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PROCEEDINGS: Conference on Transportation in Developing Countries

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Conference on Transportation in Developing Countries

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Conference Organizers,
Robert Cervero and Daniel Sperling

Editors of Proceedings,
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Section 1

Introduction and Opening Remarks

Robert Cervero and Daniel Sperling, University of California
Conference Organizers

Context

Much of the developing world is experiencing rapid economic growth. Motor vehicle fleets in many megacities are doubling every seven years, creating a huge infrastructure backlog, escalating air quality problems, and imposing constraints on economic development. Besides rapid growth, the very context of transportation challenges is qualitatively different in the developing world. Leaded and unregulated fuels are a serious source of air pollution in cities like Bangkok, Lagos, and Jakarta. In Bombay, an estimated 50,000 squatters live within the rights-of-way of the city's metro, forcing trains to crawl at under 5 km per hour in certain sections of the city. Excruciatingly slow train services have actually sparked riots among train passengers and the burning of train stations in protest. Heavy reliance on bicycle and other forms of non-motorized vehicles is another distinguishing feature of transportation in the developing world. In Tianjin, China, 80 percent of all commute trips are by non-motorized modes, mainly bicycles.

While transportation management practices and technologies from advanced economies might find relevance in developing countries, the developed world can likewise learn much from economically less well-off places. For example, other parts of the world provide useful insights into such practices as price deregulation (*e.g.*, Santiago), paratransit expansion (*e.g.*, Mexico City), road pricing (*e.g.*, Singapore), high-speed rail (*e.g.*, Taiwan), build-operate-transfer projects (*e.g.*, Hong Kong), creative infrastructure financing (*e.g.*, betterment taxes in Bogota), and coordinated, integrated land development (*e.g.*, land readjustment in Korea).

Purpose

How do we, the transportation research community, best respond to the immense challenges posed by numerous transportation and environmental problems facing developing countries? It is not altogether clear whether the theories and methods that have evolved for dealing with transportation problems in the modern, industrialized world can or even should be transferred to the third world. This conference is convened to help define the boundaries of what researchers and scholars can and should do in responding to mounting transportation problems in developing countries. We hope to reach some general agreement as to what are among the most promising areas for conducting research, and how such research might best be designed, carried out, and disseminated. We hope also to build bridges between the University of California and other institutions in defining areas of common interest for possible future collaboration. However, this gathering is not only about research. It's also about education. We probably speak for many other educators in saying that we are increasingly being approached by graduate transportation students who want to work abroad in developing countries, and are looking for the kind of training and sensitivity to cultural and political realities that will enable them to work effectively in these settings. We are particularly pleased that so many students are able to join us for the next day and a half, for much of the

challenge in improving transportation and environmental conditions in the developing world will ultimately rest with them.

Program: Aims and Design

As American scholars, we and many of you face difficulties in trying to carry out research and build educational programs in transportation in developing countries. Among the many hurdles are shortage of funds, strings which prohibit the use of traditional research grants, inflexible academic schedules, and the lack of an intellectual community and tradition in this field. In hopes of addressing critical issues and overcoming obstacles to building research programs, we've defined the aims of the conference as: (1) sharing knowledge; (2) articulating critical and promising topics that might form programmatic areas for future collaborative research; and (3) building networks and research associations between the University of California campuses and other organizations.

After discussing the idea of a conference with a number of people, including many in attendance, we decided to depart from the traditional format of formal papers being presented. Instead, we've designed the conference to encourage more open exchange and dialogue. This format, we hope, will allow us to openly and honestly discuss things we know and don't know, and converge on some agreement on how to best fill existing knowledge gaps. Key to this will be the work of break-out panels, where their principal charges will be to define promising areas of future research in specific areas by tapping into the collective knowledge and experiences of the participants.

Section 2

Keynote Address:
John Flora, The World Bank

John Flora, representative from the World Bank, frames the central issues facing transportation policy in developing countries today. Motorization clearly is the central dilemma, and its attendant problems — air pollution, traffic congestion, and road safety — are addressed in this presentation. Mr. Flora concludes with suggested strategies to improve transit operations in developing countries.

TRANSPORTATION TRENDS IN DEVELOPING COUNTRIES

Global Investment Trends in the Transport Sector

- In developing countries, infrastructure typically accounts for about 20 percent of total investment and 40-60 percent of public investment.
- Private financing accounts for about 7 percent of total investment (and may increase to 14 percent by 2000).
- Over 25 percent of infrastructure investment is for transport — primarily road and rail.

Challenges for Transport Policy

- Overcoming inherited problems
  - — increasing access and affordability
  - — confronting the maintenance crisis

    In the 1970s and 1980s, the World Bank financed a great deal of infrastructure. Today, more concern needs to be directed to the maintenance of these structures.
- Meeting new challenges
  - — Adjusting to changing global trade patterns (economic globalization)
  - — Increasing responsiveness to consumers
  - — Coping with rapid motorization

Rapid motorization is perhaps the most critical of these challenges, as motorization is a phenomenon that is sweeping the world.

Why is motorization an issue?

1. Air pollution
2. Traffic Congestion
3. Road Safety

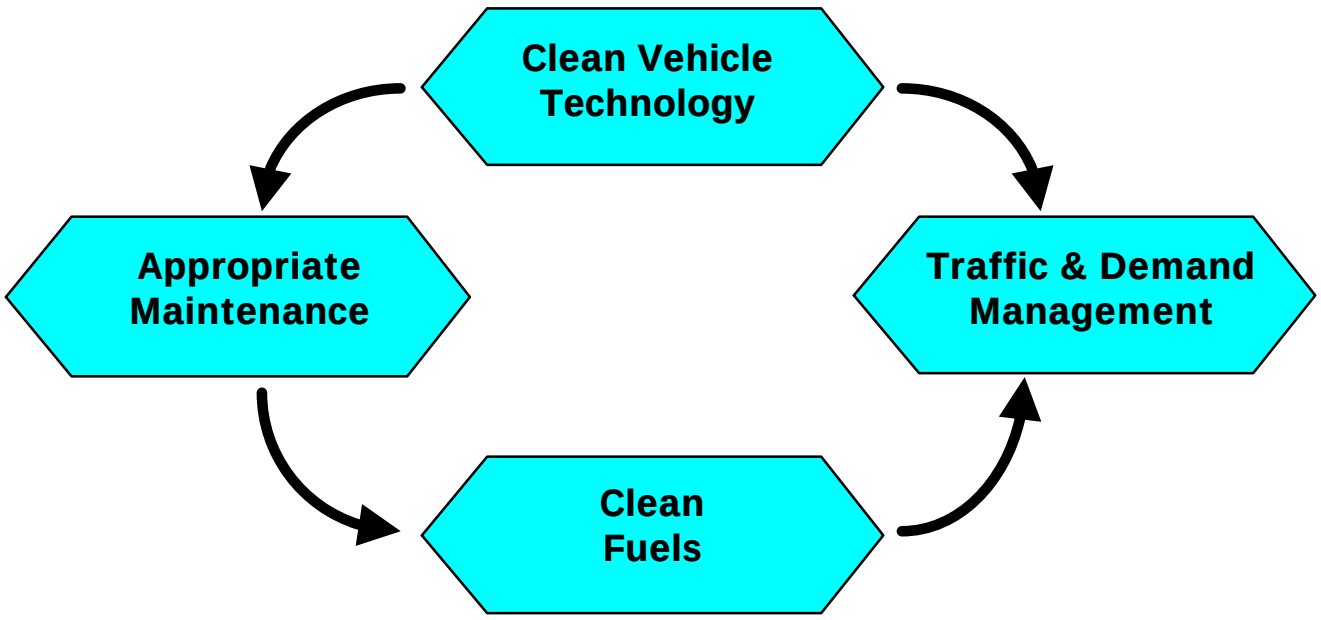
Motorization Issue #1: AIR POLLUTION

Factors influencing air pollution from land transport sources

- Total energy consumption
- Magnitude and density of population
- Degree of urbanization
- Transport modes and share of travel
- Fuel consumption and emissions characteristics

Question posed: What is wrong with motorization if we solve the air pollution and emissions problem, as some evidence suggests we might?

Exhibit 1:
Elements of a Comprehensive Vehicle Pollution Control Strategy



Motorization Issue #2: ROAD SAFETY

Not enough attention is paid to road safety. Road accidents constitute the largest killer of young people, especially among poor people and in developing countries. We have the highest traffic fatalities in the poorest countries.

Global Facts and Figures on Road Safety

- Each year, more than 500,000 people die in road accidents
  - ⇒ 70 percent of deaths are in developing countries
  - ⇒ 65 percent of deaths involve pedestrians
  - ⇒ 35 percent of pedestrian deaths are children
- 15-20 million injured
- Leading cause of death for young people

The road deaths and accidents are thought to represent between 1 percent and 3 percent of GNP. Critics could easily dispute this, however, because the statistic is based on the value of human life. Unfortunately, the value of life can often be perceived as very low in developing countries. A better and more reliable standard of measurement and evaluation is desired.

Road Safety Factors in Developing Countries

- Predominance of non-motorized traffic and pedestrians
- Lack of driver training
- Lack of pedestrian awareness
- Inadequate infrastructure
- Unsafe vehicles

People often are not even aware of the traffic safety problem.

Strategy for Improving Road Safety

1. Raise Awareness
2. Education
3. Design
4. Regulation & Enforcement
5. Incentives

Motorization Issue #3: TRAFFIC CONGESTION

Economic Impacts of Traffic Congestion

- In the United States, US$43 billion is lost every year in metropolitan areas due to congestion.
- Bangkok loses one-third of its gross city product each year, estimated at $4 million per day.
- Japan's "Just-In-Time" delivery system is under threat.
  Congestion has harmed the Just-In-Time system in Japan, but congestion has not caused the East Asian economic woes. Deeper macroeconomic factors are more responsible.

- In Britain, the Confederation of British Industries estimates £15 billion (US$ 23 billion) lost per year.

Traffic Congestion in a Mega-City: Jakarta, Indonesia

Supply-Side Strategies to Relieve Congestion

- New Construction
  (Must have *some* degree of infrastructure development to relieve traffic congestion.)
- Traffic System Management
- Improved technology
  - ⇒ Enhanced vehicle technology
  - ⇒ Intelligent Transportation System concept
- Alternative transport modes

Demand Management

- Appropriate policies
  - ⇒ Fuel pricing (*i.e.*, gas taxes) will likely not affect motorization, or at least not to the degree that it needs to be affected in the long run.
  - ⇒ Parking supply and fees
  - ⇒ Regulatory mechanisms
- Car pooling
- HOV lanes
- Ownership Restrictions

Congestion Pricing

New technology may make efficient road pricing feasible, but a strategy and a strong political will are crucial. We have thus far used the "environmental card" to push for congestion pricing. If transportation's environmental problems are mediated, where will congestion pricing's political support come from?

IMPROVING PUBLIC TRANSPORTATION

Improving public transportation is perhaps one of the best ways to address motorization and accessibility.

