

URBAN TRANSPORT SYSTEM

Evolution of the transportation system in Dubai

Abdul Ghaffar Chaudhry*

Public transport is vital for sustainable development. Dubai has embraced this challenge successfully through its 6-pronged approach of development and is becoming a model of excellence for the region.

The paradigm shift in cities' strategic plans to become smarter and sustainable cannot suppress the role of transport sector. There is a permanent challenge to balance society's demand for more mobility and the public opinion – which is becoming increasingly intolerant of chronic delays – and the poor quality of some transport services. As demand for transport keeps increasing, the community's answer cannot be just to build new infrastructure and open up markets. Hence, an evolution is already taking shape in the transport sector as cities are adopting accessibility-driven strategies in order to meet travel demand and to achieve sustainable development.

Dubai is known for its pioneering development approach in the Middle East and has some interesting lessons to offer. This paper explores the evolution of the transportation system in the city of Dubai. In 2005, some of the key transport challenges that Dubai faced were traffic congestion, increasing car ownership, high road accident fatality rate, low public transport ridership, transport pollution. It was estimated that about AED 4.6 billion were annually lost as value of time due to traffic congestion. The car ownership in the Emirate reached 541 cars per 1000 people, which is one of the highest compared to those of similar cities around the world. The road accident fatality rate was 24 fatalities per 100,000 people in comparison to 6 fatalities per 100,000 people in countries such as UK and Sweden. Additionally, the road accidents' direct cost was around AED 0.87 billion per year. The public transport comprised of buses only and constituted only 6% of the total trips that were made in the Emirate, compared to 65% in Singapore and 87% in Hong Kong. Eventually, the high use of private vehicles increased transport pollution, with hydrocarbon emissions' average reaching the threshold of 800 ppm, which is much higher in comparison to other cities' averages of 200-300 ppm.

In summary, the transport challenges faced by the aspir-

ant city of Dubai are the following:

- Managing traffic congestion
- Providing reliable and affordable public transport
- Improving transportation safety
- Discouraging the use of cars and encouraging the use of public transport.
- Bringing a behavioural change in a car-dominated society, where average vehicle occupancy is 1.7 passengers per vehicle
- Providing access to passengers with special needs
- Developing transportation legislations
- Protecting the environment

In order to maintain the city's economic prosperity and make Dubai a role model for public transport in the region, the transportation infrastructure of the city has been given priority by the visionary leadership of the Emirate. Hence, to deal with all surface transportation issues, in November 2005 the government of Dubai established an independent government body named Roads and Transport Authority (RTA).

RTA is responsible for all surface transport systems in Dubai, including planning and integration of transport systems, licensing of drivers and vehicles, and transport policies and legislations. RTA has a flat structure to streamline the decision-making process. The structure is based on an agency model principle. There are three corporate-level sectors (Strategy and Corporate Governance; Corporate Administration Support Services; and Corporate Technical Support Services) and five operational agencies (Traffic and Roads Agency; Public Transport Agency; Rail Agency; Licensing Agency; and Dubai Taxi Agency), each chaired by an appointed CEO.

The Roads and Transport Authority of Dubai took a proactive and systematic approach to face the growing challenges and improve the quality of life in the Emirate. A comprehensive integrated strategic transportation plan

* Chief Engineer - Strategic Planning, Roads and Transport Authority, Dubai, UAE, Email: <abdulghaffar.chaudhry@rta.ae>.

was developed to assess the challenges and to prepare an action plan to address them. An important element of the Strategic Transport Plan is implementing transport policies and legislations to optimize the public transport and the existing road network.

Being the first city in the Middle East in pioneering a paradigm shift from cars to public transport has not been easy. A fundamental rethinking of transport policies and legislations was required to remove financial bias towards the use of the automobile, particularly in areas where the government has invested in high quality public transit. This rethinking includes support for walking, biking and transit use, particularly in the areas immediately around public transit stations.

RTA has taken a sustainable approach of managing travel demand through policies and legislations which favour mass transit commute rather than the use of single occupant vehicles. RTA's strategic transportation plan is not limited to infrastructure projects but forms an integrated balanced approach and covers six major areas as indicated in Figure 1.

