CASE STUDY OF SUSTAINABLE TRANSPORT FOR EAST ASIAN MEGACITIES (STREAM) - URBAN TRANSPORT IN TAIPEI

Cheng-Min FENG
Professor
Institute of Traffic and Transportation
National Chiao Tung University
4F, No. 114 Chung Hsiao W. Road, Sec. 1, Taipei, Taiwan 10012
Fax: +886-2-2349-4953
E-mail: cmfeng@mail.nctu.edu.tw

Yi John SUN
Chairman
THI Consultants Inc.
5F, No. 130, Sungshan Road, Taipei, Taiwan 11000
Fax: +886-2-2748-8822
E-mail: jsun@ms1.thi.com.tw

Shiaw-shyan LUO
Associate Professor
Department of Transportation Management
Tamkang University
151 Ying-Chuan Road, Tamsui, Taipei, Taiwan 25137
Fax: +886-2-2622-1135
E-mail: aluo@mail.tku.edu.tw

Abstract: This paper presents the preliminary findings of the STREAM case study on Taipei. The focus is on urban features, transport policies, and lessons learned in Taipei, which could be relevant references for other cities. Both quantitative data and qualitative reviews are presented to backup the points of the paper. The urban context and urban transport structure of Taipei City as well as the metropolitan area are first presented. The urban transport strategies and measures adopted in recent years are presented next. Urban transport policy issues and lessons learned are also discussed. Lastly, as a conclusion, key success factors for urban transport summarized from the experiences and lessons learned in Taipei are highlighted.

Key Words: Urban transport, Transport policy, Taipei

1. INTRODUCTION

Sustainable Transport For East Asian Megacities (STREAM) is an international comparative study being conducted by an International Research Group (IRG) endorsed by the Eastern Asia Society for Transportation Studies (EASTS). Taipei is one of the megacity cases studied in STREAM.

The case study process begins with establishing a comparative database on urban characteristics associated with urban transport. Subsequently, for each case study city, its urban context, urban transport structure, urban transport strategies and measures are summarized and analyzed over time. The focus then is placed on a review of urban transport policy issues and lessons. Finally, the aim is to make policy recommendations for sustainable urban transport focusing on three levels of policy making - vision, strategy, and implementation.

The study takes a policy-oriented approach and is concerned with infrastructural, institutional, as well as financial issues pertinent to urban sustainability. The case studies are so designed as
to extract policy relevant insights as well as provide quantitative and qualitative information on empirical patterns of urban transport problems and policy responses.

2. URBAN CONTEXT

Taipei City being the political, financial, and cultural center of Taiwan is situated in the northern part of the island. It is in a basin surrounded by mountains on all sides and cut by 5 rivers. These mountains and rivers form barriers for development and transport.

The Taipei metropolitan area encompasses both Taipei City and Taipei County, which are under separate jurisdiction. There is no official governmental organization at the metropolitan level. Taipei City alone covers an area of 272 square kilometers with a population of 2.62 million at the end of 2005, making it one of the most crowded cities in the world with 9630 persons per square kilometer. Taipei County encircles Taipei City and has a total area of 2,052 km² accommodating a population of 3.73 million. Therefore, the metropolitan’s total area is 2324 km² and total population is 6.35 million. Although the City’s population has been on a slight decline, the metropolitan’s population is still growing steadily.

Employment proportions in the City across the three sectors, primary, secondary, and tertiary, are 0.2%, 19.3%, and 80.5%, respectively at the end of 2005. As for the metropolitan area, the proportions are 0.5%, 30.3% and 69.2%, respectively. Average annual household income in 2005 is US$49,700 in the City and US$42,600 in the metropolitan.

The urban structure is evolving into a tri-center metropolitan, with an old commercial and administration center in the western part of the City, a new sub-center in the eastern part of the City, and another new sub-center in the County. The typical land use pattern in Taipei is mixed use with residential and various commercial uses co-existing in the same building or adjoining sites. In recent years, a major high-tech business corridor is taking shape in Taipei City, causing a significant shift in employment and population toward the eastern districts.

