Build Integrated Transport Network to Boost the Development of City Clusters

MTR Corporation Limited

Executive Summary

Urbanization is showing an accelerated momentum across the world and city clustering will be an irresistible trend in this process. Competition and cooperation once dominated by countries or regions will gradually turn out to be dominated by cities. Development of city clusters is already highlighted as a key national strategy in China, which will serve as a significant driving force for high-quality economic growth.

City clustering contributes to achieving the economy of scale and stimulating economic growth at regional and global levels. Major city clusters across the world are composed of a small number of mega, hub cities, a few small and medium-sized cities and many smaller cities and towns. These cities and towns are integrated by tiered structure, and closely connected to each other internally and highly opened externally. Advanced city clusters normally have full-fledged public transport network which enables and reinforces the connectivity inside and outside the clusters.

A full-fledged public transport network is the foundation for city clustering. It requires the converged, multiple transport modes and transport terminals that offer convenient traffic distribution. It involves efficient connectivity between cities as well as seamless connection between inter-city and intra-city transport.

As a world leading rail transit operator, the MTR has supported the new urbanization masterplan of the Hong Kong SAR in the past forty years, and its combined development model of rail transit plus comprehensive land development has strongly promoted the development of new towns in Hong Kong region. The MTR is equipped with experiences of operating and managing multiple modes of transport such as high-speed train, inter-city train, subway, light rail, bus, among others. It has also been a veteran in terms of planning, constructing and managing comprehensive passenger traffic terminals. MTR has contributed significantly to the integration of public transport networks and urban development in Hong Kong.

MTR will continue to engage in the urban development drive on the mainland with stronger confidence and willingness to contribute more in the development of city clusters on the mainland.

Full Article

As global economy grows and social productivity increases, the world has been witnessing a momentum of accelerated urbanization. Cities communicate with each other in a closer and more frequent manner. Synchronous development of multiple cities within a city cluster is turning out to be a new form of urbanization in the era of globalization. City clustering is the irresistible trend of urbanization worldwide. In 1950s there were only two mega cities in the world whose population exceeded ten million, namely New York and Tokyo. Today across the world there are scores of mega cities which, in aggregation, are home to nearly 5% of global population and generate nearly 20% of world economy. Competition and cooperation in the future will be dominated by cities instead of countries or regions.

I. City clustering is an important strategy for economic growth

Cities are clustered along with the concentration and dispersion of industries and people caused by technology advancement and the effect of economy of scale. City clustering is an inevitable trend of urbanization within a country, a form of spatial organization of cities, and a mark that urbanization reaches a high level of maturity. City clusters serve as the carrier of regional development and underpin future economic growth. Therefore, city clustering has become a key national strategy. It will also

offer strong support to high-quality economic growth in the future. The 11th Five-Year Plan on National Economic and Social Development in 2006 put forth the initiative that "city clusters shall serve as the main form of urbanization, regions with ripe conditions for city clustering should strengthen coordination and planning in order to allow mega and large cities to play the leading role, give full play to hub cities, and build up new city clusters which consume fewer lands, create more jobs, gather more production factors and enable rational demographic distribution." This is the first time that the concept of city cluster was written in policy papers of the central government. Upon that, city clustering became a new strategy and a new direction for China's urbanization planning. The Report of the 17th CPC National Congress in 2007 pointed out that "we shall base city clustering on large cities which exert greater influence and foster new opportunities for economic growth. The 13th Five-Year Plan on National Economic and Social Development in 2011 stipulated that "we shall develop internationally competitive city clusters in eastern region and cultivate a number of city clusters in central and western regions where conditions are ripe". The Plan also proposed to "promote the construction of multi-tiered inter-city fast transit networks within city clusters that suit the needs of city clusters, depend mainly on rail transit and expressways and are supplemented by sub-national trunk highways". These stipulations charted the direction for transport network

development within city clusters. The Report of the 18th CPC National Congress in 2012 requested to “continue the overall strategy of regional development and make rational planning for city clustering”. The CPC Central Committee Conference on Urbanization in 2013 proposed that “in regions with necessary conditions in Central, West and Northeast China, we shall leverage on market resources and follow national policy in a bid to develop a number of city clusters”. According to the National Outline for New-type Urbanization issued in 2014, China should optimize the format of city clustering by improving the quality of eastern city clusters and cultivating city clusters in central and western regions so as to ensure an integrated growth of city clusters. The policy paper also required the construction of 19 city clusters throughout the country including the Yangtze River Delta, the Pearl River Delta, Beijing-Tianjin-Hebei, the Shandong Peninsula, the West Side of the Taiwan Straits, Harbin-Changchun, Central and South Liaoning, Central China, Yangtze River mid-stream, Chengdu-Chongqing, Shaanxi Plain, the Beibu Gulf, Central Shanxi, Huhhot-Baotou-Erdos-Yuci, Central Guizhou, Central Yunnan, Lanzhou-Xining, Yellow River Belt in Ningxia, and North Half of the Tianshan Mountain in Xinjiang. City clustering became an increasingly important goal of regional and spatial development policies. The 13th Five-Plan on National Economic and Social Development in 2016 called for “the acceleration of city clustering across the country

