INSTITUTIONAL FORMS AND FINANCIAL MECHANISMS FACILITATING SUCCESSFUL PUBLIC TRANSIT ENTERPRISES

-- LESSONS FROM JAPAN AND HONG KONG --

Richard K. Taube
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ABSTRACT

This report focuses on institutional and financial lessons learned in a study mission to Japan and Hong Kong in April, 1999, in which 21 transit systems, agencies and firms were visited in the Kobe, Osaka, Nagoya and Tokyo areas of Japan and 10 such systems in Hong Kong. The report reviews the political and economic context of Japan, followed by a synopsis of its customs, policies and trends of relevance to public transit markets. Organizations and policies of the various government entities are described and three important aspects of the Japanese transit environment are examined in greater detail: Daisan Sector and related enterprises, new technologies and fare collection. The same form is repeated for Hong Kong.

The final section of the report provides comparisons and lessons, among and between Japan, Hong Kong and the United States. This section emphasizes the similarities of Japan and Hong Kong, especially the devastating effects of recession, high land values, population density, low auto ownership, high transit use, active role of governments in profit-making enterprises, and vigorous leverage of land use and transit to maximize mutual advantages.

While there are also important differences (Japan's population growth is almost stagnant while Hong Kong faces even greater growth than in the past; Hong Kong is much farther advanced in electronic payment), the two countries reinforce certain lessons that seem most applicable to the U.S., despite many political, cultural and economic differences. These lessons include: 1) Accelerated project planning and implementation; 2) Region-wide electronic fare payment using smartcards; 3) Platform screen doors for safety; 4) Customer service emphasis to rejuvenate stagnant ridership; 5) Aggressive joint development by transit agencies; 6) Deregulation and competition among transit providers; 7) Emphasis on new technology.

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INTRODUCTION

International Transit Studies Program

The information compiled for this report was gathered during a study mission in Japan and Hong Kong from April 10 - 24, 1999. A team of 13 professionals selected from transit systems around the United States visited approximately 21 different transit systems, firms and agencies in Japan and 10 in Hong Kong, assisted by local experts provided by national government agencies.

The International Transit Studies Program (ITSP) is a Transit Cooperative Research Program project, managed by the Eno Transportation Foundation under contract to the National Academy of Sciences. The purpose of this project is to foster the professional development of U.S. public transportation practitioners by providing opportunities to gain global perspectives in mobility management. This program's goal is to broaden the range of options available to public transportation managers to produce high quality transportation systems and services.

The Transit Cooperative Research Program (TCRP) was created by the Federal Transit Administration and authorized by the Intermodal Surface Transportation Efficiency Act of 1991. In May 1992, an agreement outlining TCRP operations was signed by the National Academy of Sciences, acting through its Transportation Research Board; the Transit Development Corporation, which is the education and research arm of the American Public Transit Association; and the Federal Transit Administration.

Purpose of the Report

This report examines the institutional arrangements and financial mechanisms that facilitate successful public transit systems in Japan and Hong Kong. Particular emphasis is placed on lessons that can be applied in the United States. To that end, the political, economic, social and cultural context of the Japanese and Hong Kong markets must be examined to determine which of the many innovations employed in those countries have the greatest likelihood of favorable application in the United States.

Caveats

This report is not meant to be an exhaustive and scholarly treatment of the subject. Rather, it is based substantially on the informed impressions of the author, with the expectation that these personal observations, when taken together with those of fellow study team members and published sources, will form a mosaic that captures the essential features of the successful Japanese and Hong Kong public transit enterprises.

Communication was clearly an issue, especially in Japan where most officials worked through interpreters and where culturally, intellectual ambiguity is accepted. Interpreters appeared to have some trouble with converting yen to dollars. Also, little contact occurred with the private sector and with transit customers.

In this report, yen and Hong Kong dollars have been converted to U.S. dollars using approximate exchange rates (100 ¥ = $1.00 U.S. and $7.8 HK = $1.00 U.S.). Because the yen/U.S. dollar exchange rate has varied significantly, historical costs can be misleading.

Organization of the Report

The report first reviews the institutions and financing techniques in place in Japan. The political and economic context is reported, followed by a synopsis of customs, policies and trends of particular relevance to public transit markets. Organizations and policies of the various levels of government are described and financial mechanisms are discussed. Finally, three important aspects of the Japanese transit environment are analyzed: Daisan Sector and related enterprises; new technologies; and fare collection issues.

This form is repeated for Hong Kong, followed by an examination of the important similarities and differences among and between the institutional and financial architecture of Japan, Hong Kong and the United States. Particular emphasis is given to public/private cooperation, regulation, new technologies and fare collection innovations with promise for application in the United States.

For those interested largely in the conclusions, the comparisons and lessons section at the end of the report is presented primarily in outline form without repeating the discussion in preceding sections that supports these findings.

JAPAN

Overview

Japan is the second largest economy in the world and has suffered during the 1990's from a very difficult recession. Japan's economy is known for being very tightly regulated, closed to foreign firms, exhibiting favoritism to old and well established companies (especially large vertically integrated trading companies). The recession, and efforts to recover from it, are bringing about sharp changes in these economic institutions, as regulations are reduced, innovation is rewarded, and markets are opened to newcomers. Culturally, Japan is becoming more westernized.

Implications for public transit are readily apparent. Public-private partnerships that have driven expansion of rail services to new town developments almost all report financial difficulty. New technologies, such as magnetic levitation, which were being nurtured for introduction domestically and in the international market, have been placed on hold. Existing transit enterprises, struggling to maintain ridership in the face of the recession and a shorter work week, have turned intensively to customer service. Employers are allies of the public and private transit providers: 86 percent of employers pay the full cost of employee trips to and from work.

Politics and Economics

Japan has 126 million people, now growing at only 0.2 percent annually. Nearly 80 percent live in urban areas, and 45 percent in only three metropolitan regions: Tokyo, Osaka, and Nagoya.[1] Real gross domestic product is $21,581 per person.

Japan is a constitutional monarchy, although the emperor has no governing power. The prime minister heads the national government. The Diet consists of a 500-seat House of Representatives and a 252-seat House of Councilors.

Japan has 47 prefectures (provinces), each with an elected governor. Before WWII, the national Ministry of the Interior appointed prefecture governors and local mayors. The U.S. imposed constitution (ironically denying Japanese the "fundamental" U.S. right to bear arms) changed this. For independent cities, the mayor appoints the director-general of the local transit bureau, but these transit agencies have independent budgets (like U.S. enterprise accounting) and hire their own employees and make their own regulations independent of the mayor.

Japan has achieved a vital status as the lynchpin of Asian economies, with 70 cents of every dollar of output coming from Japan and with major investments by

[1] Culturgram '99, Brigham Young University, at pages 2-3.

Japanese firms in the economies of its neighbors. Japan itself has provided $43 billion of financial aid to its neighbors during the ongoing world financial crisis.

Japan Prime Minister Keizo Obuchi has pumped billions of dollars into the Japanese economy and helped to stabilize Japan's teetering banking sector with his economic reform program. Techniques include banking reforms, the infusion of $75 billion of public money into 15 banks in March, 1999, vigorous purchasing of long-term bonds by the Finance Ministry, and tax reductions favored by the U.S. The Bank of Japan is driving short term interest rates to nearly zero.

Obuchi is the sixth premier since 1993, when U.S. President Clinton took office. Like the U.S., Japan's leaders have been rocked by scandal. Ten years ago, Japan's premier at that time was forced to resign over allegations of profiting from stock payoffs in a firm call Recruit. On the eve of his landslide re-election in April, 1999, as Governor of Osaka Prefecture, Yokoyama Knock, was charged with indecent assault by a campaign worker.

Japan has several competing political parties, including the Liberal Democratic Party, Democratic Party, New Komeito, New Party Sakigake, New Frontier Party, Japanese Trade Union Confederation, Liberal Party and Japan Communist Party. Osaka's Governor, who is an independent, was re-elected in April, 1999 without facing opposition from any of the major parties (only the Japan Communist Party fielded a candidate). The situation was similar in 10 other gubernatorial races.