Organization and operations:

Best Roles for the Government and the Private Sector (*please see Exhibits 2 and 3*):

Role of Government:	planner and regulator
Role of Private Sector:	provider of service

Busways and Integrated Facilities

Busways and integrated facilities are promising developments in public transportation. Curitiba, Brazil, has a successful integrated transport system anchored by busways (*please see Exhibit 4*). Curitiba's system is working well, but bikeways should have been included with the busways in the planning process. At the time the system was being designed, however, bicycles were not part of the thinking. It is important to note that this effective system cannot even be replicated in the rest of Brazil. Why can we not do this? We need to understand this better.

Urban Rail

After years of avoiding the funding of metros (urban heavy rail), the World Bank now sees metros as essential in particular situations where a certain threshold of corridor demand has been reached. The recent increases in passenger ridership on the Buenos Aires metro attest to the success of the model of private operation coupled with public regulation.

Mixed Traffic with Sequestered Pathways for Cyclists, Taipei, Taiwan

Exhibit 2
The Public-Private Continuum

The varying degrees of public/private cooperation

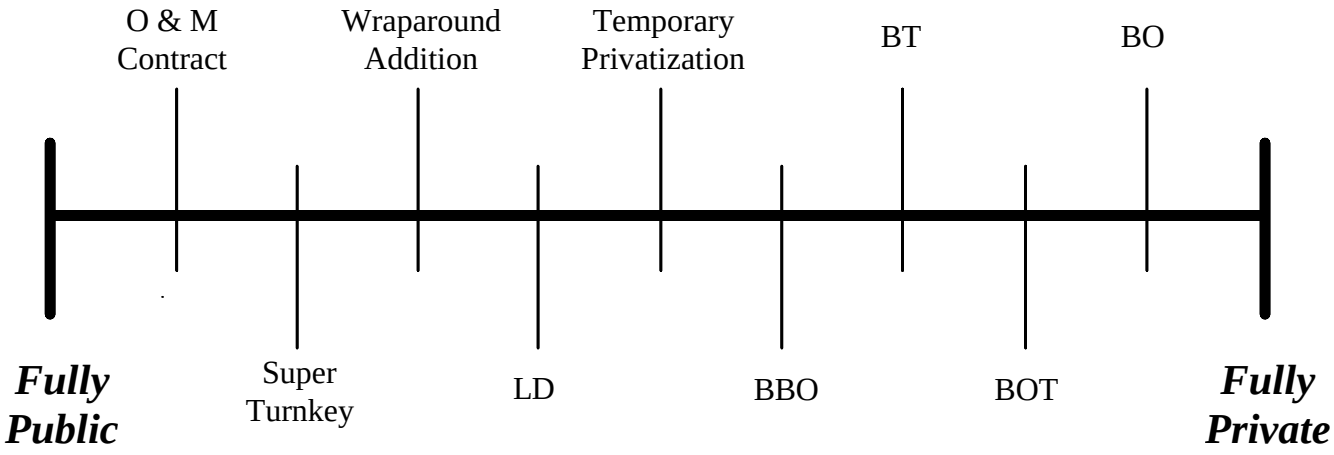


Exhibit 3: Transition Stages

The transition process to greater private sector involvement in transportation cannot be done overnight, and China provides a good example of a transition that takes time.

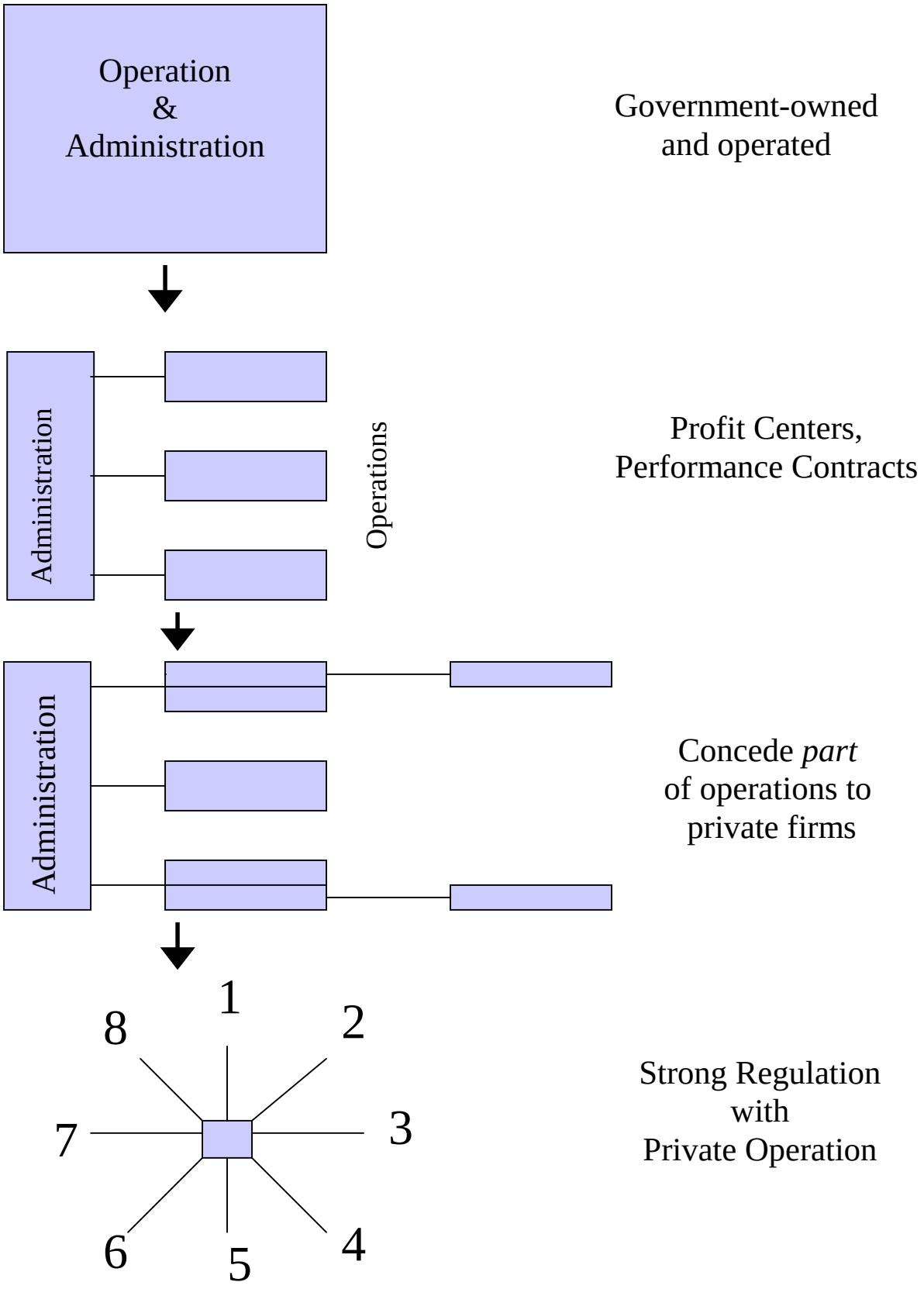


Exhibit 4
Curitiba's Integrated Transportation System

SYSTEM CHARACTERISTICS

- Integrated system covers 75% of the city
- 60 km of exclusive busway
- 280 km of feeder routes
- 190 km of interdistrict (cross-town) routes
- Government coordinated and regulated
- Private operation (10 franchises)
- Over 1,000,000 passengers per day
- No operating subsidy

CONCLUSION

Sector Demands and Trends

- Technologies are established and evolving gradually toward more flexible, demand-responsive systems.
- The institutional paradigm is shifting towards greater private sector participation.
- A growing emphasis on commercial management of roads and remaining public transport enterprises.
- Increased attention to financial, institutional, and environmental sustainability (*please see Exhibit 5*).
- The cross-sectoral linkages to poverty and education need strengthening. Policy-makers cannot ignore the plight of the poor and must avoid gender bias.
- A growing trend to contract out transport services and even infrastructure to the private sector.

Transportation services produce unwanted by-products (air pollution, global warming, accidents, and congestion), and rapid motorization contributes a great deal to these problems. The costs of these negative externalities are very high — around 6-7 percent of GDP — and they need to be addressed. Handling motorization is an enormous task. Automobile economies are huge and very hard to control and police; furthermore, the frequent lack of reliable figures only undermines the strength of policy analysis and intervention. How can we also better integrate land use planning and transportation planning? For the future of the transportation sector in developing countries, we depend on new thinking.

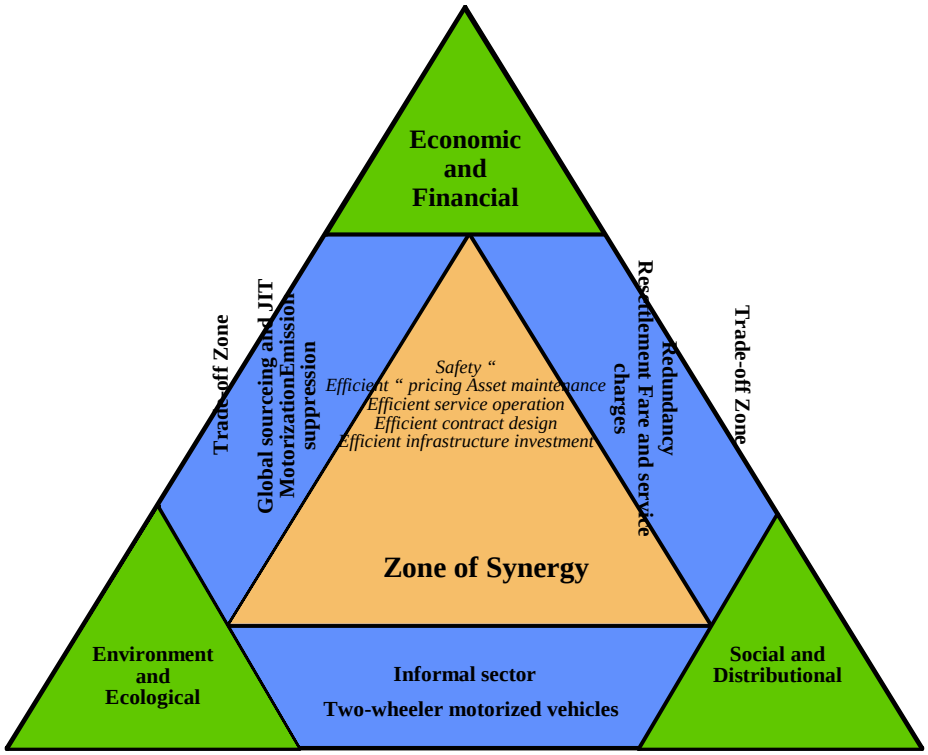
Audience Comments

— Statistical figures are often unreliable. We need reliable, "hard" data to convince policy-makers. There are issues concerning data standards.

— Even if you solve the emissions particulate problem, 70-80 percent of the most dangerous particulates — in Santiago, Chile, for example — are coming from road dust being kicked up even on paved roads. These particulates are coming from the attrition of rubber tires and brake linings.

Exhibit 5
An Outline for Sound Transportation Policy:

Transportation policies should consider all three angles.



Section 3

PLENARY PANEL

The Roles of Research and the Academy in Addressing Transportation Problems in the Developing World

Six distinguished scholars from different countries and backgrounds presented their thoughts and ideas on the future research areas and possibilities for transportation studies in the developing world.

