

TCRP Report 95 – Chapter 19

Traveler Response to Employer and Institutional TDM Strategies

presented to

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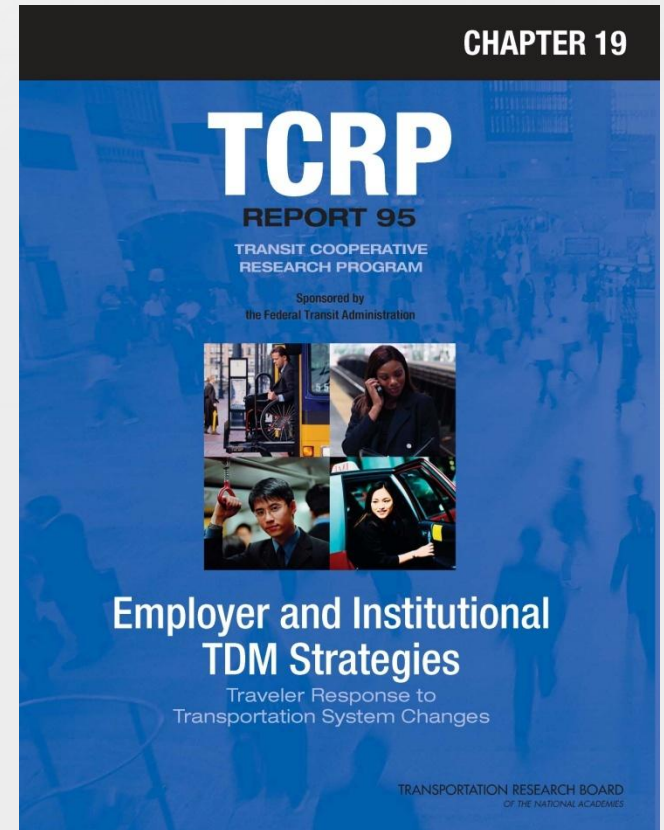
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Presentation Outline

- *Introduction*
- **Definitions and Strategies**
- **Traveler Response Summary**
- **Other Information**
- **End Notes**



Introduction

TCRP Report 95 Series

TCRP Report 95 series identified as one of the “most essential transportation publications” in a national survey of transportation professionals conducted by *The Urban Transportation Monitor*



Sources: As quoted in February 3, 2006 issue

Cover images from Transportation Research Board web site

TCRP = Transit Cooperative Research Program

Introduction

What the Handbook IS

- **Travel demand impact manual**
- **Sourcebook on results of transportation actions**
- **Survey of information on usage and feasibility**



Introduction

What the Handbook IS

(continued)

TEXT

Traveler Response Summary

Roadway transportation is a latecomer, relative to utilities, airlines and hotels, to the application of variable or peak-period pricing. In the United States, projects only began to take hold after the FHWA started funding demonstrations in the 1990s. Value pricing clearly impacts traveler behavior. When observed traveler sensitivities to value pricing are expressed as price elasticities, most fall in the range of -0.1 to -0.5, similar to but marginally less than sensitivities to transit fare. Short-term trip-making adjustments made by travelers in response to pricing include changes in route choice, time of travel, mode choice, trip frequency and selection of activity and destination. Route choice adjustments predominate when fare highway alternatives are available. Long-term effects are less certain; road value pricing may influence not only further decisions about trip-making, but potentially also automobile ownership and location choice for residences, employees, and activities.

The United States has seen public reluctance to implementing areawide value pricing projects, and they have not been common internationally. The major example of longest standing is the Singapore Area License Scheme (now Electronic Road Pricing), in effect since 1975 within Singapore's central area. Initiated with an AM peak period auto entry fee equivalent to almost 5 percent of a car-owning household's average income, with 4-plus occupant HOVs free, the pricing cutting morning traffic entering the zone by over 40 percent and greatly increased transit use and carpooling. Enhancements over the years have kept the island state's central area traffic under control. These Norway cities have for a decade or more charged autos US \$0.80 to \$1.25 during weekday hours for crossing a ring around their central areas. The traffic reduction obtained by diverting some travelers to other modes or hours was on the order of 5 to 10 percent. Early results from a new £5 (about \$8) congestion charge for entering central London between 7:00 AM and 6:30 PM indicate a 20 percent reduction in entering traffic. No U.S. areawide projects are in place.

