

Institutional Models of East Asian Railway Operators and Implications for California High-Speed Rail

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## Abstract

This paper investigates the proactive actions that the California High-Speed Rail Authority is taking in order to plan for its station areas. The investigation was prompted by my observations that transit agencies in the United States generally suffer from low ridership and operate in the red on an annual basis, meaning that ticket fares generally do not cover the full cost of operations, and that transit agencies must resort to using subsidies to keep their operations afloat. While the argument can be made that subsidies are provided in order to provide a social service, it does not dispute the fact that transit funding becomes a political hot potato and is constantly under the threat of being cut. This situation poses a challenge to the California High-Speed Rail Authority because the state law that authorizes the sale of the bonds that are being used to fund the construction of the California High-Speed Rail System prohibits the use of operating subsidies. A look into the transit systems in Hong Kong and Japan revealed that railway companies in those countries not only operate trains, but also engage in master planning, land development and retail operations in their station areas. This allows railway companies to induce ridership on their lines and to diversify their revenue streams from ticket fares, latent land value financing, and retail sales, resulting in operations with net profits. The key finding of the research was that, unlike the United States' institutional model of passenger railway systems, where the railway company is relegated to just the role of train operations and must coordinate with local governments and developers to promote land development around station areas, the institutional model in Japan and Hong Kong integrates select roles of local governments and developers into a single entity—the railway company—and thereby reduces the transaction costs of coordinating the planning of railway operations and land development. This institutional system allows the important service of transportation to be provided to the population at large without burdening governments of their limited cash-funds. The California High-Speed Rail Authority, and other transit agencies in the United States, would likely benefit from the lessons learned of the systems in Hong Kong and Japan.

**Introduction**

Whereas railway transit service is provided mainly by municipal agencies in the United States, in Japan and Hong Kong, such service is provided by private and quasi-private urban railway companies, respectively. These private railway companies are able to perform operations with net profits by not only providing transit services, but also by engaging in a multitude of additional ancillary businesses that diversify their revenue streams and increase the number of passengers on their lines. These ancillary businesses include land development, retail sales, additional transportation services, and leisure and recreation services. Table 1 lists the full range of services that the companies engage in.

Business	Range of Activities
Transportation	Railway operations; bus services; taxi services; car rentals; trucking; aviation; shipping; freight forwarding; package delivery; manufacturing of rolling stock
Real Estate	Construction, sale, and leasing of housing, office space, hotels; architectural and engineering services; landscaping
Retailing	Construction and operation of department stores, supermarket chains, station kiosks, catering services, and specialty stores
Leisure and Recreation	Construction and operation of resorts and spas, amusement parks, baseball stadia, multiplex movie theaters, fitness clubs, golf courses; operation of travel agencies

Table 1. Types of businesses operated by railway consortia and their affiliated companies. (Cervero, 1998, p. 191).

**Japanese Private Urban Railway Companies**

In Japan, there are 149 private railway companies, of which 135 are engaged in passenger transport (Saito, 1997, p. 2). Besides the six major Japan Railway (JR) companies that were formed during the 1987 privatization of Japan National Railways, there are 15 other major railway companies that mainly operate in the largest urban agglomerations in Japan (i.e., Tokyo, Osaka, and Nagoya) (Saito, 1997, p. 1). These 15 railway companies operate a total of 2,917 kilometers of line, or a mere 10.5 percent of the total line length in Japan, which amounts to 27,754 kilometers (Statistics Bureau of Japan, 2017). Yet, these 15 railway companies handle the equivalent of 41.6 percent of the total number of passengers and 29.2 percent of the passenger-kilometers of the six JRs (Saito, 1997, p. 1), as shown in Table 2. In fact, within Tokyo, Osaka, and Nagoya, the 15 major railway companies carry a larger share of passengers than the JRs do (60 percent versus 40 percent) (Saito, 1997, p. 1). These figures are significant, considering the fact that railways in Japan provide a vital role in the passenger travel market by capturing 79.1 percent of the annual 29.84 billion passenger trips and 71.8 percent of the annual 576.6 billion passenger-kilometers nationally (Saito, 1997, p. 1).

