352
19.8: Distribution of modal travel and modal split in four metropolitan areas by geographical relation, (1987/1988)	354
19.9: Daily number of interurban trips and modal split by purpose in the Randstad, (1986)	355

Norway

20.1: Net public expenditure for transport purposes	364
20.2: Trip frequencies and modal shares in Norwegian city regions for the years (1970, 1985, and 1990)	371
20.3: Modal choices for the home to work trip by location of workplace, (1985)	371
20.4: Mode choices by trip purpose in Trondheim, (1990)	372
20.5: Distances and modal splits between Oslo and other main cities	373

Sweden

21.1: Economically active population by industry, (1989)	380
21.2: Supply of the public transport network (1989)	382
21.3: Growth of the domestic travel 1980 and 1988, and distribution by type of trip (1988)	386
21.4: Division of urban and regional trips by trip purpose, (1978)	387
21.5: Interurban travel by transport mode, (1989)	391

Switzerland

22.1: Distribution of pupils (1986/87)	398
22.2: Transalpine goods traffic in million tons (1988)	400
22.3: The Swiss public transport system (1988)	401
22.4: Percentage share of personal travel by purpose on an average working day (1984)	406
22.5: Percentage share of trips by mode, purpose and week-day	407

22.6: Trip length by purpose, mode and weekday	408
22.7: Mode choice of commuters Zurich area (1980)	408
Turkey	
23.1: Distribution of employment by different economic sectors (1985)	415
23.2: Registered number of private cars in the provinces of the largest three cities (1984-90)	420
23.3: Highway network in Turkey (1987)	422
23.4: Characteristics of railway systems in Turkey (1987)	423
23.5: Selected results of Urban Transportation Surveys conducted in Turkish cities	424
23.6: Peak period (7:00-8:00am) person trips by purpose and mode in Ankara city	425
23.7: Daily person trips by mode, (1985)	426
23.8: Mean trip length in Ankara, (1985)	426
23.9: Transit characteristics in Turkish cities, (1988)	428
United Kingdom	
24.1: Age and gender structure of the population	433
24.2: Patterns of expenditure, by household income	435
24.3: Capital expenditure on transport by the public sector	435
24.4: Passenger transport by mode (1978-88)	438
24.5: Households with regular use of cars, by socio-economic grouping of head of household	439
24.6: Frequency of bus usage by age and gender	440
24.7: Travel distance per person per week, by type of person (1985/86)	440
24.8: Distance per person per week, by journey purpose (1985/86)	441
24.9: Distance to and from work by socio-economic group of working adults, by sex	442

Preface

As the long list of contributors indicates, this book is a joint effort of transportation professionals from fifteen European countries. International cooperation of this type must be initiated and supported by an appropriate agency. Ours was the European Science Foundation (ESF).

The ESF has supported between 1987-1992 the Network for European Communications and Transport Activities Research (NECTAR) to serve as a vehicle for research in these areas. NECTAR activities facilitated the collaboration of scientists from different member countries, working mainly in small groups on very particular topics. One of the groups, which focused on demand and supply behaviour, identified the void in knowledge regarding mobility patterns and related policies in various European countries.

In a series of group discussions, a number of hypotheses regarding the differences and similarities in mobility in Europe were raised. The transportation issues identified in various countries seemed to be similar and yet the responses of both travellers and policy-makers differed. Thus, the conception of the book was based on the assumption that a better understanding of behaviour - policy relationships can be accomplished through a comparative perspective. In addition, the comparative data can be a useful source of information to students of transportation in a changing Europe.

Consequently, the Group has decided to undertake the effort of producing a book that will address mobility issues in various countries. To that end, the group employed a network-based mechanism for generating information. National chapters provided the initial basis, which in turn were used, again by the group acting as a network, to analyze the information along several key dimensions.

A network-based mechanism means that the book is not merely a collection of independent contributions. It was developed in a coordinated manner, using a similar framework. Each of the 24 chapters is an original essay, developed for the purpose of allowing a comparative analysis.

The geographical scope of the book includes Europe, as represented in the ESF activities. Although it was not possible to obtain contributions from all member countries, fourteen national reports are included, representing Northern Europe, Central Western Europe and some countries from the Mediterranean region. Israel, though not formally part of Europe, is included because in many respects it constitutes an extension of the continent into Middle East. Eastern Europe is not included in the analysis, in part because it is, as will be shown, a very different case than that of its Western counterparts.

