

**EA STERN ASIAN SOCIETY FOR TRANSPORTATION STUDIES**

**“IRG Activity Report, IRG-03-2005, Dynamics of Polycentric Employment Formation in East and Southeast Asian Cities”**

**Report to the EASTS Board Meeting.**

-  
24 August 2007

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## **1. Purpose of EASTS ICRA**

The Eastern Asia Society for Transportation Studies (EASTS) offers research grants to a group of researchers involved in transportation and related fields through its International Cooperative Research Activity (ICRA). The purpose of the ICRA is to promote the research activities of the EASTS by encouraging international cooperative research.

## **2. Purpose and Mission of IRG-03-2005 (Source: <http://www.easts.info/activities/irg/>)**

Mission: To conduct international collaborative research, to build team of young researchers, and to summarize results of analytical methods and policies in manual for practicing planners.

All very large metropolises, whether in developing or developed countries, sooner or later have to face the problem of spatial re-organization from mono-centric structure to multi-centric structure that is the relocation (decentralization and further de-concentration) of firms and houses outside the CBD in particularly emerging employment centers. Such poly-centric dynamics have been extensively explored in American cities and a recent report was also published on a European Union Project. Despite these works, the lack of a methodology for the analysis of multi-centric growth and its impacts on commuting characteristics triggered us to propose an analytical framework for grasping the multi-centric dynamics in large metropolitan areas, particularly appropriate for developing countries where there is lack of precise data in most cases.

Research has already been completed at Nagoya University on a provisional framework for practising planners of study aims, suitable analytical techniques, and what the results of such analyses might tell planners. Following, the evidence of poly-centric tendency in large Asian cities led us apply the proposed framework and conduct a collaborative study for a better understanding the multi-centric urban growth and associated commuting patterns that will further illuminate policy making to assure the environmentally and economic sustainable urban development.

The proposed time-line for the various components of the international research group is attached as Appendix A.

## **3. Members of IRG – 03 - 2005**

### ***Proponents of Project***

- Professor Yoshitsugu HAYASHI, Dean, Graduate School of Environmental Studies, Nagoya University, Japan
- Professor John BLACK, Planning Research Centre, Faculty of Architecture, Design and Planning, University of Sydney, Australia
- Dr Pelin ALPKOKIN (Project Director), Graduate School of Environmental Studies, Nagoya University, Japan

### ***Collaborating Researchers***

- Ms Kirti BHANDARI, Doctoral Candidate, Graduate School of Environmental Studies, Nagoya University, Japan
- Dr Charles CHEUNG, Senior Consultant, Steer Davies Gleave, London SE1 9PD, United Kingdom
- Mr Ken Doust, Doctoral Candidate, School of Civil and Environmental Engineering, University of New South Wales, Australia
- Dr Heru JATMIKA, New South Wales Roads and Traffic Authority, Blacktown, NSW, Australia

- Mr Stefan KLUG, Doctoral Candidate, Graduate School of Environmental Studies, Nagoya University, Japan
- Mr Naohisa KOMIYAMA, Department of Civil and Environmental Engineering, Nagoya University, Japan
- Dr John LEA, Honorary Associate Professor, University of Sydney, Sydney, Australia
- Professor Yuzo MASUYA , Dean, Department of Civil and Environmental Engineering, Hokkaido College, Senshu University, Japan
- Professor Haixiao PAN, Department of Urban Planning, Tongji University, The People's Republic of China
- Mr Jia PENG, Doctoral Candidate, Graduate School of Environmental Studies, Nagoya University, Japan
- Emeritus Professor Kazuo SAITO, Department of Civil Engineering. and Architecture, Muroran Institute of Technology, Hokkaido, Japan
- Dr. Heru Sutomo, Director, Center for Transportation and Logistic Studies, Gadjah Mada University, Indonesia.
- Ms Ofra SHABTAY, Research Assistant, Planning Research Centre, University of Sydney, Australia
- Professor Tohru TAMURA, Department of Civil Engineering. and Architecture, Muroran Institute of Technology, Hokkaido, Japan
- Dr Varameth VICHIENSAN, Department of Civil Engineering, Kasetsart University, Thailand

#### ***International Peer Reviewer***

- Professor Robert Cervero, Department of Urban and Regional Planning, University of California, Berkeley, USA

#### **4. Evaluation of IRG-03-2005 Mission**

The proposed aims of this IRG were to conduct international collaborative research, to build team of young researchers, to summarize results of analytical methods and policies in a manual suitable for practicing planners. Prior to the formulation of this research proposal, Nagoya University, as an initiating member of the Academic Consortium (AC-21), had proposed an International Center for Sustainable Transport in Cities with involvement from the University of California Berkeley, Sydney University and Tongji University, Shanghai, which provided the academic leadership for this collaborative research.

