ABSTRACT: The paper investigates the recent opening of Dubai Metro and its impact on the city. This relies on data from the city’s Road and Transportation Authority (RTA), interviews with officials, as well as a case study of the proposed development around Union Station. Moreover the paper evaluates the Integrated Strategic Plan (R1000). The overall aim is to understand the extent to which the city's limited mobility has the potential to be enhanced due to the opening of a mass transit system and whether this might contribute to better societal integration and in turn social sustainability.

KEYWORDS: Mass Transit, Transit-Oriented Development, Land Use & Transport planning, Dubai Metro

The city of Dubai in the United Arab Emirates is mostly known for its spectacular architecture and exclusive developments [1,2]. Recently however it has begun operating the first light-rail system within the Arabian Peninsula. This is significant with respect to sustainability at both an environmental and social level.

Dubai is a car culture; activities and movements revolve around the automobile. Even small trips are done by car and most buildings are surrounded by vast car parks to facilitate easy access. Recognizing these serious limitations and their implication on sustainability, authorities in Dubai have embarked on a drive to not just limit movement on roads, but also to develop an integrated transit system with the Dubai Metro at its center. In addition to enhanced mobility the Metro projects aims at uniting disparate parts of the city thus overcoming its fractured urban form and bringing its inhabitants closer together [3].

Recent data is suggesting that the rate of public transport usage has increased from 7.5 to 10.5% following the opening of the Metro’s Red line. It remains to be seen whether this increase will continue with the opening of more stations as well as the Green line currently under construction. Otherwise, the Metro may simply end up being an expensive mass transit system whose main aim is to transport tourists from one shopping center to another, or acting as a sightseeing device.

In order to achieve this, the RTA (Road & Transportation Authority) began implementing a comprehensive strategy linking the city’s various transport modes as part of an Integrated Public Transport Plan. Dubai’s public transit system consists of a complex network of water boats, busses, the recently opened Metro in addition to a proposed surface tramline. An elaborate system of feeder busses links these different components together into one coherent network. Moreover, a framework of urban development using TOD (Transit Oriented Development) is being implemented to upgrade/enhance various locales within the city. The focus on innovative transport solutions in a highly fractured and car-dependent city such as Dubai should thus provide important lessons for rapidly urbanizing societies.

The proposed paper aims at discussing these developments by critically assessing the proposed plan, in addition to providing an empirical evaluation of the effect of the recently opened Red line. This investigation will rely on data from RTA, interviews with officials, as well as a case study of the proposed development around Union Station. The overall aim is to understand the extent to which the city's limited mobility has the
potential to be enhanced due to the opening of a mass transit system and whether this might contribute to better societal integration.

MOBILITY IN DUBAI

One of the main problems facing Dubai is traffic, which involves endemic queues, air pollution, noise and accidents. Many of its major thoroughfares are in a constant state of gridlock, particularly the central area in Deira and Bur Dubai. Based on Dubai Municipality estimates some numbers are quite staggering: 470,000 vehicles are registered in Dubai; furthermore additional vehicles arrive from the nearby emirates of Sharjah and Abu Dhabi, which is equivalent to almost 1 million vehicles on the road (based on two trips per day) which is roughly the equivalent of Dubai’s population [4,5].

It was estimated – prior to the financial crisis – that by 2020 the city’s population will reach 4 million, and the number of car trips 13.1 million per day. The rate of growth in the number of cars is rising at an average of 10 per cent per year, which far exceeds the world average of 2–3 per cent. Such rates can be attributed to the relative affordability of cars and cheap fuel. Furthermore, public transport – while increasingly being expanded – is not as ubiquitous as it should be. To combat these problems and to develop a transport strategy Dubai Government formed the Road & Transportation Authority (or RTA), which was formerly a department integrated with Dubai Municipality. One of the major objectives of the RTA is to integrate the various transportation modes currently in operation – bus, water and light rail (under construction). Another strategy is to prevent people from driving on certain roads through the implementation of a toll system – also known as Salik. Initially installed along the city’s main artery, Sheikh Zayed Road, it is currently being expanded and will eventually cover other parts of the city. Other measures include dedicating special lanes for buses and taxis.

