Big Cities – Big Challenges

Sustainable Urban Transport across Major Middle East and North African Cities

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of
Federal Ministry for Economic Cooperation and Development

Sustainable Transport in Large Cities in the MENA Region

Mobility is a basic necessity for the social and economic development of people, cities and entire countries. People must be able to reach their places of work or education and must have access to shopping facilities and social services.

However, large segments of the population in some countries do not have access to functional transport networks or mobility services and, therefore, cannot reach necessary amenities in a reasonable amount of time or at an affordable cost.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Islamic Development Bank (IsDB) have worked – both individually and together – to improve urban transport in the Middle East and North Africa (MENA) region and to develop sustainable urban transport systems.

Chapter 1 of this report highlights the main problems affecting urban transport in the MENA region, such as population growth, accelerated urbanisation and limited public budgets. Chapter 2 describes crucial elements for consideration in developing sustainable urban transport, including political will, financing and transport demand management.

Two good-practice examples from Istanbul and Rabat are reviewed in chapter 3 and the link between national and local governments is examined in chapter 4.

These good-practice examples were part of the three jointly organized training workshops in Amman, Istanbul and Rabat. Participants were able to experience the public transport system and exchange knowledge on their experiences, challenges and lessons learned with the public transport providers and representatives of the municipalities.

Executive Summary

The urban population in the MENA region is forecasted to grow significantly over the next decades. Cities in the region face major mobility challenges, as transport systems are sometimes inadequate, and investment is being directed towards private cars. For cities to remain attractive to inhabitants, mobility obstacles need to be overcome. Using examples of regional good-practices, this report gives an overview of the challenges sustainable urban transport faces in the MENA region and offers possible solutions.

Experience worldwide has shown that solving transport issues requires more than mere investment in infrastructure. Vision and political will to change and improve urban transport mark the first step toward a sustainable transport system. Following this, successful change requires a sustainable transport and city development strategy. Politicians and planners must be aware that unhindered transport growth is tied to population and economic growth. Before investing large sums in transport systems, this relationship can be reframed through proper urban planning and accompanying policy measures.

Cities that want to reduce private car usage must design attractive alternatives; Mass Transit Systems like the MetroBus in Istanbul or the LRT in Rabat can meet high transport demands. Primary routes make the network easier for riders to understand. Feeder networks of buses and tramways then support these linear services.

Due to climate, non-motorised transport can be a challenge in some MENA cities; however, walking and cycling are necessary to underpin various forms of public transport in many cities.

Various cities in the MENA region face serious financing issues, making it difficult for municipalities to fund necessary investments. However, cities that want to improve urban transport can be encouraged by many examples from within and outside the region. For example, fuel taxes and congestion charging can help fund a sustainable public transport network. Competition among private companies that provide public transport services can reduce cost and is likely to ensure service quality, given proper regulation.

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Amman, Jordan (2007); Photocredit: A. Broaddus

Content

1. The Need for Sustainable Urban Transport Systems in Major Cities Across the MENA Region

1.1 Big Cities, Big Challenges

The MENA region is an economically diverse region, including oil-rich economies as well as ones with limited natural resources. Over much of the past quarter century the region's economic fortunes have been heavily influenced by two factors: oil wealth and the legacy of economic policies and structures that emphasised a leading role for individual states which were often unable to deliver on their promises.

The World Bank estimates that about 23% of the approximately 300 million people in the MENA region live on less than US$2 per day; this high poverty rate needs urgent attention. As the population of the region is currently increasing at 2% per year, the region's economy must grow significantly for average incomes to keep pace.

Due to historic and cultural factors, the participation rate of women in the region's economy is low. Unemployment in many MENA countries is generally high, and the female unemployment rate is often twice as high as that of men. Consequently, female participation in the work force in MENA countries is among the lowest in the world (see Population Reference Bureau: "Population Trends and Challenges in the Middle East and North Africa" 2001).

This report uses the Arab Leagues definition of MENA countries, encompassing: Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates and Yemen.

Jordan, Amman (2010); Photocredit: K. Sakamoto

Cairo, Egypt (2001); Photocredit: Sutp transport collection

Tunis, Tunisia (2013); Photocredit: C. Huizenga

The region's population growth rate is the world's second highest, after sub-Saharan Africa, growing by nearly 7 million people each year; MENA's population is expected to nearly double in the next 50 years (Population Reference Bureau 2001). Consequently, a large number of young people in the region will be seeking employment in the future.

This population growth and the challenges it poses for the employment market are all the more significant considering the limited economic prospects in many of MENA's rural areas. This lack of work has driven large parts of the rural population to move to cities in the hope of employment, resulting in a sustained increase in urbanisation throughout the region, with no apparent end in sight.

In 2010, the average urbanisation rate across the region was around 72%; the historic rates for each country are shown in Table 1, as well as future projections (Europe is included for comparison).

A significant proportion of MENA's population are of working age. As a result, many require the means to travel between their homes and workplaces. In addition, women in many Arab countries are participating more in the economy, adding to transport demand, especially private transport. Added together, these factors put significant pressure on urban transport systems.

Uniquely in the world, the MENA region will have three main driving forces for increased urban transport:

1. rapid population growth;
2. rapid urbanisation; and
3. increased number of women travelling for social purposes and work.

Any attempt by public authorities to encourage women in the region to use urban – especially public – transport systems, will have to address women's demands for their safety and security. Women in the region will travel unaccompanied only if their social, safety and security concerns are allayed.

Many cities in the MENA region have experienced urban sprawl over the previous decades, exacerbated by programs to relocate population and economic activities to the peripheries of existing cities. The issue of urban sprawl is likely to worsen in the future with the construction of satellite towns surrounding existing metropolises. Cairo, for instance, is spread over an area of more than 1,600km^2 (46km across in the north-south direction and 35km east-west). Such developments increase average journey length, decrease urban density, and favour transport by car.

According to a study by the World Bank on gender in urban transport in Casablanca, published in October 2011, women are more likely to use public transport, but are also more likely to be victims of harassment, aggression, violence and theft.

	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050
Algeria	22	31	40	44	52	61	72	79	83	86	87
Bahrain	64	82	84	86	88	88	89	89	91	92	93
Egypt	32	38	42	44	44	43	43	46	50	55	60
Iraq	35	43	56	66	70	68	67	67	69	72	75
Jordan	37	51	56	60	72	80	83	85	87	88	89
Kuwait	62	75	86	95	98	98	98	98	99	99	99
Lebanon	32	42	60	74	83	86	87	88	89	90	91
Libya	20	27	50	70	76	76	78	79	82	83	85
Morocco	26	29	35	41	48	53	57	60	65	69	73
Palestine	37	44	54	62	68	72	74	76	79	81	83
Oman	9	16	30	48	66	72	73	76	78	80	83
Qatar	79	85	88	89	93	96	99	100	100	100	100
Saudi Arabia	21	31	49	66	77	80	82	84	86	87	88
Sudan	7	11	17	20	29	33	33	35	39	45	51
Tunisia	32	38	44	51	58	63	66	68	71	74	77
Turkey	25	32	38	44	59	65	71	79	83	85	87
United Arab Emirates	55	74	78	81	79	80	84	87	88	90	91
Yemen	6	9	13	17	21	26	32	38	44	50	57
MENA average	**33**	**42**	**51**	**58**	**65**	**68**	**71**	**73**	**76**	**79**	**81**
MENA population (millions)	**92**	**120**	**157**	**207**	**271**	**336**	**413**	**491**	**560**	**621**	**673**
Europe	51	57	63	67	70	71	73	75	77	80	82
Europe population (millions)	549	606	657	695	723	729	740	744	736	724	709

Table 1. Urbanisation rates in the MENA region and Europe (1950 -2050). (United Nations, Department of Economic and Social Affairs, "World Urbanization Prospects, the 2011 Revision", World Population Prospects: The 2012 Revision.

1.2 Urban Transport in the Region

Most cities in the MENA countries have inadequate mass transport systems, as the basic networks were developed for much smaller populations. The public sector has often neglected public transport, with investment in transport infrastructures not keeping pace with population growth.

Private bus companies exist in some cities, but they are often unregulated and uncoordinated. Consequently, many people rely on private vehicles to reach work or social events, leading to an uncontrolled growth in car use and the associated congestion, high accident rates and air pollution. The demand for travel (especially private car use) arises but, because the supply of transport systems has not kept pace, the systems collapse as a result.

Damascus, Syria (2009); Photocredit: G. Menckhoff

Although car ownership rates in the MENA region are still relatively low compared to other regions in the world (see Table 2), these rates are growing rapidly and some cities have already reached levels similar to ones observed in Western Europe.

City	Motorisation rate (cars/1,000ppl)	
	Year 1	Year 2
Cairo		68
Algiers	69 (1990)	83 (2004)
Tunis	64 (1994)	100 (2002)
Casablanca		110 (2004)
Istanbul		134 (2006)
Beirut	350 (1994)	500 (2006)

Table 2. Motorisation in selected cities in the MENA region (Urban Transport in the Mediterranean Region, CODATU, 2008).

Because public transport in the region is sometimes underfunded and of poor quality, private cars have become the dominant mode of motorised travel in many cities (Table 3).

City (year)	Cars' modal share	Source
Casablanca (2006)	60%	DGCL
Tunis (2008)	58%	Ministry of Transport, Tunisia
Tehran (2008)	50%	World Bank

Table 3. Modal share of private cars in selected MENA cities (% of all travel, including walking).