Some North American examples of corridor pricing have been implemented, but most so recently that their evaluations are still incomplete. Typically, tolling was already in place, and the value pricing is applied as either an off-peak discount or peak-period surcharge. A bridge toll demonstration in Lee County, Florida, has seen a \$0.25 (50 percent) shoulders-of-the-peak discount attract drivers away from the peak hours enough to reduce AM peak hour traffic of eligible drivers by 7 percent, with a much lesser effect in the PM. A newly instituted off-peak E-ZPass savings of \$1.00 (20 percent), relative to peak E-ZPass crossings from New Jersey into New York, may be producing comparable peak hour reductions. In all of the cases, U.S. and international, there is a clear sensitivity of motorists to peak pricing, and the expected effect of shifting traffic away from periods with the highest charges has been commonly observed.

The United States has three major projects of the lane pricing variety, the SR 91 Express Lanes tollway and I-15 HOT Express Lanes projects in California, and the lower-key Katy Freeway HOT lane project in Houston. Pricing has been successfully used to maintain good levels of service on the premium lanes, while enhancing their use in the case of the HOT lanes, and financing construction and operation in the case of the SR 91 tollway. Only a minority of paying customers elect to use the special lanes regularly, as compared to only occasionally electing to pay in preference to traveling on adjacent free lanes. The LOV toll option has detracted from use of the HOT lanes by HOVs, indeed, I-15 Express Lanes usage by HOVs grew by more than 20 percent over "before" volumes during three demonstration years. Transit use has not been adversely affected, but questions remain concerning impact on

REFERENCES

only save \$0.25 by traveling in the discount periods (Cain,

and after implementation, traffic volume data remained unchanged. This is best explained by the subject to the discount was small relative to the total ms. However, at the disaggregate level, among users in demand were observed within all discount periods, observed during peak periods. The strongest response point Bridge, where an 18 percent increase in eligible 7:00 AM discount period, associated with a 7 percent increase from 7:00 to 9:00 AM. In surveys, approximately indicated that they had altered their travel since the discount, and 50 percent indicated they took the longer trips across the bridges. Of those modifying time of travel, 9 percent changed their route, and (Cain, Burris and Pendyala, 2001; Center for Urban

of the responsiveness of traffic to the travel cost time advantage gained from traveling during the discounts the sensitivity to value pricing toll cost calculated demand sensitivities (characterized as arc elasticities) in traffic during the relevant period divided by Highway Administration, 2001a; Cain, Burris and Pendyala, 2001; and sensitivities are shown in Table 14-5 for each of the arc elasticities computed by the Handbook

Table 14-5. Lee County Demonstration Project

Cape Coral Bridge				
Arc Elasticity	Percent Change in Price	Change in Demand	Elasticities per source*	Log Arc Elasticities
-0.50	-50.0%	30.0%	-0.20	-0.14
-0.50	-50.0	5.4	-0.11	-0.08
-0.50	-50.0	5.4	-0.11	-0.08
-0.50	-50.0	1.3	-0.03	-0.02

* Change in toll cost, a shrinkage-ratio-like

elasticities computed by Handbook authors.

Pendyala, R. M., "Impact of Variable Pricing On Temporal Transportation Research Record 1747 (2001).

Mark Bradley Research and Consulting, "A System of Variable Pricing for Oregon." Draft Final Report. Portland, OR (December, 2001).

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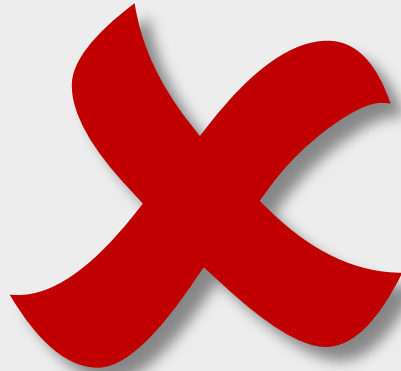
ITE Journal, Vol. 63, No. 8 (Spring 2002).