including the world-class clusters in Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta as well as the others of the afore-mentioned 19 clusters". The Report of CPC National Congress in 2017 pointed out that "cities should play the main role in urbanization and large and medium-sized cities and small cities and towns develop in a coordinated way." The Opinions on Establishing New Mechanism for Effective Regional Development in 2018 made clear that "we shall drive the implementation of key national strategies of regional integration through city clusters such as Beijing-Tianjin-Hebei, Yangtze River Delta, Guangdong-Hong Kong-Macao Great Bay Area, Chengdu-Chongqing, Yangtze River mid-stream, Central China, Central Shaanxi, and etc, and we shall establish a new model in which hub cities take lead in the development of city clusters, and city clusters take lead in regional development, and regions integrate and develop together." The Priority Missions of New-type Urbanization 2019 released by the National Development and Reform Commission stipulated that "we shall follow the principles of coordinated planning, rational layout, collaborative execution and large players leading smaller ones, bear in mind the environmental capacity, push ahead with the healthy development of city clusters and metropolitan areas, and build a spatial pattern in which large, medium-sized and small cities and towns develop in a balanced way." In addition, the policy paper also, in accordance with national master plan,

elevated the integration of the Yangtze River Delta to national strategy and combined the Pearl River Delta city cluster with the Guangdong-Hong Kong-Macao Great Bay Area as a whole. Since 2015, general planning on the 19 city clusters has been completed, and the State Council has approved specific development plans for 11 city clusters which offer clearer guidance on the geographic scope, strategic positioning and development goals of these city clusters. Guided by these plans and policies, city clustering initiative has started to show its economic dynamics and got accelerated. It will surely become a strong driving force for economic growth in the future.

II. Best Practices of City Clusters Worldwide

City clusters are important engines driving economic growth. Economic clustering leads the concentration of economic activities through effect of scale, technology spillover and competition. In the meantime, city clustering promotes free flow of production factors, expands the boundary of market, contributes to the economy of scale and therefore boost economic and social development within a region.

Urbanization of tomorrow will surely be in the form of mega city clusters. There are five mega city clusters today, namely Boston-New York-Washington DC and the Great Lakes of the US, Tokaido of Japan,

Central and Southern England, and Northwest Europe. Governments decided to develop city clusters for tackling issues like population overconcentration, traffic congestion, eco-environment deterioration and unemployment rise. They disperse industries and population from a mega city to neighbouring cities. As a result, a group of cities became connected and interwoven and further evolved into a mega metropolitan area as the economy grows. With its unique clustering advantage, a city cluster can play a powerful boosting role in the economic development of a region and a country at large. Major city clusters in the world show the following best practices.

i) Tiered structure of integrated cities

City clusters share an evident feature of tiered structure and integrated spatial form.

Advanced city clusters have a well-designed tier system. There are one or multiple mega hub cities within a city cluster that are massive in land area, powerful in economic strength, and significantly influential to other cities. Surrounding these hub cities which are the center of a cluster are a few medium and small-sized cities as well as many towns varying in size and characteristics. Therefore, a city cluster shows a clear tiered form of pyramid. Functions of cities are disseminated throughout the city network

in a progressive and orderly way, and a stronger development energy is generated by these cities collectively. Cities in the cluster play varying roles and are complementary to each other. Cities and towns grow closer links, and production factors such as human resources, capital and information flow more freely. As a result, mega hub cities, medium and small-sized cities and towns within the cluster can develop in a balanced and collective way.

