

Integrated Transport and Land Use Planning as a Success Factor for Metros

a report by
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Railway is conventionally capital-intensive to construct and operate. While covering the operating costs, it must also be able to maintain and renew assets as they wear out. The Mass Transit Railway Corporation (MTR) is among the few railways in the world operating on commercial principles and earning unsubsidised fare revenue sufficient to cover all costs, including depreciation, along with a profit margin.

MTR carried 798 million passengers in 1998. On an average weekday, 2.3 million passengers use the system, capturing a 26% market share among various franchised modes of transport. Apart from success factors such as safety, high quality services, customer orientation and financial soundness, integrated transport and land-use planning provides the requisite operational environment for the metro.

The railways of Hong Kong serve a variety of purposes which can be categorised as follows:

- long-distance services (through-train passenger services from Hong Kong to China);
- suburban services (passenger services to the China border and services linking the urban areas and the new towns);
- urban services (passenger services within the urban area, such as the MTR network); and
- distributor services (district-level distributor systems such as light rail and trams).

Passenger railways account for about one-third of travel within Hong Kong. After all, the railway is part of the transport system. Efficient and cost-effective transport facilities have been an important support for sustaining the Hong Kong economy. Good transport starts with good planning. The Hong Kong Special Administrative Region Government undertakes studies to review the local transport network, putting forward a balanced programme of road and rail investment in the light of land use intentions. A detailed Railway Development Study presently being completed will examine requirements for railways up to 2011 and beyond.

High population density and scarcity of land in Hong Kong has shaped our specific transport requirements to make full effective use of scarce land and capital resources. The best approach to support the growing community of Hong Kong will be integrated land use and transport planning that can lead to reduced dependence on the private car, improve accessibility to public transport and encourage public transport use whilst reducing greenhouse gas emissions. The electric railway is increasingly seen as the preferred transport mode to meet these objectives.

The railway will fail to meet the transport objectives of the city without sufficient capacity to cope with demand. However, if the railway runs too great a capacity, the cost-effectiveness of the system will be severely undermined. Build-up of population is dynamic and capital investment for capacity improvement for an operational railway is erratic.

It will be more cost effective to allow for provisions for future capacity expansion during the design of the railway or network extension. Required adjustments vary in complexity, from operations using more cars per train to major civil works necessitated for station capacity enhancement. Optimisation will require prudent analysis, balancing the cost of bringing forward investment and capital injection strategies with all the project benefits for the community.

MTR's approach is to start with a station-box sized for the length of trains, fit in essential installations and then determine how remaining space may be utilised for alternative uses, such as commercial kiosks, etc. The installations of commercial kiosks will be financially justified on a case-by-case basis. Further extensions of the station-box to connect to non-MTR premises will also require substantiation through a business case, looking towards contribution from developers on value capture.

It is the general community expectation that urban or suburban accessibility will be eased by the transport infrastructure. From the perspective of property

development, having the railway in place before people move in would be most preferable. Nevertheless, it would be a waste of economic resources if the railway is not supported by a reasonable volume of ridership if railway construction were advanced.

An initial low population will be better and more cost-effectively supported by buses or feeder services to the nearest mass transit systems. Railways by design follow well-defined routes. Unless a passenger lives or works near a railway station, the railways cannot always provide door-to-door service.

Success for the railway system and the community then relies heavily on good integration with other transport modes or feeder services. This requires appropriate planning from a very early stage. Appropriate planning leads to better planning and more cost-effective transport solutions.

The financial success of MTR, in part, has relied on the ability to charge a premium over the main competing modes of buses, ferries and public light buses. MTR needs to capture a substantial market share of trips within its catchment. In 1998, MTR sustained over 26% of market share of all franchised modes of transport in Hong Kong and 62% of market share for the cross-harbour traffic.

Over the years, a substantial market share for MTR has been assured when the bus network suffered from insufficient capacity to meet demand and bus services in peak hours were overcrowded. Bus passenger waiting times have been long and bus services have often been slow and unreliable due to severe traffic congestion.