Japan's political parties have been characterized as "dysfunctional" and on the verge of collapse. The LDP largely has been in control nationally since WWII.[2]

Political campaigning differs from the U.S. In Tokyo, large billboards are erected with numbered squares of about 8½ x 11 inches. Candidates are assigned squares and place their posters into those spaces using a common format. This provides an equal opportunity to be seen without the visual clutter of competing signs that proliferate in the U.S. On the other hand, sound trucks appear to be much more commonly used in Japan than in the U.S., resulting in noise pollution throughout the day and night. Television is serving to make the political process clearer and more open to the public.[3]

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[2] The Daily Yomiuri (April 13, 1999) at page 6.

[3] Japan Society Newsletter (December, 1998) at page 3.

In Japan, women are increasingly being elected to public office. Elections in April, 1999 resulted in 253 women (up 87 percent from four years ago) elected to assembly seats in 41 prefectures and 11 of the nation's 12 major cites. Three prefecture assemblies still have no female members, although seven assemblies will have their first female members as a result of the April elections. Female membership has reached 10 percent in only three prefectures.

Finally, the traditional insulation of bureaucrats from elected officials seems to be breaking down as elected officials have seized more responsibility for policy.

Customs/ Policies/ Trends Influencing Transit Markets

Japanese customs and lifestyle issues that may influence propensities to use transit include:

- Emphasis on cleanliness and health (except widespread smoking)
- Religious devotion to nature (Shintoism)
- Group orientation
- Extreme loyalty to jobs and employees
- Politeness
- Devotion to form (form is substance)
- Conformity to the group (very heavy cell phone use in public)
- Increasing female labor force participation
- High stress from crowds, recession, and efforts to get children into the best schools from kindergarten on up.

Retirees can expect at age 60 a bonus of five years pay, plus the national minimum pension of $500 per month, plus company pension earnings (say 25 percent of salary each month). Japanese population growth has leveled off and for the future, declines may occur. The result is an aging population, but one which is fairly affluent.

The need for space and the corresponding high value of land dominates life. In Japan, 125 million people live on four percent of the land. Living space is extremely small by U.S. standards, and workers often have very lengthy commutes. Land-fill projects are often economic given the enormous land values in urban centers. As a result, gas stations in urban centers have pumps suspended from the roof to allow more

space for cars on the cramped main level. Golf driving ranges offer up to five levels to economize. Given enormous costs of golfing on a real course (about $400 for a round near Tokyo, including meal, massage and sauna), driving ranges are popular.

Viewed from the air, the landscapes of U.S. cities reveal vast expenses of black asphalt devoted to parking. Japan's cities contain many elevated freeways and interconnected corridors of passenger rail tracks, but very little space for parking.

At the height of Japan's land boom, its total land value was four times that of the entire U.S. Even today, after real estate prices fell by about a third, in Tokyo one square meter costs $100,000.

In Kobe, land fill and new town development were symbiotic, as the landside hills were scoured for landfill, leaving a pleasant view of hills from the sea. The scooped out hills were used as sites for new town developments, including businesses, residences and universities.

While concerns for health and the environment benefit transit ridership, there can be negative repercussions. For example, bicycle congestion is a problem at many stations and in some cases "bicycle free zones" have been established nearby. Also, a recent trend is resistance by citizens to new rail development who fear environmental impacts. This has caused significant delays.[4]

Not all transit modes are prospering. Tokyo bus ridership is down 40 percent from its 1968 peak. Auto ownership is trending up. Planned ring expressways have not been completed but there are seven radial expressways, all of which are congested.

Osaka city has 2.6 million inhabitants and 3.8 million during work days. Its GDP is $2 billion, almost as large as Sweden. Osaka prefecture has a GDP of $3.7 billion, the size of Australia or the Netherlands. Despite a 61% market share for buses and rail (includes several private rail lines), ridership on Osaka's transit systems is down, and one factor identified by city transport bureau officials was the shift to a five day work week (40 hours) from 5½ (44 hours), plus the recession. To recover riders, the city is following a capital-intensive, customer-focused course: install escalators and elevators to eliminate the need for stairs and add air conditioning. Also, maintenance and other services have been contracted out to cut costs.

[4] Source: "Socioeconomic Characteristics, Land Use and Travel Patterns in Tokyo Metropolitan Area," Shigeru Morichi, University of Tokyo, at page 12.

In addition to the effects of population stabilization and aging, together with severe recession, other major national trends are a demand for increased quality of life and globalization of culture (perhaps 60 percent of Japan's citizens are part of the "hamburger generation"). Even Japan's largest corporations are, for the first time, opening their ownership to foreigners. Nissan Motor Company has sold a one-third interest to the French company, Renault, S.A.

Government Structure/ Policies/ Planning

Governments at all levels are expected by Japanese citizens to care for them, even as people increasingly wish to be free of government encumbrances. There is a simultaneous movement to deregulation and privatization, but also intricate cross-subsidy schemes. Governments focus on effective coordination among firms offering competing service. Customers have choices and can match trip needs with mode characteristics.

In Tokyo, with a population of 33 million in the city and surrounding suburbs, rapid growth has clogged existing transit. Trip lengths increased. Railway share to the central city is 73.3% with a 90% share to the core of the city (3.3 million daily trips). But central city population has been gradually declining, and overall population growth is forecast to stop, so that expanding corebound rail capacity is not by itself an effective long-term solution.

As a result of these new population trends, policies call for fighting near term rail congestion with spot improvements and customer service initiatives while restructuring land use to a multi-core structure with greater provisions for an aging population. This all is occurring in the context of severely constrained financial resources.

Throughout Japan, subway networks are operated by eight municipal governments, in cities of over one million inhabitants, with privately owned lines in 9 such cities. Both ownership forms exist together in six of those cities. Privatized firms (e.g. JR, Teito Rapid Transit Authority) compete with quasi-government firms (e.g. Tokyo Municipal Railway).

National transport policy calls for a balance of modes, with high speed rail for lengthy trips, commuter rail for intermediate trips, subways for shorter trips, and new transit (automated guideway) for spot applications usually in short, high-density corridors.[5]

[5] "Public Transport in Japan," Shigeru Morichi, University of Tokyo.

National policies to support subways use the same ridership criteria regardless of city size, so that smaller cities must supply a greater proportion of project costs from local sources. Automated Guideway Transit (AGT)/Monorail projects were anticipated to be more feasible for smaller cities, but to date most of these projects have also occurred in the largest cities.

The national Ministry of Transport is developing a new 10-year plan for rail in urban centers, tying together the individual plans of the 47 prefectures. Only if the Ministry funds a compelling "inconvenience to the Japanese people" can it directly interfere in those prefectural plans, but the Ministry does control the flow of grant funds and therefore has indirect influence.

The Ministry of Transport manages off-road transportation projects (railroads and magnetic-levitation) while the Ministry of Construction manages other surface modes (including monorail, AGT, street cars). Grants are primarily for infrastructure (at most 60% of project cost) and are available after design. A merger of the Ministry of Transport and Construction is planned by 2001. Lots of bureaucratic infighting is occurring.

National policies in many cases are very similar to those in the U.S., ranging from public involvement to deregulation.

The 1968 national "City Planning Law" established a system for classifying areas for urban development and areas for urban control. A formal public involvement process is included in this law.

In August, 1986 national executive branch action established policies on environmental impact assessment. By 1991, 34 prefectures also had such requirements. Historic preservation laws also exist.

In 2000, tighter national regulations take effect for diesel buses. Transportation Demand Management techniques to protect the environment are not yet widespread and have so far failed to overcome desires for greater flexibility to use private automobiles.

Accessibility for persons with disabilities is not mandated by law, but is usually a top policy priority of transit systems, given the aging population. Often localities offer subsidies to private transit providers to provide fully accessible services and facilities. We saw very little use of transit by persons in wheelchairs and operators concurred with our assessment.

A subcommittee of the Council for Transport Policy to Transport Minister Jiro Kawasaki has recommended that the Transport Ministry abolish its current system of regulating bus and taxi fares, and instead set only maximum (and possibly minimum) fares and liberalize entry. The panel also recommended that bus operators be allowed to abandon unprofitable routes by giving notice. Local governments would be responsible for determining how to provide any needed replacement service in light of abandoned routes, perhaps using municipally operated buses now used for welfare and schools. The Ministry will seek to make these changes at the next Diet session (Exhibit 1) to take effect by the end of FY 2001.[6]

An interesting example of the use of local government regulatory power involves the East Japan Railway Co. (JR East), which had planned to carry advertising on the outside of urban electric trains such as the Yamanote Line in Tokyo. The Tokyo metropolitan government vetoed the idea, using its ordinance against outdoor advertising. The ordinance does not restrict such advertising on buses and streetcars. Even public service ads on the outside of trains are banned. Elsewhere in Japan, advertising on trains is allowed by many local governments.

