Concept of Sustainable Transport and integrated Land Use Planning-
An Overview

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The adverse impacts of growth in motorization - in economic, environmental and social terms - are ruining the quality of life in our cities and our global climate.
Challenges in developing cities

Humans love to move, travel, discover... by different ways and modes...
In most cities, mobility is dominated by personal motorized transport. Many people choose cars to move around...
Challenges in developing cities

Road transport is a major contributor to air pollution and climate change. Transport contributes to now 27% of energy-related CO2 emissions and is still growing!
Challenges in developing cities
Challenges in developing cities

Worldwide, 1.3 Million road deaths and up to 50 Million people injured per year
Challenges in developing cities

10-25% of urban areas are taken by road transportation infrastructure - A lot of space for cars but...
Challenges in developing cities

...where is the space for people? the silent pedestrian, the invisible cyclist must be seen
Urban Transport Challenges

- **Growing Economy:**
  - Increased Car Ownership
  - Increased Traffic Volumes
  - Increased congestion

- **Urban Sprawl:**
  - More car dependency
  - Increased trip lengths
  - High costs for extending infrastructure and services

- **Climate Change:**
  - Global warming
  - Higher emission levels
  - Air and noise pollution

- **Road Safety:**
  - Increased speed
  - Increased conflicts among modes
  - Increased accidents and

- **Energy Consumption**
  - Transport consumes 30% of total energy
  - Increased demand for fossil fuel
  - Increased GHG emissions

The transport paradox - “Transport is unique as the only development sector that worsens as incomes rise. While sanitation, health, education and employment tend to improve through economic development, traffic congestion tends to worsen.”
Urban Transport Planning Approaches

Known as

- **Traditional Approach**
  - Automobile centered Approach

- **Sustainable Approach**
  - Contemporary Approach, planning to improve access
Failures in Urban and Transport Planning

Trends in cities

- Rapidly increasing car ownership and use
- Declining mode share of public transport, walking, and cycling
- Declining city centres; rapid decentralisation into car-oriented suburban sprawl

Focus was given to road design:

- More infrastructure for cars
- More space for motorized vehicles, which let to less density and often to sprawl
- Unsustainable focus

Source: Xie/GTZ 2006, Beijing
- Greater demand for space
- Greater impact on health and environment
- Greater impact on traffic
- Greater demand for travel
- Living areas often far away from commercial activities
Livable Cities & Urban Life

Rankings of Quality of Living

Mercer Quality of Living Survey 2014 – Top 10 (worldwide):

- Vienna, Austria (1st)
- Zurich, Switzerland (2nd)
- Auckland, New Zealand (3rd)
- Munich, Germany (4th)
- Vancouver, Canada (5th)
- Düsseldorf, Germany (6th)
- Frankfurt, Germany (7th)
- Geneva, Switzerland (8th)
- Copenhagen, Denmark (9th)
- Bern, Switzerland (10th)
Tackling the Problem

Traditional focus was given to road design: More infrastructure for cars, more space for motorized vehicles, unsustainable focus: Question is, how to use limited road space best
Why public transport priority? Corridor Capacity

(people per hour on 3.5 m wide lane in the city – PPHPD [PAX/hour/direction])

Source: Botma & Papendrecht, TU Delft 1991 and own figures

Mixed Traffic
Regular Bus
Cyclists
BRT single lane
Pedestrians
Light Rail
BRT double lane
Heavy Rail/Metro
Suburban Rail (e.g. Mumbai)

PPHPD Range (→)

1500–2000
2000

5000
8000
14000
14000
17000, Curitiba
19000
18000 – 20000
20000

43000, Bogota
40000 – 60000
80000, HKK

>100000, Mumbai

Maximum PPHPD achieved & where (→)

Equivalency road width: In order to carry 20,000 automobile commuters PHPD, a highway must be at least 18 lanes wide. (assumption 1.2 passengers per automobile)
Adopt Sustainable Transportation Policy and strategies

DO THE RIGHT MIX

Source: Bicycle Innovation Lab
The push and pull approach

Measures with push-effects
Area-wide parking management, parking space restrictions in zoning ordinances, car limited zones, permanent or time-of-day car bans, congestion management, speed reductions, road pricing...

Measures with pull-effects
Priority for buses and trams, high service frequency, passenger friendly stops and surroundings, more comfort, park-and-ride, bike-and-ride..., area-wide cycle-networks, attractive pedestrian connections...

Measures with push- and pull-effects
Redistribution of carriageway space to provide cycle lanes, broader sidewalks, planting strips, bus lanes..., redistribution of time-cycles at traffic lights in favour of public transport and non-motorized modes, public-awareness-concepts, citizens’ participation and marketing, enforcement and penalizing...

