URBAN TRANSPORT NETWORKS EXPANSION

CONNECTIONS AND COORDINATION
FOR
ATTRACTIVE, AFFORDABLE AND EFFICIENT CITIES

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Consultant and UITP Advisor
Urban rail networks are more and more recognised as the backbone of a well-integrated urban mobility in large cities as long as urban rail projects not only improve integrated mobility but generate economic, social and environmental value for the city.

Urban rail has a much higher positive balance of "external effects" than any other motorized urban transport mode: this legitimates earmarked taxation and tax reduction to support urban rail DBOM funding and financing.
METROS: WORLD OVERVIEW 2017

Asia Pacific 38%
Europe 27%
Eurasia 10%
Latin America 11%
North America 5%
MENA 9%

169 METRO SYSTEMS IN OPERATION

12500 km of metro infrastructure

+10% growth in the last two years

mainly in China, now ¼ of total
New metro **networks** openings 1860-2017
# LRT systems: Total: 386 systems
- MENA: 206
- North Am: 41
- Eurasia: 36
- Europe: 9

track length (km): Total: 15600 km
- MENA: 3855
- North Am: 8941
- Eurasia: 54
- Europe: 1016
- South Amer.: 1525
- Africa: 719.75
- Asia Pacif.: 710.8

- MENA: 3134.6
- North Am: 324.2
- Eurasia: 1016
- Europe: 1016
- South Amer.: 710.8
- Africa: 710.8
- Asia Pacif.: 8740.57
41 new LRT systems opened between 1985 and 2000
86 new LRT systems opened between 2000 and 2016
MAJOR DRAWBACK OF URBAN RAIL: CONSTRUCTION COSTS

Cost depending on local situation and (design) capacity (light rail or metro)
Due to the cost and lifetime of underground metro systems (no return), any metro project:

- is part in a long-lasting coordinated process
  - never ending from first opening
- requires comprehensive preliminary studies and impact assessments
  - huge data collection and processing
  - enough time and resources
- is a trade-off:
  - performances/system capacity targets versus
  - affordability/bankability
    (funding and financing capacity for DBOM)

Decisions on metro may condition or not LRT and BRT studies (hierachical relationship or independance)
LRT and BRT are far less expensive than metro systems, although very costly.

- In case LRT or BRT are complementary to the metro: check articulation with metro network (integrated stations)

- In case LRT or BRT are independant from the metro: the process for studies and implementation is similar, at a smaller scale (corridor or axis)
METRO, LRT and BRT projects are designed, build an operated – at different territorial scale and granularity levels - to serve multiple objectives beyond strictly transport:

• Transport/mobility (attractive and affordable safe and secure services improved in quantity and quality)
• City development and Land use
• Social inclusion
• Environmental protection and resilience
• Economic growth
• Urban quality of life

In all cases – METRO, LRT, BRT - detailed studies have to precise:
• the impact on bus (and other public transport)
• the micro scale impact on land use and urban patterns
## URBAN TRANSPORT PROJECTS IMPROVE CONNECTIONS

### Objectives and challenges

<table>
<thead>
<tr>
<th>CONNECTIONS</th>
<th>OBJECTIVES AND CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>People and Activities</td>
<td>Affordable accessibility to urban activities (work, education, health, culture…) Safe and secure mobility for all</td>
</tr>
<tr>
<td>Business and Economy</td>
<td>Accessibility to employment and consumers New business opportunities</td>
</tr>
<tr>
<td>Categories of People</td>
<td>Social inclusion of all (Poor, Young, PRM, Women, Seniors) Social integration (smart growth)</td>
</tr>
<tr>
<td>Transport and Land Use</td>
<td>Land use consumption (dynamic and static) Land use development (compact, in-fill, mixed) Land use regeneration</td>
</tr>
<tr>
<td>Mobility and Environment (Health/Climate change)</td>
<td>Clean Transport Modal shift to soft modes and public transport Sustainable city development Sustainable system development (life-cycle)</td>
</tr>
<tr>
<td>Government(s) and People</td>
<td>Social acceptance and political support Economic growth for city and country Quality of life (including cultural heritage)</td>
</tr>
</tbody>
</table>
### NATURE OF THE PROJECT