JR East had proposed the advertising as a way to seek to halt the skid in advertising revenues which are down considerably in Tokyo since the peak in 1992.

Organizational Forms/ Financial Mechanisms and Performance

In this section, the great variance in profitability of Japan's urban transit systems is reviewed. Next, the average costs of owning and operating an automobile are calculated and compared to transit commuting costs. Finally, national subsidy programs are listed for urban railroads and buses, as well as other modes (e.g. Shinkansen, light-rail, rural buses). Like the U.S., Japan is seen to have a complex array of subsidy programs functioning at several levels of government. Of particular interest is a unique Japanese practice of assembling land for parallel urban housing when it builds urban expressways and railroads.

Japanese transit systems in general recover a greater proportion of costs from the farebox than is true in the United States. Among the reasons for this are less significant competition from the private automobile (less emphasis on roads, much less parking, expensive auto operating costs), concentrations of customers due to land use policies, and greater access to development revenues. Even so, not all transit systems cover all costs and government subsidy programs are needed.

[6] Source: The Daily Yomiuri (April 11, 1999) at page one.

In Osaka in FY 1996, subway fares covered 90 percent of rail expenses (capital and operating). Depreciation was a very substantial 22 percent of total expenses. National rail subsidies covered 23% of rail subsidies, prefectural subsidies totaled about one percent, and local subsidies the balance. For bus operations, fares returned 59 percent of revenues and depreciation was 11 percent. National subsidies comprised 6 percent, and local governments paid the remainder. Cutbacks in bus service are one response.

Nagoya offers wider streets and lower density than its neighbors in Kobe, Osaka and Tokyo. Thus, Nagoya's rail transit mode split is only 28% rail, with one million daily passengers on its five subway lines and another 580,000 on a fleet of 1,300 buses. Subway and bus both recover about three-quarters of capital and operating expenses through the farebox. Nagoya has two "key" bus routes (lanes painted red) and 29 other exclusive bus lanes, including priority signals (Exhibit 2). On the key routes, peak hour headways are as frequent as one to two minutes. Reduced fare transfers apply for the key routes.

In Kobe, despite its density, its government-owned subway line recovers 19.3% of operating and capital costs from fares, with commercial sources (10.3%) and government grants (70.4%) supplying the remainder.

On the average in Japan, costs of auto ownership, as of 1993, include a purchase price of about $13,000 (includes $1,000 consumption tax and car purchase tax) totaling about a fifth of average annual household income. Car tax and car weight taxes are $470 annually; compulsory insurance is $180. Vehicle inspections in the third, fifth and seventh year cost $600 each year. Operating 1,000 kilometers monthly, gas would cost $120 (including gas tax of $46). Total cost is, therefore, $230 monthly. In addition, private parking averages $350 monthly in Tokyo, or $5.00 - $6.00 per hour.

The cost of commuting by feeder bus and then railway to reach central city offices would average about $350 - $400 monthly. However, subsidies by employers are universally available.

Roads are built at all government levels (Exhibit 3). The Ministry of Construction builds some directly through its regional bureaus and also subsidizes up to 60% of the cost of other roads. National funds for roads come from gas taxes and half of LPG taxes, plus general revenues. These are transferred into the Road Improvement Special Account . The primary objective of highway tolls (which are widely used on urban expressways) is cost recovery, not regulating demand.

The national government influences financial aid for transit projects to local governments in three ways:

1) General funds appropriations based on an index of need versus ability to pay;

2) Approves municipal bond issues, based on financial capacity;

3) Discretionary project grants up to 50% of the costs (higher in needy areas).

Exhibit 4 provides a summary of Japan's various national, prefecture and local subsidy programs for rail and bus services.

For small-scale improvements along existing railroads and rail expansions, those who benefit are expected to pay. If benefits primarily accrue to private developers, they must pay the entire costs. Local governments share in the cost where benefits are more diffuse. But decreasing land prices have sharply reduced private developer interest in these arrangements.

The Railway Facilities Development Agency was set up with the revenue from selling the Shinkansen (high speed intercity trains) infrastructure to the privatized JR companies. For the future, a portion of higher fares of railway operators will be set aside in this fund for expansion, and lent to operators at below market rates for up to 10 years. Since 1988, several such projects have been financed.

A separate fund for light rail transit was established in 1997. Also, guide-way bus systems are newly eligible for such infrastructure assistance (not for signals, controls and vehicles), and to date only Nagoya has been selected.

Subsidy shares from these funds vary as follows:

	Central Government	Local Government
Subway:	35%	35%
AGT/Monorail:	36.7%	18.3%
New Town Transit:	18%	18%

The 1996 national budget for New Town transit was $27 million. In the New Town Railway Subsidies, program, private developers provide rights-of-way and central and local governments provide construction subsidies.

The 1996 national subway budget was $734 million. For JR Construction Public Corporation, a 1996 budget of $26 million existed. No interest, 10-year loans for JR, Teito RTA and seven local governments to cover 40% of construction totaled $367 million in 1996. Loans are often repaid using payments from private companies who take over ownership of the new lines.

Three cities have established their own railway funds using such sources as taxes on corporations.

Until about 1970, private bus companies in Japan were profitable, but road congestion, more private auto ownership and expanded urban rail networks created hardships for this sector. Deregulation is designed to help such operators survive. National operating subsidies are available for certain rural routes, with 163 companies sharing in the program as of 1996. Also, national subsidies are available for replacement of old buses, with 452 companies participating.

The national government has created a fund of $50 million annually for grants to railways for new escalators and elevators to serve the aging population. Localities may issue debt to finance transit system improvements (e.g. Osaka elevator/escalator installation). National agencies purchase the bonds at designated rates using postal saving and pension funds. In some cases the Ministry of Finance and Foreign Affairs borrow in international capital markets and provide the proceeds to localities.

Through the process of "Kukaku-seiri", land for road and rail projects promotes the simultaneous development of public facilities and private housing. The local government does this by taking/purchasing extra right-of-way. Land owners are compensated by the increased value of their remaining holdings resulting from the project (Exhibit 5).

Daisan Sector and Related Enterprises

Within the context of well established government financing and planning programs, together with extensive government regulation of entry, rates and fares of transit service providers, lies an apparent paradox -- The Daisan (Third) Sector. These cooperative enterprises between various governments and private firms have contributed to significant expansion of transit services, often in conjunction with new town development. They fulfill the government's need for early cash flow to finance infrastructure investments and meet private sector objectives of goodwill, influence and an inside track on project procurements. While these projects are widespread and have served these mutual objectives well, today these projects are almost uniformly reported to be experiencing "financial difficulties." However, given the very generous levels of depreciation charged to such projects and the need to repay government grants and loans if profits are reported, the degree of financial hardship is open to question.

Daisan Sector projects have been used in Japan for several decades. One of the earliest such transportation projects is Kobe's Portliner, built by the New Transit Company at a cost of $250 million and beginning operations in 1981.

According to the Japan Local Government Center, as reported by Dr. George Wynne, by January, 1996 more than 9,400 local public corporations existed of which about half are Daisan Sector companies. Total investments exceed $30 billion, with about $19 billion from local governments and the balance from the private sector.

Perhaps the most unique aspect of this form of enterprise is the typical proportion of local government ownership (about 51 percent) and the mutual agreement to defer taking any profits until all capital costs are repaid over a period of at least a decade.

In Japan, governments do not hesitate to enter profitable business sectors, with or without private partners. Similarly , the Daisan Sector projects and private projects also seek additional profit opportunities whenever they are available. By allowing railroads to expand into other businesses (e.g. land development and housing, hotels, department stores) the national government expected them to capture the external benefits and use them for further railroad expansion. But this isn't occurring rapidly enough, so now the national government is expanding its subsidy programs and offering further deregulation of fares. For example, railways can raise fares automatically by 10 percent if the proceeds are used for expansion.