Moderator: Daniel Sperling, University of California, Davis

3.1 Future Scenarios of Mobility and Key Research Themes in Developing Countries

Ralph Gakenheimer, Professor
Department of Urban Studies and Planning
Massachusetts Institute of Technology, Cambridge, Massachusetts

Mr. Gakenheimer outlined key research themes and future scenarios of mobility. He stressed his fear that the environmental concerns will overshadow other transportation concerns, such as economic development, social equity, and congestion alleviation.

There is a great deal of research to be done on the developing countries. The tasks are somewhat different from current priorities for the United States. Rather than attempt to be comprehensive, I choose just to suggest some topics that seem to me important at the present time.

1. Scenarios. It is important to portray some pictures of the future conditions of mobility in the developing world. Because of the powerful dynamics of change now taking place in those countries, we ought to consider where trends are leading us with growing urban populations, rapid motorization, increasing incomes, explosive decentralization, and probably rapidly rising VKT (Vehicle Kilometers Traveled) per capita. This requires gathering selected variables on economy, environment, demography, and technology, as well as transportation.

Data will likely be scarce. We might need to resort to "composite" scenarios, where data are collected on a set of similar cities to fill out the description of a single "prototype" city: for example, among the full set of Spanish-speaking Latin American cities between 3 and 8 million people. It is a means of surviving a data-lean environment and, at the same time, having cross-checks among the data files if we fear the data are unreliable (or definitional issues on the data are not thoroughly documented). Mobility scenarios are being prepared for data-rich countries. There is a group currently in Europe preparing scenarios for eight European cities.

2. Saturation in the increase of vehicles. It is very important to know where these rates of sometimes 10% per year increase in vehicle ownership are going to end. This is an important research problem; it appears that great congestion is on the horizon.

Researchers have long assumed that motorization in the North has a sinusoidal ("S-shaped") curve that attenuates when approaching a maximum. The usual accompanying assumption is that in the developing world the curve has a similar shape but attenuates at some lower maximum, presumably representing the population with auto-owner income levels. This however is a dangerous assumption because the rising ownership curve in the North is constrained basically by total-use saturation, not by income. Certain other possibilities have been examined. My research group and I have attempted some initial correlations with candidate variables (such as urbanization, income, *etc.*) and Talukdar has applied the Kuznets curve, anticipating a reduction in vehicle ownership after reaching a maximum.[1]

3. Measuring congestion. In order to conclude about the performance of vehicle restraint and network amplification, we need to have better ways of following congestion across time. It is complicated. Congestion has dimensions in intensity, time, and area domain. This matter, again, is more important in the developing world than elsewhere because the rates of change are so fast — sometimes perceptible by casual empiricism over a matter of only a few months, but such observations are sometimes misleading. As far as I know there is basically no useful current comprehensive measure of congestion, notwithstanding recent attention to it by some researchers and in publications by the Transportation Research Board (TRB).

4. Special transportation services. There are already many more — mostly informal — transportation services offered in the cities of the developing world than in the North; however, other possibilities may be overlooked. One is the host of Personal Rapid Transit (PRT) systems lately proposed. Another is the prospect for car-sharing among people who could not afford to own a car. In a number of respects, the high-density, transit-served cities of the developing world are better prospects for car-sharing than cities of the North. A further special service category is transportation for the elderly in cultures where the elderly are typically more integrated with their extended families than in the North — but recently less and less so, and with less external institutional support than in the North.

One implication of this area of interest is that we need personal mobility journals for the developing world. The general statistics available from Origin-Destination (O-D) studies are not very useful in understanding the details of mobility requirements that serve special services. It would not be difficult or expensive, and it is a way for planners to become familiar with mobility requirements of population subgroups that are different even than those of planners of the same nationalities.

5. Land use planning as a mobility tool. Ultimately, there is no way to replace rational land development as a platform for socially responsible transportation use. Among the rapidly urbanizing and motorizing countries of East and Southeast Asia, in particular, there are countries where local governments have a better grasp over land use than in much of the rest of the world. There

[1]Debrabrata Talukdar, "Economic Growth and Automobile Dependence: Is There a Kuznets Curve for Motorization?", MCP Thesis, Massachusetts Institute of Technology, June 1997.

are clearly improved positions on land development that can be proposed. The problem is implementation. In environments where local government strength makes it possible (*e.g.*, China, Korea) and with the support of new privatized collaboration with government policy, we should find ways to make progress on this problem. For example, it is possible to propose the clustering of new development and to support it with public infrastructure investments that are repaid by private developers.

This is just a selection of the task ahead. There are many exciting possibilities.

3.2 Outline of a Study to Advance the Successes of the Clean Air Act into International Practice

Ruth A. Reck, Director
National Institute for Global Environmental Change,
University of California, Davis

Coming from the "environmental business," Ms. Reck is interested in the interface between surface transportation and the environment. She is especially concerned about air pollution and providing countries with the technical knowledge and options to solve environmental problems. While she believes that the Clean Air Act in the United States was a good investment, she would like to see some studies proving that it actually was.

The vital energy of human living can have many unhealthy consequences.[2] Among them are the gases, dusts, and aerosols that are emitted and become part of the global atmosphere. Nobel laureate F. Sherwood Rowland of the University of California at Irvine has found that fires in Asia, Africa, Australia, and South America are generating so much smoke that even sites over some remote South Pacific islands now have smog levels that resemble those found in Los Angeles. Concern over these uncontainable air pollutants will grow,[3] especially as large cities in developing countries join their more industrialized neighbors in consuming energy at very significant rates.[4]

Transportation is a major energy component in anyone's picture of future urbanization. To some extent, transportation is malleable in any major city on any continent, but the newly developing cities of the world offer the most potential for change. In this context, regional transportation policies may be influenced by global as well as local concerns.

We do not know at this point the extent to which the present and projected transportation energy usage will change the composition of the global atmosphere, nor do we effectively know — even in the most intensively studied metropolises of the world — the impacts on the local and regional atmospheric chemistry and composition. Consequently, regional governments and industries will struggle to define allowable engines, fuels, and other transportation variables. This struggle translates into vacillation, uncertainties, policy reversals, and ill-advised stops in law, commerce, and trade.

In the United States, we believe that public policy options should embody effectiveness in terms of the physical world, efficiency (with least possible cost), and fairness to all possible groups. Often strategies have fallen short of these laudable goals. As the United States has struggled with these issues for over 25 years, it behooves us to ask, what have been the lessons learned? Can these lessons be used to help develop transportation systems in the developing world?

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[2] A 1995 Harvard/EPA study shows that small particles in urban environments are responsible for about 70,000 deaths a year and more than 100,000 hospitalizations for heart and lung disease per year in the United States.

[3] Global warming is known to exacerbate the problems of air quality.

[4] In China, the average annual growth in energy end use between 1980 and 1992 was 4.9%. Growth was fastest in what was until recently the smallest consumer, the commercial sector, followed by transportation (China Energy Handbook, Lawrence Berkeley National Laboratory, Revised September 1996).

What is being proposed is to outline the cardinal issues and current understanding of the impacts on atmospheric composition and chemistry suggested by future megacity transportation needs throughout the Pacific Rim. Simultaneously, we propose to assess the successes of the United States' transportation systems in dealing with the Clean Air Act. Historical details of the emissions-control techniques for spark-ignition engines are available (for example, the use of catalytic converters). The specific cost-effectiveness of meeting the California low-emission vehicle standards is also well-documented. Measurement of traffic mix and the observed air quality related to that mix are available.

The idea would be to determine how much the air quality has been improved for the known mix of vehicles by running an airshed model for a mix of vehicles with the same traffic patterns, *etc.*, but calculating the air quality that would be present instead if all the vehicles were of the "pre-Clean-Air-Act" type. In the past, we know changes in the mix of vehicle type have correlated with changes in the observed air quality. If similar cities in the United States and the developing could be paired up, comparing similar sizes, meteorological settings, *etc.* then it is hoped that the lessons learned by the United States' approach could be applied to the developing world, without their having to repeat all the mistakes made in the U.S.

A study of this type would require considerable time, funds, and facilities. Study products need to include:

- A solid body of information on the value of curtailing vehicle emissions in a metropolitan region comparing cities in the US and the developing world (for example, Los Angeles and Taipei).
- Assistance in developing strategies for the improvement of air quality through the use of vehicle control devices, incentives, traffic flow, and adjustments to land usage.
- A vehicle test facility and air quality education laboratory to be located in a developing country. The facility would include a chassis dynamometer, an air quality facility, and sufficient computing capability to deal with traffic systems problems. The idea would be to make the facility available to all countries, internationally staffed, and welcoming the interaction between developed and developing world engineers, scientists, planners, and policy makers, all visiting the facility on a short-term basis.b

Many auxiliary questions need to be addressed:

- How have changes in land usage and population density over the same time periods influenced air quality?
- What would be the frequency of high ozone events today if the air control devices were removed and how would that compare with the present situation?
- How has the traffic mix and flow evolved over time and how might this have influenced the air quality?
- How might economic incentives such as tradable permits, pollution charges, or environmental subsidies help to reduce the aggregate emissions?
- To what extent do fugitive emissions (such as those from fuel volatility during refueling) exacerbate the problem?

3.3 Transportation Problems in Jabotabek (The Greater Jakarta Metropolitan Area)

B.S. Kusbiantoro
Institute of Technology, Bandung, Indonesia

Mr. Kusbiantoro describes the transportation situation in Indonesia and, in particular, Jabotabek, the greater Jakarta metropolitan area. He stresses that institutional problems are perhaps the biggest obstacle to improving transportation conditions in Indonesia. He further emphasizes the need for better technical information that is also more easily available.

Introduction

Indonesia, as an archipelago with more than 17,000 islands, is very heterogeneous. Its transportation problems vary widely. One problem is rapid urbanization. Urban population has increased significantly from 22.3% in 1980 to 34.3% in 1994; it is estimated that by the year 2020, urban population will reach 50%-60% of the total population. In addition, most of the urban population will be concentrated in major metropolitan areas. Jabotabek (the Greater Jakarta Metropolitan Area) — the biggest metropolitan area in Indonesia, with more than 20 million people (1995 estimate) — has been experiencing major transportation problems. These brief remarks focus on urban transportation problems in the Jabotabek area.

Transportation Problems in Jabotabek

Since 1971, population growth in Jabotabek has been very high, particularly in Botabek (Jakarta's fringe areas). Since 1990, the population in Botabek has exceeded the population in Jakarta. Several major activity systems (new towns and industrial estates) have been developed in Botabek, mostly by private developers. In addition, employment in the secondary sector has exceeded that of the primary sector.

Table 1: Demographic Trends in the Greater Jakarta Metropolitan Area

Population (in millions)

	Area (sq.km.)	1971	1995	% increase, 1971-1995
Jakarta	661	4.6	9.1	98%
Botabek	5978	3.7	11.0	197%
Jabotabek	6639	8.3	20.1	142%

Employment by Sector

	1971	1990	1990
Primary	19.9	21.3	15.8
Secondary	16.2	19.4	26.4
Tertiary	63.9	59.2	57.8

These activity system characteristics — combined with increasing levels of income, education, and women pursuing careers outside the household — increase trip rates, especially during peak periods.