We successfully completed an international collaborative research project with the lead senior researchers representing the EASTS member countries of Australia, Japan, Thailand and The People's Republic of China. The research team and collaborating researchers had worked as urban planning and transport professionals and/or researchers in all of the case study cities included in this research project: Bangalore (India), Bangkok (Thailand), Canberra (Australia), Dalian (The People's Republic of China), Delhi (India), Istanbul (Turkey), Jakarta (Indonesia), Sapporo (Japan), Shanghai (The People's Republic of China), Sydney (Australia), and Tokyo (Japan).

We are aware, that a comparative study of all large Asian cities would be ideal but neither the resources nor the professional networks stretched that far. However, we included two Australian cities. When the study was conceived we aimed to include at least the major metropolitan region in each member country of EASTS, and, indeed, with further research funding that still might be possible in the future. We have assembled a network of researchers highly familiar with the details of metropolitan planning and the analysis of data on land use and transport. With the support of the

Government of Turkey, an initial, and highly, detailed case study of data analysis and policy assessment of poly-centric employment and transport was undertaken for the city of Istanbul by Nagoya University, Japan (Alpkokin, 2006), the co-ordinating organization for this research.

The opportunity of some funding from EASTS ICRA encouraged us to refine the methodology applied in Istanbul and to propose a comparative analysis of some of the major cities of member countries of EASTS. The collaborative project also allowed us to successfully build a team of young researchers who have undertaken much of the data assembly, software writing, data assembly from official government sources on journey-to-work travel, the analyses for the project, and data collection for the policy descriptions and comparative interpretations. The young researchers on this project - arranged in alphabetical order - and their current academic standing, or year of doctoral, masters or graduation (as of September, 2007) are:

Alpkokin, Pelin (DEng 2005); Bandari, Kirti (Doctoral Candidate), Cheung, Charles (PhD 2007); Doust, Ken (PhD Candidate in final year); Jatmika, Heru (PhD 2001); Komiyama, Naohisa (BEng, 2007); Klug, Stefan (DEng Candidate in final year); Peng, Jia (Doctoral Candidate); and Varameth Vichiensan (DEng 2003).

They have actively participated at workshops and international conferences from 2005 to 2007, have shared the preliminary results of their research, and have contributed substantially to the authorship of papers for the 7th EASTS Conference Journal and Proceedings (Appendix B).

Senior researchers, Prof. Yoshitsugu Hayashi as the project manager to ICRA APEC-TR research group, Profs. John Black and John Lea from the University of Sydney, Prof. Pan Haixiao from Tongji University, Prof. Masuya from Hokkaido College, Senshu University; and Dr. Heru Sutomo from Gadjah Mada University have also been involved in the EASTS ICRA APEC-TR project either by providing data and interpretations for case cities or giving general instructions for the success of comparing in general the findings of the case metropolitan areas.

Individual research teams had to find their own resources to access journey-to-work data, conduct the various analyses and to collect the spatial plans and to interpret policies for each city. Funding did allow a workshop to be convened to discuss preliminary findings on analysis and policy and the next steps for the accomplishment of the project.. This was held successfully at Nagoya University in November, 2006 and the program of the workshop is given in Appendix C. We also invited a distinguished guest speaker from the University of California, Prof. Robert Cervero, who has been well known for his work on the poly-centric spatial re-configuration in North American cities.

However, by the time of preparing for the workshop some of the original participants had dropped out because of problems in accessing data or because of other priorities. It is pleasing to report that we have successfully built a team of young researchers who have undertaken much of the data assembly, software writing and analysis and data collection for the policy studies that form the basis of the final report. We anticipate that most of the collaborating researchers will attend the Dalian Conference in September, 2007.

In the time available, the principal researchers were unable to complete a draft guideline or manual for practicing planners, although all of the necessary contents for such a manual are available. The main reason for this aim not being met within the time-frame of this research grant was that the delay in the EASTS reviewing process, and the extended deadline for the submission of final journal papers, has mean we have had inadequate time to assemble this document. We propose to submit a grant extension, plus some supplementary aims to allow such a document to be produced and disseminated to practicing planners and decision makers. This will also require outside funding for publishing and regional seminars from international organizations such as UNDP.