Dubai is a car culture; activities and movements revolve around the automobile [6]. Even small trips are done by car and most buildings are surrounded by vast car parks to facilitate easy access. Some retail centers such as the Deira City Center are mostly accessible by car. Pedestrian entries exist but are hardly visible or prominent. Instead the entire complex is surrounded by huge car parks that have been added over the years to enable entry to its various additions [1]. Recognizing these serious limitations and their implication on sustainability, authorities in Dubai have embarked on a drive to limit movement on roads as noted above, but also to develop an integrated transit system with the Dubai Metro at its center. Given that about 9% of its population use public transportation it remains to be seen whether they will succeed in changing the dependence on cars. Otherwise, the Metro may simply end up being an expensive mass transit system whose main aim is to transport tourists from one shopping center to another, acting as a sightseeing device.

DUBAI METRO: SPECTACLE OR MASS-TRANSIT SYSTEM

From its outset the opening and operation of the Metro was meant to be a spectacular affair very much in line with the city’s image. Its construction is seen by officials as another milestone in the city’s march toward modernity, international recognition and ultimately legitimacy. There is no doubt though that the actual construction of the metro is quite a remarkable feat. It is considered the first light rail network in the GCC and represents the pinnacle in advanced driverless technology. Built at a cost of $7.7 billion it contains a VIP section in addition to a women’s only carriage as well as WiFi access across the entire network. It was built in less than 4 years although at the time of writing only the first of its two lines is partially operational. Remaining stations on the red line which runs from Rashidiyya near Sharjah/Emirates Road towards Jebel Ali near the border with Abu Dhabi are expected to open within 2010, whereas the Green line which intersects with the red line at Union station in the city’s center is expected to open in 2011/12.


The lines are mostly above ground on specially constructed viaducts, but they go underground in the city center due to a high concentration of residents and buildings. It traverses the creek and emerges again (red line) near the Burjuman Shopping center in Bur Dubai from where it continues its journey along Sheikh Zayed Road (Fig. 1). It is here that the visibility of the Metro is maximized – the image of the futuristic carriages moving swiftly along the street next to the city’s most spectacular high-rises, no doubt suggests an image of modernity. According to Mattar Al Tayer, chairman of RTA: “RTA was keen to make the Dubai Metro a global icon of transportation systems” and “… the launch of the Dubai Metro … will make Dubai a world class destination.”³ DTZ a real estate advisory firm suggests that: “… the image the Metro portrays of Dubai should not be underestimated either. It represents the first and only urban transport system in the GCC and we consider that this will have a positive impact, attracting inward investment and globally mobile occupiers.”⁴ In accordance with these visions its stations are gleaming examples of a futuristic transit node, fully air conditioned with plenty of escalators. Crossing roads is done via specially designed sky bridges. The stations are clearly visible, their entryways in some instances blocking views towards buildings or they occupy entire street corners. Where in traditional light rail networks underground entry is marked discreetly by a sign and a staircase, it is acquiring a monumental dimension in Dubai – there is no attempt at subtlety. Yet even with this focus on grandeur and spectacle there is still the possibility once all stations are operational that the Metro will indeed cater to the city’s various social classes and that it will somehow unify the disparate districts constituting its urban fabric. In order to achieve this, the RTA has embarked on a comprehensive strategy linking its various transport modes as part of an Integrated Public Transport Plan.

Figure 1  Metro Network in Dubai

Dubai’s public transit system consists of an elaborate network of water boats, busses and the recently opened Metro. The water boats (also known as abra) traverse the creek at a cost of about $0.3 linking the city’s two sides – Bur Dubai and Deira. This occurs in the historic core and is what most tourists and visitors encounter but they are mainly used by the city’s low income residents. The busses are more extensive and have recently been modernized. According to the RTA they operate around 1,800 busses (2010), which more or less serve most areas in the city. In order to integrate bus operations with the metro they introduced what has been called feeder busses – taking metro passengers to various destinations in proximity to respective stations. The effect of these remains to be seen once all stations are operational. In addition to feeder busses

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the RTA has begun construction on a surface tram line called Sufouh linking the ‘upmarket’ area of New Dubai along Internet City, Media City, Jumeirah Beach Residence and so on. It will also link with the Palm Island monorail. The setting in which this network is built is considered to be one of the most luxurious in the city, containing the Burj Al Arab, as well as the Madinat Jumeirah complex. In addition it will facilitate access to the high-end Jumeirah Beach Walk an open-air pedestrian mall. This seems to be reinforcing the idea of exclusivity. According to officials: “The aim of the tram project is to encourage people in the upmarket areas to use an alternative mode of transport instead of private cars.”