Amman, Jordan (2013); Photocredit: M. Breithaupt

Where public transport does exist in the region, it may be uncoordinated, as not all cities have functioning urban transport planning departments or regulators. To date, some MENA municipalities do not possess the professional resources or institutional structure to organise public transport in an efficient and user-friendly manner.

The public sector in the region typically does not have the budgetary means to provide large scale high-capacity urban transport modes, which is why there are few MENA cities with well-functioning metros, light-rail systems or high capacity bus-ways. Some public transport companies are obliged to charge fares that do not cover their costs, but are frequently not compensated for the shortfall due to strained municipal budgets. This leaves little funding to maintain or improve the existing infrastructure and equipment.

Izmir, Turkey (2010); Photocredit: K. Sakamoto

Without public contributions, formal private-sector bus operators are forced to charge cost covering fares and are too expensive for segments of the population. As a result, few investors are willing to invest in buses when the demand is uncertain. This starts a vicious cycle where insufficient transport capacity leads to long waiting times and poor service, thereby increasing the attractiveness of private transport. This, in turn, deepens the financial problems for public transport operators, further reducing public transport quality and attractiveness. In relatively new, peripheral areas, public transport is often deficient, forcing the population to use cars to reach other areas, notably the town centres.

Casa-blanca	Cairo	Tunis	Tehran	Latin America
433	193	508	744	> 1,000

Table 4. Number of Buses per Million Inhabitants (2007)

Because public transport does not exist or is not regulated in an optimal manner in some MENA cities, it is not surprising that informal transport providers step in to fill demand. Over the past 20 years, collective taxis and microbuses have taken on an ever more significant role. Depending on the city, they sometimes command a modal share of up to one third of all motorised trips (see CREATS – Cairo Regional Area Transportation Study, 2001-2003).

Although collective taxis and microbuses have become a significant mode of public transport, offering services where there are no buses or other systems, their external costs – especially congestion and pollution – can be significant. As they are frequently unregulated, they can also present dangers for passengers and other road users.

Microbuses in Cairo – Cairo, Egypt (2001); Photocredit: Sutp transport collection

1.3 The Scale of Sustainability Issues

Because of the aforementioned reasons, many cities in the MENA region face greater urban transport problems than comparable cities in Europe or elsewhere. This results in longer journey times and more pollution, preventing the population from achieving its private, social and economic ambitions. To illustrate these challenges, a number of case studies from major cities in the region are presented in this section.

Izmir, Turkey (2010); Photocredit: K. Sakamoto

Casablanca, Morroco (2013); Photocredit: D. Schmid

1.3.1 Casablanca, Morocco

In 2004, the Urban Transport Plan for Casablanca estimated that spending on passenger transport in the agglomeration – including infrastructure costs – amounted to more than US$1.74 billion, or 4.5% of Morocco's GDP, with 82% of this coming from private households. This shows the magnitude of the burden imposed upon MENA households by transport spending. Transport costs are especially prohibitive for households below the poverty line, limiting their access to the job market and public services. This perpetuates the cycle of poverty.

Casablanca has 4.1 million inhabitants and is Morocco's largest city, with the country's fourth largest car fleet. As a result, the street network is very busy, with many congested roads, especially in the city centre. The Urban Transport Plan made it very clear that a policy shift towards sustainable public transport is required; if not, the usage of private cars in the city would increase significantly, causing more road congestion, travel times and air pollution.

The costs to society of continuing under-investment in the urban transport sector, especially public transport, will be high. The Urban Transport Plan forecasts that without a major shift in favour of public transport, the external costs will amount to US$4.6 billion by 2019, mostly resulting from increased travel time and air pollution (especially its public health impact).

In addition to these external costs, the extension of the current car-oriented transport policy would result in annual direct costs to users of almost US$13 billion by 2019, mainly through increased fuel cost for car drivers.

Key findings

- Casablanca's mobility costs are comparatively high.
- Without a shift toward sustainable transport, the city will suffer from worsened road congestion, travel times and air pollution.
- Continuing under-investment in the urban transport sector is forecast to cost society US$4.6 billion by 2019.
- Extending the current car-oriented transport policy would result in direct costs of US$13 billion per year by 2019.

Traffic per day on selected roads – Casblanca, Morocco (2010); Photocredit: DGCL

		Costs (US$m pa)	
		2004	2019
External costs	Congestion	14	415
	Air pollution	39	117
Direct costs	Fuel	506	1,106

Table 5. External and user costs in Casablanca without changes to the urban transport policy (Casablanca Urban Transport Plan and World Bank, 2004).

1.3.2 Cairo

With a population of 6.7 million in the urban core (a 453km^2 area) and an additional 10 million inhabitants in surrounding areas, Cairo is the largest city in both the Middle East and Africa. Covering over 93,000km^2, its metropolitan area is the 16th largest in the world.

Cairo, like many other mega-cities, suffers from high levels of pollution and traffic. It is currently the only city in the MENA region to have a metro in service, with a modal share of 17% of all motorised transport within the city in 2001. In the same year, 22% of all motorised journeys were taken with private cars. However, by 2009 the share of private cars increased significantly. This rapid increase in individual transport was driven by significant fuel subsidies, increased urban sprawl and the reduced attractiveness of public transport.

The first line of Cairo's fledging metro network started operations in 1987 and is today used by more than 1.4 million passengers daily. The second line was opened in stages between 1996 and 2000, bringing the total length of both lines to 66km. Construction of line 3 started in 2006, and the first section opened in 2012. Line 3 will have a length of around 30km and is expected to be fully operational by October 2019.

Key findings

- Fuel subsidies, urban sprawl and low attractiveness of public transport have caused a rapid increase of individual transport modes in highly congested and polluted Cairo.
- Congestion, road safety, excessive air and noise pollution and an underdeveloped public transport network are the main transportation challenges for Cairo.

Mode	Modal share in 2001
Shared taxis	37%
Cars	22%
Buses and minibuses	22%
Metro	17%
Light rail	2%

Table 6. Modal Share of Motorised Transport in Cairo in 2001 (CREATS, Sustainable Consumption and Production Programme for Cairo City, 2001).

The main challenges for Cairo's urban transport network are:

- **Congestion:** major routes are 20% over-capacity during peak hours and most intersections are saturated
- **Road safety:** crashes cause over 1,000 deaths and 400,000 injuries annually
- **Network underdevelopment:**
  - shared taxis, buses and minibuses account for 59% of trips
  - only 4km of metro lines per million inhabitants (Bangkok has 20km and Sao Paulo 31km)
  - only 193 buses per million inhabitants (South American cities have more than 1,000), and the fleet is in very poor condition
- **Excessive air and noise pollution**

(Source: "Cairo Traffic Congestion Study, Phase 1", 2010; "MISR National Transport Study", 2011; "Sustainable Transport", internal project report of United Nations Development Programme)

Cairo, Egypt (2001); Photocredit: Sutp transport collection

Amman, Jordan (2013); Photocredit: M. Breithaupt

1.3.3 Amman

The rapidly growing urban agglomeration of Amman covers an area of approximately 800km², with close to 2 million inhabitants. In recent years, Amman has spread significantly; the westward expansion has come at the expense of valuable agricultural land. Migration from within Jordan and other neighbouring countries have been major causes of this rapid growth in Amman's population.

Residential density towards Amman's southeast is very high, but workplaces are typically to the west of the city, resulting in relatively long cross-city commutes.

In order to counteract urban sprawl, the Greater Amman Municipality has prepared the Metropolitan Growth Plan, which attempts to guide development back to existing settlement areas through urban intensification and population densification.

Household surveys conducted for the Metropolitan Growth Plan show that the average person in Amman undertakes 1.73 trips per weekday and 73% of residents make 2 trips per day. The surveys also showed that a significant proportion of the population (21%) do not make any trips.

Key findings

- Amman has spread significantly due to migration over recent years.
- Many people live in south east of the city but work in its west, causing long cross-city commutes.
- Each inhabitant makes an average of 1.73 trips per weekday; 73% make 2 trips per day, while 21% do not make any trips.
- All busses are privately operated (6 bus and 315 minibus operators), but are regulated by the Municipality.

Jordan, Amman (2010); Photocredit: K. Sakamoto

Amman Masterplan (Amman Municipality)

The main transport modes in Amman are private cars (33%), walking (26%), public transport (13%) and individual taxis (9%), which total more than 80% of all trips. The remaining journeys involve collective taxis and minibuses. Public transport in Amman comprises public buses, minibuses and collective taxis. In 2010, there were 524 large busses serving 90 lines, and 340 mini-busses serving approximately 140 lines.