<table>
<thead>
<tr>
<th>LONG TERM PLANNING</th>
<th>DEVELOPMENT PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>METRO NETWORK (LARGE CITY)</td>
<td>CITY MASTER PLAN, TRANSPORTATION PLAN PLAN and METRO PROJECT. Macro scale &amp; Long term process</td>
</tr>
<tr>
<td>OR LIGHT RAIL NETWORK WITHOUT METRO (SMALL/MEDIUM CITY)</td>
<td>• expected city development</td>
</tr>
<tr>
<td></td>
<td>• road and rail infrastructure and major urban sites</td>
</tr>
<tr>
<td></td>
<td>• migration from existing situation</td>
</tr>
<tr>
<td></td>
<td>Metro Feasibility &amp; Preliminary design ⇒ project approval &amp; Metro priorities ⇒ Detailed design ⇒ implementation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MID TERM PLANNING</th>
<th>DEVELOPMENT PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>METRO LINE OR LIGHT RAIL/BRT LINE (CORRIDOR/AXIS/TOWN)</td>
<td>URBAN TRANSPORT PROJECT</td>
</tr>
<tr>
<td></td>
<td>Intermediate scale &amp; following Master Plan</td>
</tr>
<tr>
<td></td>
<td>TOD/Joint Dev. /Integrated mobility plans</td>
</tr>
<tr>
<td></td>
<td>⇒ project approval ⇒ Detailed design ⇒ implementation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHORT-MID TERM PLANNING</th>
<th>DEVELOPMENT PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATION OR DISTRICT DEVELOPMENT PLAN (STATION or CITY DISTRICT)</td>
<td>STATION OR DISTRICT STUDIES DESIGN</td>
</tr>
<tr>
<td></td>
<td>Micro scale &amp; following upper scale studies</td>
</tr>
<tr>
<td></td>
<td>STATION DESIGN, TOD and Joint Development</td>
</tr>
<tr>
<td></td>
<td>DISTRICT STUDIES, Integrated mobility plans</td>
</tr>
</tbody>
</table>
Challenging issues from sketch design to operation

- Institutional set-up and governance for project delivery
- Data collection, storage and processing
  - Non-transport data: socio-economic and land use
  - Transport data: supply and demand
  - Transport forecasting models
- Preliminary design and project selection
- Detailed design and project optimisation (added value from multi-modal and multi-functional approach)
- Project management and risk management
- Choice of construction and procurement delivery method
- Assessment of business opportunities and private sector involvement (supply or investors)
- Funding and financing of project DB – project affordability and risk allocation
- Coordination of project construction – inside and outside
- Funding and financing of project O&M
- Project acceptance
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

Source: RTA – Roads and Transport Authority
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

Multimodal – Multi Dimensional Plans

NATIONAL POLICIES (UAE National Agenda)

Dubai Plan 2021

RTA Goals & Objectives

- Smart Dubai
- People Happiness
- Advance RTA
- Financial Sustainability
- Integrated Dubai
- Smooth Transport for All
- Asset Sustainability
- Safety & Environmental Sustainability

Blueprint

Dubai Strategic Transportation Plan

- Bus
- Taxi
- Rail
- Marine
- Biking
- ITS
- EXPO
- Road
- Freight
- Pedestrians
- Etc

Community Plans

Traffic Impact Studies
Transportation Master Plans
Special Area Plans

Implementation Tools

- Manuals and Guidelines
- Policies
- Laws and Regulations
- Smart City Program
- Transit Oriented Development
- Transportation Model
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

TRANSPORTATION PLANNING IN DUBAI

Source: RTA – Roads and Transport Authority
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

Public Transport
Private Transport - Road Network
Non-motorized modes
Demand Management policies
ITS

Integrated Mobility
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

Current Dubai Metro

Basic Information
- Elevated: 58.7 km
- Underground: 12.6 km
- At Grade: 3.3 km
- Total Length: 74.6 km
- No. of Stations: 47
- Depots: 3
- Park & Ride facilities: 3 (over 1000 spaces)