ASSESSING THE METRO

Given that the Metro is still in its opening phase any attempts at assessment are ultimately speculative. Yet it is critical to examine its operation to see the degree to which it falls under the theoretical framework set out in this chapter – namely the extent to which the metro will enhance residents’ mobility or whether it may contribute to further isolate its already disparate communities; and that it is largely an image making spectacle reinforcing the city’s reputation as an exclusive setting for a highly mobile, technologically advanced workforce.

One of the main arguments made in support of mass transit systems in general is that they are a key ingredient for a sustainable city. Yet one of the requirements for the success of such systems is that they serve a vital and large Central Business District (CBD). It is only when a city has a large and dense CBD that a large number of people who happen to live on a particular corridor need to travel in the same direction [7]. For example, Tokyo, New York, Paris and London, each have CBD’s with more than 750,000 jobs. Tokyo has one of the world's largest, with approximately 2.3 million jobs, with an employment density of approximately 58,600 per square kilometre, and almost all of central Hong Kong is a business district. In Dubai the total number of the white-collar workforce is about 220,000 and they are not concentrated in a single CBD but are dispersed along various specialized free zone areas throughout the city. This is not conducive to a successful rail operation. According to Mohan (2005) when business districts are dispersed and incomes relatively low as in Asian cities (compared to cities in high income countries), the situation worsens for rail-based high-capacity transit systems [7]. Shanghai City has about 82 kilometres of metro and light-rail lines, but rail transport only accounts for 2 percent of the local traffic volume. Mexico City (population 10 million) has 201 km of metro rail and it is the cheapest in the world, but it carries only 14% of trips.

Given Dubai’s polycentric and fragmented urban form a rail-based network may not have been the best alternative for its transit system. Other options were never explored or considered. For instance, the much cheaper and efficient Bus Rapid Transit (BRT) systems successfully implemented in South America. BRT systems can achieve very high coverage at low investment costs. As they are road based they can go near homes and destinations and cover most of the city as planned for 80% of Bogota residents in Colombia for example. This would not be possible technically or financially with rail systems. When road systems are modified for BRT, it results in complete urban renewal [7]. Moreover such systems can easily adapt to changing urban forms, which would be particularly suitable for a city such as Dubai given its rapidly changing cityscape. Ultimately BRT systems mostly serve the poor and are effective in reaching outlying, low-income districts.

A key factor in determining the extent to which Dubai Metro will indeed be successful is the share of public transportation noted earlier. RTA hopes to increase this percentage to 30% by 2020 (from an estimated 5-9%). An ambitious goal if compared to other major cities in the world. Another factor relates to acceptable

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3 ibid. DTZ (2009)
walking distances, which stands at about 500m (5-10min walk). Given Dubai’s severe climate that distance may have to be shortened. In addition to climate there is also the issue of land use which substantially impacts a pedestrian’s perception of distance. Thus, if one is surrounded by varying retail activities, people, street vendors and performers, the effect of distance is substantially less than walking through a desolate landscape. Consider walking from the Satwa Bus station to the Emirates Tower station which falls within the 500m walking radius. Analyzing the actual path which a pedestrian takes reveals that s/he needs to walk across an inhospitable terrain for about 1.8km (Fig. 2).

![Figure 2: Walking path from Satwa to WTC Station](image)

The Metro as of now seems to be popular with users – although anecdotal evidence suggests that more than half of its use falls under “fun” which would include tourists and sightseers, and only 21% use it for work.\(^5\) Land use value along the Metro stations has not increased – which maybe related to the financial crisis but seems more of an indicator that white collar workers have as of yet not given up on moving in the comfort of their cars. Some observations suggest that those who use the Metro live on the city’s outskirts.\(^6\) Recognizing that the success of the Metro’s operations is not so much dependent on high-tech hardware but relies on upgrading the areas surrounding its stations, RTA has embarked on an extensive study involving TOD or transit-oriented-development, inspired by world-wide practices. This may prove perhaps to be a significant factor in moving the city towards a more sustainable urban form in addition to the implementation of the R1000 plan which is discussed in the next section.

**R1000: TOWARDS AN INTEGRATED TRANSPORT PLAN**

The R1000 is a derivation of updated 5-year transportation system implementation plans for Dubai by the RTA. The report was issued in January 2007 for transportation system implementation for the years 2006 to 2020. This version was the latest; however an update will be issued in near future. The new update will eventually consider the public transportation plans and road networks, and most probably will keep the strategic policies and goals. The main components of R1000 that define a sustainable transportation system are: An integrated Metro system and tram network to be built around a high speed train network with high passenger capacity metro network and high quality tram network on secondary axes, and provide an extensive feeder buses network to connect private developments with the primary metro system or tram.