Amman, Jordan (2013); Photocredit: M. Breithaupt

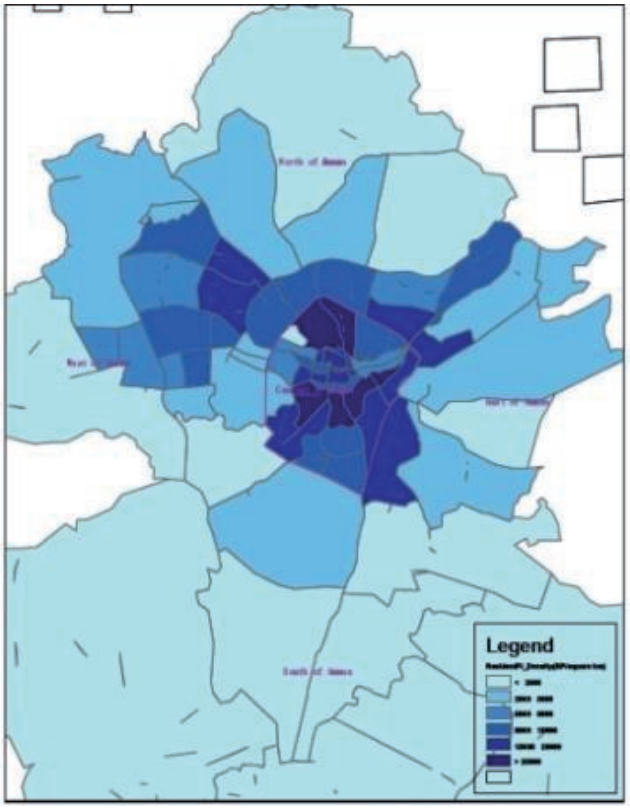


Figure 1: Residential density in Amman (Amman Municipality)

Tunis, Tunisia (2013); Photocredit: C. Huizenga

1.3.4 Tunis

Tunis is a conurbation built around two centres: the old Medina and the European city. It has a population of approximately 2.4 million. The city has a developed and diversified transport network. However, urban sprawl and increasing motorisation are presenting it with new challenges.

In recent decades, the spatial organisation of Tunis has changed significantly; as a result, commuting distances have increased. As car ownership has also grown, there has been a significant increase in private car use.

Since 2003, the Tunis Transport Company (TRANSTU) has operated the largest part of the transit network, one of the most developed and diversified networks in the MENA region. It covers about 80% of the city area, and is characterised by a radial line-structure with multimodal stations near the city centre that facilitate connections within the metropolitan area.

The network carries 330 million passengers per year, 46.5% of which are students. TRANSTU's network covers the following systems:

- 215 bus lines (229 million passengers pa.)
- 6 light passenger rail lines over 70km (92 million passengers pa.)
- One 18km long heavy passenger rail line

Key findings

- Tunis consists of two main centres.
- Covering around 80% of the city area, Tunis' public transport network is one of the most developed and diversified networks in the MENA region.
- Tunis Transport Company (TRANSTU) and four private companies operate the network.
- Missing bus corridors and high congestion lead to a low average speed of bus lines.
- Competition between regulated public transport and small taxi and minibus companies results in further congestion.
- The multitude of actors involved leads to a lack of coordination and accountability.

Population (million)	2.38 (2007)
Density (ppl/km²)	10,127
Motorisation rate (vehicles/1,000ppl)	100 (2008)

Table 7. Key facts for Tunis (World Bank, Système de transport et urbanisation dans le Grand Tunis, Sylvain Houpin)

The private sector is also present in Tunis: there are four operators serving 35 bus lines, and a multitude of small operators of taxis and minibuses, mainly serving the suburbs.

Tunis's transport system faces several challenges:

- The system lacks proper coordination (there is a multitude of actors involved, including ministries, governorates, municipalities, government agencies and operators).
- Large parts of the network are congested during peak hours, while there is plenty of spare capacity off-peak. This situation is caused by the city's large geographical spread, and by small taxi and minibus companies that compete with the established bus and tramway providers.
- The average speed on bus lines is low, as there are no clearly designated bus corridors.
- The city centre is often congested, due to increased motorisation.
- The connection between the city centre and the suburbs is in need of improvement.

Tunis, Tunisia (2001); Photocredit: Sutp transport collection

Tunis, Tunisia (2013); Photocredit: C. Huizenga

Tunis, Tunisia (2013); Photocredit: C. Huizenga

2. Designing Sustainable Urban Transport Systems

The first step in any transport reform programme is to have a vision – a view of where a city wants to be in 5, 10 or 20 years. While the vision can be abstract ("city of short distances", "city with sustainable transport", etc.) the goals set to realise the vision have to be concrete and achievable. All relevant stakeholders must be involved in this visioning process.

Many practical ideas and proposals have been developed to provide sustainable solutions to urban transport problems for cities in developing and transitioning countries. However, many urban areas are caught in a vicious cycle of complex management problems and a lack of resources to deal with them. As the problems increase, the available resources are further reduced.

Many elements must be considered when designing sustainable urban transport systems; this chapter lists some primary concerns.

2.1 Visions, Plans, Political Will, Continuity

Implementing modern urban transport systems requires a shared vision among politicians, the administration, planners and transport providers, and widespread political will to change things for the better. Because political parties and experts may be replaced during the implementation of the urban transport programme, it is also key that paramount procedures exist to ensure continuity.

While politicians can lead in defining a vision, goal setting needs the input of technocrats who can practically define what is possible technologically and planning-wise.

Once a vision has been articulated and goals set out, the next step is to develop a coherent policy on how to achieve the goals and realize the vision. A lack of political will to deal with controversial transport issues can be a major problem when stakeholders defend their ingrained interests. Changes to transport policy, transport infrastructure and transport services affect almost everybody and can be contentious; their implementation can take some time and the net benefits may only be apparent in the distant future.

"The challenge is not technology. The challenge is to build public awareness and political will."

Sunita Narain, Centre for Science and the Environment India, IEA Clean City Vehicles Workshop, Paris 24 Sept. 2001

Consequently, politicians and technocrats might be tempted to concentrate on infrastructure measures without tackling underlying policy issues. Expensive investments are often seen as a substitute for unpleasant and unpopular regulatory changes. However, such an approach can exacerbate problems, as limited financial resources are wasted while the real problems, such as bad transport policy, are ignored.

Aqaba, Jordan (2010); Photocredit: K. Sakamoto

Even if policies are pursued to achieve the vision's goals, implementation may be disturbed by the city's election cycle. The next politician in power might have a different vision for the municipality, making the previous goals and transport policy obsolete. This lack of consistent policy can destroy the good work already completed and the solution to the city's transport problems must start again from the beginning.

For further details please see the SUTP Sourcebook Module 1e – Raising Public Awareness about Sustainable Urban Transport on www.sutp.org

Damascus, Syria (2009); Photocredit: G.Menckhoff

Damascus, Syria (2009); Photocredit: G.Menckhoff

2.2 Sustainable Transport and City Development Strategies

Over recent decades, the relationship between urban mobility and urban growth has been that of a "vicious cycle" in many developing and developed countries. The increase in car traffic has often led to uncontrolled urban growth, as people were able to travel longer distances in less time. However, this urban sprawl required more private cars as only they could provide the mobility necessary to serve the new townships.

This dual growth frequently creates a high reliance on individual cars, the demise of public transport and the reduction of non-motorised transport, such as walking and cycling.

The car-oriented development produces spatially diffused and functionally segregated settlement structures in belts around cities and towns. This continuing trend causes more traffic growth, resulting in increased pressures on the environment.

As a result of these growth patterns, resources such as land and energy, which ought to be preserved for future generations, are depleted. Large areas are occupied by the structures of sprawl and the consumption of limited fossil fuels continues to increase, especially for transport. This excessive use of resources damages the environment that provides the basis for human life, and future generations.

There is a consensus among western countries that restricting automobile usage should be at the core of a sustainable urban model. These restrictions should cover certain times of the day, specific geographic areas and cars with low occupancy. In parallel to the measures aimed at reducing car traffic, measures to increase the attractiveness of public- and non-motorised transport modes must be developed. This includes priority at junctions, increased frequency of services, investment in new rolling stock, extension of pedestrian zones, etc.

In western countries, such a combination of measures increases the usage of public- and non-motorised transport modes that help to 'shrink' the city. When areas for living, working, entertainment etc. are no longer segregated, the population is able to walk, cycle or take a bus between different attractions. The need

Tunis, Tunisia (2013); Photocredit: C. Huizenga

to own and drive a car is reduced which in turn accelerates the usage of non-car focused transport modes.

The overall effect of these measures is a city with a higher quality of life where the population does not need to spend hours commuting between home and work and where there are large spaces which are car-free and, therefore, can be used for play, entertainment, meeting with friends, etc.

For further details please see the SUTP Sourcebook Module 2.b – Mobility Management on www.sutp.org

2.3 Infrastructure Design

Every city should have infrastructure and service planning guidelines for public and non-motorised transport that are at least as detailed as the guidelines for car traffic.

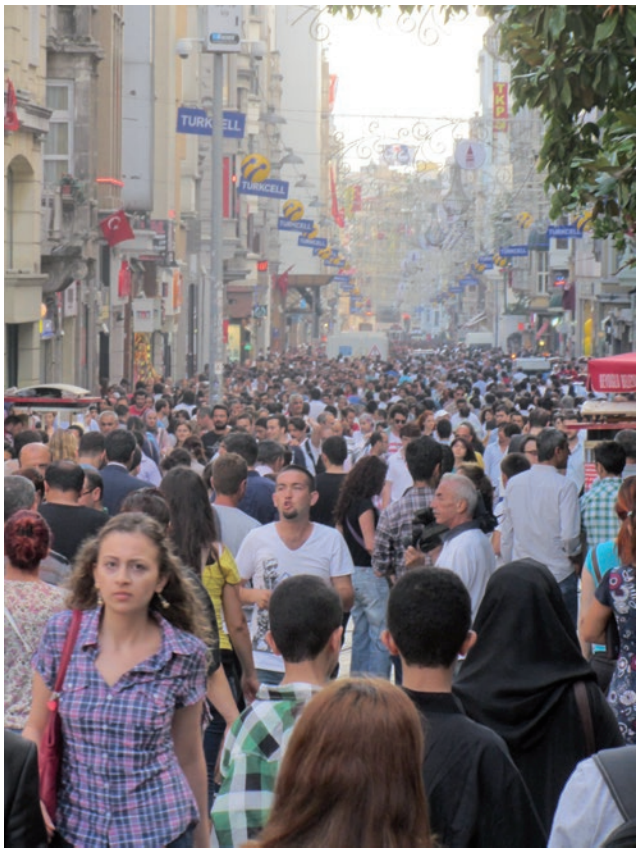
It is telling that most countries and cities have detailed guidelines for the planning, design and maintenance of roads and associated infrastructure for cars, such as parking, garages, etc., but not necessarily for other forms of transit.