Line capacity: 26000 PPHPD

Metro and Tram Network (421 km)
Bus Network (3000 km)
Marine Transport Network (450 km)
Regional and federal rail lines

2006
- 6%

2014
- 14%

2020
- 20%

Significant development since 2006

2006
- 8,715 lane-km
- 19 lanes

2014
- 12,947 lane-km
- 48 lanes

Short-term (2013-2016) road projects:

Dubai Creek Crossings

- 2006: 19 lanes
- 2014: 48 lanes

Medium term (up to 2020) road projects:

Percentage of PT trips (2014)

87 Hong Kong
% Singapore
14% of PT trips

Urban Mobility Forum II | Cairo (Egypt) | 22.11.2017
INTEGRATED MOBILITY DEVELOPMENT
AN EXAMPLE IN MENA AREA - DUBAI

Integration of Different Modes (Physical and operational)

Transit Oriented Developments
Example: Union Square Station
- Higher density
- Mix of uses (live-work environment)
- Focus on Public Transport
- Special attention to urban design to encourage non-motorized trips

TDM

5. Comprehensive ITS Master plan for Dubai
Examples of implemented systems
- UAFC system
- Journey Planner
- AVM system
- Taxi dispatch center
- Variable Message Signs
- Traffic Signal Control System (SCOOT)
- Central Parking Control System and mParking
# INTEGRATED MOBILITY DEVELOPMENT

AN EXAMPLE IN MENA AREA - DUBAI

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of PT passengers including T axis (M passenger)</th>
<th>Metro network (km)</th>
<th>Tram network (km)</th>
<th>Percentage of trips done by PT modes (including taxi)</th>
<th>Bus Fleet</th>
<th>Bus Lines</th>
<th>A/C Bus stops</th>
<th>Maritime transport stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>503</td>
<td>75</td>
<td>11</td>
<td>14%</td>
<td>1,565</td>
<td>105</td>
<td>626</td>
<td>33</td>
</tr>
<tr>
<td>2006</td>
<td>163</td>
<td>0</td>
<td>0</td>
<td>6%</td>
<td>620</td>
<td>74</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: RTA – Roads and Transport Authority
AN EXAMPLE OF TOD IN MENA AREA - TEHRAN

Length of operational lines - March 2016

Property development model

The revenue generated from property development model covers more than 50% of metro construction cost

There are +40 station development projects underway with a total value of US $2.5 Billion

Source: UITP MENA Congress April 2016
City regeneration and image (LRT)

A major benefit of Urban rail is the opportunity to improve the urban environment and quality of life by:

- reducing space for car-traffic and parking
- re-landscaping streets and squares along routes (especially LRT)
- improvement of deprived areas
- in some cases: city branding
Metro impact on real estate: a sales argument!

Hindustan Time, Nov. 2014
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RECOMMENDATIONS 1/3

• Urban rail = key driver for connecting all categories of citizens with essential urban activities:
  
  • urban regeneration/new cities
  • integrated mobility
  • accessibility
  • social inclusion
  • environment protection, sustainable development and climate resilience
  • economic growth
  • quality of life and cultural development
  • improved cooperation between authorities

• Rail stations property = interface urban development and urban transport = huge potential & high value for rail operator and authorities
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RECOMMENDATIONS 2/3

• Urban transport project follows a complex process which needs efficient coordination of project management from sketch design to operation

• Funding and financing of project assets benefit from a multifunctional approach of system design

• Funding and financing of project O & M facilitated by project performance monitoring and adaptative integrated fare policy and fare levels
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RECOMMENDATIONS 3/3

• Station design process = make maximum use of site location and increase added value of rail assets
• Each station = achieve multimodal functions generating synergetic effects
• Synchronise:
  • multi-functions design and build process
  • construction and property development process
  • funding and financing decisions for station construction and operation
• Marketing strategy for property development and management
• Communication strategy for project acceptance and support
Thank you for your attention

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