1. Enhancement of the road network
2. Development and enhancement of public transportation system
3. Enhancement of pedestrian and cyclist networks and facilities
4. Development of policies and legislations to overcome congestion and to promote sustainable transportation
5. Development of intelligent transportation technologies
6. Enhancement of traffic and safety awareness

Enhancement of the road network

Enhancement of road network is usually taking place by increasing its capacity and reducing delays at junctions. RTA has been working on both by widening the existing road corridors, developing roads parallel to the strategic road corridors, creating ring roads around major developments, and providing free-flow junction layouts.

RTA has created some major strategic road corridors – such as the Sheikh Zayed road, the Emirates road, the Outer bypass road, the Al-Ittihad road and the Al-Khail road – in the past few years to reduce the traffic congestion levels and improve journey times for the public. The latter is a significant socio-economic benefit for the community. Additionally, more bridge crossings have been added to the Dubai Creek to reduce the traffic burden on the existing bridges and the tunnel. The number of traffic lanes crossing the Dubai Creek has been increased from 19 to 48 between 2005 and 2011.

RTA has further plans to create main road corridors, ring roads, and interchanges in order to meet future development needs, as well as to provide dedicated bus lanes in order to improve journey time of public buses. The road network in Dubai has increased from 8,715 lane-km in 2005 to 11,208 lane-km in 2010.

Development and enhancement of public transportation system

A main pillar of RTA's strategic transportation plan is the development of an integrated public transportation system. RTA's ambitious project of Dubai metro and bus net-



Figure 1 | Six main areas of Dubai strategic transportation plan

work has been completed and the benefits of the system are becoming real.

RTA has successfully started the operation of its Metro Red and Green lines. The Red Line is 52km long with 29 Stations and the Green Line is 22km long with 18 stations. At the moment, RTA is focusing its efforts on the delivery of the Al-Sofouh tram system, which will complement the metro.

The integration of different public transportation modes is also accounted for in the strategic transportation plan. RTA aims to create more multi-mode stations, for ease in transfer between metro, buses, taxis, and water transport.

RTA's long-term ultimate plan involves construction of 318km metro network, 270km of Tram network and new bus and water transportation routes. RTA is also working towards the concept of Transit Oriented Developments (TODs) in the city in coordination with urban planning entities for safe and efficient accessibility in order to address the need of a sustainable model for transport policy to be integrated with land-use policies as suggested by Santos et al. (2010).

Enhancement of pedestrian and cyclist networks and facilities

RTA has long realized the importance of the concept of sustainable transport for the future of Dubai and has provided 72 grade separated pedestrian crossings. Furthermore, a comprehensive bicycle network master plan for more than 580km of main cycle tracks is developed and is being implemented in phases. A pedestrian safety and mobility plan is being devised for the following three years to reduce the traffic accident rate and eliminate accident black spots from the transportation network.

The pedestrian and cycling infrastructure requires improvement in the traffic legislation to support non-motorized road users. A pedestrian safety and mobility plan is also devised for the following three years to reduce the traffic accident rate and to eliminate accident black spots from the transportation network.

Development of Policies and Legislations to overcome congestion and promote sustainable transportation

One of the main pillars of RTA's strategy is to introduce policies that will firstly reduce the need to travel by car and secondly make best use of the existing infrastructure. As the research by Eriksson, Garvill, and Nordlund (2008) indicates, combining policies is very important for

increasing public acceptability, especially when push measures (aiming to make car use less attractive by, for example, raising taxes or charges) and pull measures (aiming to improve alternative options to cars by, for example, improving public transport) are implemented in the same policy package.

RTA has developed an overall Mobility Management Plan, which includes a comprehensive toolkit for optimizing the existing capacity of the road infrastructure. International best practices show that all the



Figure 2 | Evolution of Dubai's transportation system

developed cities avail the benefits of mobility management plans such as reducing the time wasted on roads allowing people to use their time productively and to contribute to the development of the country's economy.

RTA has successfully implemented the concept of mobility management plans with leading private companies managing the demand and optimizing the existing capacity. Also, RTA is presently studying the implementation of other transport policies that will promote the public transport system and will bring behavioral change, hence will shift people from private vehicles to public transport (mode share is 9.4%).