Where guidelines exist for public transport, however, they are mainly geared to ensure the health and safety of the passengers. Very limited design rules and regulations exist to increase the comfort of passengers who are typically not seen as customers or clients but as entities that simply need to be moved from one place to another. As a consequence, public transport design is optimised to ensure operational efficiency for public transport companies, but not passenger comfort. Examples include high steps in the entrances to board buses and trains, poorly designed HVAC (heating, ventilation and air conditioning) systems, limited information about public transport services and inadequate updates about service disruption or delay. Few public transport operational guidelines focus on the passengers instead of the transport operators.

The conditions of both public transport and non-motorized transport are far from ideal. These modes are mostly seen as add-ons to car traffic and are only mentioned in the regulations if they could prevent the free flow of the automobile.

However, every transport policy should prioritise public- and non-motorised transport modes, tailored to the local political, geographic and climatic conditions. Alongside health and safety, the main focus should be on customer satisfaction and ease of use. If these aims conflict with car traffic, the compromise should never disadvantage public- and non-motorised transport.

For further details please see the SUTP Sourcebook Module 2.a – Land Use Planning and Urban Transport, 2.b – Mobility Management and 2.c – Parking Management on www.sutp.org



Istanbul, Turkey (2012); Photocredit: M. Merforth

Tunis, Tunisia (2013); Photocredit: C. Huizenga

Tunis, Tunisia (2013); Photocredit: C. Huizenga

2.4 Financing

There is often a large discrepancy between the local population's need for an efficient, equitable and environmentally friendly urban transport system and the available financial resources to meet these needs.

Infrastructure and services for urban transport are often underfunded and transport must compete with other services, such as water, education, etc. for scarce funding. When transport is underfunded, its quality deteriorates, lowering patronage and revenues, thus further increasing its cost pressures.

Transport financing poses two challenges: the initial investments and sustainable financing for the long term. The first problem involves budgeting and sourcing funds to pay for public transport, and infrastructure for non-motorised transport modes (sidewalks, cycle paths, sheds to store bicycles, etc.). The second problem is the challenge of financing the operation and maintenance of this infrastructure.

While city authorities might be able to allocate funds for the initial investment, many governments are unable to secure the funding for the necessary on-going operation and maintenance. In the long run, a sustainable transport system will only be technologically sustainable if adequate investment is made in the system and if revenues can cover expenditures.

In order to ensure a sustainable transport system with lasting success, cities should include a "financial health checker" in their planning process to evaluate what type of investments and services it they can afford in the long run.

For further details please see the SUTP Sourcebook Module 1.f – Financing Sustainable Urban Transport on www.sutp.org

Ensuring that recurrent transport expenditure is covered by revenue might not be a vote-winner. But neglecting this will, in the long-term, lead to a collapse of the transport system – a sure-fire vote-loser.

Aqaba, Jordan (2010); Photocredit: K. Sakamoto

2.5 Public Transport and Mass Transit Systems (MTS)

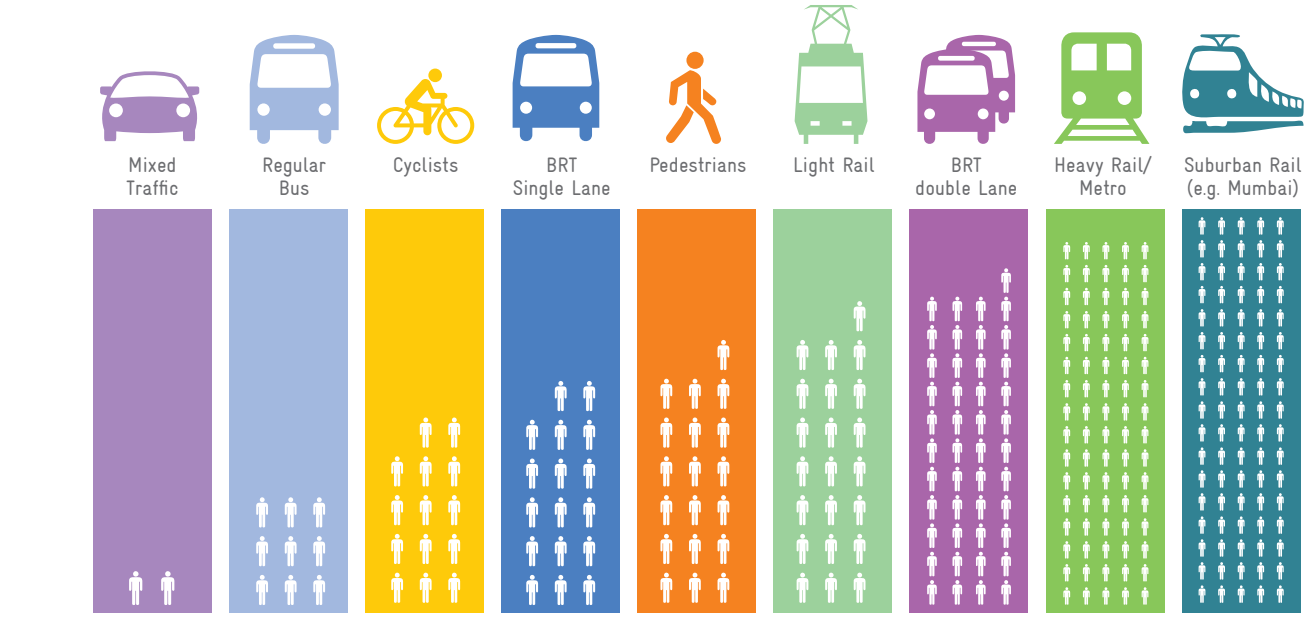
All MTSs share the characteristic of being designed to carry many passengers along a limited number of corridors. MTSs are not suited to cover large areas without the help of feeder systems (mainly buses). MTSs are generally very efficient when large numbers of passengers need to be transported. However, MTSs are expensive and thus there is a danger that their investment costs might reduce the funding available for other sustainable urban transport measures, or that the necessary feeder services to the MTS will not be implemented.

MTS investment costs tend to be very high and local authorities have to make sure that they can also afford the on-going operation and maintenance of the systems.

Fare box ratios of most rail systems tend to fall below one, whereas bus focused solutions frequently cover their operation and maintenance costs.

Why public transport priority? Corridor Capacity

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



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)

Source: Botma & Papendrecht, TU Delft 1991 and Manfred Breithaupt

Rabat, Morocco (2014); Photocredit: M. Breithaupt

Four general forms of MTS have been developed: Bus Rapid Transit (BRT), metros, commuter rail and Light Rail Transit (LRT):

- BRT typically involves bus-way corridors using segregated lanes and modern bus technology. In addition to these infrastructure-based improvements, BRT also commonly include provision for rapid boarding and alighting, efficient fare collection, comfortable shelters and stations, clean engines, modal integration with feeder services, sophisticated marketing and excellent customer service.
- 'Metro' is the most common international term for subway or heavy rail transit, but it is also commonly applied to elevated heavy rail passenger transport systems. A metro requires exclusive right-of-way (ROW) and safety measures due to its high speed. In order to provide the ROW, many systems are built underground or elevated, with very high investment costs. Because of this they frequently do not cover their operating costs and require a high corridor density. In order to function properly, metros must be integrated with other transport modes and the areas around stations should be dense enough in order to maximise the benefits. If metros are properly designed and operated, they have the highest passenger throughput of all MTSs.
- The distinction between metro and commuter rail is fluid, but commuter rail generally carries passengers longer distances within urban areas, or between urban areas and their suburbs. Commuter rail carriages are generally heavier than those of metros or LRT, and operate on tracks that are part of the regular railway system.
- LRT systems are electric railways consisting of single cars or short trains on exclusive ROW at ground level, on elevated structures and in tunnels. LRT systems include tramways, although tramways generally operate in mixed traffic and do not have exclusive ROW.

For further details please see the SUTP Sourcebook Modules on Transit, Walking and Cycling and the BRT Planning Guide on www.sutp.org

Istanbul, Turkey (2012); Photocredit: M. Merforth

2.6 Safety and Security

Although urban transport is generally safer than interurban transport, some forms of urban transport are more prone to accidents. Pedestrians and cyclists are most vulnerable. Car and truck drivers often overlook people crossing the street or slow-moving cyclists. For a long time, planners and engineers tried to increase safety through a separation of motorised and non-motorised transport. This led to "cars and trucks only" roadways that encouraged higher speeds while simultaneously forcing pedestrians to use cumbersome underpasses or bridges. Cyclists were discouraged from using the roads by the high-speed traffic and occasionally aggressive behaviour of motorised drivers.

Public transport is generally safer than car transport and the few public transport accidents are usually a result of poor maintenance (such as bus brake-failure or tramway signalling problems).