Transport Demand Management (TDM)

Rationale: “Demand for transport services is not given, but depends on transportation policies, pricing, investments & choices”

Definition: „TDM is a strategy which aims to maximize the efficiency of the urban transport system by discouraging unnecessary private vehicle use and promoting more effective, healthy and environmental-friendly modes of transport, in general being public transport and non-motorised transport“.
## CO₂ emissions from passenger transport vs. modal split: Selected cities, different densities, different lifestyles

<table>
<thead>
<tr>
<th></th>
<th>Share (%) of public transport, walking and cycling</th>
<th>CO₂ emissions (kg per capita per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Houston</td>
<td>5%</td>
<td>5690 kg</td>
</tr>
<tr>
<td>Montreal</td>
<td>26%</td>
<td>1930 kg</td>
</tr>
<tr>
<td>Madrid</td>
<td>49%</td>
<td>1050 kg</td>
</tr>
<tr>
<td>London</td>
<td>50%</td>
<td>1050 kg</td>
</tr>
<tr>
<td>Paris</td>
<td>54%</td>
<td>950 kg</td>
</tr>
<tr>
<td>Berlin</td>
<td>61%</td>
<td>774 kg</td>
</tr>
<tr>
<td>Tokyo</td>
<td>68%</td>
<td>818 kg</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>89%</td>
<td>378 kg</td>
</tr>
</tbody>
</table>

Source: UITP
AVOID/Reduce
Reducing the need to travel

SHIFT
Changing mode choice or at least keep the mode share of NMT

IMPROVE
Increasing the energy efficiency of vehicles, fuels and transport operations
Example: transit-oriented planning in Tokyo (Hikarigaoka New Town)

- At terminus of new subway line (opened 2000)
- Mixed use with excellent ‘green’ walking and bicycle network to complement subway and buses
Design and implementation of land use plans

- Curitiba’s solution: Land use and transport plans as part of a Transit-Oriented Development plan

Source: Government of Curitiba
The case of Curitiba: land use and transport
...so, what is the impact of the Traditional/automobile oriented approach to land use and transport planning?
Traditional Approach

Congestion, Pollution and Accidents

- Rampant increase in automobile ownership and usage (up to 14% in Maroc)
- Incessant traffic jams
- Fatalities and injuries due to accidents

http://carimg.sulekha.com/automotive-albums/default/original/delhi_traffic_congestion.jpg

1.6 million road fatalities every year worldwide!
Traditional Approach

Air and Noise Pollution

Top 30 most polluted cities in the world

Strategies to solve the problem

- Avoid sprawl
- Encouraging mixed Land Use
- Dense, compact development
- Transit oriented development
- Good urban design (buildings AND public realm)
- Not too much land for roads and parking (normally between 10 and 25% of land in a city, in US can be up to 45%, incl parking)
The principles of the sustainable approach

- High density, compact development
- Mixed land uses
- Transit oriented development
- Pedestrian / NMT scale
Encourage Compact and Mixed Land use

- Mixed Land-use reduces the necessity to make some trips
- Distance traveled is greatly reduced

Source: GTZ Photo DVD
Encourage Compact and Mixed Land use

- Complemented with space for walking and cycling
Traffic dependent on major arterial roads even for short Local Trips!
... Kathmandu is not very far behind

Development of townships far from the city center

Homogenous form. Predominantly residential. No mixed use

Connected to the city center by broad roads, encourages automobile use.

Ad-hoc development; no public transport, NMT networks planned
Urban Density & Carbon Intensity

Transport-related energy consumption
Gigajoules per capita per year

To sum up, the traditional automobile oriented approach of planning has resulted in

Increased number and length of trips means:

× increased expenses on fuel,
× traffic congestion,
× strain on road infrastructure,
× increase in number of accidents/fatalities,
× excessive dependence on roads,
× adverse impact on human health.

To address the dynamic complexities of urban systems, a multi-disciplinary, Integrated Planning Process is needed.
Mixed-Use Norms create: Safety, Vibrancy & Reduced Travel Demand
Pedestrian friendly connections to encourage walkability
Place Making: vibrant places, inclusive communities
TOD Plan

- **Core station area (400m):** Pedestrian access generates a significant portion of transit trips.

- **Primary catchment area (800m):** Bike and pedestrian access are major contributors to ridership.