Today, we see bus operators running more spacious and air-conditioned vehicles. Easing of general road traffic congestion, especially with the opening of the third cross-harbour tunnel, further creates an edge for the buses to compete with urban trains, the downside of which is an increase in pollution. MTR reacts by maintaining its focus on responding to customer needs on safe, reliable and cost-effective transport, and creates demand through marketing campaigns. Through deployment of well trained front line staff and involvement in community activities, MTR is aiming to cultivate a more intimate relationship with customers beyond being a simple passenger/transport operator one.

While it is debatable that the government should regulate private transport operators such as buses, some regulation over excessive competition (for example, on parallel routes) is important for the

economic sustainability of a new railway. The new railway is subject to high debt-servicing payments in its earlier years of operation before patronage has built up.

There may also be some sort of indirect regulation of car traffic through taxation to create a level playing field in public transport if this aligns with the overall objectives of the community in relation to reduced road traffic, improved environment and fresher air.

From the railway's perspective, high density developments within walking distance of stations should be expected, reducing commuters' reliance on road-based feeder services. Over the years, MTR has been in joint ventures with property developers and has developed 31,000 apartments and more than half a million square metres of office and commercial space along its urban lines.

The newly completed Airport Railway, along with the new Tseung Kwan O extension (TKE) under design and construction, will see MTR reaching communities that are not yet fully developed. To help in the development of these new communities, the MTR has adopted a strategy of comprehensive, integrated development when planning projects. It is a total planning concept, including co-ordination of transportation networks with the provision of residential and shopping facilities, as well as social and recreational amenities.

Associated with the newly completed 35-kilometre Airport Railway will be a property development programme delivering an additional 25,000 apartments and 1.3 million square metres of office, retail and hotel space. Plans for development on top of the TKE stations are also underway. MTR has taken a proactive approach to shaping a favourable transport and land-use environment, not solely for the railway but in conjunction with government to build a better modern lifestyle and environment that enhances the lives and aspirations of local community members. MTR is striving to create a win-win situation for both the corporation and the community.

Technical Innovations to Improve Service

Octopus – Innovation in Automatic Fare Collection and Customer Convenience

The Automatic Fare Collection System operated by MTR is a mix of mature and emerging technologies. The 20-year old system, based originally on

magnetically encoded reusable tickets, has been upgraded to incorporate the latest contactless smart card technology in order to boost reliability and flexibility and create new customer features. There are presently five million cards in circulation and the demand for Octopus services continues to grow.

Octopus is a highly reliable and secure fare payment card that can incorporate multiple features for customers. Card data is protected by dynamic keys and Octopus is capable of allowing data recovery, even when data corruption has taken place. In terms of reliability – a key customer requirement – Octopus can achieve around 6,000 journeys to one malfunction. This is an improvement of four times compared with stored value magnetic tickets. The target for future card reliability is 50,000 journeys to one malfunction.

The Octopus card has a large memory by current standards. This makes it possible to implement more sophisticated bonus, loyalty and discount schemes, as well as giving MTR the flexibility to add or adopt more business features.

MTR's Fare Collection system presently processes about two and half million journeys per day. Every card's read-and-write transaction takes less than 300 milliseconds. The transaction data is passed on automatically to the clearing-house and all MTR and other service providers' transactions are cleared within six hours of the end of the same business day (See *Figure 1*).

Customers benefit from self-service Add Value Machines (AVMs) that have clear graphical displays and instructions, as well as self-service terminals that can be used to check the current card value. It is easy to top up the Octopus at AVMs using cash or bank cards through the Electronic Payment Services Co. (HK) Ltd. In the near future, technology will allow the fare payment to be done directly through Autopay.