On the other hand, the transportation network in Jabotabek is still very limited (*e.g.*: road space in Jakarta makes up about 5% of land area; a poor hierarchical street network; and the insignificant role of rail systems). This limited and poor street network serves various modes of transportation [*e.g.*, buses, mini- or micro-buses, bajajs, and bemos (bajajs and bemos are both three-wheeled, motorized public transit), cars, motorcycles, trucks/mini-trucks, carts, and others]. The road system is also utilized for various, often conflicting purposes (*e.g.* street vendors, parking, garages, *etc.*). Furthermore, capacity is used inefficiently [*e.g.*, it is used mostly by private vehicles (86%) compared to public vehicles (2.5%); the vehicle occupancy rate for private cars, moreover, is only around 1.5 passengers per car]. This 2.5% of capacity used by public vehicles serves 57% of all passengers, while the 86% of capacity used by private vehicles only serves 43%. In addition, the gap between demand and supply has been widening (*e.g.* the annual growth rate of motorized vehicles is more than 10%, compared to less than 5% in terms of road capacity).

Public transit services are further complicated by institutional problems (*e.g.*, as public transit drivers have to pay a certain amount of money each day to lease a vehicle, they often neglect traffic regulations while hustling for customers, creating traffic snarls). Furthermore, new companies face few restrictions to enter the market. Currently, Jakarta has more than 40 taxi companies. Too many institutions are involved in transit management, creating coordination problems, especially given these institutions — whether governmental or in the private sector — have no single, consensual vision on urban transportation policy and management.

The institutional problems are not limited to mass transit, but reach across all transportation sectors. For example, in 1992 the government tried to prohibit low-occupancy vehicles from entering particular major streets in Jakarta during peak hours. Paid passengers, however, became a new business. As there is no law prohibiting paid passengers, the government could not stop this practice, and the scheme failed. Another example is the government's effort to build a Mass Rapid Transit system (MRT). Over the years, numerous studies have been completed, public and private institutions have formed, different financing schemes have been proposed, and so far no fixed date has been set to start the MRT development.

Transportation issues in Jabotabek can be categorized as those related to: (a) sustainable development and (b) good government. Issues related to sustainable development include: efficiency — the limited street capacity is under-utilized by low-occupancy vehicles; equity — transit vehicles that serve 57% of passenger trips have to use low-priority lanes [*e.g.* along one of the major streets in Jakarta, public vehicles have to use one slow lane while private vehicles use four lanes]; and issues of the environment — Jakarta is one of the most polluted cities in the world [*e.g.* with ambient pollution levels beyond the acceptable standards – NOx = 0.125 (standard: 0.05), TSP = 556.31 (260), and dBA = 72.3-85.3 (60-70)]. Issues related to good governance are: an underdeveloped legal system, a lack of capable institutions and human resources, and financial shortages. Finally, it should also be noted that the availability and quality of databases is another big problem in developing countries, and Indonesia is no exception.

Potential Research Topics

- Given the various modes and the other activities which are related to the existing limited and poor street network, how can the transportation network be restructured or redesigned? In particular, there must be better design to reduce points of friction among various modes and activities.
- Given the existing limited and poor public transit systems, how can public transit systems be managed and regulated so that they could serve both motorized users and the non-motorized majority of the population?
- What scheme should be developed to enable public-private partnership to finance and operate the MRT system?
- We need more documentation of the best practices as well as lessons learned from various countries and cities.

Role of Research and the Academy

Since there is no clear vision on urban transportation among stakeholders yet, one of the roles for research and academic institutions is to act as an agent of change (*i.e.,* to influence stake-holders' attitudes, to make the stakeholders aware of emerging problems, *etc*.). This can be done, for example, by disseminating research results and other related information through conferences, workshops, and mass media. In addition, given the limited and poor databases available, academic institutions should become clearinghouses for databases.

3.4 The NGO's Perspective: Key Areas of Transportation Research in Developing Countries

Walter Hook, Executive Director
International Transportation Development Program, New York

Mr. Hook, executive director of the Institute for Transportation and Development Policy (ITDP), a non-governmental organization (NGO), outlines promising areas of future applied research from a NGO's perspective. Transportation planning in developing countries faces different challenges than in the developed world and perhaps even has better opportunities in actually creating sustainable transportation systems.

Promising Areas of Future Research

I. The Relationship between Transport & Poverty Alleviation

How do the poor benefit from road-building, if they have no access to vehicles? What is the benefit of spending public funds on road-building, if the majority of the population has limited or no access to vehicles?

We need to gather time budgets of the poor. Transportation's greatest contribution could be to reduce the time the poor devote to collecting water or firewood. Most studies to date have been in rural areas, but what about low-income urban communities? Urban studies of travel time and time budgets constitute a promising area for research.

We need a better analysis of infrastructural investments that make little economic sense but are used to generate jobs. A more rigorous financial analysis of the impact of road-building on government debt would be helpful.

II. Public vs. Private Control of Roads, Rail, and Transit, with respect to:

i. poor people
ii. the environment
iii. aggregate investment levels
iv. efficiency of the system
v. accountability

What is the impact of transit and rail privatization on the poor in less developed countries, in both the short term and the long term? What impact does this privatization process have on aggregate investment into new construction and maintenance? Research findings on the impact on relative subsidies between modes and mode share would be useful. Transportation is very politicized. Isolating productivity gains from system characteristics is a true challenge due to a great deal of misinformation and deception.

With regard to concession highways through public/private partnerships, the quantification of risk to taxpayers is poor. Information about concession highways is not usually open to the public, and accountability and public participation are important concerns. How does this method of finance compare to other options (toll roads, gas tax revenues, *etc.*) in terms of efficiency,

equity, revenue generation, and cost recovery? Also, are levels of public/private subsidization comparable between road and rail?

III. Transport and Economic Growth

The relationship between transport improvements and economic growth is very complex and often involves a lot of faulty econometric analysis. Studies often ignore the economic debates on growth theory. Research on aggregate transportation costs and the impact of transportation investments on domestic savings levels would be useful. What percentage of GNP is devoted to transportation in a given country, and how does this influence system efficiency and economic competitiveness for the country? How can countries maintain adaptable transportation systems and better avoid the "lock-in" dependency to a sub-optimal transportation system over time?

IV. Issues of Decision-Making Procedures within Transportation

How are decisions *really* made? Does cost/benefit analysis play a decisive role in the decision-making process? We have a needs for better cost/benefit analyses and for more rigorous financial analyses of the impacts of road-building on government debt.

In addition to an appraisal of road projects, cost/benefit analysis needs to be applied to bikeways and traffic calming measures. Cost/benefit analysis should also be applied to transit system changes, such as line cuts or frequency of service cuts.

Furthermore, we need a better evaluation of the economic importance of the informal sector, including street vendors. Given the growing importance of the tourist industry in the global economy, do street vendors have a more valuable economic role than perhaps currently perceived? Is the economic value of street space greater for transport or for street vendors and cafes? In an increasingly post-modern economy, perhaps the latter produces more societal benefits. Perhaps street vendors deserve to be on the streets, because their economic value is greater than the congestion delays they contribute to.

V. Role of NGOs and governments in disseminating and inducing technological innovation for (i) cleaner motorized vehicles and (ii) better non-motorized vehicles, particularly in developing countries.

We are told vehicle fleet improvements will solve emissions problems, but what determines the rate of technological change? How do we project this for the future? Facilitating the dissemination of clean technologies to developing countries is clearly a central research goal.

Inducing technological innovation in non-motorized vehicle technologies is also important. For instance, progress is stalled in the bicycle industry at the moment. How can technological progress be induced through government and NGO activity?

VI. Public Health and Emissions

The relationship between air pollution and personal health is still poorly understood. Until we are better able to calculate the epidemiological impacts of automobile exhaust, our ability to assign true long-term costs to personal modes of transportation as part of an economic appraisal of projects will be limited.

3.5 Environmental Impacts Assessment for Urban Planning and Transport Projects in Vietnam

Luu Duc Hai, Deputy Director
Center for Research and Planning on Urban and Rural Environment (CRURE)
Ministry of Construction
Ha Noi, Viet Nam

Mr. Luu Duc Hai outlines the urban planning framework in Viet Nam and notes the increasing importance of urban planning there. Transportation problems continue to escalate in Viet Nam, thus transportation should receive greater attention in Environmental Impact Assessments reports for urban projects.

Background

Viet Nam's urban population is 14.7 million people, about a fifth of the national total (73 million people). Nearly half of the urban population lives in the two largest cities: Ho Chi Minh City and Ha Noi. At present, the needs for suitable urban infrastructure in the country's two largest urban centers, including water supply and sanitation, drainage, solid waste disposal, housing, and transportation, are immense. The Government of Viet Nam gives high priority to the rehabilitation and upgrading of deteriorated infrastructure in its cities and towns.

Urban Planning and Its Applications in Viet Nam

Urban planning in Viet Nam has significantly contributed to socio-economic development, in general, and to efficient urbanization, in particular. In Viet Nam's shift from a centrally planned economy to a multi-sectoral, socialist-oriented one, urban planning has gained importance. For nearly the half century since 1954, urban planning in Viet Nam has encompassed three hierarchical scales, listed in declining level of activity scale.

- Regional Territory Planning (regional level)
- Urban General Planning (city/town level)
- Detail Planning (project level)

Prior to the introduction of "dôi mói" renovation policies, the urban development in Viet Nam was very weak, adversely impacted by an economy based on central planning and subsidies. Constant budget shortages constrained the development of new projects.

The Government Decree 91/CP of 1994 established a general framework for managing the urban development of Viet Nam's cities, adopting many of the urban planning principles found in the developed world yet tailored to Viet Nam's unique historical, cultural, and geo-political situation.

Environmental Factors in the Urban Planning Process

To date, there has been inadequate consideration of environmental factors in the process of macro-planning (such as the formulation of long-term plans of general planning). Issues of the macro-level — such as conflicting uses of natural resources, basin-wide water quality management, rapidly increasing motorization, and potential negative impacts of urban development on

ecosystems — are not adequately analyzed. More effort is required to promote environmental awareness in agencies in accordance with their planning and strategy formulation functions.

The Center for Research and Planning on Urban and Rural Environment (CRURE) has been given responsibility by the Ministry of Construction to conduct research and provide early guidelines for environmental impacts assessment for many kinds of urban planning projects.

In general, the "environmental impacts assessment report" of a urban planning project must consider the following issues: (1) Drainage System, (2) Transport Environment, (3) City Greening, (4) The Historical-Cultural-Built Environment, (5) Slum Improvement, (6) Environmental Health, (7) Water Pollution Control, (8) Air Pollution Control, (9) Land Use Planning, (10) Solid Waste Management, (11) Special Waste Management, and (12) Resource Management.

Transport and Environmental Impacts

Motor cars have become an inseparable part of urban life. On the one hand, motor vehicles provide needed mobility. On the other hand, they cause severe environmental problems, notably air and noise pollution.

Another major problem with motor cars is traffic congestion. Traffic congestion is partly due to the lack of coordination among the government departments which plan and implement transport policies. With rapid urbanization, congestion will only worsen in the absence of effective planning.

In urban planning projects, the issue of “transport environment” should be considered as a separate part in Environmental Impacts Assessment reports. Traffic safety, traffic congestion, and air and noise pollution from the transport sector should be considered carefully. Better research is needed to help planners in Viet Nam conduct such analyses.