The dividing lines between firms with varying amounts of public ownership are not always readily apparent, since all transport firms appear to be profit-driven and customer focused. Several examples are reviewed next, including the privatized JR enterprises, new transit serving Tokyo's Waterfront Development, Tokyo's government subway operator, a Daisan magnetic-levitation development initiative in Nagoya, a new bus exclusive guideway being built in Nagoya by a Daisan group, a city-owned AGT in Osaka, a Daisan AGT in Kobe and a Daisan AGT in Nagoya. Of the examples, some reveal strong customer acceptance and financial success; others have financial problems; while for others the jury is still out.

In 1987, the Japan National Railways (JNR) was split into seven private companies (six passenger, one freight) plus the JNR Settlement Corporation. The Settlement Corp. initially owned the stock and retired long term debt ($250 billion) by selling real estate and stock while managing the reemployment of surplus workers. JR East, Central and West now operate through service but change crews at borders.

JR Central was established in 1987 with the division and privatization of Japan National Railways and now has 22,500 employees. JR Central's shares are publicly traded as of October, 1997. JR Central operates 280 Tokadai Shinkansen trains each day and 2,000 conventional trains carrying 370,000 and one million passengers, respectively. JR Central's FY 1998 revenues from 38 other companies totaled $2.2 billion: its railroad revenues were $8.7 billion, of which 83.8% derived from Shinkansen operations (Exhibit 6). JR Central is also developing the huge twin-towered structure

that will become the focal point of Nagoya (Exhibit 7). It will serve high-speed intercity rail, commuter trains, subway, and buses with a 1,700 car parking lot, 800-room hotel, shopping and offices.

JR Central is active in technology development. For example, the firm is testing superconducting magnetic levitation (mag-lev) with a decision expected this year on whether to begin to develop it for regular high-speed operations.

JR West, Osaka Prefecture and Osaka city have created a Daisan Sector company for a $1.4 billion effort to double-track, electrify, and add stations and trains for service to Kansai Airport by 2005.

In many areas of Japan, several railroads (publicly and privately owned) compete successfully. For example, in the Kobe area, there are a 649 vehicle bus fleet (city owned), subway (city owned), suburban railway link to the subway (jointly owned by two private railroads), two AGT lines (Daisan Sector, with the city of Kobe owning 55%), central access for four private interurban railways (50% owned by Kobe city and 50% by the four railroads), and several private interurban railways, one of which operates a fleet of 128 feeder buses. Three railroads offer parallel routes linking Kobe and Osaka. Two funiculars climb Mt. Rokko and Mt. Mayor.

The Tokyo Waterfront New Transit, Inc. Yurokamome Line AGT serves a land-fill development with 20,000 workers and 3,000 residents. The company was capitalized in 1988. Forecasts from 10 years ago predicted 110,000 workers and 60,000 residents. Revised current forecasts call for about 44,000 workers over the next 20 years. Nonetheless, tourism has boosted current daily ridership to 80,000, with the original optimistic ridership forecasts expecting only 60,000. Gross earnings for FY 1997 were $68 million, with net profit of $8.3 million. Annual debt service is $6 million on borrowing from banks of $550 million for rolling stock (126 cars) and station interiors. Track and infrastructure cost $1.1 billion, with Metropolitan Tokyo paying 67 percent and 17 banks paying the remainder. Rolling stock was jointly developed by Nippon Sharyo, Kawasaki, Tokyo Sharyo, and Mitsubishi (Exhibits 8, 9 and 10).

One of the two Tokyo subway operators, Teito (TRT), runs 8 of 12 lines and was formed in 1941 by the national and Tokyo governments. Today the national government owns 53.4 percent of the firm, and Tokyo the rest (no private sector). Fares cover 85 percent of costs, with advertising providing 7%. TRT is doing its first joint development project at Shibuya station. Altogether its subsidiary business ventures employ 2,200 persons. Considering all sources of revenue, TRT made a profit of $60 million which is held in reserve for expansion projects. Total assets are valued at $13 billion, with accumulated depreciation of $8.6 billion. Service is interlined with the other operator and crews change at the border. This service operates at 200 percent of capacity, and carries six million people daily. The infamous packers (who were employed to shove commuters onto hyper-crowded subway cars) have been discontinued to reduce dwell time.

The Chubu HSST project in Nagoya is a joint venture with Aichi Prefecture, Nagoya Railroad Co., Ltd., and HSST Corporation beginning in 1989. One division of the company is testing track at Chubu; the Tokyo division is working on rolling stock. A 10-year period was set aside for this development work. The Aichi governor has formed a team to evaluate HSST versus monorail versus rubber-tired AGT, including government officials of various levels and university professors (Exhibits 11 and 12).

The Chubu HSST uses attraction magnets as opposed to the repelling superconducting version used for higher speed projects. Tests of the high speed version have generated speeds of up to 400-500 km/hr (350 m.p.h.), but the superconducting version is more costly (requiring more electricity and cooling) and also raised environmental concerns due to greater dispersion of magnetic fields.

The Chubu HSST uses linear induction for propulsion. It is under active consideration for the "Dreamland" Line in Tokyo (slowed by the recession), Hiroshima Airport, as well as the Nagoya subway extension. Costs of the Chubu HSST are estimated to be only 60% of monorail and 20% of subway.

Chubu HSST capitalization was about $100 million in 1993. Fifty-two private companies are also participants, with investments totaling $2.4 million including Tokyo Car with $5,000. Tokyo Car has built the prototype railcars. Of interest are the investments of Japan Airlines ($516,000), many electrical suppliers, banks and insurance companies. Japan Airlines actually started development of HSST technology as early as 1972.

This list of investors supports the notion that Diasan Sector investors do so for many reasons, including an inside track on immediate sales to the project (Nippon Sharyo) or loans (banks), potential future sales, favorable relations with supporting governments and even expectations of future profit.

A study team member from Florida DOT has reported that her agency is seriously evaluating the German version of high-speed mag-lev for use in the Orlando area. The Chubu HSST group has partnered with DMJM, ICF Kaiser and Lockheed Martin, to apply to FTA for development funding for U.S. applications, with a decision due in June, 1999.

The impetus for the Nagoya guideway bus project dates to a national policy in 1985 to promote such systems for medium density corridors. A Nagoya study committee recommended this approach for the Shidami corridor in 1988. Various local coordinating committees continued development work with the city and in 1992 the Ministry of Transport's Council for Transport Policy approved the proposal. In 1994, the Daisan Sector group was incorporated (Nagoya Guideway Bus Co., Ltd.) with $30 million of capital, and the project officially entered into the city's comprehensive plan. Investors include Nagoya City Government; Japan Development Bank; Nagoya Railroad Co., Ltd.; JR Tokai Bus Co., Ltd.; Tokai Bank, Ltd.; Chubu Electric Power Co., Inc.; Toyota Motor Corp.; Aichi Bank; Chukyo Bank; Nagoya Bank; and Toho Gas Co., Ltd.

Also, the procedures of the national "Street cars" Law were followed to qualify for national subsidies. Total project cost is estimated at $216 million for construction and $62 million for other items (e.g. rolling stock). Forecasts call for 36,000 passengers per day by 2008, with one to two minute peak hour headways. Development of a new town is proceeding simultaneously. The cost of this project far exceeds that of Nagoya's key routes and will provide another interesting experiment on the benefits of tying new towns and new transit development.

For Osaka's rubber-tired AGT "New Tram" a city-owned enterprise was used, but to extend the tram to connect to the subway, a Daisan Sector project was created (Exhibit 13). The city dispatches and controls both tram segments, but crews change at the border. The tram is designed to be driverless but is crewed nonetheless for additional safety. In addition, safety features include emergency stop buttons (Exhibit 14) on board and at access doors, as well as television monitors watched by control center personnel. Only about one malicious stop button incident occurs each month. Infra-red beams start escalators and they stop with timers to save energy. Pressing a button flattens three escalator steps to permit wheelchair use (Exhibit 15). Osaka is also pioneering new propulsion systems with its linear induction motor subway (Exhibit 16).