## 5. Observations on the Main Research Activities of IRG-03-2005

1. A research project inception meeting was held in Bangkok, 6<sup>th</sup> Conference of EASTS, on 23 September, 2005, where the lead researchers discussed potential collaboration with colleagues.
2. The confirmation of the final international research group proved slightly more difficult than anticipated because potential contributors withdrew (from Beijing, Seoul, and Singapore). We aimed for a coverage of major Asian cities (as distinct from East and Southeast Asian cities plus those in Australia), and successfully added other cities, but failed to include Tehran and Isfahan in Iran after promises of data.
3. A briefing paper was issued to all participants on data requirements and proposed analytical techniques. Through electronic mail a brainstorming session was held by all collaborating researchers to confirm analytical techniques and to include any new ideas.
4. The main analytical tasks successfully completed during the course of this project included: extraction of relevant transport network data, land use and O-D commuting patterns for each city and time period; writing of computer software that was shared by the research team; and the formation of a GIS data base, so that the application of agreed techniques could be applied.
5. Preliminary analysis and results in all cities by research collaborators were presented at a workshop, convened by the Graduate School of Environmental Studies at Nagoya University, on 23 November, 2006 (Appendix C contains the workshop program.) To help ensure the international quality of our research we invited, as a keynote speaker, Professor Robert Cervero, University of California Berkeley, who has published much in the international literature on the US experience of employment decentralization and commuting patterns.
6. Although the research proposal included a short literature review that identified research gaps, a comprehensive review of the literature on employment location in major cities was undertaken up to and including the 11<sup>th</sup> World Conference on Transport Research, held in Berkeley, California, 24 – 28 June, 2007. A bibliography has been compiled, and this will be included in the final report.
7. The analytical techniques proposed were refined throughout the project where the researchers kept in regular contact through electronic mail issued by the Project Manager. These methods were applied successfully to several data-sets across the case study cities, and the main results will be summarized in the main report.
8. A second briefing paper (together with a later series of additional policy questions) was issued to the IRG members, who identified the relevant spatial planning documents, and other reports on policy on their city.
9. A review of the literature on the planning and management of Asian cities was completed. Different conceptual models for the evolution of cities and their spatial organization were assessed by some of the senior researchers in the group.
10. Given the delay in members finalizing their EASTS papers – some of which had a policy component included - research into comparative policy interpretation was delayed, but it will be completed and summarized in the final report.
11. Similarly, because drafts on policy questions from all collaborators has out of necessity been delayed the preparation of draft guide-lines on how to conduct research on the dynamics of employment location and transport in any city for practicing planners and consultants, and decision makers cannot be completed within the time-frame of this research.
12. The IRG has completed 9 papers either for the 7<sup>th</sup> EASTS Journal or the Conference Proceedings.
13. The EASTS conference can provide a forum to discuss how best to progress the guidelines mentioned, and to discuss a possible book publication together with the costs of preparation of a book manuscript for an international publisher.

## **6. Acknowledgements**

The authors thank EASTS for the financial support for this collaborative research, and the collaborating researchers. Data contributed in-kind to this project by the numerous government organizations is acknowledged in the final report.

## APPENDIX A

### PROPOSED TIMELINE FOR IRG-03-2005 (AS OF SEPTEMBER 2005)

#### Summary of Key Dates for APEC - TR

1. Research project inception in Bangkok, 6<sup>th</sup> Conference of EASTS, **23 September, 2005**
2. **Early October, 2005**, Confirmation of Research Team and Distribution of EASTS International Collaborative research proposal.
3. Issue of Briefing Paper 1 – first week of **October, 2005**.
4. **October – November, 2005**, Issue of briefing paper by Pelin Alpkokin on proposed techniques and internet brainstorming by all collaborating researchers to confirm analytical techniques
5. **Mid November, 2005** – Issue of Briefing Paper by John Black to young researchers on Professional Career Coaching and the development of a network of young researchers for the long-term future of EASTS.
6. **Deadline by March, 2006** - Extraction of relevant transport network data, land use and O-D commuting patterns for each city and time period and formation of GIS data base (guidance by Pelin Alpkokin and all participants).
7. Application of agreed techniques, analysis and results in all cities by all research collaborators for presentation at Nagoya workshop, **October 2006**.
8. **December, 2005 to June, 2006** identification of relevant planning documents and reports on policy by researchers and collection of each city's policies and documents. These are to be forwarded to Professor Yoshi Hayashi at Nagoya University
9. **June – July, 2006** – Interpretation and description of these reports to be completed and discussed in Nagoya Workshop (Yoshitsugu Hayashi, John Black with assistance from Pelin Alpkokin).
10. **October Workshop in Nagoya** (Organised by Pelin Alpkokin with Yoshitsugu Hayashi and John Black as Co-Chair) – presentation and discussion of results for all cities (all research collaborators are requested to attend), and preparation of publication schedule for 7<sup>th</sup> EASTS, Dalian, China, 2007, and other journals.
11. **November – December, 2006** – draft interpretation of policy assessment on employment location, transport and environmental benefits and costs (Yoshitsugu Hayashi and John Black) and distribution to all collaborators for comment, **March, 2007**.
12. **May 2007** - completion of policy assessment from January to May, 2007 – preparation of draft guide lines on conducting research into the dynamics of employment location and transport for practicing planners and consultants (comments from all collaborators).
13. **Attend 7<sup>th</sup> EASTS 2007 Special Conference Session** on this topic – peer review of guidelines and special session presenting the results of this research project.
14. **7<sup>th</sup> EASTS 2007** – Discuss possible book publication and prepare manuscript.