3.6 Visions for Action in Transportation Planning in the Developing World

Harry Dimitriou
Department of Development and Planning, University of Aalborg, Denmark;
University College London

Mr. Dimitriou concludes the plenary session with a call to action — not to just generating new ideas — concerning transportation scenarios in the developing world. He calls for a paradigm shift in transportation planning, as the perception of transportation problems is of critical importance. Transportation involves multi-disciplinary issues and should not be treated as a single, stand-alone sector. Urban transportation is rooted in the concept of visions for the future, and the future transportation environment is a matter of priorities and choices.

Too many of us are under the gross misconception that we have the luxury of time to do further intricate analyses before we take action. The truth of the matter is that urban transportation problems in the developing world and elsewhere are exploding at such a fast rate that we just do not have this luxury of time. We do not need new thoughts as much as we need new action.

Part of the problem has to do with the fact that we just do not understand (or care?) enough about the implications of our recent and current short-term actions. The devastating impacts of current habits need be disseminated globally (with the utmost of priority and speed) if politicians and others of influence are to be convinced of the need to take alternative actions and employ more sustainable visions.

What is also underemphasized (too often overlooked?) is the very important role of vision-building and dissemination in the urban transport field. This is so in the developing world, especially, but also in the developed world. International development advisors, government officials and city mayors, professionals and vocal citizens all have visions (implicit or otherwise) of how transport and urban developments should take place. Many such visions are greatly influenced by economic (commercial) visions of the marketplace (including those of the motor-car industry and the construction industry) and by environmental visions of suburbia and CBD development in the Western world (and more recently successful Asian cities such as Tokyo, Hong Kong, and Singapore) shown by the media to an increasingly large middle-class-aspiring audience worldwide. The time has come to shatter some of these visions by showing the logical outcome of their pursuit and promote in their place other visions that are more sustainable and equitable. We have entered into a critical era of international discourse about future visions for urban transportation, and we do not, unfortunately, have the time to ponder too long on their outcomes. The critical question, however, is who has the power to define, implement, and fund these visions?

Alternative visions about transport priorities in cities have been with us for a long time — as have the warnings about the shortcomings of automobile dependence. It is, therefore, not new ideas that we need, so much as the support for the implementation of actions and instruments that enable more sustainable futures to develop — freeing cities from the shackles of economic rationalism and raising more concerns about the quality of life as we increase mobility and accessibility provision in the name of productivity enhancement.

Inherent in the problems cited above is the preoccupation of international development agencies, governments, banks, and politicians with projects — *transport* projects — rather than transport strategies for sustainable urban development as the incubator of transport projects. This preoccupation has had a great deal to do with the excessive influence of single-discipline perceptions — predominantly engineers and economists — of the city and urban transport needs. Worldwide, the 1980s saw the decline of respect for proactive planning and "fuzzy" (*i.e.*, too complex) multi-disciplinary perceptions as a basis for action. Such planning was too often seen as an obstacle or constraint to the free market (and thus highly undesirable). Yet the private sector has been the master of planning and strategy use — in the marketing of its products (be they soft drinks or motor cars). Today, the media technology offers planners and vision-builders of city futures the opportunity to disseminate city and transport alternatives that have a new set of priorities that are both environmentally more sensitive and concentrate more on non-motorized responses to city movement needs. The marketing of these new visions and related actions should be a top priority of those agencies, institutions, and individuals that have something to offer.

In the fiscally problematic environments of South-East Asia, there exists today a great opportunity for transport investments in cities to be reoriented toward lower cost investments in non-motorized infrastructure — what I call the *lowerarchy* of city transport infrastructure — so long neglected in favor of major road investments and expensive rail investments. The small streets of Asian cities, in particular, are not only places for movement but extended residential and working spaces of communities. Re-investing in such areas can do much for the local economy and social development, as well as traffic movement. Once again, this kind of attention calls upon the skills of multi-disciplinary analysis and planning rather than the skills of single disciplines such as economics and engineering. Centers of expertise in this approach to urban transport planning for developing countries are critically needed if the powerbase of cross-sectional/inter-disciplinary professions is to be enhanced and rise to the new challenges of the future.

Section 4

BREAKOUT PANEL SESSIONS

The charges given to each panel were to reach some degree of consensus on: (1) the topic's most critical issues; (2) at least three important things we know about the topic; and (3) at least two promising research topics, including a brief outline of how work might best be carried out.

Panel 1 — Motorization, Environment, and Ecology

Co-moderators:
Mariano Bauer, National Autonomous University of Mexico
Jayant Sathaye, Lawrence Berkeley Laboratories
Daniel Sperling, University of California, Davis

Recorders:
Jonathan Mason
Joshua Polston

The session began with opening welcome and introduction led by Daniel Sperling, and Mariano Bauer and Jayant Sathaye followed with brief overviews of the problems as they see them.

Summary of Mr. Sathaye's Presentation

- There is a substantial gap between environmental standards and performance, due to issues concerning effectiveness of enforcement. Examples included the early years of smog check in California that was rife with graft. Perhaps developing countries are still in this phase.
- Internationally, the importance of rail has diminished and has been replaced by road and air transport. In some countries — India, for example — it has been replaced by motorcycles.
- Urban areas around the world now have a high concentration of motorized vehicles.
- Key factors that are allowing for more vehicles in the world's cities:
    - Individual desire for mobility
    - Rising incomes
    - Higher fuel use per vehicle

Summary of Mr. Bauer's Presentation

- Even for developed countries, there are different stages of development.
- Two models for transportation in developed countries were presented:

Slow Transformation	Fast Transformation
Low Gross Domestic Product	High Gross Domestic Product
Decreasing markets	Increasing markets
Old vehicles	Modern vehicle fleet
Poor vehicle condition	Improved fuels
No mass transit	Efficient mass-transit system

- Mr. Bauer argues that the “fast” model is more controllable
- Available intervention techniques were classified as follows:
  - "*Hard*": New ICE technology, Mass Transit, Alternative vehicles
  - "*Soft*": City planning, lifestyle changes

A critical point of Mr. Bauer's presentation was the need to change the way people think concerning their lifestyles and transportation. For example, making small cars fashionable and desirable in the same manner Levi’s Blue Jeans transformed the image of their work clothing.

Summary of Panel Discussion

Promising Research Issues:

The Process of Adoption, Adaptation, and Diffusion of Technology

The adoption, adaptation, and diffusion of transportation technology is perhaps the central research theme of this panel. A better understanding of how technology spreads is crucial. Can developing countries "leapfrog" quickly to the most advanced technologies, avoiding the interim technologies developed countries had to utilize? How do the international markets for used vehicles operate? What policies are influential in encouraging the adoption of certain technologies?

Behavior and Preferences

Beyond the study of technological and institutional solutions, more attention needs to be paid to consumer behavior and preferences in regard to transportation. With a large spectrum of technologies and modal choices, the understanding of why choices are made is important. Consumer preferences vary across society and culture. What local factors influence these consumer practices? With the growing influence and pervasiveness of media information, the presented images and visions of transportation modes are suspected as being particularly important in influencing transportation choices and investments. Further study in this area is certainly encouraged.

Institutional decision-making processes

The effects of economic and cultural globalization need to be better understood as they relate to the transportation context. The role of national decision-making institutions within an increasingly global structure is noted as an important research topic. How does globalization affect the nature of public-private partnerships and privatization schemes within the transportation

sector? Will national ideologies contest globalization? For example, the need for a national car might be perceived as important in China regardless of the economic rationale.

Analysis of impacts and costs (for technologies and policies)

Research and analysis of the impacts of certain technologies and policies is necessary. The health and environmental impacts of transportation technologies and policies is an area in particular need of attention. Are policies as effective as they are claimed to be? Cost-benefit studies and studies of the impacts of certain rules and incentives are encouraged. Policy and investment debates need to be better informed with solid studies and research results.

Data gathering and collection

Data gathering and collection is clearly an important research issue. Due to different data collection methods and categorization procedures, the lack of standardization hinders comparative research. The need for common data standards and protocols was emphasized. An information depository and clearinghouse would perhaps facilitate the process.

Center for international transportation studies

A proposal for the establishment of a center for international transportation studies was raised. It was noted that none currently existed within a university setting. The argument for such a center revolved around the idea of creating learning labs and intellectual communities to support the training of a next generation of specialized professionals.

Observations

Perhaps precisely what was *not* discussed at the panel session is notable. Interestingly, a discussion of the impacts high CO_2 levels and infrastructure development would have on natural habitats in developing countries was not raised, despite the nature of the panel discussion.

Panel 2 — Enhancing Mobility: Transportation Technologies, Operations, Design

Co-moderators:
Sarosh Khan, University of Colorado, Denver
Ramakrishna Tadi, University of California, Riverside

Recorders:
Lee Klineman
Mahendra Subba
Shunji Suzuki

Present Transportation Conditions and Problems in Developing Countries

General Issues

The panel opened with a short presentation of facts and statistics to illustrate the magnitude of problems, the nature of transportation in developing countries, and what the future might hold.

The transportation future does not look bright for developing countries. Due to high population growth, up to 50% of the world's population will be living in developing countries by the year 2000. Of the 21 megalopolises with a population greater than 10 million, 13 will be in Asia. Increased auto ownership, which has surpassed the population growth in the past 10 years in South East Asian cities, has increased traffic congestion.

Given that urban public transport, especially buses, is heavily relied upon in many developing countries, the main problem is that supply is consistently short of demand.

A large percentage of transportation in developing countries is made of pedestrian traffic, but the presence of street vendors, poor pavement conditions, and other factors can make pedestrian travel difficult. . In Chile, street vendors are mostly banned from the streets. Traffic laws are also often biased against the pedestrians.

These factors also affect non-motorized transport. In some developing countries, pedestrian and bike traffic account for more than 80% of urban trips. Motorcycles are also an important mode for consideration in developing countries. The motorization of urban populations, involving both four-wheeled vehicles and two-wheeled vehicles, is increasing at a rate faster than the population growth. Transportation-related problems are likely to become more acute unless adequate planning, policies, and technologies are developed.

Individual Issues

The following issues on transportation condition and problems in developing countries were discussed in the session.

- Motorization is rapidly expanding, not only for four-wheeled vehicles but also for two-wheeled vehicles. In Nigeria, the share of people using motorcycles has rapidly increased from 33% in 1989 to 58% in 1992. In many cities, the capacity is insufficient to handle the

demand for motorized trips.