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Introduction

What the Handbook Is **NOT**

- Best practices manual
- Implementation manual
- Design or operation manual



Handbook Organization

General Sections and Topic Area Chapters with Status

- **Introduction**
 - Ch 1 – Introduction (with Appendices A, B)
- **Multimodal/intermodal facilities**
 - Ch 2 – HOV Facilities
 - Ch 3 – Park-and-Ride and Park-and-Pool
- **Transit facilities and services**
 - Ch 4 – Busways, BRT, and Express Bus
 - Ch 5 – Vanpools and Buspools
 - Ch 6 – Demand Responsive/ADA
 - Ch 7 – Light Rail Transit
 - Ch 8 – Commuter Rail
- **Public transit operations**
 - Ch 9 – Transit Scheduling and Frequency
 - Ch 10 – Bus Routing and Coverage
 - Ch 11 – Transit Information and Promotion

Color Key

Final
Published

Interim
Published

Deferred
to Future
Project

Handbook Organization

General Sections and Topic Area Chapters with Status

(continued)

● Transportation pricing

- Ch 12 – Transit Pricing and Fares
- Ch 13 – Parking Pricing and Fees
- Ch 14 – Road Value Pricing

● Land use and non-motorized travel

- Ch 15 – Land Use and Site Design
- Ch 16 – Pedestrian and Bicycle Facilities
- Ch 17 – Transit Oriented Development

● Transportation demand management

- Ch 18 – Parking Management and Supply
- Ch 19 – Employer and Institutional TDM Strategies

Color Key

Final
Published

Publishing
in 2011

Handbook Organization

Topic Area Chapter Format

- **Overview and summary**
 - Objectives of [the system change]
 - Types of programs
 - Analytical considerations
 - Traveler response summary
- **Response to [the system change]**
- **Underlying traveler response factors**
- **Related information and impacts**
- **Additional resources**
- **Case studies**
- **References**

Chapter 19

● Authorship

- Lead Author – Rich Kuzmyak
- Contributing Authors – Dick Pratt, Jay Evans

● Source Data Cutoff

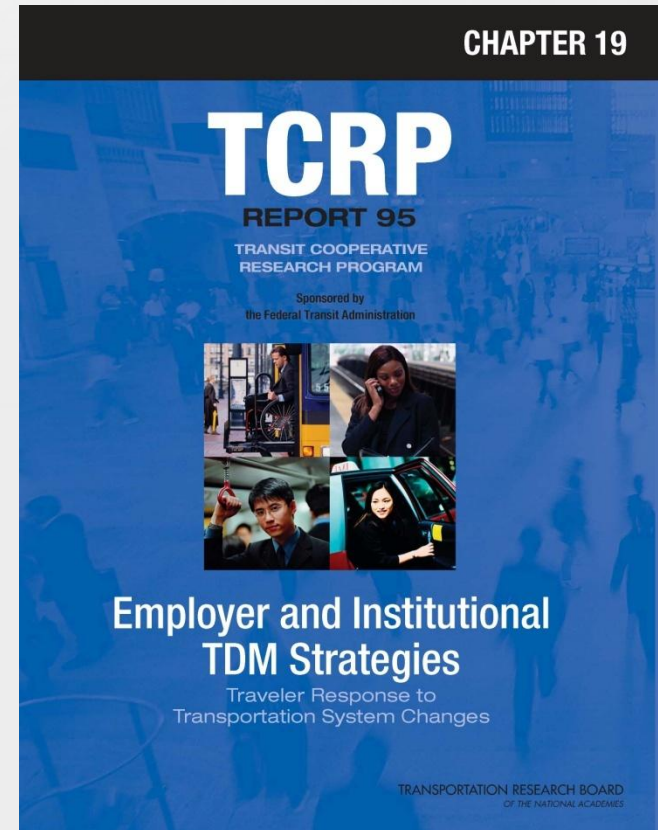
- Generally 2007; Portions 2009

● Publication Date

- August 2010

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- *Definitions and Strategies*
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TDM Definitions