The New York-Boston-Washington DC cluster spans on the plain on the Atlantic coast. It covers the massive land from Boston in the north and Washington DC in the south. In this cluster Boston, New York, Philadelphia, Baltimore and Washington DC are the hubs and over 40 smaller cities including Summerville, Worcester, New Bedford, New Haven, Paterson, Trenton and Wilmington connect the afore-mentioned hub cities and form a super cluster along the 600-kilometer coast. This cluster boasts a 90% urbanization rate and its manufacturing output exceeds 30% of the country's total. Each city has a unique role to play in the cluster and has its own advantageous sector. Cities divide the labour and collaborate with each other, and the cluster becomes the heart of the US economy. Unlike the US and Japan which value "super big" hub cities, the Central and Southern England city cluster, the earliest city cluster in the world, favours "small and fine" towns. London is the hub city and the

axis between London and Liverpool connects a few large, medium-sized and small cities such as Birmingham, Manchester and Sheffield as well as many towns. Although covering only 45,000 square kilometres, this cluster hosts many industries and serves as the heart of the UK economy. London is the largest financial centre in Europe as well as one of the three global financial centres. Manchester is a manufacturing hub for printing machinery and automobiles. Leeds, Birmingham and Sheffield play a key part in textile machinery industry. In 1960s, UK population started a massive migration to small towns. Satellite cities and towns surrounding large and medium-sized cities prospered quickly. The UK government moved its departments and affiliated agencies to small towns. Public entities including higher education institutions followed the government and migrated to small towns. Even large UK companies also chose to locate in small cities and towns. Judging from the afore-mentioned examples, a city cluster gathers a large quantity of cities which vary in feature and size. Within the cluster, cities are closely connected with each other while emerging as a highly open, highly integrated group of cities outside the cluster.

ii）Full-fledged public transport network

Transport system is the most foundational and dynamic factor contributing to the formation and development of city clusters in

developed countries. City clusters normally develop along comprehensive transport passages in the early days and then expand and grow as transport infrastructure improves. Advanced mega city clusters always boast regional transport networks composed of multiple modern transport modes including highway, railway, aviation, waterway, and urban transport within cities. These transport modes are connected to each other, operate in high speed and frequency, and link hub cities, medium-sized cities and small cities and towns into a whole, integrated body. Public transport system is developed in a way that fits spatial structures of the cluster. In addition, cities within the cluster normally have large-scale transport network hubs such as sizeable seaports, airports and land transport interchange terminals.

The Tokaido city cluster in Japan develops from three hubs, namely Tokyo, Osaka and Nagoya and spans from Chiba westward to cities of Tokyo, Yokohama, Shizuoka, Kyoto, Osaka and Kobe. This cluster constitute the political, economic, cultural and transport centre of Japan as well one of the world centres for automobile, household electric appliance, automated office equipment and ship building. The Tokaido city cluster is consist of the three metropolitan areas in Tokyo, Nagoya and Osaka. The cluster started to form as a result of city dispersion caused by railway. The Tokyo metropolitan area is Japan’s transportation

centre, boasting advanced sea, land and air transport systems that connect Japan to the rest of the world, as well as the densest rail transit networks in the world. Tokyo train system started with two bifurcated lines, evolved into loop lines during its middle stage of development, and later expanded with the JR lines. Later multiple bifurcated lines were radiated to surrounding areas. As the transport network evolved, private railway companies built more railways which promoted the expansion of cities into greater area, and finally the Tokaido city cluster took its shape. Total length of rail transit network in the Tokaido city cluster exceeds 2,500 kilometers. Residents in the cluster depend heavily on rail transit system for daily commute, i.e. Shinkansen, light rail, and urban rail. Rail transit system in the cluster connects to other transport modes and supplement with each other, offering high line density and accessibility. Well-developed public transport network tackles the challenge of passenger traffic within the cluster, and strongly boosts the economic growth of the Tokaido city cluster. Best practices of city clusters in advanced countries show that a well-developed public transport network system promotes regional development. In particular, the fact is acknowledged more widely that rail transit system generates both technology strength and economic effect. It ensures the exchange and gathering of human resource, capital, information and technology, steps up the connection and labour division among cities, allows greater

synergy between cities, and supports industrial upgrading and transformation in the cluster, and therefore plays an irreplaceable role.

III. Full-fledged transport networks boost city clusters

Well-developed and full-fledged transport network is the driving force as well as precondition for the development of city clusters. As the medium for the flow of human and other production factors, transport networks converge cities in the cluster and boost overall development of the cluster on the one hand, and determines the strength of connectivity among cities on the other. Therefore, a full-fledged and highly efficient transport system is of great importance for the formation and growth of a city cluster.

i) Convergence of multiple transport modes

Integrated development of city clusters depends on full-fledged transport network. Within a city cluster, transport modes play varying roles, and should be developed in a coordinated way in order to form a comprehensive transport system. Railways, highways, waterways and aviation networks offer freedom of choice to passenger traveling between cities. Despite a certain degree of competition, these transport modes can connect to and supplement each other so as to maximize the benefits of a comprehensive transport system, accelerate the flow of human resources,

capital, information, technology and other production factors, and enhance the overall competitiveness and integrated development of the city cluster.