## APPENDIX B

### PAPERS AND PRESENTATIONS BY IRG, 2005 To 2007

Alpkokin, P. (2006) Analyzing urban dynamics and business locations of poly-centric cities: A case study of Istanbul, Doctorate thesis, Nagoya University.

Alpkokin, P., Black, J., Kato, H., and Vichiensan, V. (2007) Poly-centric employment formation in mega-cities: Analysis from APEC-TR collaborative research. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and fully accepted for Journal of EASTS).

Alpkokin, P., Hayashi, Y., Black, J. and Gercek, H. (2005) Polycentric employment growth and impacts on urban commuting patterns: Case study of Istanbul. Journal of the Eastern Asia Society for Transportation Studies, 6, 3835-3850.

Alpkokin, P., Kato, H., Black, Y., Hayashi, Y. (2007) Empirical model of firm location for clustered cities: The case of Istanbul, *11th World Conference on Transportation Research Society, Berkeley, USA, 24 – 28 June (CD-ROM)*.

Alpkokin, P., Kato, H., Hayashi, Y. and Shimizu, K. (2005) Analyzing urban dynamics in multi-centric cities. The case of Istanbul. Japan Society of Civil Engineers, 32<sup>nd</sup> Proceedings of Japan Society of Civil Engineers Conference, Hiroshima, Japan (CD Rom).

Alpkokin, P., Kato, H. Shimizu, K. and Hayashi, Y. (2006) Business location model applicable to non mono-centric structure: The case of Istanbul. 34<sup>th</sup> Proceedings of Japan Society of Civil Engineers Conference, Kagawa, Japan (CD Rom, in Japanese).

Alpkokin, P., Komiyama, N., Takeshita, H. and Kato, H. (2007) Tokyo Metropolitan Area cluster employment formation in line with its extensive rail network. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and fully accepted for Journal of EASTS).

Bhandari, K., Peng, J., Alpkokin, P. Policies, commuting patterns and accessibility in a non-monocentric city: case study of Delhi, 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and accepted for Proceedings of EASTS).

Bhandari, K., Alpkokin, P., Kachi, N., Peng, J., Kato, H. (2007) Dynamics of employment distribution and accessibility index: Case of Delhi. Forthoming, *36<sup>th</sup> Proceedings of Japan Society of Civil Engineers Conference, Hachinohe, Japan (CD Rom)*.

Black, J. (2006) Sustainable urban transport technologies and policies: A research perspective, *Dialogues in Urban Planning, The Planning Research Centre at The University of Sydney*, pp. 4 – 20.

Black, J. (2006) East Asia Society for Transportation Studies International Collaborative Research Activity (ICRA) – Asian Polycentric Employment Collaborative: Transport (APEC-TR), Presentation to Members of the Parliament of the Republic of Indonesia, held at University of Sydney, 4 December.

Black, J. (2007) Spatial plans and policies to support poly-centric employment in Canberra. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and fully accepted for Journal of EASTS, but withdrawn from Journal).

Black, J., Cheung, C., Doust, K., Shabtay, O. (2007) Metrics of changes to major employment centres: analyses of spatial plans for Sydney 1948 – 2031, 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and fully accepted for Journal of EASTS).



Cheung, C., Black, J. (2005) Residential location-specific travel preferences in an intervening opportunities model: Transport assessment for urban release areas. *Journal of the Eastern Asia Society for Transportation Studies*, 6, 3773-3788.

Cheung, C., Black, J. (2007) Poly-centric employment location in Canberra: planning a home-work balance and the journey-to-work. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and fully accepted for *Journal of EASTS*).

Klug, S., Alpkokin, P., Black, J., Hayashi Y. (2007) Policies for employment centers in metropolitan regions. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and accepted on condition for *Journal of EASTS*).

Komiyama N. (2007) Analyzing Tokyo Metropolitan area growth by firm location and associated commute patterns. Undergraduate thesis, Nagoya University (in Japanese).

Komiyama, N., Alpkokin, P., Takeshita, H., Kato, H., Hayashi, Y. (2007) Analyzing Tokyo Metropolitan area growth by firm location and associated commute patterns Coming 36<sup>th</sup> Proceedings of Japan Society of Civil Engineers Conference, Hachinohe, Japan (CD Rom, in Japanese).