Kobe New Transit Co., Ltd. was created in 1977 with the city purchasing 55% of the total equity of $97 million. The mayor serves as Chairman of the Board. Nine banks own 22.1%, four private companies in Kobe own 13.4%, 26 port-related companies own 4.4%, and six others own 5%. Capacity of the rubber-tired system is 10,000 passengers per hour (Exhibit 17). Platform doors are used (Exhibit 18). Ridership as of FY '97 reached 73,000 daily, with annual revenues of $48 million. Depreciation of rolling stock, as shown in the company profile, comprises almost 25% of total expenses, which casts some doubt on the reported deficit for FY '97 of $22 million.

In the case of the Kobe New Transit Co., Ltd., the national government approved the projections of profit after 20-30 years and gave the go ahead to the Daisan Sector project. Breakeven is expected in about 10 years from now, with 680,000 daily riders. In the meantime, the project is experiencing financial difficulty and has raised fares. After the earthquake, $300 million was needed to restore their two lines (Port Liner and Ryoko Island), with the city of Kobe and the Ministry of Construction sharing the burden with the company. The city paid the cost of rolling stock repairs.

Nagoya's Tokadai Line AGT Daisan Sector (Exhibits 19 and 20) project provides a stark lesson in what can go wrong when ridership projections are not met. In 1979, Aichi Profecture joined Nagoya and several private sector investors to provide $30 million of capital.

Opened in 1991, ridership on the Tokadai Line is still a mere 3,000 per day, compared to a cumulative $157 million investment for infrastructure and $169 million for other startup costs (rolling stock, management). Operating costs of almost $7 million annually exceed fare revenues by a factor of three and fares were raised recently by

over 15 percent. Ridership was projected in 1979 at 10,000 daily with 54,000 new residents in the associated Tokaidi New Town developments. Only 26,000 new residents have materialized.

What about the investors? For example, one private participant, Nippon Sharyo, a railcar manufacture, put in about three percent ($900,000). Are they bemoaning their poor investment choice? Not Nippon Sharyo! The company sold five train sets of four cars each to the project at a total cost of $100 million.

Depreciation seems to provide a relatively large percentage of the Daisan Sector and other projects we reviewed, which is in effect held in reserve for future investments. National grants nominally must be repaid if the lines become profitable. Thus, the claims of financial difficulty should be subjected to careful scrutiny.

New Transit Technologies

Even with extensive national subsidies and regulation, most Japanese transit systems remain highly innovative, adorned with the latest in technology and customer service oriented. Not all rail systems are sleek and new. In Osaka, JR's older orange and green electric trains clatter along elevated guideways (Exhibit 21). But they are still clean, reliable and frequent.

The January 17, 1995 Kobe earthquake, with its epi-center under the Akashi Bridge, cost $100 billion to repair, including $70 billion in Kobe. The city paid $30 billion; the national government paid the remainder. As a result, pillars for transit and highway projects have been made much sturdier, with concrete encased in steel. Also, at transit stations, wells have been dug for fire safety, with water also used for toilets. More independent fire fighting stations were established. Some redundancy of systems proved beneficial after the earthquake, when buses substituting for rail carried 220,000 daily riders during the several months necessary to restore full rail service.

A computer-controlled bus location system in Kobe, with real time, solar-powered bus stop displays of approaching buses and travel times, has operated since 1995 (Exhibit 22).

Nippon Otis Elevator Co. is developing its linear induction, air pad technology AGT on its own, without government/Daisan Sector assistance. The company is jointly owned by Otis Elevator Company (U.S.) and Matsushita Electric and Sumitomo Bank in Japan.

JR Central is developing a high speed magnetic levitation project for its Yamamachi Line that could trim the Tokadai corridor trip time to one hour from four at speeds up to 530 kilometers per hour. Other conventional Shinkansen service being tested (300 X series) could offer speeds of 443 km/hr.

The Kawasaki Railcar (KRC) Hyogo factory, open since 1906, is strategically located in Kobe on a canal that allows railcars to be barged to the port for overseas shipment, but is set in the middle of the city and surrounded by small businesses (Exhibit 23). The KRC plant has two million square feet, employs 8,500 (about five percent female), with a capacity for 600 cars annually, in contrast to its Yonkers, New York assembly plant that can process about 60 cars annually. KRC has a 30 percent share of the Japanese domestic railcar market with four principal competitors. In some cases, domestic orders are split by the entity seeking the bids (e.g. JR companies) with drawings shared and a common price (Exhibit 24). KRC reported its best technological innovation as friction scouring welding that requires less noise and no grinding. Its biggest problem is getting quality products on time from U.S. manufacturers.

KRC is part of the giant Kawasaki Heavy Industries, Inc., with $810 million capitalization, annual sales revenues of $11 billion, and 16,000 employees as of March 31, 1998. KRC provides about 5 percent of the parent company's overall sales.

The transit enterprises we visited are served by the latest technology in their operations control centers. However, even in Tokyo, transit and freeway control centers are not integrated (as is true in Montgomery County, Maryland, for example).

Finally, there is a sharp contrast between the newest technologies employed in these control centers and for signals and communications, while back-office staff in transit and government agencies tend to perform their work in a more labor-intensive way than in the U.S.

Fare Collection

Credit cards are very little used in Japan. JR West began accepting payment by credit card for the first time in early April, 1999. Cards are accepted at 314 of the company's stations (80% of the total). One reason for the new policy is believed to be tougher competition in a recessionary market. Competition for the Shinkansen operated by JR West and JR Central from airlines has picked up, with new reduced fares. One new discount airline, Skymark Airlines, Inc., is charging 31.5 percent less on a parallel route, and other airlines are responding in kind.

The Japan Debit Card Association announced in April, 1999 that it will put off the start of its planned account-settlement information center for six months to October, 1999. Therefore, 860 financial institutions won't be able to start such services until next March. The reason for the delay is further tests of Y2K capabilities. Only about 13 financial institutions and retailers offer debit card capabilities now.

In Osaka, the common ticket network known as "Rainbow" has 25 separate transit systems participating. On the 20th day of each month, all tickets are sold at a discount for "no my-car day." Bulk orders of the magnetic stripe rainbow cards can be designed to customers' specifications.

In Osaka, urban form is cluttered with snake-like coils of urban expressways, often encased in curved noisewalls decorated with blue stripes. These expressways feature very high tolls (say $5 for 5 miles). A nationwide smartcard to be good on all such systems is said to be under development.

Thus, the Japanese do not appear to be as advanced technologically in fare collection systems as Hong Kong (reviewed below) or the U.S. Also, less effort is made in Japan to seek uniform payment mechanisms for multi-modal trips, or to provide transfer discounts. These appear likely to be near-term innovations given Japan's transit operators' quest for profitability led by customer service and the latest in technology.

HONG KONG

Overview

Hong Kong is 421 square miles (half the size of Rhode Island) and smaller than Los Angeles. Its 6.8 million population is slightly larger than Virginia. Economic growth averaged 7.5% annually for two decades, before slowing to 5% in 1997 and a negative 5% in 1998. Real GDP is $22,310, fifth highest in the world. Despite its large GDP per capita, half the Hong Kong population can't afford private housing.

The price of office space in Hong Kong has plummeted from its peak in late calendar 1997 of over $1,900 per square foot to about $640 per square foot at the end of 1998.[7] The health of the Hong Kong economy is closely tied to the property market since real estate and development comprise 40 percent of the economic activity and the government derives much of its revenue from auctioning off leases for the land it owns.

Hong Kong has about 1,000 miles of roads and over 475,000 motor vehicles for one of the highest vehicle densities in the world. Nonetheless, transit has a 90% mode split, of which a third use rail, a third use bus and a third use minibuses, taxis, ferries and trams. Virtually no bicycles are used for commuting.

Politics and Economics

The takeover by mainland China less than two years ago of Hong Kong and its new status as a Special Administrative Region apparently does not rank high on the list of significant disruptions to life there. Such a list would include the Japanese occupation of 50 years ago, an influx of refugees from Mao Zedong's communist takeover of China, riots in the 1960's, and economic booms and busts. At the time of the takeover fears centered on loss of personal, political and economic freedom, with hopes that the robust economy would cushion any hardship. Instead, loss of liberty has not occurred, while the economy has sunk into a deep recession.

For example, pro-democracy legislators thrown out of office in 1997 by China have been re-elected and remain publicly critical. Unemployment is at six percent (up from two percent in 1997) and the financial services sector has been especially hard hit with layoffs.

[7] Washington Post (May 8, 1999) at D1.