Also worth noting is the sharp rise in recreational activities in recent years, especially in the Taipei metropolitan area where the number of annual visitors to local scenic spots have increased from 24 million in the year 2000 to 46 million in the year 2005. This represents a 92% increase in 5 years.

3. URBAN TRANSPORT STRUCTURE

The planning, administration, and supervision of urban transport is under the auspices of Taipei City Government’s Department of Transportation and Taipei County Government’s Transportation Bureau. However, in Taipei City there is also a Department of Rapid Transit Systems (DORTS) which has been responsible for the planning, design, and construction of rapid transit systems within the metropolitan area.

The level of motorization is exceptionally high in the City as well as the metropolitan area. In Taipei City at the end of 2005, there are 0.7 million registered autos and 1.0 million registered motorcycles which represent ownership rates of 249 autos and 394 motorcycles per 1000 persons. These imply a combined motorized vehicle ownership rate of 643 vehicles per 1000 persons. In the metropolitan, there are 1.4 million autos and 3.1 million motorcycles which
represent ownership rates of 225 autos and 483 motorcycles per 1000 persons. These add up to a combined motorized vehicle ownership rate of 708 vehicles per 1000 persons, one of the highest in the world.

The roadway system in Taipei includes two national freeways, which also function as urban freeways, and a network of urban expressways. The local artery system provides adequate service even during daily peak periods.

3.1 Road-Based Public Transport System
Road-based public transport system in Taipei includes an extensive bus network and a massive taxi fleet. Bus service is provided jointly by 16 local private bus companies with a combined fleet size of 4100 buses. There is a Bus Joint-Operation Management Committee, formed by the private operators, responsible for coordination and decision making associated with joint-operation of buses in the Taipei metropolitan area. Local buses serve 1.7 million passengers daily at the end of 2005.

Within Taipei City there is a network of bus exclusive lanes located along 11 major arteries with a total length of 60 kilometers. This BRT system significantly improved the overall performance of the local bus service.

The bus fare system is under a triple-zonal structure with a zonal fare of NT$15. Discounted zonal fare for students is NT$12 and for the elderly, handicapped and young children is NT$8. Bus fares are collected on board through a dual system of cash deposit or contactless IC card.

Taxi is the primary provider of paratransit service in Taipei. There are 62,000 taxis registered in the metropolitan area, which can be hailed on the street. The over supply situation is resulting in a deadhead rate of 70% measured in time of operation. In response, a large number of taxi drivers have joined radio-dispatched or satellite-dispatched fleet operations.

The taxi fare structure includes an initial base charge of NT$70, a distance charge of NT$5 every 300 meters, plus a time delay charge of NT$5 every 2 minutes for travel under 5 kilometers per hour.

3.2 Rail-Based Public Transport System
The Taipei rapid transit systems operated by the Taipei Rapid Transit Corporation (TRTC) presently includes a network of 4 mass rapid transit (MRT) lines and 1 medium capacity transit (MCT) line with a total operating length of 76.6 km. The MRT lines use heavy metro vehicles and the MCT line use rubber-tire automated guideway transit (AGT) vehicles. TRTC serves 1.07 million passengers per day at the end of 2005.

High quality and reliable service provided by TRTC has not only turned itself into the pride of Taipei citizens but has also won world recognition by becoming the rapid transit system with the highest reliability among all Nova and CoMET members.

The TRTC fare structure is distance-based, NT$20+[(D-5)/d]*5, where D is total station-to-station distance traveled in kilometers and d is a distance-based parameter which increases with increasing D. Passenger can either purchase a single trip ticket or use stored-value contactless IC card.

Regional rail service also exists in Taipei. This conventional rail service is provided by the
Taiwan Railway Administration (TRA) trunk line running through the metropolitan area. There are 4 TRA stations within the City and a total of 12 TRA stations in the metropolitan. TRA service includes long-distance regional rail service as well as short-distance commuter rail service.

3.3 Non-Motorized Transport System
Pedestrians in Taipei have the option of using the sidewalk system or the arcade system at ground level of buildings along many primary or secondary roads. However, sidewalks are narrow or even non-existent in many neighborhood areas. In recent years, sidewalks and arcades have been progressively renovated and barriers along them such as parked motorcycles have been gradually removed.