The degree of personal security on public transport depends on local conditions. Female travellers are particularly vulnerable to harassment or attacks. In the MENA region this is not uncommon, and in some cities women travelling alone are a rare sight. The responsible parties (politicians, police, planners and transport operators) must ensure that women and other vulnerable groups feel secure while traveling.[1]

With female use of public transport expected to increase significantly in the MENA region, so does the importance of female security.

Cairo, Egypt (2001); Photocredit: Sutp Transport Collection

For further details please see the SUTP Sourcebook Module 5.b – Urban Road Safety on www.sutp.org

Amman, Jordan (2007); Photocredit: A. Broaddus

[1] For a detailed discussion on female participants in urban transport see "Gender and Urban Transport: Smart and Affordable", Module 7a of Sustainable Transport: A Source Book for Policy makers in Developing Countries, GIZ September 2007.

2.7 Non-Motorised Transport

In a drive to modernise their cities and their urban transport systems, many developing cities have implemented policies which reduced the appeal of walking or cycling, encouraging people to travel by motorised means even for short distances.

The advantages of non-motorised transport modes should be obvious to all parties: the investment costs to implement walking- or cycling-friendly transport policies are minimal and operating and maintenance costs are negligible.

Pedestrians and cyclists generate no air pollution, very little noise and no greenhouse gases. Non-motorised transport users also take up far less road space, thus significantly reducing congestion.

Nevertheless, the share of non-motorised transport is far below the optimum level in most cities, for three main reasons:

- Limited infrastructure for non-motorised transport: in developing cities many streets do not have footpaths and the few that exist are often used for other purposes, such as parked cars, shopping kiosks, drainage, telephone poles, etc. Very few designated cycle lanes exist and are not often maintained or are used by other transport modes, such as motorcycles or even cars.
- The system is optimised for automobile speed: in order to increase the speed of car traffic, many cities have abolished traffic lights for pedestrians, or traffic lights are programmed to optimise road traffic throughput, to the detriment of pedestrians.

Where feasible, transport planners and transport engineers should design roads and transport networks to bring motorised and non- motorised transport together. Cyclists using the road space decrease the average traffic speed, thus also making it safer for pedestrians.

Amman, Jordan (2007); Photocredit: A. Broaddus

Tunis, Tunisia (2013); Photocredit: C. Huizenga

Road medians that provide safety shelters for pedestrians crossing the street have often been converted to an additional road lane. Without a place to stop and wait, pedestrians crossing streets must weave dangerously between car drivers who see pedestrians more as a nuisance than as equals in the urban transport system. This particularly affects elderly or frail people, and those carrying heavy loads.

- Barricades erected to increase car speeds often prevent pedestrians from crossing roads, forcing pedestrians to take long detours or to climb over the barricades and cross the road where it is unsafe. As a consequence, people frequently find it safer and easier to take their car or a taxi, even if the distance travelled is short enough to walk.

Cities in the MENA region face two additional social and environmental issues that reduce the attractiveness of non-motorised transport:

- Social perceptions still associate the use of private cars with social status. This makes it difficult for politicians and planners to convince people who already own private cars to resort to public transport (if available) or non-motorised transport.
- High temperatures in many MENA cities make the use of non-motorised transport (such as bicycles) more challenging.

There is a growing understanding that non-motorised modes play an integral part in any sustainable urban transport policy. Cycling and walking are inexpensive and are crucial to improving accessibility and for social cohesion. They are also cost effective for the city as both infrastructure investment and operation and maintenance costs are low.

Providing the conditions for non-motorised transport requires cities to shift their attitudes toward the entire urban transport system. Authorities must introduce and follow planning and design standards that give at least equal weight to the most vulnerable transport modes – cycling and walking – compared to car transport. Where streets are designed to optimise conditions for car traffic, non-motorised traffic will remain disadvantaged and unsafe.

Planning for non-motorised transport frequently involves a detailed analysis of junction layouts, new traffic-light programming, creating pedestrian crossings etc., and thus can be rather time consuming. The best approach is to establish clear and detailed guidelines for routing pedestrian and bicycle traffic at all road junctions, traffic lights, and sidewalks etc.

Istanbul, Turkey (2012); Photocredit: M. Merforth

Istanbul, Turkey (2012); Photocredit: M. Merforth

Amman, Jordan (2007); Photocredit: A. Broaddus

Current policies of maximising car speeds and throughput must be abandoned for pedestrians and cyclists numbers to rise.

Planning for pedestrians and cyclists requires new guidelines that deal with issues like zebra crossings, traffic lights, preference for cyclists at junctions, etc.

For further details please see the SUTP Sourcebook Modules on Walking and Cycling on www.sutp.org

Cairo, Egypt (2001); Photocredit: Sutp transport collection

2.8 Transport Demand Management

It is well documented that in the absence of measures to dampen transport demand, it will grow in parallel with economic and population growth. Because it is unfeasible to provide enough road capacity to satisfy all potential transport demand, other more intelligent initiatives must be implemented. As many developing cities have growing economies and populations, this need for intelligent initiatives is especially acute.

Transport Demand Management (TDM), also called Travel Demand Management, aims to maximise the urban transport network's efficiency by discouraging unnecessary private vehicle use. TDM also aims to promote more effective and less damaging transport modes, such as public- and non-motorised transport.

There are two main approaches within TDM, called "push measures" and "pull measures":

- **Push measures** make private vehicle use less attractive. Typically they involve increasing the costs associated with driving a car (e.g. road tolls or parking fees), or by reserving lanes for high occupancy vehicles, or temporary and/or regional driving restrictions, among others.
- **Pull measures** make using the other modes more attractive. This can be through the expansion and improvement of public transport services, integrated fares for the entire public transport network, and modified street design for pedestrians and cyclists.
- **Combined push and pull measure**s may involve the redistribution of roadway space for cycle lanes, wider footpaths, planting strips or bus lanes, and the reprogramming of traffic lights to favour public and non-motorised transport.

Istanbul, Turkey (2007); Photocredit: M. Breithaupt

It is important to note that TDM must be implemented as an integrated package of measures. Push measures alone will only frustrate car users by making it more difficult for them to drive without offering them a viable alternative if public and non-motorised transport modes have not been improved.

Similarly, pull measures alone will not induce significant modal shifts. While public and non-motorised transport may become more attractive, car traffic remains unhindered, giving drivers little reason to switch to alternative transport modes.

A comprehensive TDM strategy requires a multi-faceted and holistic approach wherein the measures reinforce each other. Experience has shown that TDM strategies work best if they comprise three types of measures:

- **Mobility measures** include improved infrastructure for public and non-motorised transport, upgraded rolling stock, enhanced safety for pedestrians and cyclists, and improved integration of the public transport network etc.
- **Economic measures** include road-pricing reforms and parking regulations. Many economic measures are geared towards capturing the externalised costs of car use. Income from road-user charges can be used to support public transport operations.
- **Smart growth and land use polices** include orienting real estate development toward public- and non-motorised transport, parking restrictions, traffic calming, transport planning reforms, reducing the extent of urban sprawl and ideally shrinking the city again.

Tunis, Tunisia (2013); Photocredit: C. Huizenga

For further details please see the SUTP Sourcebook Module 2.d – Transport Demand Management on www.sutp.org

2.9 Alternative Institutional Frameworks and Pricing Schemes

Public and non-motorised transport in many cities was well established before the advent of mass motorisation. Although the rapid growth of car usage has eroded public transport usage, the infrastructure is mostly still in place and governments can attempt to influence modal choice in favour of public transport, often by subsidising fares.

As cities' economies and populations grow, demand for adequate transport infrastructure and services will increasingly rise. Finding adequate sources of finance becomes ever more difficult as transport is one of many sectors in need of public funds.

Supported by international development banks and agencies, many developing cities have drawn up alternative strategies to plan, implement and operate transport infrastructure and transport services. In previous decades, development aid often funded expensive transport infrastructure but insufficient care was taken to fund their on-going operation and maintenance. Nevertheless, the focus is now shifting towards the financial sustainability of transport projects.

One promising approach is to involve the private sector, especially in providing infrastructure. There is ample evidence that provision of infrastructure through the private sector can play a positive role in assuring financial sustainability by utilising the private sector's advantage in certain aspects of the infrastructure's life cycle, including construction, maintenance and operation.

Using the private sector to provide and operate transport infrastructure does not absolve the public sector from the responsibilities of planning, regulating and overseeing urban transport systems. These should not be left to private companies.

Another issue with private sector provision of transport infrastructure is that, although the costs may be reduced, they must still be financed and the on-going operation and maintenance funded.

When cities commission the private sector to provide urban transport infrastructure and services they must still take responsibility for planning, regulation and monitoring.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

There is evidence that the current charging structures used in urban transport are neither efficient nor fair. The main problem is that road transport in cities does not pay for the significant external costs it causes, effectively becoming subsidised, thus increasing car use by making other modes comparatively more expensive. Road users ought to cover their external costs through, for example:

- Local vehicle taxes
- Local taxes on national income and company taxation
- Local fuel charges
- Parking fees
- Local road pricing (tolls, congestion charges, etc.)

Amman, Jordan (2010); Photocredit: K. Sakamoto

Although not all charges are equally effective (local fuel surcharges can be evaded by using filling stations outside the city), they serve two main objectives:

- Revenue generation to cross-subsidise public- and non-motorised transport
- Transport demand management


Damascus, Syria (2009); Photocredit: G. Menckhoff

For further details please see the SUTP Sourcebook Private Sector Participation in Urban Transport Infrastructure Provision on www.sutp.org

One approach is to combine innovative pricing schemes with private sector provision of transport infrastructure and services. For example, additional revenues collected from road users can be used to subsidize private companies that operate modern, customer focused and efficient public transport services when necessary.