Cellular Phone Access for MTR Customers on the Underground

Hong Kong has one of the world's highest ownership ratios for cellular phones and radio pagers. Acknowledging this fact, MTR is among the first of the underground railways to respond to growing customer communications needs by introducing radio paging and cellular phone access into the railway network. The systems are designed to accommodate all telecoms operators so that seamless communications are provided to the customers anywhere within the network. New Personal Communications Services (PCSs) are also being progressively installed. In the near future,



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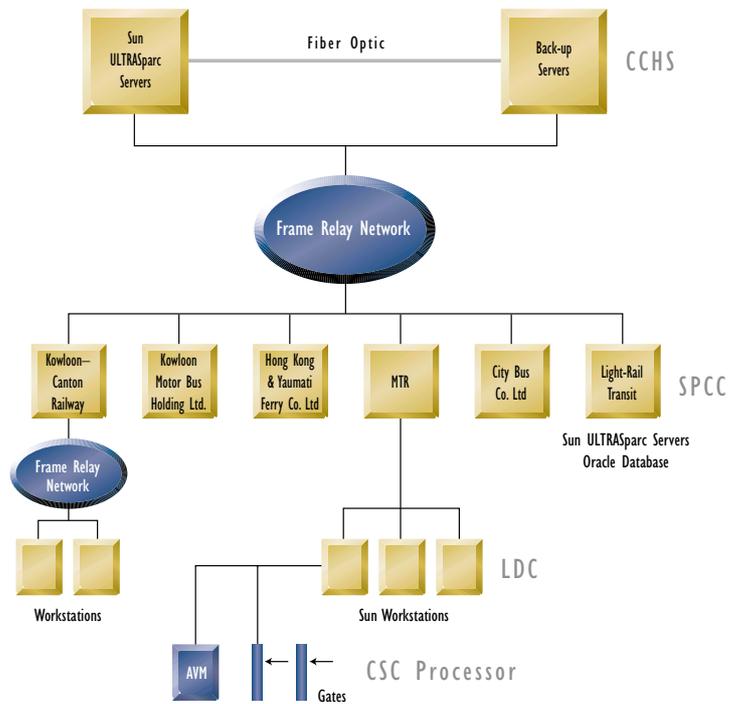


Figure 1: Network of Communication for Data Received at an MTR Ticket Gate

customers will be able to make calls, regardless of whether it is made on a Global System for Mobile Communication phone, a Code Division Multiple Access phone or a PCS phone.

Other Technical Innovations to Strengthen Customer Service

Other innovations that have been brought into service to strengthen MTR’s ability to add value and convenience for its customers include the new generation automatic train control system, digital voice announcements on trains, seat-back television for airport express trains and integrated control work-stations at the Operations Control Centre/Central Control Room.

In addition to the above, other notable items currently being developed are: an electronic information display system for the trains, which will allow information for customers to be updated through wireless links every 10 minutes; a station management system, which incorporates a decision support system to assist station operators in handling different scenarios; and an in-cab closed-circuit television system for train drivers to monitor platform conditions. All these facilities are designed to satisfy identified customer needs, ultimately adding value to customer service.

Platform Screen Doors, Train Modernisation and Station Improvement

To improve travelling comfort, environmental conditions and platform safety, MTR has

undertaken several large-scale projects that are designed to improve the current transport service. Technological innovations such as those mentioned above are an integral part of a longer-term improvement strategy to modernise all facilities across the railway system.

Platform screen doors will be to the underground system, a world first, during the next six years. The entire electrified motor unit fleet will also be modernised. This will incorporate many of the information technology applications mentioned and the stations themselves will go through a facelift to deliver a more pleasant, aesthetic and spacious environment for customers.

Conclusion

Technological innovation plays a central part in utilising information and knowledge-based services for the benefit of the customer and, therefore, the business. The integration of these technologies into larger structural improvement initiatives further strengthens and compliments MTR’s ability to meet and exceed customer expectations.

The growing importance of information-based technologies has affected the modern railway business in dramatic terms, as, traditionally, railways have been slow to vary from anything other than tried and tested technology. However, in the increasingly competitive transport market, there is a definite need for railway operators to be more active in introducing customer-focused technology-based services hand in hand with identified marketing requirements. ■