When major axes of a city cluster's transport system support massive passenger traffic, the priority of a transport system should be given to rapid transit networks which feature high speed and large capacity. High-speed train, highway and inter-city rail transit are ideal options in this regard. The inter-city rail transit system provides large transport capacity, enables fast transportation, consumes less energy and protects environment and therefore is the most optimal mode for major axes and backbone lines of fast passenger transportation. In a rational rail transit system of a city cluster, large-capacity inter-city rail transit is adopted on backbone lines whereas light rail and other modes serve branch lines and link lines that connect cities, towns, and residential/industrial/commercial areas. In so doing, varying transport demands of residents in the cluster can be well satisfied.

ii) Transport hubs improve efficiency

Various transport modes have been improved and developed in recent years. Meanwhile, higher demands on transport system have been generated by socioeconomic development and passenger traffic in city

clusters. In this context, passenger transport systems in city clusters have been developing in an increasingly comprehensive and integrated way, and comprehensive passenger transport hubs become an integral part in the passenger transport system of city cluster. Passenger transport hubs refer to interchange terminals in large and medium-sized cities where lines of two or more transport modes or multiple lines of the same mode meet. These hubs cover and serve a large area, support massive passenger traffic, and play a critical role in accelerating passenger traffic and ensuring rapid functioning of the comprehensive transport system. Planning and construction of interchange terminals must be considered seriously when a comprehensive passenger transport system consist of multiple transport modes is designed and developed. From departure to arrival, a passenger trip often involves multipole transport modes. Hubs or interchange terminals connect various transport modes and offer great convenience to passengers, and therefore play a very important role in transport planning.

Large cities in the mainland started the planning and construction of passenger transport hubs fairly late, didn’t acknowledge the importance of the hubs, and encountered many problems. Over the years, passenger transport management in city clusters have been following a highly fragmented approach of management. Expressways, inter-city trains,

highways, waterways, aviation and urban subway, light rail and bus transport fall into the jurisdiction of different regulators which are independent from each other. This decentralized, fragmented management system results in the serious issue of lack of coordination among regulators. This issue becomes more acute when it comes to the connection of various transport modes. Agencies in charge of planning, decision making and daily administration are independent from each other and follow their own plans and requirements alone when building transport facilities. They take the planning and construction of transport lines seriously but seldom consider the comprehensiveness of transport system. They pay little attention to the necessity of coordination in planning and constructing the comprehensive transport networks in city clusters. As a result, virous transport modes in hubs are separated and scattered. Without effective connection of multiple transport modes, the hubs fail to fully play their consolidating role in the entire transport facility. The fragmented management system leads to the lack of coordination between planning and construction of urban passenger transport hub and the overall planning of urban development and land use. It is the cause of many problems. For example, comprehensive passenger transport hubs are planned with irrational layout or improper size, hubs are not effectively connected to the entire urban transport system, and transport capacity fails to match demand incurred by commuting.

Hampered by the management fragmentation, it is very difficult to have coordinated planning on transport hub development. Various transport modes follow their own requirement and needs to develop hubs and all the planning and construction are done independently with little consideration of the requirements and needs of other transport modes. In particular, coordination is completely absent when it comes to the connection of inter-city transport within a city cluster (such as railway, highway, and airport) and urban transport (such as subway, light rail and bus). Terminals and stations of various transport modes are constructed separately and independently, resulting in lack of connection and inconvenience in passenger concentration and dispersion, low transfer efficiency, and longer transfer time. The “seamless connection” and “zero distance transfer” of high efficiency and high quality can hardly be realized, harming the quality of passenger transport, causing efficiency reduction and resource waste, and holding back the integrated development of the city cluster.

In China, various transport modes are administered by various regulators. Consolidated and coordinated planning is the pre-requisite for maximizing the transport efficiency and transfer convenience at hubs which connect multiple transport modes. While promoting the network-type development of multi-mode transport, careful consideration

should be given to the close connection between inter-city modes such as railway, highway, aviation and waterway and urban transport modes such as subway, light rail, bus and taxi. This allows passengers to transfer easily. Comprehensive passenger transport hubs should enable the connection and dispersion of multi-mode transport, offer multi-layer transfer or "zero distance transfer", and maximize the total efficiency of passenger transport.