- In Bangkok, it is not that uncommon to spend four hours on a one-way commute. The average traffic speed is between 4-8 km/h. The congestion is further aggravated by the inadequacy of traffic control, particularly at intersections. Traffic management and its method of application should be more carefully considered. What kind of technology is applicable to a place? It is necessary to think about the modes and system, individual method and the whole system.
- In Delhi, 40% of the population use public transit, and the percentage is higher in other cities. The planning in developing countries is also made difficult by the presence of a large number of competing modes operating at different speeds. The traffic police in Delhi, for example, identified 48 different modes of travel, a considerably higher number of modes than in developed countries.
- In Viet Nam, the bicycle is one of the main modes of transportation, but as a mode, the quality is considered low. If they can afford and need to travel faster and longer, people often shift to the scooter. The non-motorized transportation network needs to be improved.
- Regulation and management is an important issue, but in some countries, people just do not follow rules, which represents a behavioral problem. Transportation users, including walkers, should take more responsibility. Countries such as Singapore apply strict regulation, but this does not always work in all countries. The greater the congestion, the more control is necessary. What can be the principles? What is the goal? Regulations must also meet the respective cultural backgrounds as well.
- Inefficiency in public transport persists due, in part, to a lack of inter-modal coordination. Delhi's case study of 1982 shows no integration between the bus and railway system. Operational ability is greatly hindered by the financial difficulty as well as issues of governing. Regional approach of problem solving and institutional coordination lacks.
- In many developing countries there are often no sidewalks. Even if there are present, they are often crowded with street vendors or poorly maintained, creating a poor walking environment. Integrated street designs, considering both automobile and pedestrian uses, need to be sought. *Creative vision* is a crucial element, as street design in developing countries cannot be the same as those in developed countries. Establishing a good street network and hierarchy is important.
- Maintenance of the road infrastructure is extremely poor in many developing countries. Tanzania, for example, has potholes in many of its streets and very poorly maintained road networks.
- In developing countries, the majority of people do not drive automobiles, yet the majority of street space is reserved for automobiles. Is it really important to increase mobility? Maybe increasing accessibility is more important.
- Information technology may be applied in developing countries because of the great need and potential for it. It requires much maintenance and good infrastructure to support it, however, and user behavior correspond to these requirements.

Summary of Discussion: "What We Know" and Critical Issues

What We Know

- Street and sidewalk space is in high demand in developing countries, not just from vehicles but, in many countries, also from vendors wishing to sell goods along high-volume areas.
- Despite the problems of congestion and long commute times, the desire for personal vehicle ownership remains high. The rate of privately owned vehicles is growing quite rapidly, and

only a small handful of governments have been willing and able to control the growth rate.

Critical Issues

- A failure to fully understand transportation demand and to plan for adequate levels of service for all modes is a critical problem. In particular, pedestrian trips tend to be ignored in favor of motorized trips. Concerning pedestrian transportation, the lack of data, knowledge, and appropriately-trained professionals hinders better transportation planning for pedestrians.
- The conflict inherent in road space being shared by many different groups must be recognized and more effectively managed. The conflict among so many different groups leads to congestion among pedestrians, non-motorized transport modes, and motorized transport. Street vendors, especially, present hindrances to mobility by forcing foot traffic into the street.
- There is little modal integration in developing countries, on links or nodes that helps to increase mobility by public transit.
- There is a conflict between individual mobility aspirations (expressed through the high growth rate in private vehicle ownership) and overall transportation system efficiency, that might best be served by public transport. The problem needs to be considered across agents and institutions, and also done regionally.
- There is commonly a conflict between the desire of having a free market and the need for regulations.
- Transportation education and awareness needs to be increased. It is also related to the sense and value of quality of life.
- Infrastructure and vehicle maintenance is often poor.
- Equity and Environment: Modes such as well-designed bicycle and enhanced rickshaws, which are comfortable as well as having efficiency, will greatly help the mobility of low-income people in third world countries.

Research Directions

- *Research on Local Community Characteristics and Traffic Demands — Performance Measures:* The development of performance measures for all modes should be explored so that any action that is taken can be properly evaluated.
- *Land Use Planning and Transportation Planning*: The link between land development and transportation should be further explored in developing countries to aid planners in making comprehensive decisions.
- *Street hierarchy, function, and design*: Creative visions of livable streets amidst a mixed flow environment should be considered. Useful street hierarchies may further enhance the appropriate functions of the streets. Properly designed streets can be livable as well as safe. The cases of Parisian boulevards demonstrate greatly enhanced pedestrian environments complementing improvements in traffic flow and reasonably safe intersections. This fundamentally raises the questions of the understanding the linkage between the urban form and transportation demand.
- *Restructuring*: In order to improve mobility, transportation links and nodes require restructuring. Links can be privatized, but the management of the nodes should be under government responsibility. Efficient management of privately owned public transport is necessary, raising the on-going debate between free market practices and regulation.

Panel 3 — Non-Motorized Transportation: Mobility and Safety

Co-moderators:
Frank Haight, University of California, Irvine
Setty Pendakur, University of British Columbia, Asian Institute of Technology

Recorders:
Heath Maddox
Greg Shiffer

Summary

Non-motorized transportation (NMT) serves a major role in serving the mobility needs of citizens in developing countries. However, NMT is being increasingly marginalized by government officials and transportation planners in these countries in favor of capital-intensive automobile and transit projects. This workshop was designed to identify the most critical issues affecting NMT in developing countries and suggest two areas where further research would be most helpful in addressing these issues. Panel members addressed a wide variety of topics relating to NMT and offered numerous suggestions for further research. This account attempts to reflect the diversity of topics discussed and viewpoints expressed by the panel, while focusing on the key items that the panel was responsible for identifying.

Findings

NMT in developing countries includes a much wider variety of modes than is normally present in most developed countries. In addition to carrying vehicular traffic, streets are used for many public and private purposes; therefore, conflicts between different modes, as well as between vehicles and other street users, are the primary causes of accidents. The panel recognized that both motorized and non-motorized trips are rising rapidly in developing countries, and that bicycle use in some countries (especially China) is part of the same trend towards privatization of transportation that includes motorization.

NMT is marginalized by government officials in most developing countries. Officials are reluctant to spend money on improvements to pedestrian, bicycle, and other NMT facilities, because the associated benefits are undervalued in traditional economic analyses. The scarce funds available are generally targeted at large capital projects for motorized transportation. The use of the term non-*motorized* transportation itself reinforces its marginalization by putting the emphasis on motorized transportation. In addition, the needs and effects of the informal sector are not recognized by transportation planners and traditional project analyses, and research is needed to identify these needs and explicitly address them in project and policy decisions.

There was a belief that more research needs to focus on analyzing success stories in developing countries. In some cases, urban villages that thrive economically and socially in the informal sector without motorization could serve as models for other areas, but they are rapidly dissappearing due to destruction and removal. In contrast, however, many residents of rural areas desire to move to cities and own automobiles, for reasons that need to be better understood.

There was a general consensus that governments in developing countries need to create a more affordable vision of transportation. Even if it was desired, the U.S. vision of personal automobility for every citizen could never be achieved in these countries due to severe land constraints. Researchers must focus on helping the governments develop these more affordable visions. Some panelists felt that a lack of consensus on what constitutes good urban form inhibits the development of an affordable vision and contributes to the marginalization of NMT in developing countries.

The panel also felt that it was important to better understand whose visions are guiding the current transportation plans. Some panelists felt that the majority of citizens wouldn't support the current visions offered by officials if they realized how little they would benefit and how much they could be injured by the plans. The citizens who do oppose the vision of increased motorization are typically not asked for their opinions and cannot influence decisions. The panel members generally agreed that there was a lack of knowledge about how the infrastructure and policy-decision-making processes *actually* (not officially) work in developing countries. A need was identified for more detailed case studies and institutional analyses to get a deeper understanding of the various interests and forces that control these processes. Advocacy groups and the media need to know how these processes work beforehand, in order to expose and stop undesirable projects. Research needs to focus on how to educate citizens and get them involved with the decision-making process.

The panel felt that researchers have a tendency to jump to conclusions without understanding what is really happening in developing countries. There is a need to better understand the motivations behind the demand for increased automobility. What are the forces (*i.e.*, advertising, status, wealth, government corruption) driving this demand? All people want increased mobility, but this doesn't reflexively translate into a desire for automobility. There are other forces at work that are not fully understood and need to be examined more closely in order to counteract them.

Interactions between mixed modes of traffic are responsible for the majority of traffic accident fatalities — this problem will continue to worsen as motorization increases. Developing countries have a huge population of uneducated and unlicensed drivers, which contributes to their high accident rates. Rural migrants to cities are frequently untrained and unfamiliar with city driving practices and are disproportionately involved in traffic accidents. In addition, taxi and truck drivers have perverse economic incentives to practice unsafe driving habits, and there are few penalties for poor drivers and a lack of institutional capacity to enforce the regulations that do exist.

There is a dearth of good accident data for diagnostic purposes (i.e. what are the types and causes of accidents) because officials have disincentives to accurately report accidents in their jurisdictions. Policy-makers and researchers need to better understand why existing regulations are not being enforced in order to develop strategies to modify regulations and/or enforcement practices.

Most panelists agreed that researchers have a relatively good understanding of what needs to be done from a safety design standpoint and need to shift the research focus to problems of implementation and enforcement. More research, however, is necessary to better understand the impact of exclusive bicycle lanes and grade separation projects on door-to-door travel times for bicyclists. In many cases, travel times may increase and accessibility may decline by forcing bicyclists off of commercial streets and onto exclusive bikeways.

The panel agreed that developing countries are being pulled towards motorization by a variety of political, industrial, and economic forces. Western researchers, policy advisors, and advocates have generally been unsuccessful in convincing governments to adequately address and spend money on NMT needs. Research needs to identify what incentives Western cultures can offer to developing countries to control motorization and increase sustainability.

Western researchers need to develop a new partnership with Asia involving universities, officials, and especially stakeholders. Local officials and universities need to increase efforts to seek funding from private industries for research. Researchers should identify the key locations and areas where NMT has a competitive advantage over motorized transport and focus on making improvements there. For example, certain safety and access problems at many public transit stations in developing countries can be addressed with relatively minor design improvements.

The following lists identify the most important findings of the panel:

Three important things we know about NMT & mobility:

1. NMT modes have been marginalized by policy-makers and lending agencies, as most funding is funneled into promoting motorized modes to benefit a small privileged minority.
2. In the developing world, NMT modes are the norm and not the exception. They are the dominant form of mobility and will continue to play an important role in meeting mobility needs for the foreseeable future.
3. Current research on transportation in the developing world is not affecting decision-making and implementation. Much of the research to date has not involved stakeholders. In order for research to be more relevant and useful, it must be in collaboration with people in local places.

Three important things we know about NMT & safety:

1. Developing countries have a huge population of unlicensed drivers and cyclists who are uneducated in basic traffic safety principles. Many of these people are rural migrants to cities and are disproportionately involved in traffic accidents.
2. Interactions between mixed modes of traffic are responsible for the majority of traffic accident fatalities. This problem will continue to worsen as levels of motorization rise.
3. Taxi and truck drivers have perverse economic incentives to practice unsafe driving. Driving safety regulations and enforcement are often poor.

Research Ideas: Mobility

1. What are the costs/benefits of NMT? More research is needed to identify conditions that affect peoples' mobility choices and how a full accounting of costs and benefits of NMT could lead to better provision for NMT modes.
2. There is a lack of knowledge about how the processes of infrastructure and policy-decision-making actually takes place in developing countries. In the absence of a highly developed institutional capacity, what factors affect decisions?
3. Record and analyze good practices and success stories. Best practice should be defined through detailed case studies.