Tokyo’s case is particularly interesting, as the lines of the private railway companies connect the outer suburbs of the metropolitan area with the main loop line (Yamanote Line) that distributes passenger traffic to the multiple business and shopping districts that surround the city center. This arrangement developed because of national policies from about a century ago. During Japan’s industrialization in the late-1800s and early-1900s, the country experienced several railway booms (Saito, 1997, p. 3). Within that period, the Japanese Government nationalized many private intercity lines with political and military interests in mind (Saito, 1997, p. 3). After the nationalization, private railways were permitted to operate local services only when they did not interfere with nationalized lines (Saito, 1997, p. 3). As a result, the remaining private railways were strongly incentivized to build new lines in rural areas, and to increase the population near their lines with housing and commercial developments to survive financially (Saito, 1997, p. 4). The operating profits and losses of the railways are shown in Table 3. Tokyo’s railway network is also shown in Figure 1.

Passenger Rail Figures in Japan, 2014						
Sector	Passenger Line Length		Ridership		Traffic Volume	
	Kilometers	Percent	Million Passengers	Percent	Million Passenger-Kilometers	Percent
JRs	2,917	10.5%	9,809	41.6%	121,489	29.3%
Private	615	2.2%	3,147	13.3%	20,187	4.9%
15 Major	615	17.4%	3,147	24.3%	20,187	14.2%
Medium and Small	0	0.0%	0	0.0%	0	0.0%
Public	0	0.0%	0	0.0%	0	0.0%
Total	3,532	12.7%	12,956	54.9%	141,676	34.2%

Table 2. Passenger Rail Figures in Japan. (Statistics Bureau of Japan, 2017).

Operating Profits and Loss of Major Private Railway Companies, 1994							
Company	Railway	Percent	Bus	Percent	Other	Percent	Operating Profit
Tobu	\$237,734,823	44%	-\$33,599,855	-6%	\$340,594,757	63%	\$544,729,725
Seibu	\$226,799,021	52%	-	-	\$206,353,827	48%	\$433,152,848
Keisei	\$133,923,950	87%	-\$5,547,146	-4%	\$25,675,361	17%	\$154,052,165
Keio	\$174,814,340	58%	-\$3,962,247	1%	\$120,135,331	40%	\$298,911,918
Odakyu	\$222,202,815	51%	\$2,535,838	-6%	\$213,010,402	49%	\$432,677,378
Tokyu	\$323,160,870	49%	-	-	\$341,070,226	51%	\$664,231,096
Keikyu	\$155,003,105	55%	-\$10,460,332	-4%	\$135,667,339	48%	\$280,210,112
Sotetsu	\$71,954,406	28%	-\$16,799,928	-6%	\$198,112,353	78%	\$253,266,832
Kintetsu	\$254,217,771	51%	-\$22,664,053	-5%	\$263,568,674	53%	\$495,122,392
Nankai	\$128,059,825	44%	-\$19,811,235	-7%	\$182,263,364	63%	\$290,511,954
Keihan	\$105,237,282	49%	-	-	\$111,259,897	51%	\$216,497,179
Hankyu	\$138,361,667	42%	-	-	\$189,712,389	58%	\$328,074,056
Hanshin	\$43,743,207	23%	\$2,060,368	1%	\$148,663,509	76%	\$194,625,575
Meitetsu	\$114,746,675	43%	-\$19,652,745	-7%	\$174,021,891	65%	\$269,115,820
Nishitetsu	\$38,513,041	25%	\$12,203,721	8%	\$100,799,565	67%	\$151,357,837

Table 3. Operating profits and loss of major private railway companies in 1994. The original 1994 figures in Yen have been converted to 2016 dollars. (Saito, 1997, p. 6; Federal Reserve Bank of St. Louis, 2017; Federal Reserve Bank of Minneapolis, 2017).