Masuya, Y., Tamura, T., Black, J., Saito, K. (2007) Dynamics of employment location specific preference functions in Sapporo from 1972 to 1994. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and accepted for *Proceedings of EASTS*).

Vichiensan, V. (2007) Dynamics of urban structure in Bangkok based on employment cluster and commuting pattern. 7th International Conference of Eastern Asia Society for Transport Studies, Dalian, China (paper submitted and accepted on condition for *Journal of EASTS*).

Vichiensan, V. (2007) Dynamics of employment agglomeration pattern and urban mobility: An empirical analysis in Bangkok from 1995 to 2005 paper submitted to 87th Transportation Research Board Conference, Washington, D.C., January, 2008.

## APPENDIX C

### APEC-TR WORKSHOP PROGRAM, NAGOYA, NOVEMBER 2006 POWER-POINT OF KEYNOTE ADDRESS

**EASTERN ASIA SOCIETY FOR TRANSPORTATION STUDIES (EASTS)  
INTERNATIONAL CO-OPERATIVE RESEARCH ACTIVITY (ICRA)**

*<http://www.easts.info/activities/irg/>*

**WORKSHOP on POLY-CENTRIC EMPLOYMENT  
Asian Polycentric Employment Collaborative – Transport  
(APEC – TR)  
PROGRAM**

**25 November 2006 (Saturday) 10:00-18:00**

**Lecture Hall, Building for Graduate School of Environmental Studies**

**PROJECT GENERAL MANAGER:**

Prof. Yoshitsugu Hayashi, Nagoya University

**DISTINGUISHED GUEST:**

Prof. Robert Cervero, University of California, Berkeley

**RESEARCH MEMBERS:**

Prof. John Black , University of Sydney

Prof. Haixiano Pan, Tongji University

Prof. Yuzo Masuya, Hokkaido College, Senshu University

Dr. Seungil Lee, University of Seoul

Dr. Varameth Vichiensan, Kasetsart University

Dr. Charles Cheung, Sydney University

Dr. Heru Jatmika, University of New South Wales

Dr. Pelin Alpkokin, Nagoya University

Bhandari Kirti, Nagoya University

Naohisa Komiyama, Nagoya University

**SECRETARIAT:**

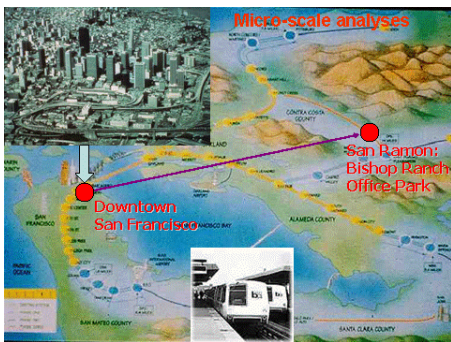
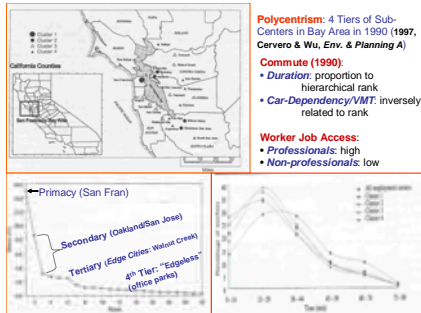
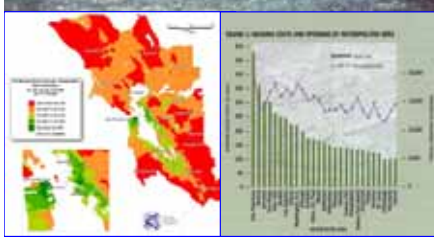
Dr. Pelin Alpkokin

Phone : +81-52-789-2773 Fax: +81-52-789-1454

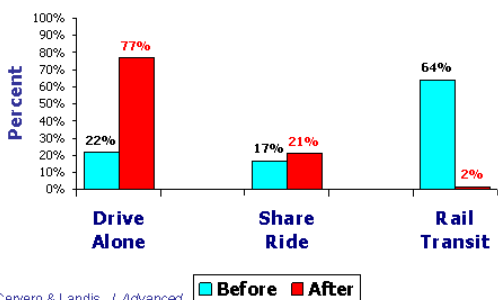
E-mail : [pelin@urban.env.nagoya-u.ac.jp](mailto:pelin@urban.env.nagoya-u.ac.jp)