Pedestrian countdown traffic signals at intersections have been widely installed to inform pedestrians of the time remaining to cross the roadway. Pedestrian-only traffic signal phasing has been applied at major junctions where high volumes of pedestrian flow justifies.

Use of bicycles in Taipei is gradually gaining momentum again after a long decline. Both the City and County have been adding bikeways in or around parks and recreational facilities. A 250-km recreational bikeway system has been completed in the metropolitan area plus a 10-km bike lane system in the new city center district. Bicycle parking space at TRTS stations have been added and bicycles are now allowed on TRTS trains under certain provisions.

3.4 Modal Competition and Integration
Modal split percentages in Taipei City among the five primary motorized modes, motorcycle, car, bus, rail, and taxi, are 27%, 23%, 26%, 16%, and 8%, respectively. The respective modal shares are 31%, 29%, 20%, 12%, and 8% in the metropolitan area. Modal share of rail, which includes TRTC and TRA services, is on the rise with the completion of more TRTC lines and the addition of more TRA commuter trains.

Integration between bus and rail has been receiving particular attention. TRTS supports feeder service to its stations by providing financial subsidy for 46 feeder bus lines operated by the local bus companies. Bus arrival information system has been deployed at TRTS stations where feeder bus service exists.

There is a transfer discount for public transport passengers transferring either from bus to TRTC or from TRTC to bus. Each way a 50% fare discount is provided to the transferring passenger within a one-hour time limit. Approximately one-third of TRTC passengers is benefited by this transfer discount. Taipei’s unified contactless IC card, named EasyCard, is used for both city bus and TRTC as well as for parking.

4. URBAN TRANSPORT STRATEGIES AND MEASURES
The overall urban transport improvement targets for Taipei City during 1998–2006 were:

- “0”; motorized vehicle ownership growth rate ≤ 0%
- “30”; average speed on major arterials ≥ 30 kph
- “60”; public transport market share ≥ 60%
- “90”; annual traffic accident deaths ≤ 90
To achieve these targets and alleviate urban transport impacts, in particular air pollution, traffic safety, road congestion, transit degradation and financial demand, an array of strategies and measures have been adopted and implemented in Taipei. A selected number of key strategies and measures adopted in recent years are discussed in the following along with their known or expected effects.

4.1 Reduction in Air Pollution
More stringent vehicle emissions control measures have been adopted at the national level and enforced at the local level. Private automobiles over 5 years old are required to undertake a smog check once every year and those over 10 years old are required to be checked twice a year. Motorcycles over 3 years old are required to undertake a smog check once every year.

New national standards on vehicle emissions have been implemented in year 2004, lowering the allowed emissions levels. This forced the phasing out of 2-stroke motorcycles which have relatively high emissions.

Taipei City has promoted the conversion of taxis from using gasoline to LPG. There are around 6,000 LPG taxis in Taipei which were converted with government subsidy and there are 7 refueling stations.

4.2 Improvement in Traffic Safety
The regulation on mandatory helmet for motorcycle drivers and passengers came into effect across Taiwan in June 1997. However, motorcyclists in Taipei have had the highest compliance rate due to strong and effective enforcement. The number of traffic accident death involving motorcyclists declined significantly as a result.

Drunk-and-driving regulation has been modified to heighten awareness and institute more severe penalties. Moreover, night time on-street inspection of passing drivers by Taipei police has proved to be quite effective in reducing drunk-and-driving. The number of traffic accident death as well as the total number of traffic accidents associated with drunk-and-driving declined significantly as a result.

Speed monitoring installations have been deployed at a total of 335 intersections or mid-block sections in Taipei. Speeding citations are issued to those driving over the speed limit. These speed control devices appear to be effective in reducing travel speed and improving traffic safety at hazardous locations.

The total number of traffic accident fatalities in Taipei City has dropped from 124 deaths in the year 2000 to 84 deaths in 2005, achieving the target set by the city government.

4.3 Reduction in Road Congestion
To mitigate roadway traffic congestion, rather than widening roads Taipei has adopted strategies to improve traffic management and promote the usage of public transport. Measures have been initiated to reduce the number of motorized vehicle trips and increase transport capacity through better management of road resources.