### Hong Kong's Mass Transit Railway Corporation

In Hong Kong, passenger rail transit plays an even more significant role in the travel market, as over 90 percent of all motorized trips are by public transit (Cervero & Murakami, 2008, p. 5). The passenger rail services are solely provided by the Mass Transit Railway Corporation (MTRC), which operates a six-line railway network of 126 kilometers and 53 stations, as shown in Figure 2 (Cervero & Murakami, 2008, p. 5). During the 1980s and 1990s, MTRC was solely owned by the Hong Kong Special Administrative Region (HKSAR) (Cervero & Murakami, 2008, p. 8). In the fall of 2000, about 23 percent of MTRC's shares were sold to private investors on the stock exchange, prompting shareholders to exert a commercial influence within MTRC, and for managers to take a more entrepreneurial and business-minded approach (Cervero & Murakami, 2008, p. 8). The HKSAR's 77 percent stake in MTRC still ensures that decisions are made with the broader public interest in mind (Cervero & Murakami, 2008, p. 8).

In contrast to private railway companies in Japan, when MTRC engages in land development, it receives a special land grant from the HKSAR (which owns all the land in Hong Kong) by purchasing development rights at a "pre-rail" price (Cervero & Murakami, 2008, p. 10). MTRC then sells these rights to developers at an "after-rail" price and negotiates a "share of future property-development profits and/or a co-ownership position from the highest bidder" (Cervero & Murakami, 2008, pp. 10-11). Like private railway companies in Japan, MTRC also engages in a diverse portfolio of projects to protect its finances from business cycles, including "equity ownership, cash holdings, property management, consulting, advertising, and ownership of other assets (e.g., telecommunication leases, [and] convenience retail shops)" (Cervero & Murakami, 2008, p. 11). Between 2001 and 2005, these investments

amounted to 62 percent of MTRC's total income, while ticket fares from railway operations provided 28 percent of total income (Cervero & Murakami, 2008, p. 11, p. 13). The monthly ridership of MTRC's rail network in 2016 averaged 133,000 passengers (MTRC, 2017b).

### **Integration versus Coordination of Operations and Planning**

The secret to the success of transit operators in Japan and Hong Kong is due to the fact that the master planning of station areas is *integrated* versus *coordinated*. For example, Model A in Figure 3 displays an institutional model that is often practiced in the United States, where the master planning of transit-oriented developments is coordinated with local governments, developers, and transit operators that are relegated to just the role of providing transit services. In contrast, Model B displays the model that is practiced in Japan and Hong Kong, in which the master planning of station areas is spearheaded by the transit operator. Model B allows the transit operator to work in tandem with local governments to change policies to maximize the success of the station area, and to have developers accommodate its master plan for the station area. This contrasts with the process in Model A, where developers begin planning their real estate projects after the transit infrastructure has been implemented.

The key difference between the two models is that Model B allows the transit operator to reduce the transaction costs of planning the different components of a transportation project and optimally designing the station area according to the characteristics of the transit system and intensity of surrounding property development. An example of the components of a station area plan is shown in Figure 4 and Table 4. Tang, Chiang, Baldwin, & Yeung (2005, p. 15) explain the idea of transaction costs further, noting that "conflicting objectives can be more effectively resolved when the decisions are put under a company hierarchy," turning a "zero-sum game" between two conflicting parties into a "trade-offs" decision within a single firm. For example, in a complex that includes a transit station and shopping mall, property planners would want to design pathways so that as many pedestrians pass by and are retained by as many retail shops as possible (Tang, Chiang, Baldwin, & Yeung, 2005, p. 14). On the other hand, transportation planners would want to design pathways that provide for the smooth and quick flow of pedestrians as much as possible (Tang, Chiang, Baldwin, & Yeung, 2005, p. 14). If the two types of planning are done by different organizations, the costs of planning property and transportation would be greater than if the two types of planning were done by the same organization (Tang, Chiang, Baldwin, & Yeung, 2005, p. 14). In general, "[t]he transaction costs in reaching a settlement within a firm are much lower than between separate companies," and the institutional model used in Japan and Hong Kong manages to reduce the transaction costs between different entities involved in a transit-oriented development project (Tang, Chiang, Baldwin, & Yeung, 2005, p. 37).

