

**CENTER ON JAPANESE ECONOMY AND BUSINESS**

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日本経済経営研究所

Occasional Paper Series

September 2015, No. 73

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## **Hiroshima Kosoku Kotsu Corporation**

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C O L U M B I A   U N I V E R S I T Y   I N   T H E   C I T Y   O F   N E W   Y O R K

Hiroshima Kosoku Kotsu Corporation  
(Hiroshima Rapid Transit Company)

Hugh Patrick

Abstract

Hiroshima Rapid Transit (HRT) provides mass transit service on an automated guideway (AGT) system in Hiroshima, Japan. The company is a case study of a public-private (third sector) firm that provides a service with substantial external benefits. HRT also has an extraordinarily weak financial base, with a negative net worth and huge financial debts. Nonetheless, it has begun to make profits, and has been an ultimately successful undertaking by Hiroshima City, supported by the Development Bank of Japan (DBJ). This study suggests the ongoing usefulness of government banks such as DBJ, despite bad financials.

## Overview

Hiroshima is a modestly sized regional city (about 1.2 million) fronting the Inland Sea in western Japan. It is four hours from Tokyo by the fastest shinkan-sen train. Mazda Motor Corp is headquartered here and accounts for almost a third of the area's GDP. Initially built on the Ota River delta, Hiroshima is divided by the river's seven mouths into six islands. This, and the rugged topography of the area, constrain the city's physical expansion and complicate its transportation network.

The city has Japan's largest surviving tram network, with eight lines. Two of the tram lines are based on modern technology. One is the ASTRAMLine, opened in 1994, as discussed here. The other is the Skyrail, a monorail-gondola hybrid opened in 1998 to connect a downtown JR train station with the new Midorizaki development on a flat space in a mountainous area of Hiroshima City.

Commencing service in 1994, the ASTRAMLine, operated by Hiroshima Kosoku Kotsu Corp (known as HRT – for Hiroshima Rapid Transit), provides mass transit service along an 18.4 km line between central Hiroshima and its northern and western parts.

Technically, the ASTRAMLine is an automated guideway transit (AGT) system with crew: the trains run on concrete trackways with operating electricity provided from the sides. The cars have rubber tires, which means less noise and vibration. The ride is very smooth and quiet (especially compared to New York City subways).

The system was built primarily by an affiliate of Kobe Steel, KOBELCO, which has built several AGT systems in Japan, as well as in Busan, Korea and at the Taoyuan airport in Taiwan. (It also built the city's Skyrail.) AGT typically are fully automated (no crew on board), but HRT trains have a driver. Compared to heavy (or even "light") rail systems, AGT system builders say they save construction costs and reduce construction area.

## The Route

The long-term driving force for creating the line was to provide transportation for the growing northwestern part of Hiroshima City and for Seifu Shinto (which translates as West Wind New Town), a long-term city-planning project undertaken in the late 1990s and slated to reach completion in the 2050s. The goal of the project is to attract companies, residential development, academics, and recreational facilities to the western part of Hiroshima. This area used to be difficult to reach from central Hiroshima due to the Ota River and mountains. The ASTRAMLine bypasses the mountain area, running initially beside the Yasukawa River. As a result, the route is shaped like a question mark.

In the two decades after the line opened, the population in HRT's service area did indeed increase: by about a third, to 239,583. This is about 60 percent of Hiroshima's total population growth during the period. About 20 percent of the metro area's 1,188,992 population (2015) lives in the line's service area.

An immediate purpose was to provide transportation to the site where the 1994 Asian Games were held in a new stadium at the line's far terminus.

There are 21 stations. The run normally takes 32 minutes. Stations are mostly about a kilometer apart, with a maximum of 1.6 km, which translates to about 2 minutes. Speed averages just 34 km/hr (21 mph).

Most of the line is elevated above the median of major (6+ lanes) roads; the central-city part and its two stations are underground. Having a dedicated right of way is key to the usefulness of mass transit systems as it means there are no problems with car or truck congestion or other interference with operations.

Weekday services begins at 5:41 am, and ends at 12:37 am. There are 135 runs each way, with rush-hour service as frequent as every 2.5 minutes. Service is less frequent on non-weekdays.

The company has 24 trains, each with six cars and a capacity of 286 passengers, 134 seated on benches running along the side of the cars. The trains are very clean, well maintained, and look new even though almost all date from when the service first began, making them 20 years old.

The stations are painted in one of seven colors, with different designs, to make it easier for passengers to know where they are. The end station where the 1994 Asian Games were held is purple, the color of the games. Hiroshima Shūdō University is also served by this station. At the central-city end, Hondori, the color is red for the Hiroshima soccer team, since its stadium is nearby.

## Rolling Along

HRT was established in late 1987, following extensive planning. Construction started in early 1989, and service began regular operation on August 20, 1994.

Ridership was an average of 43,575 passengers a day in 1994, rising to 52,998 in 2000. Then a major new road direct to the line's far terminus led to establishment of a competing bus service. This caused the number of passengers to drop to a low of 48,450 in 2004, before increasing to the current level of about 54,000 passengers daily.