2.10 Public Transport Integration and Integration with NMT

AbuDhabi, Emirates (2013); Photocredit: M. Breithaupt

Travelling in any large city by public transport is likely to involve a change of mode and/or line. If these transfers are not well coordinated, they can significantly increase the cost and duration of the journey. As private cars offer uninterrupted, door-to-door transport, other competing transport modes must make journeys as seamless as possible.

Public Transport Integration facilitates the combined use of any public transport mode, be it bus, tram or metro etc. Such integration measures might include a single ticket for an entire transit journey, adequate transfer facilities and coordinated timetables for the various transport modes and routes. Even the best public transport systems will struggle to attract sufficient passengers if they are managed as standalone routes without proper integration to other transport modes.

In cities with many public transport operators, transfers are rarely coordinated and can be cumbersome.

Even in many developed cities, the integration of public transport and non-motorised transport is often overlooked and passengers

Cairo, Egypt (2001); Photocredit: Sutp transport collection

are assumed to just appear from nowhere at public transport stations. Not surprisingly, traveling by car is perceived as the quickest and most comfortable option when public transport use is hampered by a lack of coordination and integration.

International experience has shown that public transport works best if there is an agency coordinating and integrating the various transport modes; its tasks include:

- Preparing integrated timetables for the whole city and all public transport modes.
- Establishing common operating standards for all transport operators (e.g. quality and capacity of rolling stock, standard uniforms for all employees).
- Defining standards for all interchange stations (e.g. standard designs for intermodal stations, standards for pedestrian access and egress paths, and provisions for bicycle storage etc.).
- Introducing a single ticket for public transport within the city. This does not preclude traffic zones, but it must be possible to use a single ticket for the entire journey.
- Collecting and distributing fare revenues between transport operators, according to pre-defined conditions, allowing unprofitable routes to be cross-subsidised. For this to work, operators must share revenue and patronage with the transport agency.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

For further details please see the 3.d – Preserving and Expanding the Role of Non-Motorized Transport on www.sutp.org

Amman, Jordan (2007); Photocredit: A. Broaddus

2.11 Regional Lessons Learned

The Greater Amman region in Jordan provides an example of the implementation of an Urban Transport Master Plan.

2.11.1 Urban Transport Master Plan for Greater Amman

Greater Amman, Jordan, is renowned for quality services in a number of sectors, including tourism, medicine, e-commerce, finance, commercial banking and trucking.

The Greater Amman Municipality (GAM) has been planning road infrastructure improvements ahead of time to allow for growth in traffic. However, it has not been able to avoid increased congestion. In 1999 it was estimated that around 321,500 vehicles were registered in Jordan. In 2002, the vehicle fleet had increased to nearly 543,000 – a 69% increase, or 19% per annum. In 2005, nearly 680,000 vehicles were registered – a total increase of 115% since 1999.

Using realistic growth rates for the economy and population size, forecasts predict a 3-fold increase in the number of registered vehicles in Jordan by 2025. With Amman already suffering from congestion, and with limited space to increase road capacity, alternative transport modes must be considered.

In light of this, the GAM prepared a sustainable transport strategy for the short, medium and long term, including a planned move towards public transport. Importantly, the plan does not only focus on infrastructure related investments, but starts with a

Key findings

- Urban Transport Master Plan started from a vision for Amman, including key targets to be reached in 2025.
- Based on key objectives, the plan set out core principles and policies for the entire transport system.
- The municipality defined clear targets that included their rationale, target areas, measurable factors of success and comparable international benchmarks.
- Consultants prepared specific strategies for certain topics.
- A Multi Criteria Appraisal Framework (MCAF) was used to select appropriate strategies after consultations with the public. The MCAF had three categories: Economy, Social Impacts and Environment.
- Many chosen measures deal with regulation, planning and coordination between transport modes instead of infrastructure.
- Cost and timeframe of measures are clearly defined and calculated.

Amman, Jordan (2007); Photocredit: A. Broaddus

clear vision for sustainable transport in Amman, including a list of key objectives to be achieved by 2025. Based on the key objectives, the plan stipulates core principles and policies that allow the municipality to develop the entire transport system to meet both current and expected future needs. The municipality defined parameters for the targets (please see Box on the right), including:

- The rationale for each target
- The area in which the target should be applied (mainly Amman wide)
- The method by which the target fulfilment has to be measured, including the data source (often specialised surveys, or police data)
- Benchmarks, showing international comparisons for the target
- Current position relative to the target.

In order to enable the municipality to achieve these targets, the consultants prepared strategies including the following:

- Principles of demand management and their application
- Road network improvements
- Public transport (bus, BRT and LRT)
- Road safety
- Pedestrian environment
- Parking
- Freight transport Systems
- Intelligent Transport Systems (ITS)

For example, in order to manage future traffic demand, an analysis of the effects of increased fuel levies, public transport fares, parking fees and taxi costs was prepared. After consultations with the public, strategies were selected in order to achieve the targets within the time-frame given. It is important to note that the various strategies and options were not seen in isolation, but were considered as part of an integrated overall policy with the aim to fulfil the key objectives of the Urban Transport Master Plan for Greater Amman.

In order to select the best combination of strategies and options, a Multi Criteria Appraisal Framework (MCAF) was used. The key objectives were placed into three categories – Economy, Social and Environmental – with each category having a subset of objectives. Each category was weighted according to political imperatives and the best strategy combination was chosen according to its performance in these categories.

To implement the preferred strategy, an Actions and Implementation Programme was prepared, which included a list of actions that should be implemented by 2025. Some of the actions are infrastructural, but many deal with regulation, planning and coordination between the various transport modes. Each action's cost was calculated and has a specific date by which it should be implemented. The total cost of the programme is estimated to be around JD2.7 billion (US$3.8 billion).

Some key objectives of Greater Amman's Urban Transport Master Plan:

- Improve the general mobility of persons and freight
- Improve all transport users' safety
- Improve conditions for pedestrians
- Reduce automobile reliance and encourage alternative modes of transport
- Enhance accessibility of goods and services, particularly through a comprehensive and affordable public transport system
- Reduce fuel consumption and GHG/pollutant emissions in the transport sector.

Amman, Jordan (2010); Photocredit: K. Sakamoto

Istanbul, Turkey (2012); Photocredit: M. Merforth

3. Learning from Good-Practices

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Islamic Development Bank (IsDB) have worked both individually, as well as in collaboration, to improve urban transport in the Middle East and North Africa (MENA) region, and to develop sustainable urban transport systems. The cooperation between the two entities has included three jointly organized training workshops in Amman, Istanbul and Rabat.

The jointly organized training workshops helped to raise awareness about how transport demand, if left unhindered, tends to grow in line with the population and the economy. Before investing large amounts of funds in transport systems, parties should aim to break this link by managing transport demand through proper urban planning and accompanying policy measures.

Actual site visits to good practices in the region, namely the BRT System of Istanbul and the LRT in Rabat, were part of the training workshops. Participants were able to experience the public transport system and exchange with the public transport providers and representatives of the municipalities on their experiences, challenges and lessons learned.

3.1 Case study 1: BRT Istanbul, Turkey

With a population of 14.2 million, Istanbul is the largest city in Europe and the 9th largest city in the world. It is a rapidly growing metropolis divided by the Bosporus Strait, one of the world busiest waterways. Istanbul is located between the Sea of Marmara and the Black Sea and it is the economic and cultural centre of Turkey.

Istanbul has one of the largest transport networks in the world and is currently experiencing rapid growth in car ownership: 370 new vehicles are registered every day. Like many other metropolitan areas, the city has been working to upgrade its transport infrastructure and public transport services to meet demand and reduce congestion and pollution. Istanbul has been improving its public transport systems since the late 1990s, resulting in a complex public transport network consisting of rail, light rail, metro, bus, minibus, Bus Rapid Transit (BRT), tram, ferry and cable car services. The Istanbul Metro network consists of several urban railway lines with a total length of 100km, serving more than 1 million passengers per day.

One of the main urban transport projects in recent years was the Marmaray Project, a commuter rail system connecting the European and Asian sides of Istanbul. The line is an uninterrupted, modern, high-capacity (max. 75,000 pax/h in each direction, max. speed 100km/h) commuter rail system with feeder lines on both sides of the Bosporus.

Istanbul, Turkey (2012); Photocredit: M. Merforth

Key findings

Network structure

- Marmaray Metro project integrates the public transport network of both parts of Istanbul via an uninterrupted, high capacity rail link.
- MetroBus links both sides in a 52km long, exclusive right-of-way, but shares space with cars on the congested bridge.

Scope

- MetroBus BRT replaces 1,296 minibuses and 80,000 car trips per day.
- MetroBus and Marmaray reduce travel times significantly.

Ridership

- Marmaray: 148,000 trips/day
- MetroBus: 800,000 trips/day

Integration

- MetroBus and Marmaray stations offer links to other lines and modes.
- Most MetroBus stations are wheelchair accessible.

Area	5,343 km²
Total population	14.2 million
Daily trips	26 million
Number of vehicles	3.2 million
Newly registered vehicles daily	370
Transportation network length	25,000 km
Daily trips between continents	1.1 million

Table 8. Key transport-related facts for Istanbul (VIAJEO PLUS).