Hong Kong's Liberal Party favors business interests. Its Democratic Party is fiercely critical of the current government's economic policies. The expectations of Hong Kong's citizens for government performance have been raised, and the recession has emphasized the need for close economic alignment with mainland China, its 1.2 billion population, and its growing economy.[8]

Hong Kong may be returning to financial health. Forecasts call for economic growth of about 0.5 percent in 1999.[9] Financial Secretary Donald Tsang envisions Hong Kong as a high-tech center and expects Walt Disney Co. to build a theme park there. A new $1.7 billion "cyberport" project is planned to boost high tech industries. Interest rates were cut 0.25 percent in April, 1999, the sixth reduction since October, 1998, to stimulate the property market. Real rates remain high, however, at over 10 percent. The Hang Seng (stock market) index is at its highest level since October, 1997. Tourism rose 11 percent in January, 1999, but since many of these are from mainland China, retail sales have not yet been positively affected.

Customs/ Policies/ Trends Influencing Transit Markets

Government and private transit operators favor easy wheelchair access. For example, Kowloon Motor Bus's (KMB) double-decker buses have very low floors and automatic ramps, even though only about 100 trips by wheelchair are served by their buses each month. Six percent of KMB's drivers are women. Driver wages are about $128 per month during training and $250 as a new hire, although the company offers some benefits (e.g., 20 percent reduction in lunch prices).

Hong Kong's current population is 6.8 million. Hong Kong may have to admit as many as 1.7 million immigrants from mainland China under a recent court ruling. The result could be intense demands on social services and fears about competition for jobs. The ruling would allow anyone with at least one parent who is a Hong Kong resident to live in the territory.

Hong Kong has a "sandwich" class, which makes too much income to be eligible for public housing (above $7,700) but too little to afford reasonable housing (perhaps $130,000 for a small house). Thus, about half of Hong Kong's residents are in public housing.

Politically, Hong Kong residents are opposed to more roads (believing they induce more congestion). But spot improvements are favored to reduce congestion.

Travel allowances for employees are not widespread as they are in Japan.

Government Structure/ Policies/ Planning

[8] The Washington Post (April 18, 1999) at page A21.
[9] The Daily Yomiuri (April 13, 1999) at page 6.

The government structure in Hong Kong is much less complex than in Japan or the U.S., since there are many fewer layers. Hong Kong has long been recognized for favoring free enterprise and it is continuing its reliance on market forces with an enlightened system of bus franchises that emphasize competition and customer service achieved through vigorous government quality monitoring but fewer economic regulations.

Within the Hong Kong government the Transport Bureau focuses on policy while the Transportation Department serves as the implementation body.

The Bureau is headed by the Secretary of Transportation. The secretary is assisted by the 16-member Transportation Advisory Committee, appointed by the Chief Executive in Council, and supported by the Transport Complaints Unit. The 19 local district boards and their traffic and transport committees also provide advice.

The Commissioner for Transport heads the Transportation Department, which administers the Road Traffic Ordinances, plans and regulates transport operations (other than railways), and registers, licenses and inspects autos.

The Highway Department was established in June, 1986, to design, construct and maintain the public roads. It has an annual budget of $680 million, about 80% for construction, employing 2,000 persons. It is headed by a Director.

In Hong Kong, civil servants are rotated every three years or so (in Japan, such rotations occur annually). Women comprise about half of senior management (much more than in Japan).

Hong Kong policies include:

- Emphasis on mainland connections
- Upgrading buses (air conditioning, fewer stops, wheelchair access studying more continuous exclusive lanes)
- Examining electronic road pricing
- Seeking legislation to restrict use of mobile phones while driving
- Favor passengers over freight on joint use tracks of Kowloon Canton Railway (KCRC)

Hong Kong decides on a case by case basis whether any new government capital is needed for rail projects whether or not these enterprises have some degree of government ownership. Also, intermodal facilities and terminals may receive subsidy.

Among the various planning studies underway are the Third Comprehensive Transport Study to plan through 2016, with policy emphasis on mainland China connections and environmental protection. Also, since there are no uniform standards for Intelligent Transportation Systems (ITS), a unified plan is underway to facilitate

coordination of various proprietary traffic control devices. An electronic road policy study is also underway.

The Hong Kong government is now undertaking the "Second Railway Development Study." Under the "Railways Ordinance" of June, 1997, the government must publish notice of its intended railway development and associated land resumption (the Hong Kong government owns all land and only leases it). Any public objections should be resolved in nine months and submitted to the Executive Council for final approval.

Hong Kong uses franchises for bus routes. A package of routes is offered, including high and low density. Five to 10 year terms are available. The quality of buses and proposed fare levels are considered when selecting franchisees. Bus franchises are non-exclusive but are exempt from license fees, receive rebated fuel taxes and are exempt from rent on the use of government terminals.

The Transportation Department does extensive daily monitoring of franchise performance, using passenger satisfaction surveys and reviewing performance data submitted by the carriers. A policy issue is the extent to which these analyses should be made available to the media. Government inspectors recall five percent of buses from service for immediate spot checks for safety and performance. China Motor Bus was providing poor service (and did not embrace the smartcard fare payment system known as "Octopus") so lost 23 routes in 1993 and was replaced entirely in 1998. Other penalties could include fines, restrictions on expansion and allowing more competition. Each year the franchisees must produce a five year plan and share it with the appropriate 19 local districts.

Kowloon Motor Bus's (KMB) new franchise agreement does not include the previous maximum rate of return on assets of 16 percent, but using its ability to regulate fares the Hong Kong government can still control KMB's profitability. KMB's earnings rose in FY 1998 by six percent despite fewer riders, because of a fare increase.

While KMB has routes that parallel the Mass Transit Railway (MTR) along Nathan Road on Kowloon Island, for example, the MTR could not accommodate the passenger loads without such "competing" service.

The light rail system operated by Kowloon Canton Railway Corporation (KCRC) in the northwestern New Territories provides free transfers with feeder buses. KMB sued KCRC in court over abuse of its franchise regarding KCRC's feeder buses. KMB alleged KCRC was using the buses to hide profit.

MTR has also had legal disputes with competitors. MTR planned to run feeder buses on Hong Kong Island, but China Bus protested. MTR agreed that China Bus could run the routes but they were discontinued after only six months so now MTR is again studying the feasibility of operating them.

Organizational Forms, Financial Mechanisms and Performance

As in Japan, some gradations of government participation are found in Hong Kong's several transit enterprises, ranging from entirely government owned (e.g. MTR, Airport Authority), to government owned and privately managed (e.g. mid-level escalators), to entirely privately owned (e.g. Hong Kong trams, Star Ferry, KMB). Although the Daisan Sector (51 percent government owned) enterprises so prevalent in Japan are not apparent in Hong Kong, the government controlled Hong Kong enterprises display the same intense drive for profitability, with emphasis on joint development opportunities and customer service.

Over the next five years, $30 billion will be spent on major rail, road, land-fill and port projects in Hong Kong. These include West Rail, a 30.5-km extension of KCRC costing $8.2 billion; Ma On Shan Line East Extension, a 10.3 km extension of KCRC costing $1.8 billion; and Tseung Kwan O Line, a 12.5-km new town extension of MTR costing $3.9 billion. These will be added to the existing 143 km of railway lines.

The Airport Authority is a wholly owned subsidiary of the Hong Kong government. At least half of its board must be non-government officials. The authority has 1,800 employees. The airport authority has exercised independent power in its markets, including:

- Pressure retailers to lower prices through franchise contacts;
- Imposed fee on luxury coaches (resulting in a protest);
- Involved in intensive negotiations with officials of the express train (an MTR enterprise) over sharing of revenues

A second subsidiary of the Hong Kong government was formed to focus on security (the Aviation Security Company, Ltd.)

By developing real estate near the airport, the authority will become one of the largest commercial landlords in Hong Kong. The authority retains 50-year leasehold interest in all land on the airport island.