IV. Hong Kong's best practices can contribute to integrated transport in city clusters

Transport integration in a city cluster is reflected in four aspects, namely coordinated facility network, efficient operation and organization, convenient transport connection and consistent management mechanism. MTR runs ten metro lines in Hong Kong, an airport express line, two tram lines in Northwest New Territories and multiple shuttle bus lines in downtown. In addition, MTR runs inter-city railways in Guangdong, Beijing, and Shanghai as well as cross-border bus services. It also started in 2018 to provide operating services for the Hong Kong section of Guangzhou-Shenzhen-Hong Kong high-speed train. In cooperation with the SAR government, MTR made unified planning of public transport of multiple modes in Hong Kong, put in place a consistent rail transit regulation system, and enabled the synergy effect and high efficiency in

Hong Kong rail transit networks. In terms of connection of multiple transport modes, MTR follows the principle of putting people first and pursues maximal convenience. The Kowloon station is a good example. The station is located in the new land reclamation area and the project was designed and executed by MTR in the 1990s. It has a 118-level office building which is the tallest skyscraper in Hong Kong, a six-star hotel and service apartment, a shopping mall of 80,000 square meters, and over 4000 luxury residential units. It integrates multiple transport modes including airport express, Guangzhou-Shenzhen-HK high-speed train, metro, cross-border bus, tourist bus, mini bus, taxi and private car. It serves Hong Kong as a very important road and railway hub. Passengers can easily access every part of Hong Kong, and also can travel to major mainland cities via the rail transit system. When designing the Kowloon hub project, MTR took into consideration traffic to Hong Kong international airport, the Guangzhou-Shenzhen-HK high-speed train service and cross-border bus service. Terminal platform, residence, commercial service, bus transfer and other public facilities are integrated throughout a multi-layer layout. All transport modes are connected and seamless transfer is realized. Meanwhile, property projects in neighbouring areas are linked with roofed corridors to offer convenience to residents who can get to the metro station via the corridors. After the metro operation ends at night, residents can walk back to their

neighbourhoods through the 24-hour passages in the shopping mall and the corridors. This is a great convenience for passengers and residents provided by rail transit and passenger transport hubs.

MTR also actively engages in the development of new towns. It plans and constructs many rail lines including Tung Chung line and Tseung Kwan O line, develops rail transit and land in synergy, uses rail transit terminals as centers to build transport and commercial hubs. This approach successfully boosts the construction, development and emergence of new towns in Hong Kong. The rail transit plus land development model practiced by MTR changes the structure of Hong Kong's urban space from single-centre to multi-centre. The fast rail transit system with reasonable layout and its supporting facilities eliminates Hong Kong's structural flaw of large population in limited land. The fast rail transit lines that connect existing downtown areas with suburban areas plays a significant role in moving residents originally living and working in city centres to the suburban areas, and hence reducing population and transport density in the downtown. This remarkably improves the spatial structure of Hong Kong. Fast rail transit lines connecting residential areas in the suburb makes even greater contribution to the city's expansion from downtown to peripheral areas and the balancing between the suburb and the downtown. As a result, resources are allocated in a more

reasonable and fair way, and new towns are created. The Hong Kong government and MTR started in 1973 to develop new towns through rail transit expansion. In old industrial communities, rural villages, farming lands, deserted slopes and mudflats, the largest cluster of new towns in the world was built. Nine new towns were developed through four generations and now are the home to three million people. Sha Tin, a new town along the Kowloon-Guangdong railway, hosts 600 thousand residents. In west New Territories, the West Rail Line and the Light Rail Line serve over a million residents in Tuen Mun, Yuen Long and Tien Shui Wai. The Tseung Kwan O Line which is designed to support the development of Tseung Kwan O makes the local population increase from less than ten thousand to hundreds of thousands. In order to enhance the efficiency and quality of public transport services, MTR makes rational planning consistent with passenger throughput and transfer among metro, residential facility, commercial facility and public road. At each comprehensive hub, there is taxi stand or transfer spot. Multiple entrances to metro are opened in commercial or residential areas in order to facilitate seamless passenger transfer. Rail transit terminals and surrounding lands are developed in high intensity to serve multiple purposes. Metro entrances are seamlessly connect to residences, shopping malls, office buildings, public facilities and nearby communities. All this satisfies Hong Kong citizens' need for travel, shopping and commuting,

and contributes to Hong Kong's prosperity.

City clustering is a national development strategy and a new driving force for economic growth. Public transport is a strong booster to the development of city clusters. Internal communication within city clusters requires multiple transport modes. The effective connection of multiple transport modes and easy transfer are very important for improving the experience and efficiency of passenger traffic. MTR learns a lot from developing new towns in Hong Kong. It boasts best practices in planning, construction, operation and management of both multiple transport modes and comprehensive passenger transport hubs. We at MTR are willing and capable to contribute even more to the development of city clusters in the country.