- |                 |  |
|-----------------|--|
| • 10:00-10:10   | Opening Speech (Prof. Yoshitsugu Hayashi, Nagoya University) |
| • 10:10-10:30   | Key Note Speech (Prof. Robert Cervero, UC, Berkeley)         |
| • 10:30-10:40   | Introduction of APEC – TR (Dr. Pelin Alpkokin)               |
| • 10:40-11:00   | Presentation on Sydney (Prof. John Black)                    |
| • 11:00-11:20   | Presentation on Bangkok (Dr. Varameth Vichiensan)            |
| • 11:20-11:40   | Presentation on Jakarta (Prof. John Black)                   |
| • 11:40-12:00   | Presentation on Sapporo (Prof. Yuzo Masuya)                  |
| • 12:00-14:00   | Lunch  |
| • 14:00-14:20   | Presentation on Istanbul (Dr. Pelin Alpkokin)                |
| • 14:20-14:40   | Presentation on Canberra (Prof. John Black)                  |
| • 14:40-15:00   | Presentation on Tokyo (Mr. Naohisa Komiyama)                 |
| • 15:00-15:20   | Presentation on Seoul (Dr. Seungil Lee)                      |
| • 15:20-15:40   | Presentation on Shanghai (Prof. Haixiao Pan)                 |
| • 15:40-16:00   | Presentation on Delhi (Ms. Bhandari Kirti)                   |
| • 16:00-16:20   | Coffee Break   |
| • 16:20-16:50   | Summary (Prof. John Black)                                   |
| • 16:50-17:40   | Discussion (Chaired by Prof. Yoshitsugu Hayashi)             |
| • 17:40 – 18:00 | What is on horizon? (Dr. Pelin Alpkokin)                     |
| • 19:00         | Dinner   |

## Decentralization, Balanced Growth & Travel Behavior Lessons from the San Francisco Bay Area



## Before and After VMT/Worker ↑ 4.5 times

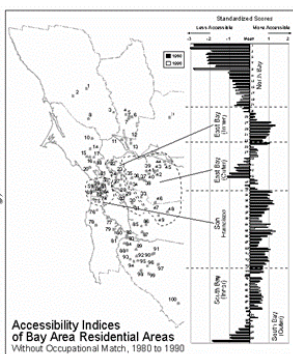


Cervero & Landis, J. *Advanced Transportation* (1992)

## Residential End Employed-Resident Perspective

**Work Trip VKT/person**  
Poorly accessible  
Bedroom Communities  
65% higher  
than regional average

(Cervero et al., 1999, *Env. & Planning A*)



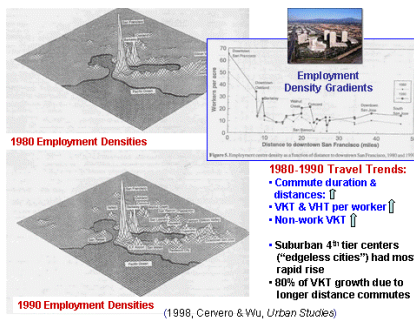
## Decentralization & Commuting

### • Widening Mismatch or Co-location?

– **U.S.:** Mean Metro Area journeys-to-work distances & durations have increased:  
**1990 (25.6 minutes; 7.6 miles)**  
**2000 (29.4 minutes; 8.9 miles)**  
(faster than metro population growth)

### – Rising:

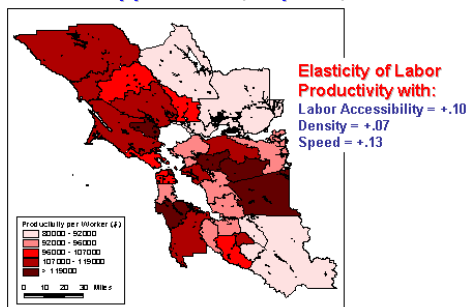
- Mean commute speeds (*private benefit*)
- Drive-alone shares, VMT & VHT per capita (*public cost*)



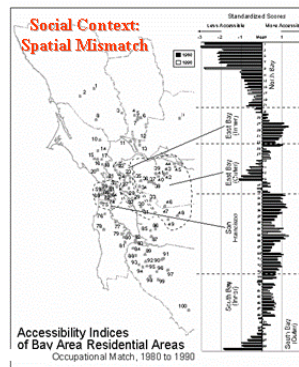
## Bishop Ranch: Pacific Bell Headquarters