Istanbul, Turkey (2007); Photocredit: M. Breithaupt

However, the Marmaray Project is not the only recent major improvement made to Istanbul's urban transport network; the city's MetroBus BRT is the first of its type in the MENA region. The BRT's first route began operation in September 2007, with a total length of 18.5km. Since then the network has been extended to 52km with 45 stations.

Of the 52km of BRT routes in Istanbul, only 1.5km is mixed with other traffic; the vast majority are segregated corridors. The dedicated bus lanes have high barriers to separate them from other traffic and are located in the middle of the road, opposite to the main traffic direction. Such a design aims to prevent other transport modes to use the dedicated BRT lanes.

There are 45 MetroBus stations in total, 26 of which are accessible by wheelchair either through elevators (21 stations) or slopes (5 stations). All BRT stations are around 100m to 200m long to allow 3 or 4 buses to arrive at the same time. The largest station is Mecidiyeköy station, located in Istanbul's main commercial and business district, and serves as an interchange with regular buses and metro lines.

The system carries 800,000 passengers/day, significantly reducing travel times, traffic congestion and air pollution. Minibuses used to play an important role in Istanbul's transport system, carrying about 10% of the city's traffic, and were very polluting and accident-prone. Since the introduction of the MetroBus system, the total number of minibuses has been reduced by 1,296. In addition to this reduction of minibuses, the number of private car journeys has decreased by around 80,000/day as a result of the new MetroBus network.

	Length (m)	Seated capacity	Total capacity	Number of axles
Mercedes Citaro	18	42	150	3
Mercedes Capacity	19.54	42	193	4
Phileas	26	52	230	4

Table 9. MetroBus vehicle characteristics (VIAJEO PLUS).

Istanbul, Turkey (2010); Photocredit: K. Sakamoto

Rabat, Morocco (2014); Photocredit: M. Breithaupt

3.2 Case study 2: LRT Rabat, Morocco

The Rabat-Sale conurbation consists of Rabat, Morocco's capital, (95km²) and Sale (150km²), which are divided by the Bou Regrag valley, and recently also includes the industrial city of Temara. The region has experienced rapid urbanisation, with annual population growth of 3.2%, the highest in Morocco. The current total population of the urban conglomeration is estimated at 2 million.

According to the local Mobility Plan 2006, there was a daily average of nearly 1 motorised trip per inhabitant.[2] The most common motorised mode is the bus (45%), while individual vehicles have a 35% share and taxis 19%.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

Key findings

Network structure

- Tram is well integrated with other public transport modes.
- New bus network complements tram network.
- Bus network is structured clearly around 6 core routes.

Scope

- The tram reaches ca. 400,000 inhabitants homes directly.
- Approximately 80% of the passengers converted from other modes.

Ridership

- 80,000 passengers/day

Integration

- Stations offer shelter and information

[2] 66% of trips are by foot, a high percentage for such a large and extensive agglomeration, which is symptomatic of low income and still low car ownership rates. http://www.giz.de/expertise/downloads/Fachexpertise/giz2013-en-ifp2013.pdf

3.2.1 The tram linking Rabat and Sale – the first tram in Morocco

Studies began in 2005 for the first two tram lines in Morocco, which were completed in 2011. Line 1 serves major areas in Sale and Rabat University City; line 2 serves densely populated neighbourhoods in Sale and Rabat, along the Medina. The total length of both lines is 20 km, with a common core of 3 km at a new bridge spanning the Bou Regrag River. There are good connections between the tramway stations and other urban transport.

The tram has a peak hour capacity of 8,000 passengers per direction. The rolling stock is 60m long, each with a capacity of 580 passengers. Around 400,000 inhabitants live along the lines and can access the tramway at stations every 500m. The commercial speed is 17 km/h, with a uniform frequency throughout the day.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

Rabat, Morocco (2013); Photocredit: Rabat Salé Planning Agency

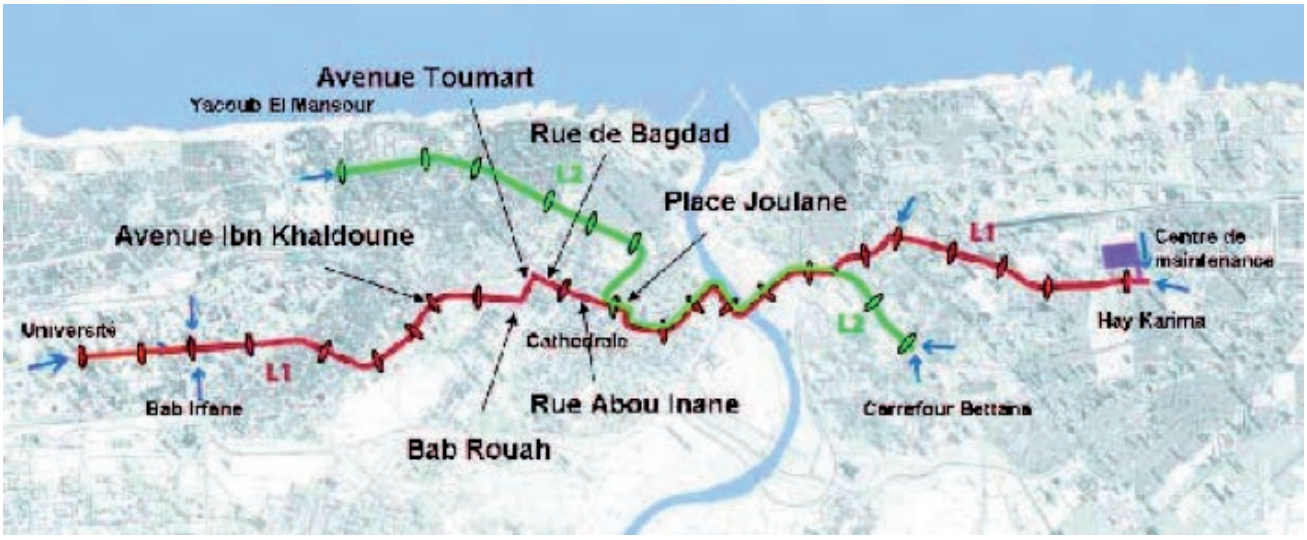


Figure 4. Route of tram lines in Rabat-Sale (STRS)

3.2.2 Reorganisation of the bus network

In March 2009, authorities appointed a new bus operator, in charge of 634 buses. Fares on the network are DH3.50 (€0.30). The bus network is structured around six lines, linking Rabat, Sale and Temara. In order to increase efficiency, the bus lines function as an extension of the tramway, complementing the network. 6.8km of dedicated bus lanes were initially constructed, with the aim of reaching 39km. Once completed, the bus network will have 1,500 stations, 500 of which will be equipped with shelters. The remaining stations will be identified with a designed stop with necessary information.

Rabat, Morocco (2013); Photocredit: Rabat Salé Planning Agency

4. Paving the Way Towards a Sustainable Future

Developing a sustainable urban transport network requires more than simply the political will to do so. Significant improvements to the transport system can only be achieved if all responsible parties work together and complement each other. The following chapter outlines the main actors and the steps needed to improve and transform urban transport systems.

Most national governments have 'sustainable transport' as a policy aim. However, although most governments are happy to promote public transport, enacting policies that curb urban car usage seems more difficult.

4.1 The Role of National Governments

The national government does not deal with urban transport directly in most countries, but it does set vital national policy frameworks, and can play a crucial role in the transformation process.

The role of the national authority is typically strategic in that it sets priorities for the entire country. Most governments have the declared objective of enabling its population to move in an economically efficient manner that is also environmentally friendly, financially affordable and socially inclusive.

This policy aim is most easily achieved in cities by promoting public and non-motorised transport, while simultaneously discouraging the excessive use of private cars. While most governments are happy to promote public transport, they are more reluctant to enact policies that curb urban car usage; as such measures can be unpopular with voters.

The main regulatory and political areas where national governments can assist in the transformation of urban transport are described below.

Tunis, Tunisia (2013); Photocredit: C. Huizenga

4.1.1 Fuel taxes

Fuel taxes are set by the national government in nearly all countries. Fuel taxes are a very powerful policy tool to foster energy efficiency in the transport sector. These tax revenues (along with other taxes on vehicles) can be redistributed to infrastructure beyond the direct costs of building and maintaining roads, including public transport, walking and cycling. This follows a very basic logic of economic efficiency and also aims to internalise the external costs of individual road transport, which are even higher (per km driven) in urban areas.

However, few countries allow cities to levy additional surcharges, which would enable them to recover their higher costs, both direct and external. To remedy this, national governments should enable local authorities to collect special fuel taxes to finance public- or non-motorised transport.

In the MENA region, fuel taxes are a difficult issue, as many governments do not tax petrol, and some even subsidise it. Consequently, in Libya, Algeria and Egypt, government subsidies keep the fuel prices well below worldwide average prices, thus all taxpayers are effectively subsidising the citizens wealthy enough to afford cars. Based on information collected by GIZ, petrol in Jordan and Tunisia is close to world market prices, while Palestine and Turkey levy significant fuel taxes.[3] All European Union countries levy high fuel taxes and frequently use the revenues generated to subsidise public transport systems. Norway, for example, has the highest retail fuel prices in the world, despite being a major petroleum exporter.

Tunis, Tunisia (2013); Photocredit: C. Huizenga

4.1.2 Allow competition for public transport

In many countries, one company (often state-owned) will have a monopoly on operating public transport services.