The airport at Chep Lap Kok and its connections cost $23 billion. A billion dollars was spent on site preparation alone. The airport opened on July 6, 1998, only nine years after it was first announced. The Hong Kong government has contributed equity of $4.7 billion and borrowed another $1.5 billion. Private sector investments in franchises and subleases stand at $2.6 billion

Among borrowings was a loan of $1 billion from a consortium of 48 local and international banks at a rate 43 basis points over the "Hong Kong interbank offered rate." It must be refinanced in 2001. In addition, the Hong Kong Monetary Authority

has agreed to manage a $640 million program which will help establish confidence in the airport's other borrowing programs.[10]

Airport financing provided one of the few examples of difficulties with mainland China. The PRC officials demanded a higher percentage of equity, and opening was delayed for a year as a result of these negotiations. Apparently, PRC officials feared the British were trying to divert resources through relatively heavy borrowing on the project.

In 1982, Kowloon Canton Railway Corporation (KCRC) was created by ordinance, after completing double-tracking, and separated from the Hong Kong government (Exhibit 25). KCRC was charged $128 million for the right-of-way, an amount which was regarded as well below market. By developing the land above its stations and depots, the corporation earns considerable income that is applied to its capital program. KCRC also operates feeder buses (118,000 passengers per day) and a light rail system (314,000 daily), in addition to its commuter rail line (737,000 daily riders). Up to 12 freight trains run daily in each direction.

KCRC is benefiting from cross-border crossing volumes, as a premium fare is charged. For FY 1998, a net profit of $226 million was earned, for a 17 percent return on assets.

Mass Transit Railway (MTR) nets $200 - 300 million annually ($358 million in FY 1997), with profits returned to the Hong Kong general fund. It is being prepared for privatization to make the corporation even more market sensitive and to invite an influx of private equity. MTR and Hong Kong are now negotiating a franchise agreement like those that apply to KMB and other bus companies, as a means to establish performance standards.

When MTR was formed in 1975, Hong Kong put in $640 million out of $1.4 billion of capital. Hong Kong adds more equity as needed for extensions. The deep recession ended plans to finance MTR's eastern expansion without further Hong Kong funds. Hong Kong has provided $4.1 billion for MTR, including over $3.0 billion for the airport express. Staff totals 8,400 persons.

[10] Source: "Hong Kong International Airport Development in Brief," Reference Paper RP-EO22RR (September 10, 1998) at page 6.

MTR is expected to operate under "prudent financial principles," which means to maximize the rate of return on assets, cover operating costs and establish reserves for future expansions. Hong Kong amended this understanding to demand a return of 40 percent of profits, but then suspended that edict. While poorly defined, MTR understands the concept to focus on service quality so that profits are plowed back into the enterprise.

For its station development deals, MTR requires private developers to take most of the risk and then shares in the profits. MTR is likely to manage the development, but if it is not contiguous to a station (e.g. a shopping center), MTR may or may not actually manage the property. Most of MTR's profits are from property, as ridership has been flat since FY 1995 (at about 2.4 million per day). MTR has earned over $512 million from its joint development projects, which include 31,366 residential flats, 251,000 square meters of office space and 290,000 square meters of retail. In planning 34 kilometers of additional service by 2008, MTR is projecting an 11.5 percent rate of return on investment, primarily from development returns. MTR's rule of thumb is to provide service in corridors with 50,000 persons within 500 meters.

MTR has excellent credit ratings, including A+/A and A-1/A3 for long-term domestic/foreign currency debt by Standard and Poor's and Moody's, respectively. These are as good as the Hong Kong government itself. The debt/equity ratio has improved from 2/1 as recently as FY 1992 to ¼ by FY 1997.

Kowloon Motor Bus (KMB) is the largest of Hong Kong's four franchised bus operators (Exhibit 26). It has 3,150 buses and 12,500 employees and 2.9 million daily passengers. For the first six months of FY 1998, KMB earned 9.1 cents per share, after paying $6 million in profits tax at the rate of 16 percent. KMB has three substantial owners, who are property developers, totaling almost 60 percent. In late 1997, KMB created KMB Holdings, Ltd., incorporated in Bermuda, whose shares trade on the Hong Kong exchange (known as Hang Seng). In September, 1997, KMB proposed a fare increase of 9.2 percent, but the Chief Executive in Council approved only 7 percent, illustrating the remaining direct regulatory role of the Hong Kong government that may be eased in the near future.

The Wharf Group owns both the tram and Star Ferry, as well as development interests, cable television, hotels, container ports, car parks, toll collection facilities and cargo handling. It regards its transit investments as loss leaders and is willing to tolerate modest losses, even while striving for profitability.

The escalators to the mid-level were built by government for $25 million, and are contracted out for private operation under a four year contract. They carry 34,000 persons daily (Exhibit 27).

Tunnels and bridges can be privately built and operated but tolls are regulated and the projects eventually revert to the government in 30 years (known as Build/ Operate/Transfer or BOT).

The Lantau link (costing $3 billion) to the new airport is maintained, operated, and managed by a private firm under a four year, MOM contract.

New Transit Technologies

With hordes of "captive riders" one might imagine that transit providers in Hong Kong would take their customers for granted. This is uniformly not the case, however.

As one example, KCRC has rigorous performance standards (e.g. no more than two minutes to buy a ticket and to enter through fare gates, even during peaks).

The 34 kilometers (21-mile) Airport Express Line is built and operated by MTR, with the Lantau subway line sharing tracks. Travel time is 23 minutes. The new airport shuttle is loaded with customer amenities and high tech features:

- Lighted display shows how far the train has gone and how far to the next stop
- Touch screen television monitors at each seat
- Pay only at destination ($10 U.S.)
- Lots of luggage storage space at doors
- Downtown terminal for airport check-in of baggage
- Connecting feeder buses in the city with digital displays showing time until next bus leaves

Although the Airport Express carries 30,000 daily (out of 110,000 airport users), use of the airport and ridership on the shuttle have failed to meet early projections due to the effect of the recession on airline traffic. The airport was built to accommodate 2040 projections.

Hong Kong invited bids from MTR and KCRC for the service, but reportedly KCRC did not provide a serious proposal. MTR must return 40 percent of its profits (if any) on the line to Hong Kong.

At the airport, new touch screen telephones have proved intimidating to the elderly so that some conventional phones have been installed.

As another practical innovation, MTR uses railcars with five sets of doors and no end doors to facilitate rapid and even loading. Platform doors are being retrofitted on MTR and are used widely in Japan as well as Hong Kong, together with closed circuit television surveillance, as a safety measure and for temperature control in stations.

KMB is testing Automatic Vehicle Location systems. GPS systems have not worked well in tests; distance reckoning systems using microwaves appear to offer greater promise.

New technology plays a key role even on Hong Kong's oldest surface mode, the double-decker trams which began service in 1904 (Exhibits 28 and 29). Although ridership has declined to 254,000 per day, down from 350,000 due to intense competition from buses, the one-minute peak headways and 25 cent flat fare offer a reliable bargain to the tram's market. Newly installed technology includes:

- Electronic speed controls;
- Closed circuit television on rear stairs;
- On-board battery rechargers;
- Adaptive braking;
- Programmable logic controllers;
- Austrix 3 scheduling software (from Australia).

The tram has shown an admirable trend to improved safety over the past few years. Among the programs that account for this success are:

- Defensive driving school certification with annual recertification;
- Courtesy training;
- Mandatory counseling after training with senior employees;
- Joint employee-employer consultative committee;
- Work improvement program;
- Joint analysis of each accident;
- Focus groups with customers.

About half the employees are unionized and Hong Kong also regulates entry into trades.

Fare Collection: The Octopus Card

In contrast to Japan, Hong Kong is far advanced in electronic fare collection using smartcards. Hong Kong offers a striking example of how to organize, using private sector and government cooperation, an immediately successful and profitable enterprise for multi-agency fare collection. And the most startling revelation from the Hong Kong example is the irresistible torrent of customer demand that has propelled very rapid expansion of the system.

Since Creative Star was formed by MTR and five (now six) partners in September, 1997, there are now almost six million Octopus Cards in circulation, with three million daily transactions. A deposit of $5 is assessed (the cards cost $4); politicians have objected to deposits. The cards are made by Sony in Japan. After initial tests a steel plate was added to the card to prevent breaking.

The Hong Kong Monetary Authority limits the maximum amount that can be added to the cards, in $6.50 increments. Add value terminals are available in many convenience stores (these are more secure than remote bus terminals). The system cost about $80 million to develop and install, financed by loans from the transit systems at market rates. The loans are being paid by Creative Star using deposits and float totaling about $77 million. Costs of transactions are one percent of fares, which is expected to decline as volume rises. Participants pay according to a formula that has proved to be quite complex for smaller operators who are lobbying for fixed rates guaranteed for longer terms.