- **Secondary catchment area (1.5 km):** Bike, feeder transit, and auto are the primary access modes to and from the stop or station.
Transit Oriented Development (TOD)

Transit users benefits
- More destinations near transit stations
- Better walking conditions
- Increased security near transit stations

Transit operator benefits
- Increased ridership
- Lower costs per rider
- Better image

Benefits to society
- Reduced traffic
- Reduced public infrastructure / service costs
- Community liveability
- Increased property values / business activity / tax revenues

Source: Litman, 2006
Way forward for Integrated Planning
1. Pedestrian & NMT Friendly Environment

2. Connectivity and Network Density

3. Multi-Modal Interchange
4. Inducing Modal Shift

5. Placemaking and Ensuring Safety

6. High Density, Mixed-use, Mixed-Income Development
Main Components of Sustainable Transport

- Public Transport with priority over all other modes on the road
- Non-motorised transport
- Creating/conserving public space
- PT Integration
- TDM measures

Do you see these factors here?
Mobility Options?

Mobility Options like:

- Enhancing Non-Motorized Transport (like Walking and Cycling)
Promoting Public Space

Walking areas, proper sidewalks, cycling network, and car-restricted zones

- More safety for citizens
- More pedestrian space
- More traffic calming measures
- Preserve architectural heritage and aesthetic value

Brandenburger Tor, Berlin
Promoting NMT

Promoting cycling: Amsterdam
Promoting NMT

Promoting cycling: Amsterdam
“In terms of infrastructure, what differentiates advanced cities are not highways or subways but quality sidewalks and cycleways.”

Enrique Penalosa, former Mayor of Bogota, Colombia
“The highest priority should go to public transport, walking and non-motorised vehicles that are accessible to almost everyone and have low impacts”

*Enrique Peñalosa*
BRT Guangzhou (Winner of 2011 STA Award)
Street design: Example from Rotterdam
Muenster, Germany - the German cycling City

- Bicycle share rose from 29% in ’98 to 38% in 2007
- 457 kms of cycle network
- 280,000 inhabitants own nearly 500,000 bikes
- Started with a “Vision Zero” road safety policy
- Minimum width of cycle tracks > 2m
- Traffic speeds reduced to 30 kmph
Measures for Promoting Public Space

Will our children find our cities as entertaining as playing a video game?

Lyon’s waterfront with bike share
International Experiences reg livable Cities

Europe:
✓ Zurich
✓ Vienna
✓ Berlin
✓ Amsterdam
✓ Groningen
✓ Copenhagen
✓ Freiburg
✓ Muenster

Non-European Cities:
✓ Bogotá
✓ Curitiba
✓ Singapore
✓ Tokyo

All of these successes featured an integrated and packaged approach:

1. High-quality public transport
2. Improved conditions for walking and bicycling
3. Effective integration of modes
4. Supportive land-use policies
5. Car-restriction measures
Examples: Vienna (#1 Quality of living Index)
Public Transport and NMT
(PT and NMT not for poorer cities, but smart solutions, promoting growth and attractiveness. Proven to be a success factor for high income and successful cities)

- Integrated Transport Policy: PT, NMT and IMT
- Modal Share of PT 36%
- More than 2/3 of journeys are done by PT and NMT
- Vienna top ranked in quality of living surveys conducted by the British consultancy firm Mercer during years 2009 to 2012
The transport paradox
“Transport is unique as the only development sector that worsens as incomes rise. While sanitation, health, education and employment tend to improve through economic development, traffic congestion tends to worsen.”

…but still: Decoupling of economic growth and individual motorized transport is achievable!
Leadership

World’s best systems were developed with high levels of political support

With strong political will, anything is possible

Lee Myung-bak
Mayor of Seoul

Enrique Peñalosa
Former mayor of Bogota

Jaime Lerner
Former mayor of Curitiba
SUTP Website (Engl., CN, Span.)

- Active since 2002
- GIZ SUTP Publications
- Multimedia (gallery, videos)
- 35,000 visitors (per month)
- Approx. 20,000 downloads (per month)

www.sutp.org
Training course manuals

- Bus Rapid Transit
- Public Awareness and Behavioural Change
- Non-motorised Transport
- Travel Demand Management
- Mass Transport Options
- Bus Regulation and Planning
- Financing Urban Transport

WWW.capsut.org
Our publications

- Measuring Public Transport Performance: Lessons for Developing Cities
- Sustainable Urban Transport Technical Document #9
- Rising Automobile Dependency: How to break the trend?
- Sustainable Urban Transport Technical Document #8
- Urban Transport and Energy Efficiency
  Module 5h
  Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities
Write to us for any assistance on making Sustainable Urban Transport a reality in your city

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