TDM = “Travel” or “Transportation” Demand Management

- **Actions typically applied by employers or institutions to reduce vehicle trips by employees or clients**
- **Applied by some employers/institutions voluntarily to make more efficient use of space, reduce parking, provide alternatives for workers**
- **Applied by most employers under regulatory pressure to address traffic impacts, emissions**

Types of TDM Strategies

- **Support Actions** – Strategies to raise awareness, provide information on alternatives, promotion, flexible start/end times, guaranteed ride home, rideshare matching, preferential parking
- **Transportation Services** – Physical expansion of the set of alternatives through vanpools, subscription bus, shuttles, etc.
- **Financial Incentives** – Monetary inducements to change behavior, including modal subsidies, parking fees, transportation allowances
- **Alternative Work Arrangements** – Telecommuting, compressed work weeks, staggered/flexible work hours

Analytic Challenges

● Poor Data

- Almost no before-and-after studies
- Most information aggregated at employer level (can't look at choice in relation to individual circumstances)
- Not always clear what strategies have been implemented, their magnitude (e.g., value of subsidy), when or how implemented

● Employee awareness of strategy availability highly variable

● Almost impossible to isolate individual strategies

General Approach

- **Desire to shed light on individual strategies**
- **Identify sample of 82 individual TDM programs with acceptable data**
- **Categorize programs according to types of strategies offered (support, services, incentives, work schedules)**
- **Key performance measure: Vehicle Trip Reduction (change in vehicle trips per employee versus pre-program conditions or some control baseline)**
- **Perform pairwise comparisons to evaluate vehicle trip reduction in relation to types of strategies offered**

Illustration of Impacts

Table 19-1 Vehicle Trip Reduction Related to Support Level

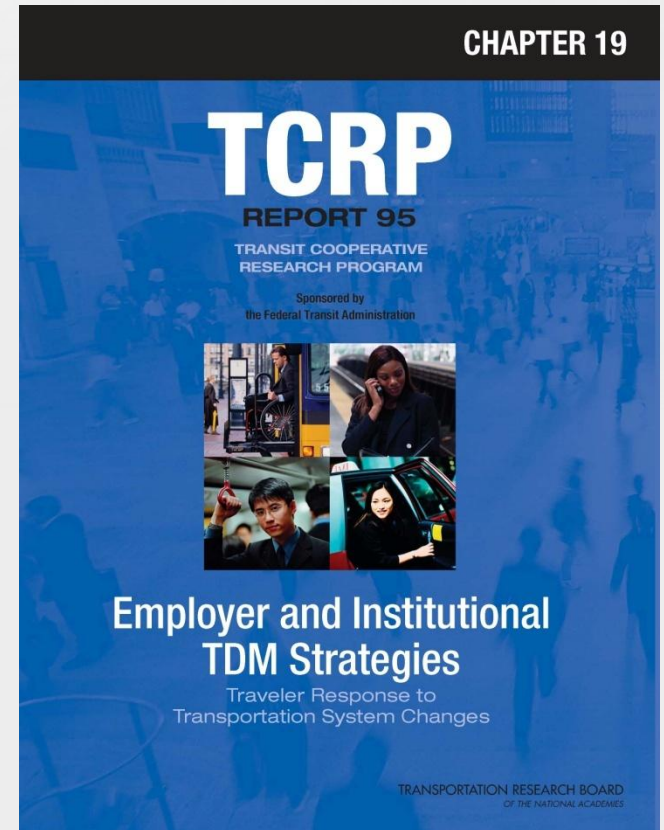
Other Conditions	Level of Overall Employer Support (sample size)			
	High	Medium	Low	All
All	19.0% (32)	15.9% (33)	15.0% (17)	16.9% (82)
Transit Availability				
High	28.4% (10)	28.2% (6)	24.3% (8)	26.0% (24)
Medium	10.1% (5)	15.3% (10)	3.2% (3)	11.9% (18)
Low	15.9% (17)	13.6% (17)	8.6% (6)	12.3% (40)
Restricted Parking				
Yes	29.9% (12)	23.8% (11)	18.0% (11)	24.1% (34)
No	12.5% (20)	12.0% (22)	9.6% (6)	11.9% (48)