A traffic orderliness improvement program had been implemented to change the aggressive behaviour of road users such that right-of-way rules are followed. This is carried out with extensive promotional campaigns to enhance public awareness and enforcement actions to ensure compliance of right-of-way priority regulations. In addition, curb parking has been
cutback especially along arterials to reduce roadside interference. By reducing conflicts and interferences along urban streets, road capacity is restored and travel delays are reduced.

The majority of public on-street parking spaces are brought under parking management control such as charging an hourly parking fee. Pilot programs have been implemented to charge for and improve orderliness of motorcycle on-street parking. Fees for both on-street and off-street parking are increasing to curb demand and increase turnover rate.

As a result of these and other accompanying measures, average travel speed on the urban network in Taipei has not only stopped declining but shown notable overall improvement. The average travel speed on major arterials had increased from 19.2 kph in 1995 to 28.2 kph in 2003, not far from the set target of 30 kph.

Growth in the number of registered automobiles in Taipei was still growing at 2.4% per annum from 2004 to 2005. However, motorcycle registration growth rate had been lowered to 1.2% from 2004 to 2005.

4.4 Prioritization of Public Transport

To increase competitiveness of public transport, it is necessary to give right-of-way priority to public transit vehicles. TRTC rapid transit lines all have exclusive right-of-way. Buses in bus exclusive lanes also have priority, except at signalized intersections. This bus priority strategy has gained approval by over 70% of the general public in Taipei City.

Public transit fare has been deliberately kept low by the City government. Local bus fare level has remained unchanged during the last 8 years. TRTC passengers receive 20% discount when using the EasyCard for paying the fare. The EasyCard is voted by local citizens to be the most recognized achievement in Taipei City in 2005.

Five new urban rail transit lines are under construction, one existing line is being extended, and construction will soon begin on at least one more planned line within the Taipei metropolitan area (see Figure 1). Total length of the TRTC network will increase to 154.4 km by the year 2011. Additional future rail transit expansions are planned and when fully completed by 2016 the overall TRTC network will have 281.6 km. Additional bus exclusive lanes are also planned in Taipei.

![Figure 1 Urban rail transit network in Taipei](image)
In Taipei City, modal share of public transport including bus and rail has increased from a low of 31% in 1995 to 42% in 2005. Although this is still well below the target of 60% market share, marked improvement has occurred in the past 10 years as shown in Figure 2.

![Figure 2 Average daily passengers carried by public transport](image)

**4.5 Alternative Sources of Financing**

Urban transport improvement projects often have a high price tag and the operation and management of completed systems can also become a financial burden to local governments. Therefore it is crucial for government agencies to develop alternative means to finance transport projects and systems.

In Taipei, revenue generated from parking fees and parking violation fines is a major source for supporting transport improvement. A local Parking Management Fund has been set up for managing parking revenue which can be allocated for public transport purposes.

Initiatives based on public-private partnership (PPP) models have proved to be feasible in Taipei. Intermodal passenger terminal BOT projects, joint public-private investment in the Smart Card Corporation, and the joint development of TRTC stations are all successful examples of PPP in Taipei.

**5. URBAN TRANSPORT POLICY ISSUES AND LESSONS**

The key issues and lessons learned in Taipei on urban transport policy are presented in the following. A review of urban transport policies in terms of their impact, timing, direction, current issues and barriers is summarized in Tables 1 and 2. Impact of each policy listed is noted as generally positive or negative. Timing of adoption is noted as too early, too late or about right for each policy listed.

**5.1 Lessons of Taipei Rapid Transit**
The key issues of Taipei rapid transit are summarized as follows:

- Late coming (initial operation in 1996).
- Six lines simultaneously constructed.
- Two systems (MRT + AGT) with various station designs.

The key lessons learned are summarized as follows:

- Lesson 1: Do it early.
- Lesson 2: Don’t be so ambitious.
- Lesson 3: Special design for some stations justified.

5.2 Lessons of Exclusive Bus Lane

The key issues of exclusive bus lane are summarized as follows:

- Counter-flow, curb lane, or central lane.
- No physical barrier, no closed shelter.
- No pre-board ticketing.

