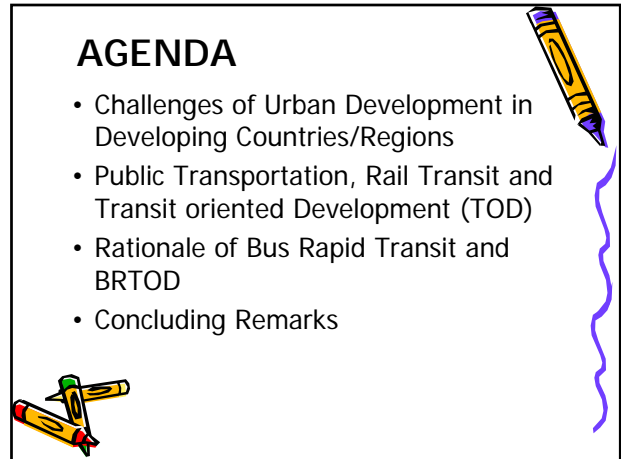


Myth of Urban Rail Rapid Transit System in Transition Economies

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AGENDA

- Challenges of Urban Development in Developing Countries/Regions
- Public Transportation, Rail Transit and Transit oriented Development (TOD)
- Rationale of Bus Rapid Transit and BRTOD
- Concluding Remarks



Issues in Urban Development and Transportation Systems

- Congestion 擁擠
- Air Pollution 空氣污染
- Noise 噪音
- Energy 能源消耗
- Safety/Security 安全
- Health 公共健康




Further Challenges 更大挑戰

- During next two decades, the world's population will increase by 2 billions, and 95% of them will be living in developing and undeveloped regions. 人口增長
- Urbanization will bring millions of people into cities and how to meet their mobility demands is a challenge. 城市化
- Needs for Mobility and Motorization. 行動力、機動化需求

Transportation Solutions?

Highway-oriented Development??
 Car-oriented Development?? **NO!!**
 小汽車/公路為導向之發展政策?? **絕對不可行!!**



Highway-oriented Development?? Car-oriented Development?? 小汽車/公路為導向之發展政策??

這是後果
Obviously NO !!!

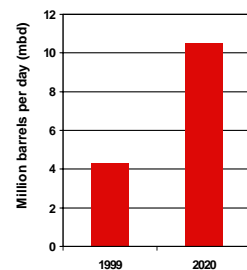


Growing Oil Dependence and Energy Security

• By 2020, China will import 80% of its oil demand



Oil Use in China



Source: IEA

Growing Car Culture??

Travel behavior is influenced by car culture...
There is no show girl/boy for public transport! Why?

-小汽車文化影響旅遊行為?
-為什麼沒有公共運輸帥哥美女??

cn.autos.yahoo.com

Another form of Equity?
and Harmony?
另一種「公平」? 「和諧」?

No more license,
PLEASE!!
不要再發牌照了!!

享受您的新車!

Use of automobiles is OK for Recreation and in Off-peak Period 合理使用小汽車是可以接受

In Tokyo, 72% trips are Public Transport during peak hours compared with an average of 41% PT.

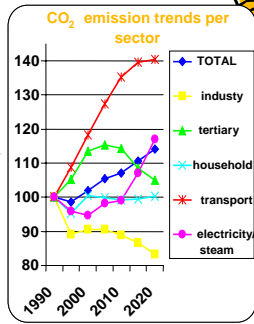
Effects of Pollution on Public Health 空氣污染對健康/生產力的影響

178,000 Premature deaths 早夭	
6,779,000 Hospitalized & ER 急診數量	→ 2.5% of GDP \$840 mi/yr
4,537,000 Outpatient 活動受限天數	
346,000 Labor day loss/呼吸系統疾病住院病例	
76,869,000 Respiratory illness and Asthma attack 哮喘發作何支氣管炎	

Source: Harvard/Energy Foundation

CO₂ Trends in EU 交通部門對環境的影響

- CO₂ Emissions from Transportation are expected to rise fast.
- "If present trends continue, transportation will be the main factor in our failing to fulfil our Kyoto commitment of -8% by 2010." 歐盟分析，再不落實具體政策，交通運輸活動持續產生之**污染增量**將抵銷掉其他部門減污所做的努力。



Our Cities Face an International Competition 城市競爭力也必須考量



10% of Shanghai's GDP is lost due to traffic congestion.