Another component is to provide a high quality road networks with clear hierarchies to meet the needs of strategic and local users supported with intelligent transport systems to facilitate the use of the main transportation infrastructure. The R1000 also seeks to provide demand management policy to encourage sustainable travel choices to face car dependent society in Dubai [8].

The R1000 report considers the city as a spatially fragmented city. So the report assumes a development scenario which includes private and semi-private developers' master plans. The main elements are: existing CBD built out around Dubai Creek, the extended CBD in Bur Dubai, Business Bay area, Festival City area, World Central: incorporating Commercial City, Dubai Waterfront: focused around the Madinat Al Arab, Dubai Land: focused around the City of Arabia, Three Palms: Jumeira, Jabal Ali and Deira, and Dubai Marina and the adjacent TECOM developments. The previous developments projects will create a number of competing centers, which requires a comprehensive transportation system to be incorporated. The main concepts that identify the land use and transport planning policies in R1000 are to invest in transit-oriented development expertise to encourage best practice, and encourage developers to provide projects suitable for transit-oriented development and defining the key stations as a focal point of wider development zones. Another concept is to create a land use hierarchy that contains transport based on planning goals and accommodate clear policies to sustainable growth in housing and employment and involve developers and lenders to understand and share the basis of the structural plan and the wider vision for the growth of the city [8]. For further understanding of the potentials of this plan the following section briefly presents the case study of Union Station.

UNION STATION: TRANSIT-ORIENTED DEVELOPMENT

In the year 2009, RTA initiated a transit-oriented development project to be implemented in the vacant land around Union Station in Deira. The project started as a design and business model competition, which attracted international architectural firms. The project aimed to create a landmark destination for the people and visitors of Dubai. The development was envisaged as a tribute to the spirit of the city. This shall manifest itself according to the RTA, as a monumental statement in place making taking shape through its architecture, landscape and transport links and hubs. The project aimed to be developed with an inherent business model that sustains the development economically and create generous surplus revenue for RTA. The development was envisaged to be a mixed-use property model having a good combination of retail or other commercial entities along with anchor community spaces and civic facilities. Once developed the project should be identified as the best example for a multimodal public transport hub that revitalised not only the project site but also had a positive impact on the social and commercial development of the surrounding region. The design competition is currently finished and the project aims to go forward by investigating the potential of public-private partnership (PPP).

CONCLUSION: RIDING THE METRO

Speeding along the elevated tracks of the metro the city seems to be somehow making sense. Passing its various landmarks – high-rise buildings, shopping malls, low-rise districts – as if they are frames in a movie viewed in close succession, creates an animated reality that does not appear if one is driving in a car or moving on foot. A narrative of illusion is created – as if the whole city can only be experienced through this high-tech moving device. Yet, the ride does reveal hidden spaces which would not have been perceived otherwise. The industrial district of Quoz for example with its backyards located next to warehouses; or the low-income residential area of Karama, revealing striking images of back streets, and close-ups of balconies containing clotheslines. These spaces are empty – the lack of people is striking, suggesting lifelessness (Fig. 3).
Such images contrast sharply with the gleaming interior of the metro stations. Similar to lobbies in 5-star hotels they are highly regulated. Security – both private and government – patrol its corridors and entryways ensuring that a carefully crafted script of movement is followed. Suspicious characters are checked for identification; a woman daring to drink a bottle of water is scolded for breaking the no-food/drink policy. Many eateries and cafeterias have not opened yet further adding to the sense of a transient space that does not encourage lingering. The situation is no different once one emerges from these luxurious, cavernous spaces. Rigga station – located along one of the city’s commercial thoroughfares – for example has not, as of yet, been transformed due to the introduction of the station. The lack of any signs of spontaneous activities, gathering point or presence of vendors is evident.

Yet given the efforts by the RTA at implementing a strategic plan that would incorporate principles of Transit Oriented Development, as well as considering the invitation of well-known architectural practices to design areas around stations – such as Union Station – the potential for a social transformation is there. In addition taking into account world-wide practices may prove to be yet another factor that would transform the Metro from merely being a mass transport system to a tool for societal integration. Indeed enhancement of mobility has become a key component for a city that is heterogeneous and in turn socially sustainable [9,10,11].

REFERENCES