Limitations of Approach

- **The 82 examples are not random**
 - **Cannot conclude that the average vehicle trip reduction seen in sample is typical for all TDM programs**
- **Pairwise comparison approach is very simplistic**
 - **Many intervening factors that are not controlled for**
- **Vehicle Trip Reduction is implied in most cases**
 - **Observed rate is compared with some control site or datum to get a net reduction estimate (e.g., CTPP for TAZ)**
 - **Not a before-and-after measure**

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Traveler Response Summary

Employer Support Actions

- **Most broadly applied of all strategy types – especially in regulatory environments**
- **Most common measures [in sample!]: employee transportation coordinators, marketing and promotion, rideshare matching, guaranteed ride home**
- **Solo effect in sample of 82 ranged from 12.5% to 9.6% vehicle trip reduction for High vs. Low support programs**
- **Range observed in large-scale regional programs 4% to 5% trip reduction**
- **Work best when used to support other strategies, raise awareness**

Traveler Response Summary

Transportation Services

- **Most common strategies: vanpool programs (13%), transit + vanpool (13%), use of company vehicles (13%)**
- **Programs with services show 8 percentage points greater trip reduction than without (21.6% vs. 13.6%)**
- **Results are highly conditioned on location as re. transit availability: employers more likely to provide options if transit not viable**
- **Services programs work best when combined with Modal Subsidies (27% trip reduction with vs. 9% without)**

Traveler Response Summary

Incentives and Disincentives

- **Most common measures: parking fees (38%), transit subsidies (27%), travel allowance (29%), HOV parking discounts (27%)**
- **Relative effects on vehicle trip reduction:**
 - Parking fees: 25% with vs. 12% without
 - Transit subsidies : 21% with vs. 13% without
 - Travel allowance: 19% with vs. 16% without
 - HOV parking discounts: 26% with vs. 14% without
- **Parking pricing and restricted supply often paired**
 - 84% of programs with parking fees have restricted supply
 - Trip reduction if parking priced + restricted = 28%