Research Ideas: Safety

1. Develop and implement safety-monitoring indicators.
2. Conduct audits to determine the effectiveness of safety improvements.
3. Assess the costs of fatalities and injuries. Develop new analytical methods and tools. Monetary costs do not accurately or equitably reflect the value of human lives in developing countries

Issues: Mobility and Safety

1. *Vision.* Urban transportation planning is rooted in a vision of the future. The established vision, in the form of traditional transportation plans, is not the vision of most people in developing countries; rather, it is a motorized vision that best serves the needs of an elite few. How can local decision and policy makers' vision be "de-motorized"? For a new vision to be useful, it must be developed internally, not be handed down or prescribed from the North. The international press can play a role, but information must first be gathered and made available. This is the role of researchers interested in promoting NMT.
2. *Barriers/Incentives.* There is a lack of understanding by researchers of the full range of forces acting simultaneously to promote motorized travel and to discourage NMT. Until these factors are better understood, attempts at counteracting these forces will not be fully effective.
3. *Informal Sector.* Any consideration of the dynamics at work in developing countries must take into account the strength and importance of the informal sector. Informal transportation services and networks play a key role in the mobility of large groups of people and present unique challenges in terms of research and data collection.
4. *Incremental Design Improvements.* Micro-level improvements hold the potential to increase safety and mobility of NMT substantially. Safety and access features for pedestrians and cyclists are often lacking and/or ignored in large capital projects. Large-scale urban transportation infrastructure projects must give proper attention to those design details that provide safe, easy access for non-motorized users.

Panel 4 — Economics, Financing, and Pricing

Co-moderators:
David Dowall, University of California, Berkeley
Zmarak Shalizi, The World Bank, Washington, D.C.

Recorders:
Mary Hill
Hiroki Matsuyama
Larissa Muller

This panel was charged with exploring the critical issues and potential research areas relating to the economics, financing, and pricing of transportation in developing countries. The panel discussions focused primarily on three critical issues before outlining several potential research areas and research designs.

Critical Issues:

Economic Consequences of Transportation System Performance

The panel briefly discussed the need to better understand both the explicit and implicit penalties of poor mobility, as well as the implicit and explicit benefits of improved mobility. However, other issues were explored more fully and are discussed below.

Economic Incentives to Promote Sustainability

Economic incentives were seen as one way to promote transportation sustainability. The panel was less inclined to immediately support efforts to slow the rate of motorization, but rather, it was more interested in constructing a pricing regime such that all users would pay the full social costs associated with their mode choice. In this way, the playing field would be leveled across all modes, perhaps encouraging shifts to non-motorized or less harmful modes of transportation.

Efficient pricing was also seen as a way to provide funding for operations and maintenance leading to a more sustainable transportation system. Robert Cervero noted that this was especially important considering that many developing countries face several critical needs in addition to transportation, such as health and education. Tying up budgets with large transportation investments may leave the governments incapable of attending to these other priorities.

Another way to enhance sustainability and increase revenue might be to engage in land development adjacent to transportation investments. Shunji Suzuki noted that in Japan, land development at station areas has provided a source of revenue for the transit operation and maintenance, as well as ensured increased ridership. Zmarak Shalizi, however, added that Japan is currently considering unbundling its land development and transit provision. Reasons for this proposed unbundling should be explored further.

Financing of Infrastructure

As noted above, the panel recognized a need to focus on the sustainability of transportation infrastructure investments, including emphasizing cost recovery such that operations and mainte-

nance can be financed as well as capital investments. Several participants noted that while the operation and maintenance of existing transportation facilities is often lacking in the developed world, this issue is even more critical in the developing world.

This discussion led to the necessity of introducing more private funding in developing countries, through privatization, concessioning, and leasing. The panel generally agreed that broad deregulation of transportation provision may not be the solution. Rather, interjecting competition, while leaving a role for the government, may be the more desirable approach to ensure efficiency without compromising service provision.

Research Areas:

Developing Performance Indicators

The issue of the need for reliable indicators of transportation performance arose throughout the panel discussion. The panel recognized the difficulty of developing these measures, especially in light of the poor quality of available data. One possible approach would be to access the World Bank's data from project files. These projects, however, are often completed quickly, and it is not clear how reliable and comparable the data would be. One potential model for developing transportation performance measures might be the World Bank and UNCHS' Housing Indicators Program, which has produced housing indicators on 35-40 cities around the world over the past five years.

Transportation Equity

The panel spent a significant portion of the time discussing the equity of the current transportation system, including the availability of services. The panel agreed that research into the equity impacts of alternative transportation pricing regimes — including higher gas taxes and higher tolls — would be useful.

The equity impacts of privatization schemes was also seen as a valuable research area. The panel recognized that privatization has certainly been shown in many cases to improve the efficiency of service provision as well as the cost recovery of investments. However, the effect of privatization on the access to transportation services for low income or under-served communities might be one area that merits further study.

Privatization

Related to the above, early research has shown that privatization can improve system efficiency and cost recovery, but a systematic and rigorous analysis of privatization projects may provide further insight. The current available evidence is limited and based on early research. New research efforts could gauge the effects of privatization projects over intermediate time periods to determine whether these projects are still meeting the intended service delivery goals.

Another issue that was raised in the panel and plenary session was how to determine the correct level of private intervention such that the benefits of competition are realized along with the advantages of public sector involvement, including safety and assurance of adequate service provision. Research could help specify the appropriate role of the private and public sectors and help identify the necessary institutions needed to balance the public and private interests.

Social Costs and Alternative Modes

As noted above, the panel felt that research on the social costs of alternative modes would better inform policy making. While the panel realized that cost-benefit analysis does not drive decision making, better data and participation can inform the debate and perhaps lead to a more systematic analysis. The panel discussion also stressed that the positive externalities must also be considered, despite the fact that this may prove difficult both theoretically and quantitatively. In the plenary session, Robert Cervero noted the difficulty of conducting full social cost accounting even in the developed world, where data are generally more available. He suggested that full cost-benefit analysis in developing countries would be an enormous task, and that research efforts might instead focus on cost effectiveness.

Historical Research

Although the panel did not explicitly discuss this topic, Zmarak Shalizi noted in the summarizing session the importance of performing historical research to look at prior attempts to solve transportation problems. These prior experiences may provide insight into the viability of potential solutions. Walter Hook responded that this research area would be useful, noting, for example, that rail systems used to be privately owned and operated prior to widespread public takeover. Mr. Hook stressed that the reasons for the failure of the private control should be fully understood before advocating a return to private control, in an effort to avoid repeating the mistakes of the past.

Possible Research Approaches:

In addition to specifying critical issues and research topics, the panel also debated two possible research approaches.

Problem-Focused Research

This more traditional approach would focus on specific research problems across several areas. For example, one could focus on privatization of bus transport or road sharing across modes in several cities. Another possibility would be to focus on how to best price transportation to account for both positive and negative externalities.

Systematic Approach

The systematic approach to research would inherently be more comprehensive. Cities would be the units of analysis to study the connections between transportation mobility, land development, and finance. For example, several rapidly urbanizing areas could be studied which would allow a more holistic research approach. Mr. Cervero voiced concern regarding this approach in the panel session, noting that the institutional and economic conditions in each city would be difficult to control for, making reasonable cross-city comparisons difficult. In the summarizing session, support for this approach was voiced by Ralph Gakenheimer, who thought this approach would help fill out composite data sets that could then be used in future research efforts.

Also, within these individual metropolitan areas, the panel discussed the possibility of conducting policy experiments — such as pricing, privatization or a specific approach to demand management — in conjunction with the local governments. These experiments would be carried

out within a specified area or corridor and the effects would be measured against areas of the metropolitan region not included in the experiment. It was recognized that the cooperation of the local universities would be extremely helpful in this effort.

Panel 5 — Social Equity and the Mobility Needs of Women

Co-moderators:
Amrita Daniere, University of Toronto
Deike Peters, Rutgers University

Recorders:
Isabelle Fauconnier
Todd Goldman

Introduction

Two trends are emerging in planning today. On the one hand, planning has become a profession in which planners act as regulators or facilitators of private action and engage in public-private partnerships, particularly in developing countries. On the other hand, a role has developed for planners as people who develop a vision, represent marginalized groups and facilitate their access to power and decision-making in public matters that affect them. The participants in the panel adopted both angles, with the understanding that planners have both a positive and a normative contribution to make in public affairs.

Summary of the Discussion

The panel concentrated on gender issues within the topic of social equity and the mobility needs of women for two reasons: first, roughly 70% of the 1.3 billion people living in poverty worldwide are women; second, a substantial overlap exists between gender equity needs and economic equity needs.

A major factor contributing to women's poverty in many parts of the developing world is their lack of access to household income. While traditions regarding female ownership of assets and access to disposable income may vary from place to place, a common occurrence is for a relatively large share of household income to be unavailable for household needs, including the needs of women and children. Another factor contributing to female poverty is the tendency for single-parent households to be headed by women.

The overlap between the mobility needs of women and those of the poor at large stems from the fact that many among the poor are either unemployed, underemployed, or informally employed, thereby having travel patterns that are more temporally and spatially diffuse than people who are regularly employed. This is also the case for women, as discussed below. The unemployed, regardless of gender, also are more likely to have household management responsibilities.

Travel characteristics of poor women

Women's social roles as income earners, home-makers, and community managers require them to make more trips than men. Their trips tend to be shorter in length, but more frequent and more dispersed during the day. In many parts of the world, they — along with the elderly and children — have responsibilities to supply the household with water, fuelwood, and food. Transporting these goods exacts a high toll on women's and children's health and available time that could be used for other activities such as education.

Integration of transportation and development

In other sectors — including health, education, agriculture, and others — there is a recognition that the challenges of development must be addressed comprehensively. Yet this lesson often seems to be lost in the transportation sector, where a technology and infrastructure orientation continues to predominate.

The transportation needs of the poor in developing countries are often inseparable from their broader socio-economic needs and cultural contexts. These contexts are as important as traditional demand variables in determining which approaches are most appropriate for a given situation. For example, in order to ease the headloading burdens of women in rural sub-Saharan Africa, we must understand local traditions for female ownership and access to family income as well as other complex issues outside the traditional domain of transportation analysis. In several cultures, it is unacceptable for women to drive or to ride bicycles, and planners need to understand how to incorporate this into transport planning decisions.

Early efforts to improve the plight of women in poor rural areas by improving roads and supplying wheelbarrows or other vehicles often failed because cultural and socio-economic issues were not considered. In some cases, bringing services closer to women instead of enhancing transport to access those services may be more appropriate. Bringing piped water to rural settlements, and improving other local services such as schools and health centers, can be part of a more comprehensive approach to transport problems faced by women and their families. Corresponding investment options must be evaluated in terms of long-term, sustainable benefits to local communities. More recently, attention has been shifting to "soft" solutions, such as the establishment of women's fuelwood collectives, and culturally sensitive efforts to explain to families the economic surplus they could realize from allowing women access to transportation technologies.

Culturally sensitive research

More data is needed about the travel behavior of the poor in developing countries, in both urban and rural contexts. Researchers must take great care to conduct this research in a way that is culturally appropriate, while striving to obtain a comprehensive picture of travel patterns, including trips by women and children. Depending on the context, travel diaries or better origin/destination studies may yield the data that is needed. Alternative approaches, such as ethnographic methods, may be useful in order to obtain more detailed and culturally complete information. Where illiteracy, privacy concerns, or other impediments do not prevent the use of comprehensive surveys, questionnaires should ensure that both women and men are well represented in the pool of respondents. In the past, large surveys using heads of households as respondents have tended to record primarily the views of men.