Timing the production of this book was an issue in itself. Western Europe is undergoing a very elaborate, but planned, change into a 'Single Europe'. Increasingly, the events taking place in one member country will be affected by European-level policies. Hence, it was thought that an understanding of the situation prior to the formal establishment of a unified Europe is in place. In the course of our work, very dynamic (and unplanned) changes have taken place in Eastern Europe, bearing on the transportation systems of some of the countries included in our analysis. The extreme case is that of Germany. Rather than excluding the new Germany, as its mobility is now changing so rapidly, we chose to deal with the Federal Republic, with only brief references to the implications of the unification. It may take years before the dust settles down so that the mobility patterns of the new Germany can be identified, but the book can at least provide the benchmark for understanding the forthcoming developments.

The success of this joint effort will be evaluated by the utility of this book to the readers. On the one hand, it should serve as a reference book to students of transportation interested in one or more of the individual countries. But a broader audience, including public and private sector policy-makers, planners and other professionals can also use the analytic parts of the book to gain some insights into the developments and prospects of travel behaviour in Europe. Travel behaviour, as will be explained in the next chapter, is the underlying domain for understanding transportation and the variety of social, economic and environmental implications it has.

The twenty-four chapters of this book represent an effort to display the best available data and to discuss its significance. However, as is discussed in Chapter 4, data qualities vary widely among countries, and hence it was not possible to bring all information to a truly comparative state. In particular, it was difficult to use comparable currency data. To overcome this problem, we have included a conversion table as an appendix. Errors due to inconsistencies or misinterpretation may still be present and we apologise for any such mistakes.

It is our hope that the information provided by this volume will serve to increase the awareness of decision-makers, professionals and to the complexity of Europeans' mobility, and as such, will make our environment a better place to live in. Reducing congestion, air pollution and noise, providing greater equality and access to all population groups and providing safer mobility, are all valuable objectives which require the understanding of travel behaviour.

Ilan Salomon, Piet Bovy and Jean-Pierre Orfeuil
Editors

Acknowledgements

Editing a book in which thirty-two contributors take part, could not be managed without the sincere cooperation of all involved. In particular, the assistance of Dr. John Smith of the European Science Foundation, Ms. Marie Stratta of Kluwer Publishing is greatly appreciated. Tamar Sofer, Anat Bloch, Noa Nahum of the Cartographic Laboratory of the Department of Geography at the Hebrew University of Jerusalem, and Doron Zur and Dorit David, provided unending efforts to help in the design of this book. We thank them all.

The editors would like to thank the following institutions which have assisted in the production of this book: The European Science Foundation (ESF), INRETS (Institut National de Recherche sur les Transports et Leur Securite) Paris, The Israel Academy of Sciences and Humanities, The Hebrew University of Jerusalem, and the respective organizations employing the contributors. Numerous colleagues have served as referees for the book's chapters. We thank them all for their valuable comments and time.

Chapter 9: It is a pleasure to thank Rolf Freitag from ETIC for the permission to use ETM data.

Chapter 24: The author would like to thank the Rees Jeffreys Fund for their support in writing this chapter and Peter Jones, formerly of the Transport Studies Unit, Oxford University for reading earlier drafts.

Abbreviations:

AU	: Austria
B	: Belgium
CH	: Switzerland
DK	: Denmark
EC	: European Community
ECMT	: European Council of Ministres of Transport
EFILWC	: European Foundation for the Improvement of Working and Living Conditions (Dublin)
EFTA	: European Free Trade Association
ESF	: European Science Foundation
ETDC	: European Travel Data Centre
ETM	: European Travel Monitor
F	: France
fGDR	: former German Democratic Republic
FRG	: Federal Republic of Germany (West Germany)
GR	: Greece
I	: Italy
IATB	: International Association of Travel Behaviour

INRETS	: Institut National de Recherche sur les Transports et Leur Securite
IRF	: International Road Federation
IRL	: Ireland
IUTP	: International Union of Public Transport
LPG	: Liquefied Petroleum Gas
N	: Norway
NECTAR	: Network for European Communications and Transport Activities Research
NL	: Netherlands
OECD	: Organization for Economic Cooperation and Development
P	: Portugal
S	: Sweden
SF	: Finland
SP	: Spain
sqkm	: square kilometre
TRB	: Transportation Research Board (US)
TRRL	: Transport Road Research Laboratory
TSU	: Transport Studies Unit, Oxford University
UK	: United Kingdom
VFR	: Visiting friends and relatives

List of Contributors:

- Bovy Piet, Dr., Director, Transportation and Traffic Research Division, Ministry of Transport and Public Works, The Netherlands. (Editor and contributor to Ch. 1, 2, 3, 10, & 19)
- Cullinane Sharon, Dr., The British Council, Cairo, Egypt. (Previously at the Transport Studies Unit, Oxford University). (Ch. 24)
- Del Sole Giancarlo, ECOTER, Istituto di Ricerca Progettazione Economica e Territoriale, Roma, Italy. (Ch. 18)
- Feitelson Eran, Dr., Department of Geography, The Hebrew University of Jerusalem, 91905, Israel. (Ch. 17)
- Gunal Turgay, Senior Specialist, Housing and Development Administration, Prime Ministry, Turkey. (Ch. 23).
- Heidemann Claus, Prof., Universitat Karlsruhe, Institute fur Regionalwissenschaft, Karlsruhe, Germany. (Ch. 15)
- Hervik Arild, Research Economist, More and Romsdal College, Box 308, N-6401, Molde, Norway. (Ch. 20)
- Hilka Lassi Technical Research Center of Finland, Road, Transport and Geotechnical Laboratory, Espoo, Finland. (Ch. 13)
- Jansen Gijsbertus R.M., Dr., TNO Institute of Spatial Organization (INRO), Delft, The Netherlands. (Ch. 6, 7, & 19)
- Jones Peter, Prof., Transport Studies Group, Faculty of the Environment, University of Westminster, London, UK. (Ch. 10)
- Kallberg Veli Pekka, Technical Research Center of Finland, Road, Transport and Geotechnical Laboratory, Espoo, Finland. (Ch. 13)
- Klooster Jeroen, Drs., Transportation and Traffic Research Division, Ministry of Transport and Public Works, The Netherlands. (Ch. 6)
- Korver Wim, Dr., TNO Institute of Spatial Organization (INRO), Delft, The Netherlands. (Ch. 6 & 19)
- Kunert Uwe, Deutsches Institute fur Wirtschaftsforschung, Germany. (Ch. 15)
- Maggi Rico, Socio-Economic Institute, Zurich University, Zurich, Switzerland. (Ch. 22)

- Mentes Gokhan, Vice President, Housing and Development Administration, Prime Ministry, Turkey. (Ch. 23)
- Meersman Hilde, Prof., UFSIA, Faculty T.E.W., Antwerpen, Belgium. (Ch. 12)
- Orfeuil Jean-Pierre, Dr., Head, Economics of Space and Mobility Division, INRETS, 94114 Arcueil, France. (Editor and contributor to Ch. 1, 2, 3, 4, 10 & 14)
- Ovstedal Liv, Research Scientist, SINTEF Transport Engineering, N-7034, Norway. (Ch. 20)
- Pazienti Massimo, Prof., ECOTER, Istituto di Ricerca Progettazione Economica e Territoriale, Roma, Italy. (Ch. 18)
- Petrakis Kostas, Transport Consultant, Athens, Greece. (Ch. 16)
- Philipini Massimo, Socio-Economic Institute, Zurich University, Zurich, Switzerland. (Ch. 22)
- Potier Françoise, Dr., Researcher, Economics of Space and Mobility Division, INRETS, 94114 Arcueil, France. (Ch. 9)
- Salomon Ilan, Prof., Department of Geography, The Hebrew University of Jerusalem, 91905, Israel. (Editor and contributor to Ch. 1, 4, 5, 10 & 17)
- Sammer Gerd, Dr., Dept. of Transportation Planning, Graz University of Technology, Graz, Austria. (Ch. 11)
- Stern Eliahu, Prof., Dept. of Geography, Ben Gurion University Beer Sheva, Israel. (Ch. 8)
- Tacken Mart, Dr., OSPA Research Institute, Delft University of Technology, Faculty of Architecture, Delft, The Netherlands. (Ch. 5).
- Tretvik Terje, Dr. Ing., Research Scientist, SINTEF Transport Engineering, N-7035, Trondheim, Norway. (Ch. 8 & 20)
- Turel Ali, Prof., Dept. of City and Regional Planning, Middle East Technical University, Ankara, Turkey. (Ch. 9 & 23).
- Van der Voorde Eddie, Prof., UFSIA, Faculty T.E.W., Antwerpen, Belgium. (Ch. 12).
- Westin Krestin, Dept. of Geography, Umea University, Umea, Sweden. (Ch. 21)
- Zumkeller Dirk, Prof., University of Karlsruhe, Institute für Verkehrswesen, Karlsruhe, Germany. (Ch. 3 & 15)