As one would expect of a line built to connect a periphery to its center, the two busiest stations are the ones at the city-center end of the line. Together they handled about 31% of total boardings and detrainings (2013 data). The next-busiest station, with 10% of traffic, is Omachi, a major bus terminus and HRT's only interchange with JR. This connection is to a JR branch line that runs to Hiroshima's main train station, which is on the northern edge of the city's core area. Most passengers are commuters, students, and those going shopping.

A new station (Shin Hakushima) is being built where the JR's main rail line crosses the ASTRAMLine near the city center. Currently, the only connection to JR is to a JR branch line near the line's mid-point. The new station's walls will be painted white. It would have made sense to build it when ASTRAMLine was first built, but JR opposed it, presumably because JR was afraid it would lose passengers. The project will cost ¥23 billion. Two-thirds will be subsidized – half each by the national government and the Hiroshima municipal government.

## The Company

HRT currently has 205 employees, 55 of whom directly operate the trains. Most entered the company when it was first formed, and now are in their 40s. Retirement age is 60. Almost all of the employees are high school graduates trained on the job. A disadvantage of being a public-private (third sector) firm is overstaffing, and this was the case at HRT from the beginning.

Train workers have a 24-hour shift, then sleep in a bedroom at the headquarters building or at the first station. Conductors have their own schedule. Since they begin work at 5:00 am, they also sleep overnight at company facilities. Maintenance is done at night. Given the working and sleeping situations, the company feels no pressure to hire women; only one train driver is female.

The company also has kiosks, restaurants, parking areas, civil engineering and construction divisions, a travel service, and an insurance agency, primarily related to its station locations. Their combined contribution to total revenues is modest, slightly less than 10 percent.

## Finances

I was really startled when I first examined the company's financial data. As of the end of March 2014, the company had paid-in capital of ¥10 billion, accumulated losses of ¥11.3 billion, a negative net worth of ¥1.3 billion, and total debt of ¥36.2 billion, with short-term borrowings of ¥15.5 billion and long-term debt of ¥19 billion. How could such a company survive? The answer is that it is a joint municipal-private company, operated and managed to provide the social good of public transportation.

Hiroshima City took the initiative in planning and building ASTRAMLine. The city provided 51 percent of the equity, lent about ¥30 billion at a relatively favorable interest rate of 4.8 percent over 20 years, and had one of its officials become HRT's president. The Development Bank of Japan (DBJ) provided 10 percent of the equity, a ¥30 billion loan, and sent a staff member to be Executive Managing Director. The remaining equity was provided by local firms. Hiroshima City continues to own 51 percent of the shares. DBJ has held 20 percent since

2004. The remaining shares are owned by some 28 local businesses and institutions: Hiroshima Bank and Chugoku Electric Power Company each own 5 percent; Mitsubishi Heavy Industries, Mazda, Hiroshima Electric Railway (the local tram service), and Mizuho Bank each own 3 percent; the remaining 7 percent is owned by the 22 others.

It cost ¥174.4 billion to build the ASTRAMLine, of which HRT paid ¥80 billion for the 0.3 kilometer underground section in the center of the city. The national government's Ministry of Land, Infrastructure and Transport paid for the 7.1 kilometers over a city road that was designated a national highway; and Hiroshima City paid for 11.0 kilometers over a prefectural highway.

HRT borrowed ¥70 billion, half from a national government financial institution. This, together with its own ¥10 billion capital, paid for its share of construction. HRT also borrowed from banks to pay for the cars, electrical connections, and other costs.

Table 1

## Hiroshima Rapid Transit Business Overview

(in million yen)

Fiscal year	Passenger growth %	Operations			Non-Operations		Net Profit
		Operating Revenue	Operating Expense	Subsidy	Non-Operating Expense	Subsidy	
1994	—	2,602	4,582		1,809		-3,057
1995	4.2	4,312	6,592	1,061	3,005	2,332	-1,794
1996	7.5	4,590	5,982	858	2,812	1,951	-575
1997	2.9	4,696	5,725	762	2,711	1,561	-847
1998	2.7	4,852	5,002	692	2,637	1,171	-340
1999	1.8	4,851	4,902	734	2,449	1,170	-701
2000	0.9	4,856	4,818	575	2,362	1,170	-654
2001	-0.2	4,841	4,755	517	2,267	1,170	-497
2002	-6.1	4,536	4,634	459	2,122	1,170	-594
2003	-2.0	4,462	4,557	307	1,220	1,170	159
2004	-0.5	4,256	4,499	88	441	781	183
2005	1.2	4,259	4,609	22	231	2	-554
2006	0.9	4,469	4,807	21	207		-526
2007	2.2	4,581	4,605	20	169		-176
2008	1.3	4,620	4,612	19	164		-455
2009	-1.9	4,375	4,431	29	233		-358
2010	1.0	4,323	4,274	27	227		-146
2011	1.1	4,351	4,195	25	226		-46
2012	2.0	4,403	4,038	23	230		282
2013	3.3	4,470	3,894	21	210		362

Fiscal years end in March of the following calendar year.