## Productivity per Worker, Bay Area, 1990

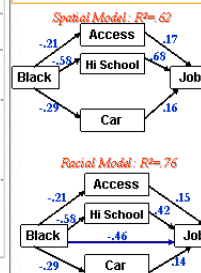


Cervero, *Urban Studies*, 2001



$$A_{ik} = \sum_j [Jobs_j + \exp(-\nu Time_{ij})]$$

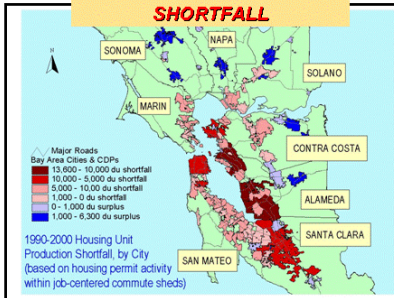
Jobs = # of jobs in Occupation Categ.  
Time = Travel time, network  
i = residential address  
j = centroid of employment zones  
k = mode (transit vs. highway)



**Balanced: Composition & Mix of Uses**  
Linking Housing to Jobs vs. Retail

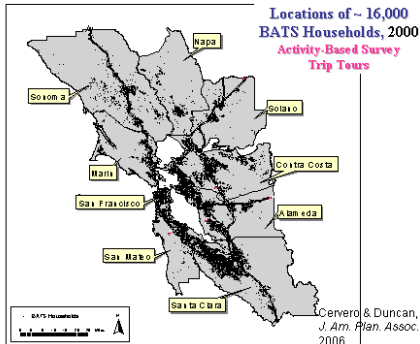


**BAY AREA HOUSING SHORTFALL**



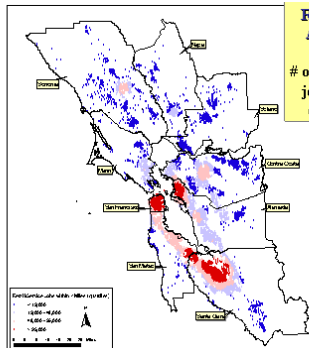
1990-2000 Housing Unit Production Shortfall, by City (based on housing permit activity within job-centered commute sheds)

**Locations of ~ 16,000 BATS Households, 2000**  
Activity-Based Survey Trip Tours



Cervero & Duncan, J. Am. Plan. Assoc. 2006

**Retail-Service Accessibility Index = # of retail-service jobs ≤ 4 miles of residence**



**Retail/Service Accessibility & VMT (Shop, Services, Eating)**

	Vehicle Miles Traveled (VMT), LN		
	Coeff.	Std. Err.	Prob.
Retail-Service Accessibility: No. of retail and service jobs ≤ 4 miles of residence, LN	-0.168	0.008	.000
Motor vehicles per licensed driver, LN	0.211	0.040	.000
Driver's License (0-1)	0.669	0.071	.000
Personal Income > \$40,000 per year (0-1)	0.012	0.007	.070
Age (years), LN	0.218	0.034	.000
Latino (0-1)	-0.151	0.062	.015
Male (0-1)	-0.080	0.025	.002
Constant	2.215	0.174	.000
<b>Summary Statistics:</b>			
F statistics (prob.)	629.44	(.000)	
R <sup>2</sup>	.289		
Number of Cases	12,405		

**Jobs-Housing Balance: Aims**

- **Sustainability** -- Reduce Commute VMT per capita
- **Rationalize Commuting Patterns** — More sub-regional "internal" trips; balanced directional flows
- **Promote Diversity/Affordability** — housing and communities
- **Economic Development** — Encourage business expansion & investment



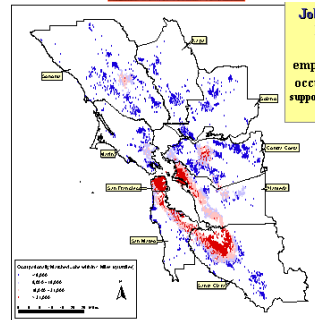
**Shaping Travel through Land Use**

**3 D's (Density, Diversity, Design):**  
U.S. studies show:

- **Traditional Neighborhood Designs/ New Urbanism:**  
5-30% lower VKT & Vehicle Trip Rates; 8%-12% more walk travel



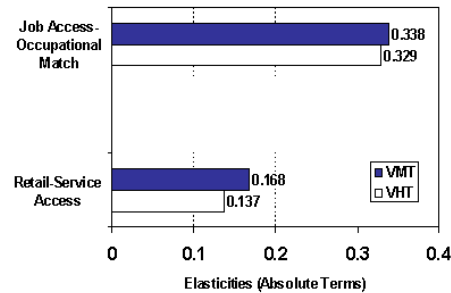
**Jobs Accessibility Index (OJ) = # of jobs in employed-resident's occupation (exec/prof; support/service; blue collar) ≤ 4 miles**