Traveler Response Summary

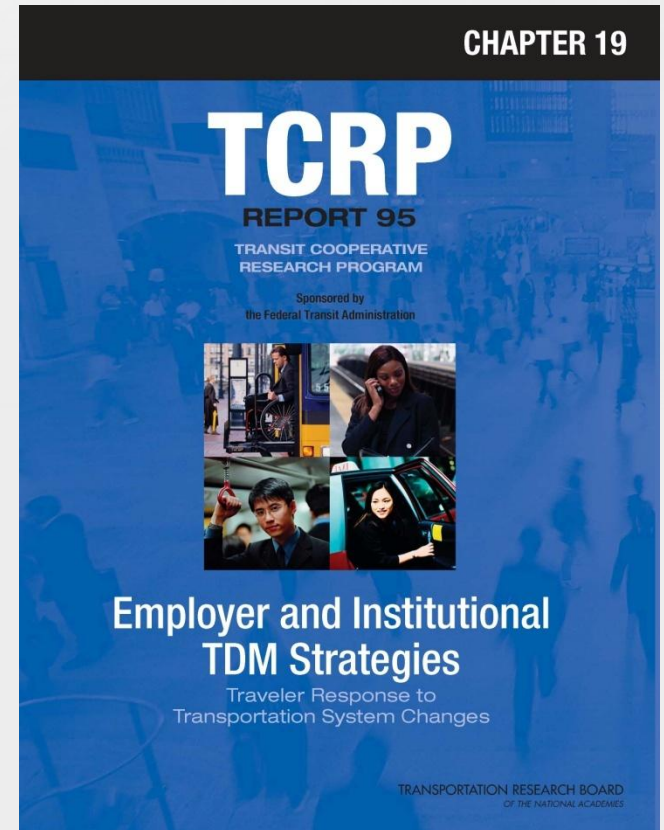
Alternative Work Arrangements

- **Most common strategies: telecommuting (79%), compressed work weeks (66%), flexible work hours (55%)**
- **Interesting Finding: TDM programs that included compressed work weeks, staggered work hours had lower vehicle trip reductions than those without**
 - **Compressed work weeks: 15.8% with vs. 19.1% without**
 - **Staggered work hours: 15.9% with vs. 17% without**
- **Telecommuting similar: 17.1% with vs. 16.5% without**
- **Flexible Hours: 20.1% with vs. 13.1% without**

Explanation: Flexible hours encourages use of alternative modes – other strategies provide commuters with more freedom to drive

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Other Information Topics

- **Review of International Experience**
- **Synergy and Complementarity of Strategies**
- **Site- versus System-Level Impacts**
- **Cost Effectiveness**
- **Energy and Environmental Impacts**
- **Five Detailed Case Studies**

Modeling Studies

- **California Air Resources Board (COMSIS, 1993)**
 - Developed to support Regulation XV plan review
 - Supplemented Reg XV plan data with new employer surveys
 - Performed statistical modeling to estimate coefficients for individual strategies
 - **Illuminating but inconsistent results (data issues)**
- **Worksite Trip Reduction Model (CUTR, 2004)**
 - Compiled data from California, Washington, and Arizona statewide programs
 - Developed model based on neural network approach
 - Estimated trip reduction for 50 most common combinations, or any pairwise strategy grouping
 - **Some inconsistencies with particular strategy pairings¹**

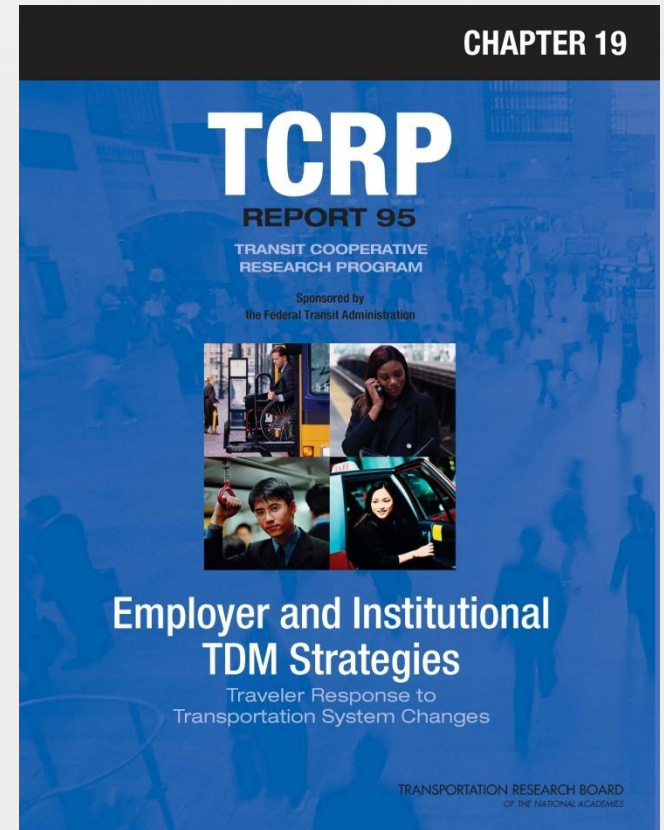
¹ This model has continued to evolve since we applied it; it is now called TRIMMS©

Sample of 82 Employer Programs

- **Full details on each program in Appendix – tables can be used for additional analysis**
- **Individual programs used throughout report to illustrate specific strategy types or implementation methods**
- **Source documents identified for further study**

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Getting the Handbook

● Download Electronic Version

- Free download of PDF versions from TRB/TCRP
- Official Handbook page
 - www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1034

● Order Hardcopy Version

- Purchase hardcopy from TRB Bookstore
- Free hardcopy via APTA's www.tcrponline.org

● Be sure to get the Interim Introduction, published as Research Results Digest #61

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