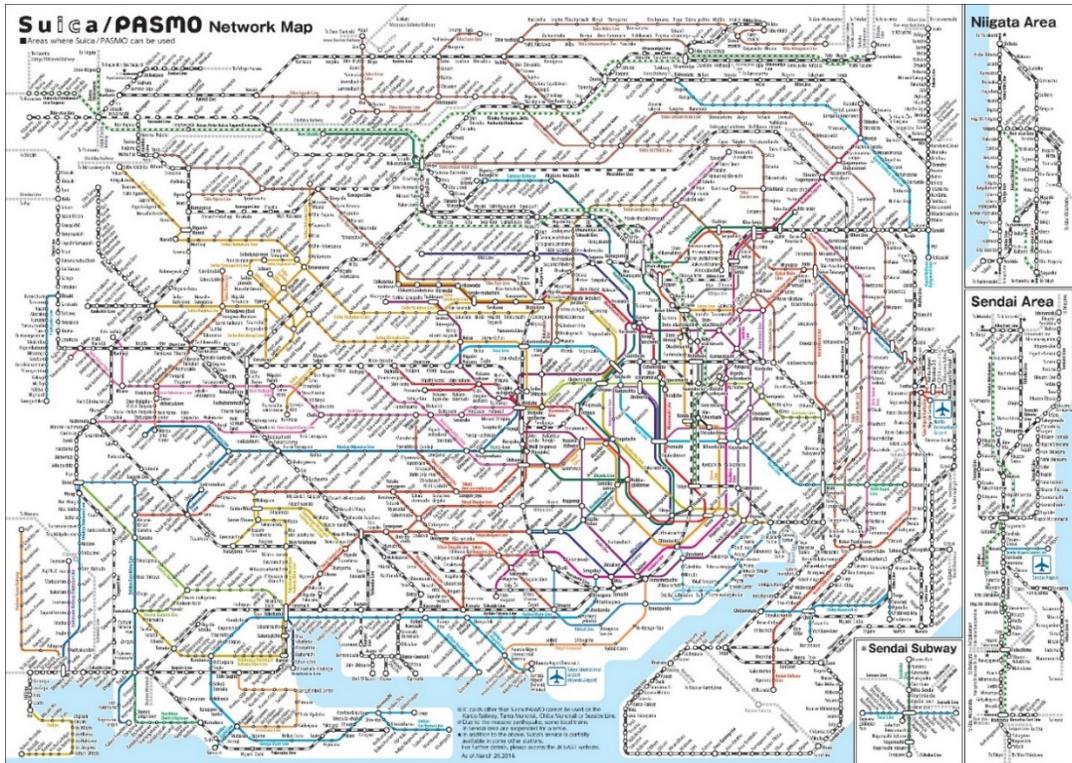


Figure 1. Map of Tokyo Metropolitan Area railway network. (East Japan Railway Company, n.d.).