-- An SDRG Report on Shanghai 國際知名環境組織SDRC的研究指出：“上海交通擁擠造成經濟損失達10%GDP”

“Beijing and Shanghai are not livable Cities due to traffic congestion and air quality.”

-- American Business Club in China 「美商在中國聯誼會」提出白皮書指出：“由於交通擁擠和空氣污染，北京與上海不適合居住”

We all know this policy: Getting more people on public transportation!
我們也都知道要積極發展大眾運輸、讓更多的民眾使用大眾運輸！



Additionally, we must have further actions:

此外，我們需要更積極的行動!

NO! Car-oriented Development?

YES! Transit-oriented

Development for Our Cities!

揚棄以小汽車主導的發展模式，以大眾運輸為骨幹來引導城市發展!

積極推動TOD政策



Great Vision in Seoul

首爾都市環境和大眾運輸改造成績亮眼



and,
in Singapore, London,...
還有倫敦、新加坡...



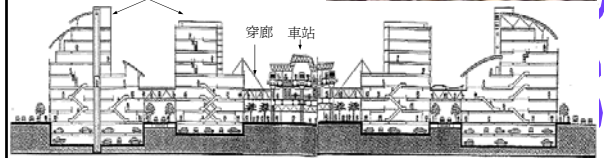
Principles of TOD Policy TOD政策三要素

- Density
 - 高強度
- Diversity
 - 多樣化
- Design
 - 人本觀

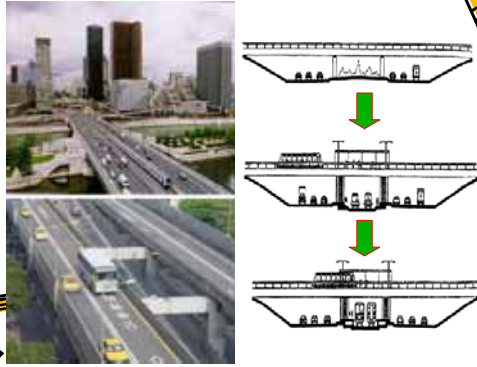


TOD and Transit Village TOD和「公共交通村」

- Intermodal Station 樞紐站
 - Mobility/Accessibility
- Urban Design 城市新風貌
 - Node vs. Place
- Financial Sustainability 財務永續
 - 物業發展、聯合開發



TOD Policy and Strategies



TOD: Public Transport Interchange



Various TOD Models 以不同大眾運輸為骨幹的TOD發展模式



MRTOD? Urban Rail Network in Developing Countries 以城市軌道為骨幹的TOD模式

Which Models? 哪一種模式?

- Paris? 巴黎
- London?? 倫敦
- Tokyo??? 東京
- New York???? 紐約

And WHEN? 何時形成路網?

南京地鐵項目規劃工作於1984年啟動，先後歷經多次調整修改。按照新的城市總體規劃思路，新確定的南京軌道交通線網規劃為14條線，其中10條線為地鐵，4條線為輕軌，總長度達到了433公里，預計將於2050年前建成。
(地鐵建設指揮部)



"Urban Rail + Bus" as a policy in most of our cities??

必須檢討過去的政策：“以軌道系統為主、公共汽車為輔的大眾運輸系統”??



But, the Real Situation

現實情況：仍是追求個人機動性

- Except in very few cities, people is still searching for personal mobility due to
 - huge capital investment for rail,
 - poor integration of public transport services,
 - unfair tax and pricing schemes.
- 主要原因：軌道投資巨大、未能整合、稅費不公平



Fairness: 付費公平 Trip Cost Analysis 旅次成本

- Actually Paid / Should Pay

Walk:	100.0%
Bike:	96.6%
Motorcycle:	34.8%
Car:	59.6%
Taxi:	47.8%
Bus:	81.6%
Metro:	99.7%



Personal mobility of using private mode has been heavily subsidized by social resources

Rail Transit has been recognized as a Disaster by US Experts!!!!