The key lessons learned are summarized as follows:

- Lesson 1: Central lane is better.
- Lesson 2: No physical barrier is more flexible.
- Lesson 3: E-ticketing is not bad.

5.3 Lessons of Transit System Selection

The key issues of exclusive bus lane are summarized as follows:

- MRT vs. LRT vs. BRT.
- Weighing demand against budget.

The key lessons learned on transit system selection are summarized as follows:

- Lesson 1: Large City (> 1 million): MRT first, then LRT, BRT, bus-only lane.
- Lesson 2: Medium City: BRT, LRT first, then MRT.
Table 1 Review of urban transport policies – impact and timing

<table>
<thead>
<tr>
<th>Domains</th>
<th>1. Past Policies and Measures (year)</th>
<th>2. Impact (Positive or Negative)</th>
<th>3. Timing (Early, Right, Late)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. National level policies</td>
<td>A.1 Two New Town Developments, Airport-Link Transit Projects</td>
<td>A.2 Positive</td>
<td>A.3 Right</td>
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<tr>
<td>- Regional development</td>
<td></td>
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<tr>
<td>- Transport related taxes</td>
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<tr>
<td>- Population settlement</td>
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<td>B. Urban development</td>
<td>B.1 Two CBD Structure, Land Development Permit System, Subsidized Public Housing</td>
<td>B.2 Positive</td>
<td>B.3 Right</td>
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<td>- Urban structure (monocentric vs polycentric)</td>
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<td>- Land-use planning and control (zoning, FAR etc)</td>
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<td>- Housing development</td>
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<td>- Infrastructure and Services</td>
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<td>- Urban roads, motorization, parking</td>
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<td>- Bus and paratransit</td>
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<td>- Modal competition and coordination (fare, routes, transfer facilities)</td>
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<tr>
<td>- Transport Demand Management (TDM)</td>
<td></td>
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<tr>
<td>D. Institution, regulation and financing</td>
<td>D.1 Taipei Department of Transport (1987), Privatization of Public-owned Bus Company (2004), Discount Fare for MRT-Bus Transfer (1999), OT of Parking Spaces</td>
<td>D.2 Positive</td>
<td>D.3 Late</td>
</tr>
<tr>
<td>- Urban transport related institutions</td>
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<tr>
<td>- Regulation/deregulation, privatization</td>
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<tr>
<td>- Vehicle and fuel tax, pricing, and subsidies</td>
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<td>- Value capture, BOT, Bonds etc</td>
<td></td>
<td></td>
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<tr>
<td>E. Mitigating the transport impacts</td>
<td>E.1 Increase of Penalty for Drunk Driving</td>
<td>E.2 Positive</td>
<td>E.3 Late</td>
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<tr>
<td>- Air/noise Pollution control</td>
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<td>- Safety enhancement</td>
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Table 2 Review of urban transport policies – current issues and barriers

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<td>A. National level policies</td>
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<tr>
<td>- Regional development</td>
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<td></td>
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<tr>
<td>- Transport related taxes</td>
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<td>Central Government Support</td>
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<tr>
<td>- Population settlement</td>
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<td>B. Urban development</td>
<td>B.4</td>
<td></td>
<td>B.6</td>
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<tr>
<td>- Urban structure (monocentric vs polycentric)</td>
<td></td>
<td>B.5</td>
<td>Institutional Arrangement of Metropolitan Planning Authority</td>
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<tr>
<td>- Land-use planning and control (zoning, FAR etc)</td>
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<td>- Housing development</td>
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<tr>
<td>C. Urban transportation system</td>
<td>C.4</td>
<td></td>
<td>C.6</td>
</tr>
<tr>
<td>- Infrastructure and Services</td>
<td></td>
<td>C.5</td>
<td>Political Concern</td>
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<tr>
<td>• Urban roads, motorization, parking</td>
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<td>- Urban transport related institutions</td>
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<td>D.5</td>
<td>Shortage of Financial Incentive</td>
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<td>- Regulation/deregulation, privatization</td>
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<td>- Air/noise Pollution control</td>
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<td>Acceptance of City Councilor</td>
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<td>- Safety enhancement</td>
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5.4 Lessons of Transit Ticketing System
The key issues of transit ticketing system are summarized as follows:
- Coin, stored value card, or countless smart card technology.
- Bus only, Bus + MRT, or Bus + MRT + Public Parking application.