Net profit includes items not shown in the table.

Passenger growth is percentage change in boarding passengers from the previous year.

As shown in Table 1, from its founding in 1994 until 2004 the city government heavily subsidized HRT. The various subsidies are not transparent. Even with the large subsidies, HRT



had net losses until 2003. Operating revenues were less than expenses, and depreciation changes and other non-operating expenses were substantial.

HRT has reduced operating expenses almost every year from its inception. Nonetheless, its depreciation, interest payments, and other non-operating costs were almost half as much as operating costs until the major reforms from 2003.

## Highway Competition

Ridership, and thus revenue grew until 2000. Then, a new major highway opened directly serving the far-end of HRT's route, which made possible a competitive bus service. This led to decreases in passengers and hence in revenues, precipitating a major financial crisis in 2003 that was exacerbated by the city wanting to reduce its subsidies.

The main challenge was to reduce non-operating costs, and in this the newly-appointed management was successful, but essentially by changing the form of subsidy. In 2003 Hiroshima City took over DBJ's ¥30 billion loan to HRT; DBJ increased its equity to 20 percent, buying out some smaller local shareholders. Hiroshima City reduced to zero the interest rate on the loan it took over from the DBJ, and extended the repayment schedule to 30 years. That reduced non-operating costs by ¥144 billion a year.

A second adjustment was to reduce the number of employees from 300 to the current level of 205. This was done gradually, mainly by not hiring as employees left or retired; employment is always an important local government issue.

A third adjustment was in pricing. Fares had not been increased since the 1994 opening. In 2003 the price of a one-month pass was increased by 400 yen, but the discount for advance purchases was increased to 20 percent from 10 percent in order to compete with the bus company. That meant that on a net basis the price was reduced. However, passenger ridership did not respond much at all, so revenue decreased. The only other change in fares was to incorporate the 3 percentage point increase in the consumption tax in 2013.

Gradually since 2003 these adjustments have paid off. Operating costs continued to be reduced. Revenues have increased gradually as the population in the neighborhoods being serviced rose. In 2012 HRT finally started recording profits.

## Looking Ahead

Aside from financing, HRT faces two operational challenges in the coming 5 to 10 years. Both are manageable.

First, 22 of the 24 trains are 20 years old; the other 2 are 10 years old. In another 5 years or so, HRT will begin replacing them over a 10-year-period at a cost of about ¥500 million per train. This will mean annual depreciation of ¥18 million.

Second, in due course current employees will retire, and new young workers will have to be hired and trained.

The new station, once it opens in, is expected to add annual revenues of about ¥300 million and, significantly, profits of about ¥100 million.

## Conclusion

Hiroshima Rapid Transit Corporation provides excellent mass transit to a set of Hiroshima neighborhoods. It is a public good with considerable positive externalities. The neighborhoods it serves have increased their population more than other parts of the metro area.

Unlike private commuter lines in some other cities, HRT did not initially invest in land around its proposed stations, so it has not directly benefited from land price increases due in part to the better transportation it provides. However, the city benefits indirectly from the rise in property tax revenues.

Importantly, the city no longer has to pay significant direct subsidies to keep HRT in operation. The decrease in direct subsidy payments is substantially larger than the implied

subsidies underlying the major reduction in non-operating costs. Clearly the benefits, political as well as economic, for Hiroshima City significantly outweigh the costs.

DBJ played an important role in financing HRT, in what perhaps is an archetypal local infrastructure project with substantial external benefits. It then successfully eliminated its loan exposure, thereby not having to classify it as a non-performing loan, albeit at the cost of increasing its equity position. Presumably that equity will continue to be carried on DBJ books at face value, with no expectations of dividends.

HRT is an example of DBJ contributing to beneficial local infrastructure projects at below-market terms. Supporting local and regional economies is one of the key economic policy objectives of Prime Minister Abe's administration, as well as decades of previous governments. If the DBJ is expected to continue to finance and help organize such local government projects, then there is justification for indefinitely postponing DBJ's privatization.

As for HRT, I anticipate that it will long continue as a company providing excellent local transportation services.

## Acknowledgments

On November 5, 2014 I visited Hiroshima Kosoku Kotsu Corp. I met with Isao Kadomatsu, Executive Managing Director, and Toshihiko Nakamura, Director and Safety Manager, together with Mikihiro Yoshida of the Development Bank of Japan (DBJ), which had arranged the meeting, and Mrs Kazue Hotta, my interpreter. Mr Kadomatsu has been with HRT about two years following many years at DBJ. Mr Nakamura also joined the firm about two years ago following many years with Mazda, which is headquartered in Hiroshima.

We met at the headquarters, next to Chorakuji station, saw the central control room for all the trains in operation, visited the repair and cleaning facilities next door, and then took the train back downtown, near my hotel.