- Out of the nation's fifty largest urban areas, twenty-three had rail transit in 2000. This study reviews these twenty-three regions and finds:
 - + 4 had rail infrastructure lost transit connections during the 1990s;
 - + Taken together, rail regions lost 33,500 transit commuters in the 1990s;
 - + Non-rail regions among the fifty largest urban areas gained 27,600 transit commuters in the 1990s;
 - + Transit lost market share of commuters in two-thirds of all rail regions in the 1990s;
 - + The regional transit ridership declined as half the rail regions;
 - + Transit's share of total transit declined in a majority of rail regions;
 - + Sixteen of the twenty urban areas with the fastest growing congestion are rail regions—and one of the other four is building rail transit;
 - + By comparison, only three of the twenty urban areas with the slowest growing congestion are rail regions—and only because all three have nearly zero population growth.



Studies by the World Bank and Others

Parameter	Measure	Performance
Average Cost	Types - Ground - Elevated - Underground	US\$ m/km 8 – 27 2 – 60 50 – 165
Capital Investment	Compared w/ Estimation -10% to +10% +10% to +50% +50% to +500%	# of Cities 3 4 6
Construction Time	Compared w/ Estimation as forecast up to +50% +50% to +500%	# of Cities 3 6 4
Operation Cost	Compared w/ Estimation	All higher than the estimation
Passenger Volumes	Compared w/ Estimation as forecast up to -50% -50% to -90%	# of Cities 1 3 5
Finance (Fare Box rev/Direct Operating Cost)	Fare Box Ratio: less than 1.0 1.0 to 1.5 1.5 to 2.0 greater than 2.0	# of Cities 5 2 2 1

Underestimating Costs in Public Works Projects

Error or Lie?

Best Planning, More Savings, Faster and Lower Risk

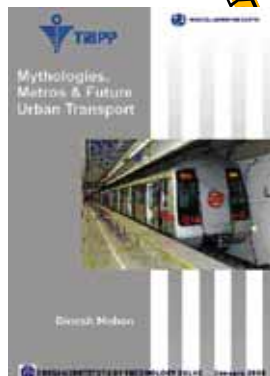
APA Journal, 68(3), Summer 2002

TABLE 2. Inaccuracy of transportation project cost estimates by geographical location (fixed prices).

Project type	Europe			North America			Other geographical areas		
	Number of projects (N)	Average cost escalation (%)	Standard deviation	Number of projects (N)	Average cost escalation (%)	Standard deviation	Number of projects (N)	Average cost escalation (%)	Standard deviation
Rail	23	34.2	25.1	19	40.8	36.8	16	64.6	49.5
Fixed-link	15	43.4	52.0	18	25.7	70.5	0	—	—
Road	143	22.4	24.9	24	8.4	49.4	0	—	—
All projects	181	25.7	28.7	61	23.6	54.2	16	64.6	49.5

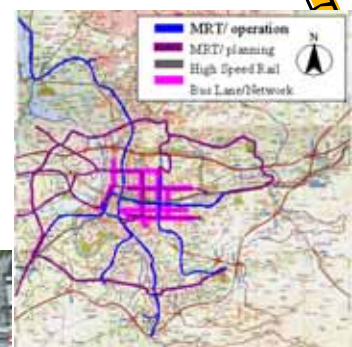
In New Delhi, less than 0.1% Passengers in the subway.

In Hong Kong MTR, the only profitable rail transit system, financial issues have been raised.....

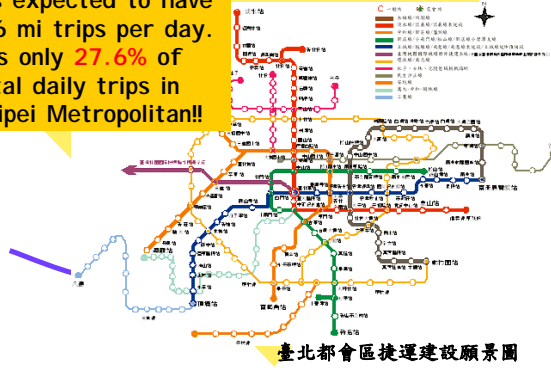


Taipei Urban Rail Network

By 2020, there will be 160 km urban rails; however, the network can only "cover" 35% ridership!



When the network reaches to 270 km, it's expected to have 3.6 mi trips per day. It's only 27.6% of total daily trips in Taipei Metropolitan!!