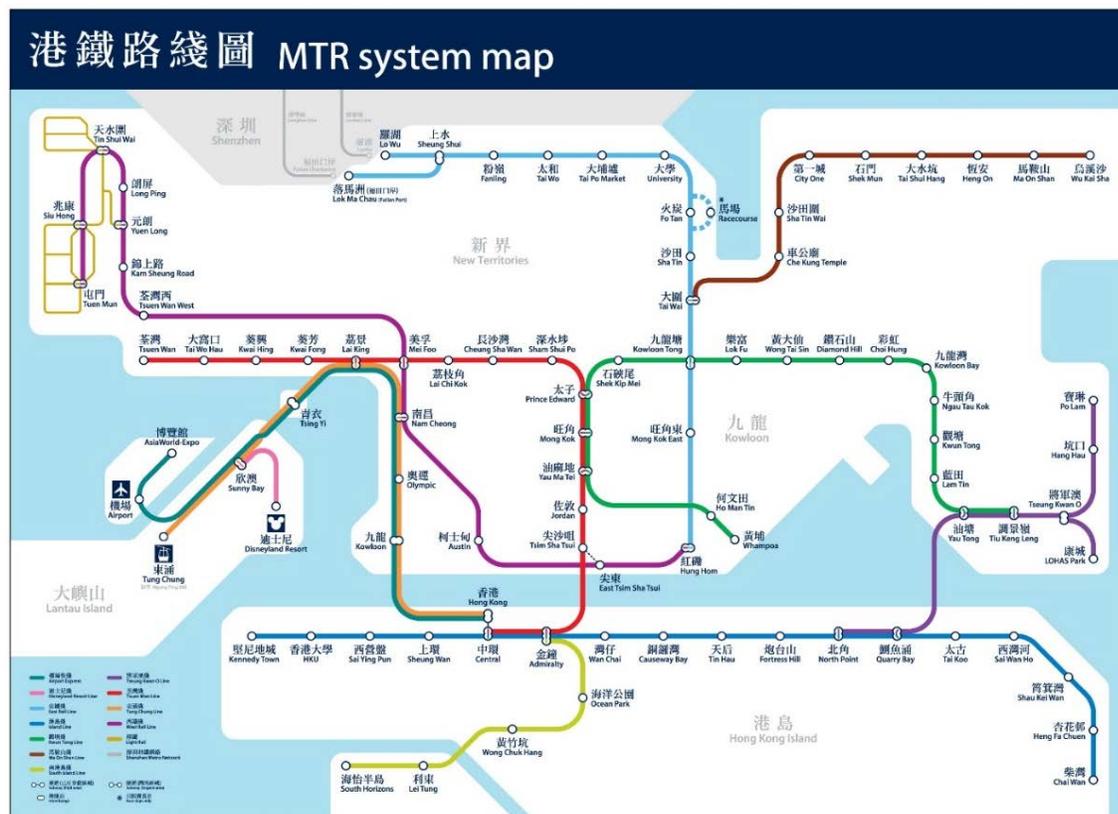


Figure 2. Railway transit map in Hong Kong. (MTRC, 2017a).

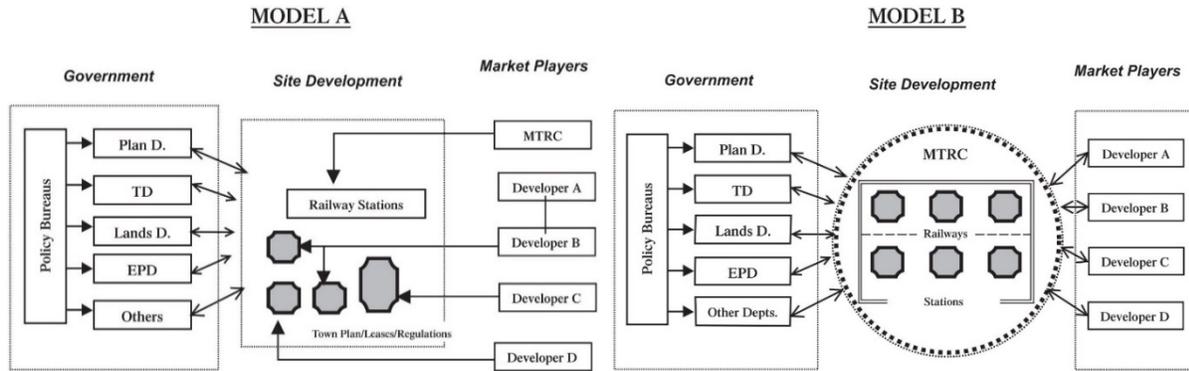


Figure 3. Two institutional models of station area planning. (Tang, Chiang, Baldwin, & Yeung, 2005, p. 29).