Practical vs. strategic needs

For the rural poor especially, little is understood about what types of intervention are appropriate in what situations. The fuelwood and outreach strategies mentioned above clearly have a broader agenda than simply meeting transportation needs: they are *strategic* efforts to bring about social change. There is a need for greater discussion about the circumstances under which this is appropriate. Part of the answer is clearly that it must happen through the initiative of local, rather than external, organizations.

The needs of the urban poor

Most of the research that has been conducted on the travel needs of the poor in developing countries has focused on the rural poor. Comparatively little is known about the urban poor living in squatter settlements within cities or at the urban fringe. Given the rapid urbanization underway throughout the developing world, this is a critical area for further research.

As with studies of the rural poor, solutions need to be developed comprehensively. They should focus on improving poor settlements' accessibility to jobs and resources, in part through the provision of transport services and/or vehicles, and in part through changing activity locations and times to better meet the needs of residents.

The effects of privatization on equity

Privatization — including various degrees of private sector participation, from service contracts to full divestiture — is ascendant in transportation policy around the world, as in other areas of infrastructure. The driving force behind this movement has been the search for better efficiency and cost-recovery in the delivery of transport services. However, little is known about the equity impacts of such policies in terms of access, affordability, and quality of service. As the cases of Great Britain and Chile illustrate, proper regulation of private operators is key in order to avoid sharp price increases, declining levels of service, and/or the lack of service in non-profitable areas. Much remains to be learned about which pricing and subsidy schemes will foster both efficiency and equity at the same time. Although there is some speculation that private institutional arrangements will allow markets that were largely ignored thus far – such as the market for transportation needs of women – to be better accommodated, little empirical data exists to support this theory, which merits further exploration.

What We Know

- Different social roles for women and men across societies make for different patterns of transport.
- Existing transport planning and systems are not adequately geared toward the needs of women.
- The poor, and women in particular, bear a disproportionate share of the time burden of transportation, representing a high opportunity cost vis-à-vis other more productive activities.
- Transportation solutions to address the equity problem need to be low-cost, relying on public transit and non-motorized transportation, including walking.

What We Do Not Know

- Travel patterns and needs of the urban poor.
- Ethnic differences in modal preferences
- Where the poor and women *cannot* go: How much access is constrained? What is the extent of latent demand?
- The impacts of privatization on social equity.
- The economic and health dimensions of women's transport responsibilities.

Areas for Further Research

- Extensive and detailed data is needed on travel patterns of the poor and of women across developing countries.

- In urban areas, it is believed that the incremental costs of providing transportation services to squatter settlements might be low because demand would be off-peak. Further research is needed to determine whether this is the case. If it is low-cost, and if these areas are indeed under-served, then more research is needed to understand the causes of this mismatch.

- Much more research is needed into the equity implications of different privatization schemes, including the short-term vs. long-term impacts on affordability, quality of service (age of fleets, etc.), and accessibility for women and the poor. Research is also needed into incentive structures (e.g., performance criteria in contracts with private operators) that can be used to promote equity objectives within competitively provided services.

- Are women's transit needs not being met because of gender blinders or because it is not profitable? Does it make economic sense? Some growing industries are providing jobs to women (e.g., the apparel industry in South East Asia); are transit services keeping pace?

Panel 6 — Institutions, Regulations, Processes, and Partnerships

Co-moderators:
Randall Crane, University of California, Irvine
James Wang, University of Hong Kong

Recorders:
Alix Bockelman
Bambang Susantono

Critical Issues

- The relationship between land use planning and transportation planning;
- The appropriate balance between centralized decision-making and the participation of stakeholder groups;
- The proper role of government and the private sector.

What We Know

Defining Transport Planning

The panel session commenced with a brief summary by Harry Dimitriou about the historical periods that have defined transportation planning. The discussion continued with an assessment of the current battles over the definition of transportation planning. Different groups — environmentalists, politicians, economists, and others — struggle over how transportation planning should be conducted. Furthermore, some uncertainty exists over the proper coordination between land use and transportation planning decisions. The role of government and the private sector is also being debated in contemporary transportation planning circles. The importance of the client relationship in defining transportation planning was also recognized.

Capacity Building

The panel discussed the difficulty of reaching consensus in transport planning and the challenge of creating a knowledge base on different critical issues. Several individuals stressed the importance of involving all stakeholders in decision-making before attempting to coordinate the entities. The reverse might result in less participation by parties involved. Bombay was provided as an example of where conflicts between the state and municipal level of government exist. The World Bank has refused to fund rail projects in Bombay until there is some coordination among these jurisdictions.

The politics of transport planning was briefly discussed. One participant thought that the politics threatened to reduce planners' credibility. Another participant stressed the importance of understanding and being involved in politics for effective planning. Three factors need to be understood to improve interaction between planning and politics: What do people want? What do people need? How much are entities willing to pay?

The discussion shifted to the importance of affordability rather than demand for transport planning in developing countries. Funding mechanisms, such as taxation or financial involvement of the private sector, are critical.

Privatization

The role of the private sector is complicated in the developing world because governments may not have experience with regulation or the necessary enforcement power. Again, the role of the public and private sector was discussed. One participant said that the private sector is better positioned to provide services, provided the government has the capacity to regulate. The government should remain prominent in planning and regulation by selecting the operator, monitoring the operator, and regulating the operator.

Promising Research Topics

Three main focus areas were identified for research topics: planning, governance, and institutional capacity building.

Planning

- Determine how measurements of accessibility among various modes can be improved. The specific example given during the panel session was how a government might monitor changes in accessibility to determine if the provision of public transit improves or hampers accessibility.
- Perform systematic evaluations of project impacts with respect to the original project objectives. These project evaluations will provide insights that could then be transferable to other countries (in some cases) to improve transportation planning efforts.
- Determine how to improve transportation planning's 'knowledge information management' system. The existing institutional knowledge and research reports are not readily accessible by individuals in the field.

Governance

- Evaluate the past decade of privatization for examples of success.
- Determine specific outcome parameters to be analyzed, such as reduced subsidies and full cost recovery, for each project.
- Compare these outcome parameters, making note of each project's degree of public and private participation and political and economic factors.

Institutional Capacity Building

- Research in this area should be concerned with overcoming institutional barriers to transportation planning.
- Identify best practices and areas where projects have been successful despite minimal coordination. These lessons could be especially important in areas where bureaucratic challenges and economic crisis threaten transportation planning progress.
- Explore appropriate educational programs for transport and land use planning stakeholders.
- Evaluate private sector successes for applicability to the public sector.

Section 5

Concluding Remarks

5.1 Concluding Thoughts Concerning Transportation in Developing Countries

Mel Webber, Professor Emeritus and former director of the UC Transportation Center, University of California, Berkeley

Much discussion concerns the negative externalities of transportation, but very little is concerned with the positive externalities of transportation. Transportation, however, has held a powerful influence on the shaping of human history. This is not always a popular idea, but perhaps developing countries need *more* transportation capacity. Through the course of history, transportation has moved people and materials around the world. Transportation is the medium of interaction, intercourse, and manufacture.

The merger of new transportation capabilities enables economic globalization and development. Singapore took advantage of its strategic location, and careful planning transformed it from a small pre-industrial society to a thriving post-industrial economy in only a matter of decades.

We need more transport, not less. We need more roads, not less; more ships, not less; more public transit, not less. Again, we should expand transportation capacity in developing countries.

We need to think about transportation in a more comprehensive way, as part of a larger development strategy. Transportation enhances productivity, and we need a bigger pie, rather than just relying on a redistribution of wealth. Rather than simply a Center for Transportation in Developing Countries, perhaps it should be a more encompassing Center for Development Studies. We need big-scale studies, not small-scale studies.

5.2 Where We Go From Here?

Robert Cervero, Professor and Conference Co-Organizer,
University of California at Berkeley

We started out the conference by noting that we would depart from traditional paper presentations, relying on directed group discussions and dialogue instead. Not ever having attended a gathering that was structured quite like this, I wasn't really sure what was in store. As with all experiments, I was prepared for both successes and flops. From what has transpired over the past day and a half, I would conclude that, all and all, it was a successful experiment, worthy of replication hopefully in the not too distant future.

The trade-off in designing break-out panels around six topical areas is that knowledge is treated as if it is highly compartmentalized and segmented. Obviously many of the topics and issues discussed are cross-cutting and closely inter-related. For instance, initiatives to promote non-motorized transportation (Panel 3) or road pricing (Panel 4) have important implications for air quality (Panel 1) and social equity (Panel 6). There are even dangers — we should remind ourselves — in separating transportation from other sectors. Pouring more money into metros or road improvements can mean fewer funds available for other acute and pressing social needs, like improved education and health care. Ultimately, these are difficult resource allocation questions that must be confronted in a systems context. I appreciated hearing Mel Webber's departing advice that we should approach transportation as just one component, albeit a potentially important one, of a much larger agenda dealing with overall social, economic, and institutional development in lagging regions of the world.

For me, one of the most important and often recurring themes that emerged out of the last day and a half of discussions dealt with equity considerations. Many participants reminded us that by promoting traditional road-based transportation solutions, we are effectively directing 90 percent of resources to serve just 10 percent of the population. There are likewise worrisome disparities in transportation resource allocations within metropolitan areas and developing countries themselves. Metros that link affluent in-city residents to jobs in the core do little to enhance the mobility of squatters and the very poor living on the periphery of urbanized areas. And, of course, there are glaring disparities between countries, particularly among those in the South versus the North. The United States constitutes less than 5 percent of the world's population, yet consumes about one-quarter of finite fossil fuels in the transportation sector and is responsible for a comparable share of greenhouse gas emissions. Is it fair to curb motorization in the developing world when we in the first world are so prodigious and disproportionate in our own consumption habits? Part of the solution to transportation and environmental problems in poorer countries inescapably lies in dealing with the embedded inefficiencies and inequities — with perhaps grossly underpriced automobility leading the list — found in so many advanced societies. We can no longer ignore the serious global implications of disproportionate levels of consumption that characterize many parts of the world.

I was also encouraged to hear the many discussions during break-out sessions about issues like institution-building and research methodologies. Many participants emphasized the value of carefully designed comparative case studies. Case comparisons were viewed as particularly important in understanding how different institutional arrangements might improve the quality of

decision-making. Many of you also stressed the importance of good research designs that allow the effects of policy changes to be better understood — for example, how a new integrated fare regime might boost transit ridership or how reassigning street space to cyclists might affect accident rates? Designing hypo-deductive studies that illuminate the impacts of policy shifts invariably requires better data and the introduction of statistical controls. However, just as important is designing research programs so that results can be easily and acceptably generalized. Here, better approaches to sampling and case inferences are needed.

We have made valuable progress over the past day and a half in identifying potentially fruitful areas of research; however, this endeavor will only have proven its worth if meaningful and influential research gets carried out as a result. Our strength lies in our numbers and diversity. I would suggest that we consider forming a consortium of like-minded institutions and organizations to pursue research on transportation in developing countries in tandem. I'm sure I speak for many others in saying that we here at the University of California would welcome an opportunity to conduct collaborative research on transportation in developing countries, particularly with our visitors from abroad. Hopefully, some common areas of interest have been defined, so we can build future research programs around. Let me close by inviting others — whether from the University of California or elsewhere — to consider sponsoring a follow-up conference in a few years that brings many of us together again to report on research results which hopefully evolved from our gathering of the past day and a half.