HUGE MRT Capital Investment

- Phase I:
 - 91.4Km 79 Stations
 - \$13.89Bi (CG: 50%, TPG: 36.875%, TWP: 13.125%)
- Phase II (XinZhuang/LuZhou Branch)
 - 26.1km 21 Stations
 - \$5.24Bi (SL: 15.41%, CG: 63.44%, TPG: 6.02%, TWP: 15.13%)
- Extension of NanGang Line
 - 2.5Km, 2 Stations
 - \$491.72Mi (SL: 29.67%, CG: 35.165%, TPG: 36.165%)
- XinYi Line
 - 6.4Km, 7 Stations
 - \$1.06Bi (LD: 6.46%, SL: 27.25%, CG: 33.145%, TPG: 33.145%)
- SongShan Line
 - 8.5Km, 8 Stations
 - \$1.56Bi (LD: 17.46%, SL: 17.56%, CG: 32.49%, TPG: 32.49%)

CG: Central Govt.; TPG: Taipei City Govt.; TWP: Province Govt.; LD: Land Procurement; SL: Self-liquidation;

In Kaohsiung? Smart Decision??



Basic Question is: Cities in transition economies can not wait for a good public transport services based on rail systems!!
我們的城市不能再等到軌道路網完成



Public Transit Alternatives

選擇最佳的公共交通系統

Regular Bus

Light Rail Transit

Bus Rapid Transit

Heavy Rail Transit

Personal Rapid Transit

- Using BRT to provide the excellent public transport services, to create a green environment, and to achieve the TOD Objectives.
- 我們現在就需要優質的大眾運輸服務！運用BRT系統在未來二~三年形成路網，同時創造優質公共運輸、自行車、步行的綠色交通環境，並逐步達成TOD目標。

Short Construction Time & Low Cost: Governance and Financial Sustainability

Bus Rapid Transit
< 18 months

Metros
5 ~ 30 years

Bogota Smart Decisions

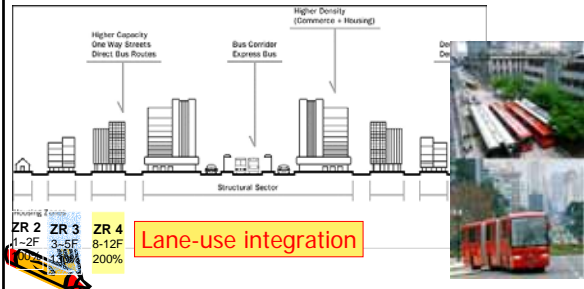
波哥大聰明選擇

Social Equity: 體現社會公平
Everyone is able to participate in economy, culture, and social activities by **affordable and reliable** public transit services.

Brisbane BRTOD



Land Use Model in Curitiba



Taipei MRT/BRT Station 台北城軌/BRT車站





Beijing BRT



More Strategies and Actions..... 需要同步採取的行動



BMW Integration: Bike + Bus + Metro + Walk



Car Free Day
NO
Public Transportation Day
???

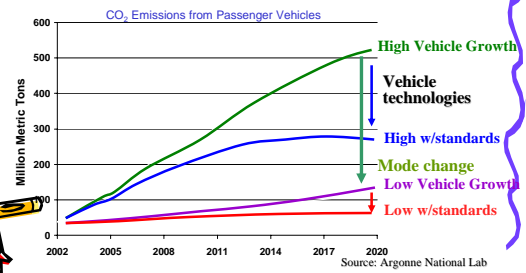
Bring Parking under Control 停車需要管理



Taipei brings motorcycles under management 當然包括摩托車



Vehicle Technology, Environment Impact and Travel Behavior 改變運具使用習慣之效益大過車輛技術提昇



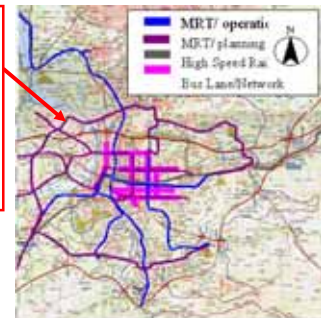
Goal of Market Share of Public Transport 訂定公共運輸市場目標

Mode Choice	1996	2000	2004	2006
Private Mode:	66%	48%	40%	30%
Auto:	30%	22%	20%	17%
Motorcycle:	36%	28%	20%	13%
Public Mode:	24%	42%	50%*	60%*
Taxi:	10%	10%	10%	10%