**Job-Accessibility (occupation-adj.) & Work-Tour VMT**

	Vehicle Miles Traveled (VMT), LN		
	Coeff.	Std. Err.	Prob.
Job Accessibility: No. of jobs in person's occupation ≤ 4 miles of residence, LN	-0.338	0.013	.000
<b>Control Variables</b>			
Motor vehicles per licensed driver, LN	1.101	0.047	.000
Driver's License (0-1)	2.467	0.099	.000
Male (0-1)	0.061	0.030	.041
Full-time Student (0-1)	-1.023	0.305	.001
Private Sector Job (0-1)	0.247	0.025	.000
Executive/Professional Employment (0-1)	0.317	0.037	.000
Employee Flex-Time Privileges (0-1)	0.145	0.032	.000
Constant	3.234	0.160	.000
<b>Summary Statistics:</b>			
F statistics (prob.)		544.23	(.000)
R <sup>2</sup>		.188	
Number of Cases		16,503	

**Comparison of Elasticities (in Absolute Terms) for Job-Access and Retail-Service Access Variables**



**Relative Advantage (Jobs-Housing Balance)**

$$\text{Advantage Index JHB (VMT)} = \left[ \frac{\text{Prop. total VMT for work purpose}}{\text{Prop. total VMT for shop-service purpose}} \right] * \left[ \frac{\text{Elasticity of Work VMT as function of job-accessibility index}}{\text{Elasticity of Shop-Service VMT as function of retail-service accessibility index}} \right]$$

$$\text{ALJHB (VMT)} = [(.367) * (-.338)] / [(.428) * (-.168)] = \mathbf{1.725}$$

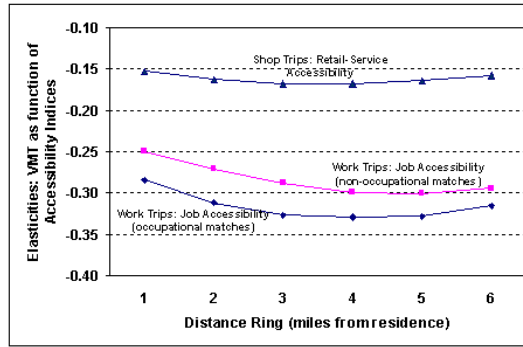
$$\text{ALJHB (VHT)} = [(.346) * (-.329)] / [(.443) * (-.137)] = \mathbf{1.876}$$

... of course, biggest “bang for the buck” is jobs-housing balance combined with retail/services near residences or jobs ... for efficient chaining of shop & work related trips

**Findings in Context**

- Found Accessibility increases # of our Tours & Links per Tour (Crane hypothesis)
- Because lengths of tours & links are shorter, VMT & VHT decline (consistent with Krizek’s findings in Puget Sound)
- Net impacts of Balance & MXD: *Reduction in Travel Consumption*

Plot of VMT Elasticities Across 1 to 6 Mile Distance Rings



**Policy Responses to Imbalanced Growth**

**Market Approaches:**

- “Planners Get Out of the Way”: Firms and residences will co-locate
- **Congestion pricing:** Pass on true motoring costs



**Policy Responses: Market Interventions**

- **Tax Base Sharing:** Remove fiscal zoning incentive (MN)
- **Tax Policy:** Property tax abatement (OR), Split-Rate tax (PA)
- **Fair-share Housing Initiatives:** Quota system (NJ)
- **Housing Linkage Programs:** Escrow Accounts (SF, Boston); Affordability Mandates (Palo Alto, Boulder)
- **Housing Production Incentives:** Tax-exempt financing
- **Preferential Treatment:** Rights of First Refusal, Live Near Your Work Program (MD, DL), fast-tracking
- **Density Bonuses:** Reward land use mixing
- **Inclusionary Zoning:** Mixed-use zoning; floating zones
- **Zoning Swaps:** San Jose, Palo Alto, Boulder
- **Fee-based Strategies:** Sliding Scale Impact fees; fee-bates; mileage-based fees (Orlando)
- **Growth Phasing:** Indexing building permits

**Recent California Initiatives**

- **Jobs-Housing Balance Incentive Grant Program (AB 2864, 2000):** up to \$25 million grants to communities proposing to improve jobs-housing balance (e.g., attract businesses in “housing rich” areas)
- **Inter-Regional Partnership Jobs-Housing Balance Pilot Program:** ABAG (Alameda, CC, SC counties), San Joaquin COG, Stanislaus COG; aim to create jobs/housing opportunity zones in the IRP region – *Mountain House* (build out: 27,000 jobs & 27,000 working residents).

**CLOSE**

- Balanced Growth & Accessibility matter from a sustainability/urban efficiency standpoint
- Of all mixed-use strategies, jobs-housing balance provides the largest net travel efficiency benefits, though hardest type of MXD to implement
- Jobs-Housing Balance & mixed retail-housing are not mutually exclusive. Synergies from introduction both... (e.g., retail at gateway entries to residential neighborhoods)



**Offering Choices**