It is well known that monopolies are mostly detrimental to economic efficiency and bad for consumers. Because they lack competition, monopolies tend to have higher investment and operating costs, with poorer customer service.

Although it is not always possible to have true "head-to-head" competition in public transport, some competition between different providers can be introduced. One way is through initial competition for the right to operate a monopoly. This "competition for the market" is frequently used to tender the operation for tramway or suburban railway lines. However, there can also be competition in the market, where, for example, different bus companies compete directly for passengers.

There is ample evidence that competition can be beneficial for all parties: transport users receive better service while local authorities are likely to be able to reduce their subsidies or compensation payments because of competitive pressure.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

4.1.3 Useful autonomy for cities

While not every urban area is adequately equipped to solve its transport problems alone, many cities do have the financial and human resources to take steps to improve their transport systems. Such cities should be encouraged and some regulatory tasks and funding sources should be devolved to the local level (e.g. the planning of public and private transport networks, regulations covering parking and non-motorised transport).

[3] http://www.giz.de/expertise/downloads/Fachexpertise/giz2013-en-ifp2013.pdf

Istanbul, Turkey (2012); Photocredit: M. Merforth

4.2 The Role of Cities and Local Institutions

As mentioned, important components of urban transport policy can and should be delegated from national to local levels.

Municipalities have intimate knowledge of local problems and are in regular contact with its inhabitants. In order to avoid insular solutions, cities should establish regional transport authorities tasked with coordinating the transport system.

The wide scope of regional coordination encompasses public transport, its timetables and ticketing, and the road network. National transport providers, like sub-urban railway operators, can play an important part in urban transport, and so national authorities are also frequently part of the regional transport authority.

In addition to public sector institutions, private organisations should also be included in urban transport policy making. Typical examples are private transport operators, chambers of commerce or unions. If transport-related Non-Governmental Organisations (NGOs) are active in a given country or city, they too could be part of the political planning and regulatory process.

The successful establishment of regional transport authorities requires careful surveys and planning.

Setting fares and the distribution of costs and revenues between parties is frequently the most contentious topic.

There are many successful examples worldwide that serve as models to emulate.

Istanbul, Turkey (2007); Photocredit: P. Lauko

4.3 Financing Urban Transport

Fare revenues often do not cover the expenses of public transport infrastructure and operations, as the fares required to cover costs would be unacceptably high, lowering demand for public transport. Fares are typically set to optimise social benefits, rather than to maximise revenues; public transport services usually run at a financial loss, but are beneficial to cities.

If fares are insufficient to cover costs, public authorities must subsidise services from the city's budget, which is already tight in most cases. In relatively wealthy countries, the national government may be able to provide additional financial support (e.g. by allocating part of national fuel tax revenues).

Faced with the cost of subsidising public transport services, municipalities often have to reduce maintenance spending. However, decreased maintenance leads to accelerated vehicle depreciation, increased operating costs and reduced attractiveness of public transport to users, who will eventually switch to other transport modes, especially cars.

The improved funding that comes with new sources of financing must also include cost-cutting through reprioritising networks, optimising the choice of mode of transport for corridors and improving the operational speed of vehicles in service. Revenue can also be increased by reducing fraud, increasing passenger numbers and changing the service pricing structure.

Private sector funding is often seen as a singular solution to cities' financial needs. However, private investors must still recoup their costs, either via fares or by collecting transfer payments from the public sector. Nevertheless, the private sector could play a major role in providing public transport services, as it can be more efficient, customer-focused and innovative than public sector providers. Before engaging with the private sector, public authorities must ensure that they chose their partners carefully. Any private sector agreements entered into should always be tendered and must be governed by Public Service Contracts, clearly stating the rights and obligations of the public authorities and the private operators.

Rabat, Morocco (2014); Photocredit: M. Breithaupt

Amman, Jordan (2007); Photocredit: A. Broaddus

4.4 Sharing Knowledge and Transferring Experience

(2014) Training Course on Bus Improvement and BRT in Istanbul held by IsDB and GIZ

Each city is unique and faces different problems, but many common factors affect cities in developing and transitioning countries. Municipalities in the MENA region are certainly not alone in their endeavour to tackle urban transport challenges and to make it more sustainable.

International development agencies and international development banks have assisted a series of cites in a wide variety of regions worldwide in reforming their urban transport sectors in recent decades. As a result, staff and consultants from these agencies have a wide-ranging and extensive experience with sustainability issues in urban transport.

These organisations are willing to share their experiences and are urged by their governing bodies to transfer their knowledge to other cities. Cities in the MENA region are encouraged to work with development institutions working in the region and utilise their experience in their reform efforts. In addition to individually tailored advice, there are a multitude of reports and policy documents available on the topic of urban transport. Many of these documents have been translated from English into Arabic and French and are especially suited for cities in the MENA region.

Find trainings, webinars and e-learning on sustainable urban transport worldwide at: http://capsut.org/

Many organisations and institutions host training courses on sustainable urban transport, which local politicians and experts can benefit from.

One method of knowledge transfer that has been used extensively in recent years is the pairing of municipalities in developing and transition countries with counterparts in developed countries. In such arrangements, experts from the recipient city work for some time in the donor city, and vice-versa. Experience from such "training on the job" has been mostly positive.

4.5 Example: Reform of Public Transport Management in Morocco

In the current model of urban transport regulation in Morocco, the public authority and the public transport provider enter into a management contract governing the service, including the revenues of the public transport operator. Fares are the main source of revenue and, in theory, these revenues should enable the transport provider to cover its operating costs, any planned investments and also to generate a reasonable profit.

However, this model often leads to financial problems in practice as rapid urban sprawl and increased motorisation combine to cause traffic congestion, reducing the attractiveness of public transport (mainly comprised of buses) and thus lower patronage and revenue.

The future institutional framework developed in Morocco plans for the separation of urban transport assets and operation through:

- The creation of a public company that owns the assets (mainly buses) and whose main shareholder is the local municipality.
- A Public Service Contract between the local municipality and private transport providers to provide transport services using the publicly owned buses. This isolates the service provider from the risk of investing in assets that might become obsolete through political developments.

In this model, the private transport operator collects the fares, passing them directly to the public sector. The operator then receives payment for services rendered as per the agreement, subject to meeting certain quality and quantity requirements.

Casablanca, Morroco (2013); Photocredit: D. Schmid

Casablanca, Morroco (2013); Photocredit: D. Schmid

5. Conclusion

Tunis, Tunisia (2013); Photocredit: C. Huizenga

Cities in the MENA region face major mobility challenges as public transport systems are sometimes not adequate and private cars are frequently the transport mode of choice. This leads to urban pollution, noise, time wasted in traffic jams and poor access to services for parts of the population.

The urban population in the region is forecast to grow significantly in the next decades, potentially escalating these problems. In order for cities to be attractive to current and future inhabitants, traffic obstacles need to be resolved, without overstretching scarce municipal resources.

Experience worldwide has shown that solving transport issues requires more than mere investment in improved and new infrastructure. The first step towards a sustainable urban transport system is the vision and political will to change and improve existing systems. Once the politicians have expressed this will, it is up to the planers to develop a sustainable transport and city development strategy. Policies are the guiding principles for future infrastructure design, and should be implemented according to a well-defined plan.

Since many cities in the MENA region face serious financing issues, funding the necessary investments can pose difficulties for municipalities. However, some cities have had positive experience with charging car drivers and using the proceeds to pay for public and non-motorised transport.

Cities wanting to reduce private car usage have to provide alternative means of transport. This could mean developing Mass Transit Systems that are able to transport a large number of people along linear lines. These lines will need to be supported by a network of buses or tramways.

Because of climatic reasons, non-motorised transport might be a challenge in some MENA cities. Despite this, walking and cycling can still underpin various forms of public transport in many cities.

Politicians and planners must be aware that, left unchecked, transport tends to grow in line with the population and the economy. Before investing large amounts of funds in transport systems, parties should aim to break this link through proper urban planning and accompanying policy measures.

Once transport demand has been reduced to an acceptable level without reducing the population's access to services, work and enjoyment, it will be up to the planners to integrate all transport modes and systems.

Cities in the region that want to improve urban transport should be encouraged by the many examples from within and outside the region where politicians and experts have guided urban transport systems along a path of sustainable development.

About IsDB

The Islamic Development Bank (IsDB) is a South-South Multilateral Development financial institution established in December 1973 with the purpose of fostering the economic development and social progress of its member countries and Muslim communities individually as well as jointly. The present membership of the Bank consists of 56 countries, where any prospective member country should be a member of the Organisation of Islamic Cooperation (OIC).

In addition to providing financial assistance to member countries for economic and social development, functions of the Bank include participating in equity capital and grant loans for productive projects and enterprises, assisting in the promotion of foreign trade especially in capital goods among member countries, and providing technical assistance to member countries.

In June 2012, IsDB was one of the eight multilateral development banks (MDBs) that made a joint and voluntary Commitment to Sustainable Transport at the United Nations Conference on Sustainable Development (Rio+20). The financial support provided by the organisation is meant to help develop and implement sound policies for sustainable transport, build capacity of institutions, finance projects and disseminate best practices.

About GIZ

GIZ is a federally owned organisation. We work worldwide in the field of international cooperation for sustainable development. Our mandate is to support the German government in achieving its development objectives. We provide viable, forward-looking solutions for political, economic, ecological, and societal development in a globalised world. Sometimes working under difficult conditions, we promote complex reforms and change processes. Our corporate objective is to improve people's lives on a sustainable basis.

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