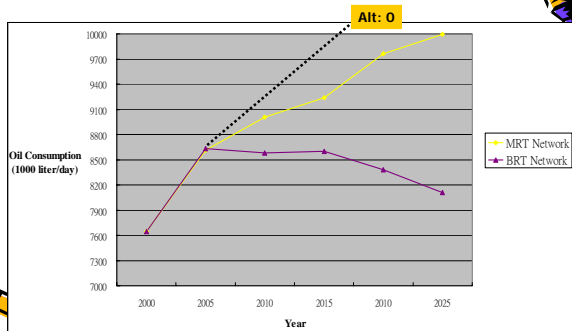
*One of indicators for Health City and Sustainable Development
「公共運輸比例」：健康城市與永續發展指標

A Preliminary Analysis in Taipei

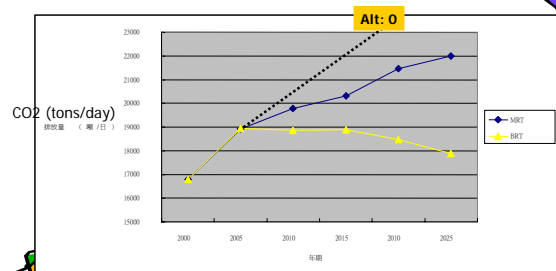
- Alt #1
Elevated Exwy
- Alt #2
Rail Rapid Transit
- Alt #3
Bus Rapid Transit



Potential Benefits of Energy Efficiency



Potential Environment Benefits



oThe social benefits of BRTOD will be \$3 bi per year.

Policy Formulation Shall Meet Pillars of Sustainable Development

以永續發展作為研擬政策與評價之指標

- Environmental Sustainability 環境可持續
 - Energy, Emission, Ecology
- Social Sustainability 社會公平
 - Equity, Fairness
- Economic/Financial Sustainability 經濟財務
 - Affordability, Full Cost
- Governance Sustainability 政策與機制
 - Legal, Institution, Enforcement



Concluding Remarks

- Transit-Oriented Development
 - Bus Rapid Transit-Oriented Development for environmentally, socially, and financially sustainable development
- Bring Confidence to Public Transport
 - Safe, Reliable, Affordable, Seamless Services
 - BMW Integration: Bike+Bus+Metro+Walk
- Governance Sustainability
 - Institutional Reform
 - Pricing and Tax Scheme
- Education and Training
 - Students, Operators, Users, Media, Planner, Engineer, Decision Makers, ...

Thanks

"LEARNING" BENJAMIN CHEE CHEE skchang@ntu.edu.tw

A Global View of BRT

Latin America
 Belo Horizonte
 Bogota
 Campinas
 Curitiba
 Goiania
 Mexico City
 Porto Alegre
 Quito
 Recife
 Sao Paulo

Europe
 Bradford
 Claremont Ferrand
 Eindhoven
 Essen
 Ipswich
 Leeds
 Nancy
 Paris

Asia
 Akita
 Ankara
 Beijing
 Fukuoka
 Gifu
 Hanzhou
 Jakarta
 Kanazawa
 Kunming
 Miyazaki
 Nagaoka
 Nagoya
 Nigata
 Seoul
 Taipei
 Shijiazhuang

Oceania
 Adelaide
 Brisbane
 Sydney

North America
 Honolulu
 Los Angeles
 Miami
 Ottawa

Orlando
 Pittsburgh
 Seattle
 Vancouver

www.theoorea.com/maps
Systems in operation

Systems at the Planning or Construction Stages

Latin America
 Barranquilla
 Bogota(Phase II)
 Cartagena
 Cuenca
 Guatemala City
 Guayaquil
 Lima
 Panama City
 Pereira
 Quito (expansion)
 San Juan
 San Salvador

North America
 Albany
 Alameda and Contra Costa
 Boston
 Charlotte
 Chicago
 Cleveland
 Dulles Corridor
 Eugene
 Hartford
 Las Vegas
 Louisville
 Montgomery County
 San Francisco
 Toronto

Asia
 Beijing
 Bangalore
 Chengdu
 Chongqing
 Jiayi
 Jinan
 New Delhi
 Shanghai
 Surabaya
 Taichun
 Tainan
 Wuhan
 Xiamen
 Xian

Oceania
 Auckland
 Perth
 Sydney