The key lessons learned are summarized as follows:
- Lesson 1: Location of adding value for EasyCard is important: convenient stores.
Lesson 2: Ticketing integration for multiple modes needs a ticketing company.

5.5 Lessons of ITS
The key issues of ITS are summarized as follows:
- ATPS applicability to Dynamic and Real Time Bus Information.
- ATIS applicability to Parking Guidance Information System.
- Prerequisite for E-Travel information system.

The key lessons learned are summarized as follows:
- Lesson 1: ATPS for bus-only lane.
- Lesson 2: Location of parking guidance is critical (regional area to local area to parking site).
- Lesson 3: E-travel needs a wireless infrastructure.

5.6 Lessons of Privatization
The key issues of privatization are summarized as follows:
- Public bus company or private bus company.
- Public infrastructure or BOT.

The key lessons learned are summarized as follows:
- Lesson 1: Labor union support is critical.
- Lesson 2: BOT for MRT is not easy.

5.7 Lessons of MRT Operation
The key issues of MRT operation are summarized as follows:
- Operating Revenue < Operating Cost or Operating Revenue > Operating Cost.

The key lessons learned are summarized as follows:
- Lesson 1: Networking effect is the most critical factor.
- Lesson 2: Infrastructure cost paid by government (Public Goods).
- Lesson 3: Joint development is helpful.
- Lesson 4: Transfer fare discount (50%) between MRT and bus also has contribution.

5.8 Lessons of Land Use and Transport Integration
The key issues of land use and transport integration are summarized as follows:
- Tanhai New Town Development not yet successful.
- Joint development not equal to TOD.

The key lessons learned are summarized as follows:
- Lesson 1: Rail link is important to new town.
- Lesson 2: Three D’s are critical for TOD: Density, Diversity, Design.
- Lesson 3: Station-oriented industries have to be introduced.

5.9 Lessons of Sustainable Transport
The key issues of sustainable transport are summarized as follows:
- Task Force in Taipei DOT or not.
- Budget follows sustainable transport plans or not.
- Role of motorcycles in urban transport.

The key lessons learned are summarized as follows:
- Lesson 1: We need Mayor’s strong commitment.
- Lesson 2: Institutional and financial supports are backbone.
- Lesson 3: Motorcycles do not fade away with rise in income.
6. KEY SUCCESS FACTORS

Based on this review of past and current urban transport policies, strategies and measures applied in Taipei, a few key success factors for achieving a shift towards the more sustainable path can be identified. These factors are believed to be vital to turning cities from a motor-vehicle-dependent path to a transit-oriented development path. The key success factors are:

- Sustained leadership support is a must-have.
- Comprehensive planning performed professionally and followed respectfully.
- Sensible public relations with long lead time and media support.
- Determination demonstrated with patience by local transport officials.
- Right-of-way priority for public transport.
- Shifting focus from motor vehicle mobility to passenger travel reliability.
- Shifting focus from road accessibility to public transport connectibility.
- Triple synergy among traffic management (push), transit improvement (pull) and transit-oriented land development (hold).

Urban transport connectivity and reliability are improved in Taipei through the operation of a dual-system rapid transit network with rail transit & BRT, plus an extensive feeder system with feeder buses and taxis. In addition to network integration, other aspects such as ticketing, fare structure, advance traveler information, terminal design are all necessary elements being integrated across public transport modes.

Taipei has adopted the vision of creating a human-oriented transport system for more than 10 years. Although noteworthy actions have been taken, it is clear that more needs to be done. A comprehensive bus reform is much needed to address issues such as over-crowding in bus exclusive lanes, overlapping of bus lines, feeder service coverage deficiency, imbalanced fare subsidy, etc. On traffic management, more needs to be done on charging motorcycles for on-street parking. On transit-orient land development, more can be done in coordination with rail transit projects as well as urban renewal projects.

REFERENCES