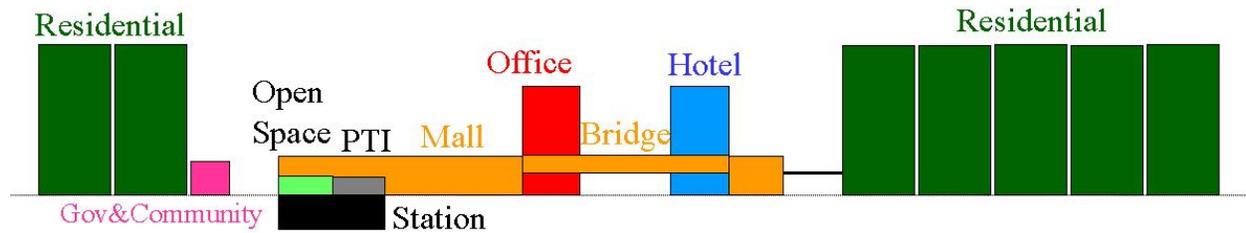


Figure 4. Example of a station area plan by MTRC. (Cervero & Murakami, 2008, p. 72).

Component	Residential Towers	Mall and Retail Bridge	Office	Hotel	Town Square	Government and Community (Post Office and Day Nursery)	Public Transport Interchange (Train Station)
1) Construction	Developer based on railway/development coordinated design; enabling works provided by MTRC (multiple packages)						
2) Mechanism for sharing costs and profit	-Developer paid land premium and development cost -Investment return split by up-front profit and end-profit sharing			Part of the property design	Conditions in land grant		
3) Ownership of asset	Individual flat owners	Developer		Common area of the mall and PTI	Government		
4) Management	MTRC	Developer	Hotel operator	Developer	Government delegated to operator		

Table 4. Components of a MTRC station area plan. Modified from (Cervero & Murakami, 2008, p. 72).

### Implications for California High-Speed Rail

The institutional arrangements of Japanese private railway companies and Hong Kong’s MTRC could prove to be potentially applicable for California’s High-Speed Rail System, which began construction in January 2015 (Siders, 2015). The bond act that provides the main source of funding for the High-Speed Rail Project, titled the *Safe, Reliable High-Speed Passenger Train Bond Act for the 21<sup>st</sup> Century* and which passed as *Proposition 1A* in November 2008, prohibits the use of public funds for future operating subsidies (CA SHC §§ 2704-2704.21). Given that transit in the United States has a legacy of requiring public funds to support operations, as shown in Table 5, the success of high-speed rail to demonstrate that transit does not always require such support may serve to politically boost its appeal and help other rail and transit projects across the country come to fruition (Thompson, 2008). The California High-Speed Rail Authority’s 2016 Business Plan strongly indicated that “[i]ntegration of the operating model, equipment, infrastructure and commercial approach is critical to creating a safe, efficient and highly reliable service” (p. 40). This indication was supported by the Authority’s (2017b, p. 82) 2015 procurement of a Rail Delivery Partner to provide such services. The Authority (2016b, p. 40) is also making efforts to solicit advice from an Early Train Operator, which will make “early decisions on safety, operations, equipment and systems, fare structures and schedules and other commercial and operating elements [to help] ensure that the system is designed to operate as a safe and successful enterprise once construction is complete.” Finally, the Authority (2014; 2016a; 2017a) also hired a Director of Planning and Integration in September 2014, and formed a Transit-Land Use

Committee to spearhead station area planning efforts on a statewide basis. These are all appropriate steps that the Authority is taking to improve the commercial value and utility of the California High-Speed Rail System.