MTR runs Creative Star under a management contract, but this may be somewhat inhibiting expansion into new markets. New markets now served include local telephones and, in six months, long distance. Octopus is earning Creative Star profits in excess of 15 percent. It handles $4 million each day, projected to triple in three years. Creative Star has 45 employees, including four computer operators who handle the clearinghouse function.

Currently, Hong Kong regulates Creative Star so that only 15 percent of its transactions can be for non-transit uses. If it is allowed to become a "bank" it can expand this to 50 percent, but the existing banks are opposing this move. The new classification would allow the card to be used to purchase items at stores rather than merely adding value there.

Currently seven transit providers are participating in Octopus. Over 75% of KCRC customers now use Octopus. KMB is studying the potential of Octopus to permit reduced price transfers between systems which could then be used as a means to rationalize routes. KMB processes about 450,000 daily Octopus transactions, and 70 percent of customers use the card on the 1,600 buses equipped to accommodate Octopus. Even though KMB expects 90 percent of customers ultimately to use Octopus, they must still retain their fareboxes. Before Octopus, KMB processed 20 tons of coins each day (Exhibits 30 and 31).

Transit systems (MTR, KCRC) use hand-held verifiers that have 12-hour battery packs. These units cost less than $1,700 each, and are durable (passing two-meter drop tests). They provide an excellent example for U.S. transit systems that are barrier-free and are considering smartcard technology.

One of the benefits of Octopus is a 70 percent reduction in faregate faults versus magnetic cards. Throughput on MTR faregates has improved 10-20% using Octopus

cards. Octopus offers frequent user benefits of 10 to 28%. A tourist Octopus card will soon be sold at the airport for a smaller deposit, using special graphics to encourage saving as a souvenir. A firm called ERG is marketing the system overseas.

Not every aspect of the Octopus story is totally positive. Hong Kong recently replaced 14,000 parking meters that accept only electronic cards (not Octopus). The feasibility of accepting Octopus is being explored. Also, the tram is resisting the conversion to Octopus (even though the Star Ferry, owned by the same company as the tram, is converting) because there is no room to install targets and the transaction cost of a half cent (two percent of revenue) is deemed too great.

COMPARISONS AND LESSONS

In comparing Japan and Hong, there is no underestimating the wrenching effect of the severe economic recession, especially in Japan.

The following are comparative growth rates.[11]

Gross Domestic Product

	1997	1998
Japan	1.4%	(2.8)
Hong Kong	5.3%	(5.1%)
Mainland China	8.8%	7.8%
United States	3.9%	3.9%

Unemployment is now 6 percent in Hong Kong (up from 2.1 percent in 1997) and is 4.8% in Japan (up from 2.0 percent in 1993 and 3.5 percent in 1997).

The dislocation, fear and hardship from economic hard times have had a stifling effect on what otherwise would appear to be the most successful transit innovations incubated in these two locations. Public-private partnerships (combining land use and transit to mutual advantage while using new technologies) remain viable despite the hard times, but their success is mixed.

In light of the extensive discussion above, the following is a brief outline of the major similarities and differences among Japan, Hong Kong, and the United States, together with the most likely innovations to find success in the U.S. if they were to be applied here.

Compared to the U.S., both Japan and Hong Kong have:

- High land values
- Extreme population density
- Very high transit usage
- Very low auto ownership
- Limited parking for private autos
- Low transit fares
- Little attention to intermodal and intersystem transfer discounts
- Much greater emphasis on matching transit and land use to provide symbiotic benefits

[11] Wall Street Journal (April 28, 1999) at A-1.

- Intense interest in international benchmarking of transit performance
- Greater willingness of government to seek profits in private markets
- Very little attention to insurance and indemnity, given no history of lawsuits (this may be changing with a recent $1 million judgment against KMB)
- Severe economic recession
- Many more choices of transit modes
- A greater mix of public and private transit enterprises often competing in the same corridors

Similarities between the U.S., Japan and Hong Kong include:

- Recognized need for strong emphasis on customer service in transit enterprises
- Strong role of government in public transit with complex layers of regulation and subsidy
- Policies favoring environmental protection and access by disabled and elderly persons
- Only occasional use of pricing mechanisms to help rationalize transit supply and demand, but much interest in studying future application
- Government emphasis on conversion to clean transit fuels but delayed and confused response by transit operators about how best to comply

In Hong Kong, the elements that offer the greatest opportunities for U.S. applications are:

- Octopus smartcard fare collection network
- Accelerated project planning and implementation
- Platform screen doors
- Aggressive government and public/private transit enterprises in combination with new developments to use land use and transit to mutual best advantage
- Deregulation
- Emphasis on new technology
- Emphasis on customer service

In Japan, the elements that offer the greatest opportunities for U.S. applications are:

- HSST (low speed, magnetic levitation AGT)
- Key bus routes
- Platform screen doors
- Aggressive government and public/private transit enterprises in combination with developments to use transit and land use to mutual best advantage (e.g. Kukaku-seiri)
- Deregulation

- Emphasis on new technology
- Emphasis on customer service

Despite the above effort to condense the lessons of this study mission to cryptic lists, the complexities of the cultures and economies make reliance on such generalizations very hazardous. One obvious reason is that each country poses a moving target: trends at any given moment are simultaneously pulling and pushing at comparative constructs.

For example, in the U.S. in 1964, three out of four persons trusted the federal government to do the right thing. By 1994, 75 percent mistrusted government. In a 1997 poll, only 32% expressed a "great deal" or "quite a lot" of confidence in state government and 38 % in local government. In the U.S., technological advances have raised expectations for improved government performance. Governments are having a hard time responding to these expectations but seem newly devoted to more effective customer service.

In both Japan and Hong Kong scandals have become clearly visible, and efforts to avoid them are ongoing. This serves as a backdrop to government/private sector procurements, for example. In Hong Kong, an anti-corruption campaign has been formed and giant posters appear in the transit systems and elsewhere.

U.S. population is projected to jump 50 percent by 2050 from 1990, to reach almost 400 million. This is like Hong Kong but unlike Japan. The U.S. population will be older and more diverse.[12] This is like both Japan and Hong Kong.

In the U.S., the average work week has grown to 50.8 hours in 1997 from 40.6 hours in 1973. In Japan, the work week is shrinking. By 2020, in the U.S., 80% of mothers with children under six will work, up from 50 percent today. Labor force participation of Japanese women is also increasing.

In Japan, despite the array of new modes (AGT, monorail, HSST), there has been a tendency to reward established enterprises. Even Daisan Sector projects seem to select products and services from their own equity partners (club members).

[12] "Transforming State and Local Government: The Critical Role of Public Management," KPMG LLP (January, 1999) at page 6.

In Hong Kong, there is almost a fanatical devotion to the latest of technologies. Kowloon and Hong Kong have installed different traffic management systems (SCAT from Australia and SCOOT from the UK) to test which will perform best. Mainland China, on the other hand, seems more like the U.S., for example adhering rigidly to AASHTO manuals rather then embracing an innovative highway/development proposal featuring new town pods with transit stations along new freeways.

A member of the study mission reported that the Kawasaki mock up of the MTA - New York City transit railcar featured seats that were severely damaged when some New York transit police officers applied rigorous jumping to simulate the rough treatment of its customers. Thus, cultural differences must continue to be recognized if firms are to compete effectively in world markets. By the time we arrived at Kawasaki's plant in Kobe, the seats had been replaced with sturdier versions.

The linking of Japan and Hong Kong economically is illustrated by proportions of contracts awarded by MTR for new construction. Japanese firms are generally awarded 25 to 60 percent of the work, exceeding even Hong Kong's own firms.

On the other hand, Japanese manufacturers continue to provide the vast majority of products for Japan's transit systems, despite recent pronouncements regarding the westernization and opening of its domestic markets.

In conclusion, the study mission provided a unique opportunity to share first-hand experiences with a diverse group of highly motivated transit professionals. Perhaps the best lesson was that problems can be approached and solved in a myriad of ways, and it is useful to put down our cultural prisms from time to time to examine transit markets from a different perspective.

EXHIBITS

- Can be obtained by request from NVTC