Some of the successfully implemented policies are the following: road tolling, parking control, dedicated bus-lanes, car registration schemes, car pooling services (Sharekni), company transport schemes (Awselni) and awards for the promotion of sustainable transport initiatives by the private sector (Dubai Award for Sustainable Transport). Car sharing is one of the policies that can make a small but cost-effective contribution in reducing traffic levels and pollution (Bonsall, 2002).

More specifically, there are two major Park'n'Ride facilities constructed at major metro peripheral stations, around 800 air-conditioned bus shelters constructed, memoranda of understanding have already been signed with leading private companies to provide bus services and three annual award ceremonies for Dubai Award for Sustainable Transport have been successfully held. The geographic reach of the latter is being extended to other countries in the region.

RTA carefully monitors the phased implementation of the above transport policies and amends its plans accordingly in lieu of the changing economical and social conditions.

Development of intelligent transportation technologies?

The importance of ITS is clearly identified by RTA, which has developed a comprehensive ITS strategy. The strategy integrates all the available transport and communication systems, and identifies the ITS programs and projects that are needed to optimize Dubai transport system efficiency.

RTA has made significant progress in utilizing the intelligent transportation system in order to maximize efficiency and socio-economic returns from Dubai's transport system. The following list includes some of the systems implemented:

- Unified automatic fare collection system
- Dynamic navigation system.
- Variable message signs.

- Traffic signal control system SCOOT.
- Central parking control system.
- Journey planner system

RTA has planned around 20 multi-modal ITS packages on short, medium and long term basis, which will further optimize the socio-economic returns from the existing infrastructure. Some of them are the following:

- Multimodal control and command centre
- Shared CCTV infrastructure
- On-trip information distribution through signs, mobiles, PDA and terminals
- Demand responsive transport service
- Vehicle emissions measure and weigh-in-motion

Enhance traffic and safety awareness

RTA's care for safety can be shown from the fact that safety is embedded into the authority's vision. The global trend of rising automobile use puts increasing pressure on urban roadways as cities face increasing traffic congestion. Development patterns that focus exclusively on the movement of automobiles not only have led to serious traffic problems, but also have safety, health and environmental consequences.

RTA wants to provide Dubai residents with the basic right to walk without unnecessary inconvenience or fear for their personal safety. To achieve this goal, it has implemented a number of safety campaigns and initiatives for the road users in coordination with the Dubai Police, other government authorities and the private sector. Some of the implemented safety and awareness campaigns are the following:

- Cyclists and pedestrian campaigns
- Speed reduction awareness campaigns
- Seat belt campaigns
- Red-signal crossing campaign
- Truck safety campaigns
- Safety campaigns (HASEB)
- Speed management through engineering and enforcement measures
- Standardized conceptual designs and layouts for pedestrian footpaths
- Car-free zones
- Pedestrian crossings near public transit

Conclusion

In conclusion, RTA's journey of development continues as conceptualized in Figure 2. RTA has comprehensive plans and policies to achieve its vision to make Dubai an accessible and environment friendly city.

Dubai pioneered the concept of public transport in the

MENA region by realising early the need for sustainable development. Many countries in the region are following this path and have announced their strategic transportation plans with mass transit as the backbone of their transportation system. However, policymakers must approach the challenge of creating a sustainable mobility model for the future by working on the 6-pronged approach discussed in the paper. ★

References

- Bonsall, P. (2002), *Car share and car clubs: Potential impacts*, Final report for DTLR and the Motorists Forum, Institute for Transport Studies, University of Leeds, Leeds.
- Dubai Strategic Transportation Plan (2006), Roads & Transport Authority, Dubai, U.A.E.
- Eriksson, L., Garvill, J., and Nordlund, A.M. (2008), 'Acceptability of single and combined transport policy measures: the importance of environmental and policy specific beliefs', *Transportation Research Part A: Policy and Practice*, 42 (8): 1117-1128.
- Santos, G., Behrendt, H., and Teytelboym, A. (2010), 'Part II: Policy instruments for sustainable road transport' *Research in Transportation Economics*, 28: 46-91.