Ratio of Fare Revenues to Operating Expenditures of North American Transit Agencies in 2012				
Rank	Operator (State)	Fare Revenues	Operating Expenditures	Ratio
1	NYCT (NY)	\$3,622,833,825	\$6,685,391,347	<b>0.54</b>
2	NJ Transit (NJ)	\$891,835,082	\$1,890,514,517	<b>0.47</b>
4	MBTA (MA)	\$472,185,325	\$1,295,890,428	<b>0.36</b>
3	WMATA (DC)	\$714,512,997	\$1,513,176,930	<b>0.47</b>
6	LACMTA (CA)	\$359,058,439	\$1,245,808,764	<b>0.29</b>
5	CTA (IL)	\$551,162,509	\$1,283,092,210	<b>0.43</b>
7	MTA LIRR (NY)	\$581,408,370	\$1,163,468,650	<b>0.50</b>
8	SEPTA (PA)	\$451,094,843	\$1,163,326,950	<b>0.39</b>
9	MTA-MNCR (NY)	\$588,121,687	\$945,225,586	<b>0.62</b>
10	MUNI (CA)	\$202,266,632	\$646,619,295	<b>0.31</b>
11	King County Metro (WA)	\$181,315,403	\$630,539,306	<b>0.29</b>
12	Metra (IL)	\$298,394,322	\$627,591,444	<b>0.48</b>
13	MTA (MD)	\$137,905,520	\$597,623,138	<b>0.23</b>
14	BART (CA)	\$366,474,018	\$488,882,256	<b>0.75</b>
15	DART (TX)	\$61,614,860	\$450,030,313	<b>0.14</b>
16	DTPW (PR)	\$44,904,968	\$45,951,173	<b>0.98</b>

Table 5. Fare revenues to operating expenditures in 2012. (National Transit Database, 2013).

For future implications, the Authority should note that in regard to joint development and value capture in North America, experience has shown that the revenue generated by actual projects has not lived up to potential. The GAO (2010, p. 15) found that “[a]lthough several transit agencies have generated millions of dollars in annual revenue from joint development, this annual revenue is generally small when compared with an agency’s annual operating expenses.” In fact, revenue from joint developments for the three North American transit agencies with the most experience in joint developments—Los Angeles Metro, Washington Metro, and Metropolitan Atlanta Rapid Transit—amounted to at most one percent of their operating expenses in 2008 (GAO, 2010, pp. 15-16). What could be the cause of this? One possible reason is that transit agencies are not allowed by law to own commercial pieces of property. Washington Metro officials noted that they do not have the authority to own land where condominiums are sold, and would rather opt to selling the land in that scenario (GAO, 2010, p. 17). Another reason is that because of local resistance to increasing density, joint developments cannot be built to their full potential and, thus, generate less revenue. Finally, value capture was often discussed in the form of joint development, special assessment districts, tax increment financing, and development impact fees (GAO, 2010, pp. 5-8); with these methods, the added value of the land from accessibility to transit often goes to the local government, rather than the transit agency (GAO, 2010, p. 17). Any amount that the transit agency does receive is only a portion of that originally generated, while the rest is used for other public infrastructure improvements (GAO, 2010, p. 17). These conditions limit transit’s ability to benefit from value capture and reach its full potential in North America.

**Conclusion**

The history and range of proactive actions that private railway companies in Japan and Hong Kong take in order to boost their incomes and increase patronage are impressive. By engaging in a number of activities, such as property development, property management, and retail operations, these companies are able to diversify their revenue streams and reduce the transaction costs of planning the different components that are involved in transit-oriented developments near their stations. Given the dominant narrative of transit and passenger railways in the United States requiring ongoing public subsidies for support almost by default, the California High-Speed Rail Authority has a big political hump to overcome in order to prove that high-speed rail can be financially viable. The Authority has so far taken appropriate actions to emulate the institutional model used by railway operators in Japan and Hong Kong, but should also mind and circumnavigate the conditions that inhibit transit agencies in the United States from taking a similar approach.

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