

Countermeasures to Deterioration of Infrastructure on Small- and Mid-Sized Railways

Shuji Takahara

Introduction

To perform the necessary maintenance and renewal of infrastructure, railway operators make regular inspections based on government directives such as the Ministerial Ordinance to Provide Railway Technical Standards and the Order on Periodic Inspection of Facilities and Rolling Stock. However, following a fatal accident in December 2012 when heavy concrete ceiling panels in the Sasago Tunnel (inbound: 4417 m, outbound 4414 m) on the Chuo Expressway collapsed onto several cars, as well as incidences of concrete and mortar falling from railway infrastructure, the Railway Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has been conducting emergency inspections of railway infrastructure and making new efforts in countermeasures to deterioration of infrastructure as well as in enhanced maintenance/management.

This article explains the status of government support for such efforts, which include a subsidy system for countermeasures to infrastructure deterioration as well as for maintenance and renewal of infrastructure on small- and mid-sized railways facing difficult business conditions.

Current Status of Railway Infrastructure

Much of Japan's railway infrastructure was built during or before the period of rapid economic growth in the 1950s and 1960s. In particular, large structures like bridges and tunnels have a national average age of 56 and 62 years, respectively, when the construction year is known (including operators in the JR group of companies and larger private railways).

The majority of local railway operators have been in business for more than 70 years. Local railways are generally small- and mid-sized lines other than shinkansen, trunk lines, and urban railways. There are 91 local railway companies as of 1 April 2013 but 75% of these operators run at a loss (Figure 1). The causes are the drop in passenger numbers stemming from decreasing birth rate, aging population, and rising private car ownership. Due to their stringent financial situations, local operators are having a difficult time maintaining and renewing their infrastructure by their own efforts and countermeasures to deteriorating infrastructure are becoming a serious issue.

Figure 1 Current Balance (in Railway Business) of Local Railway Operators (FY2011)

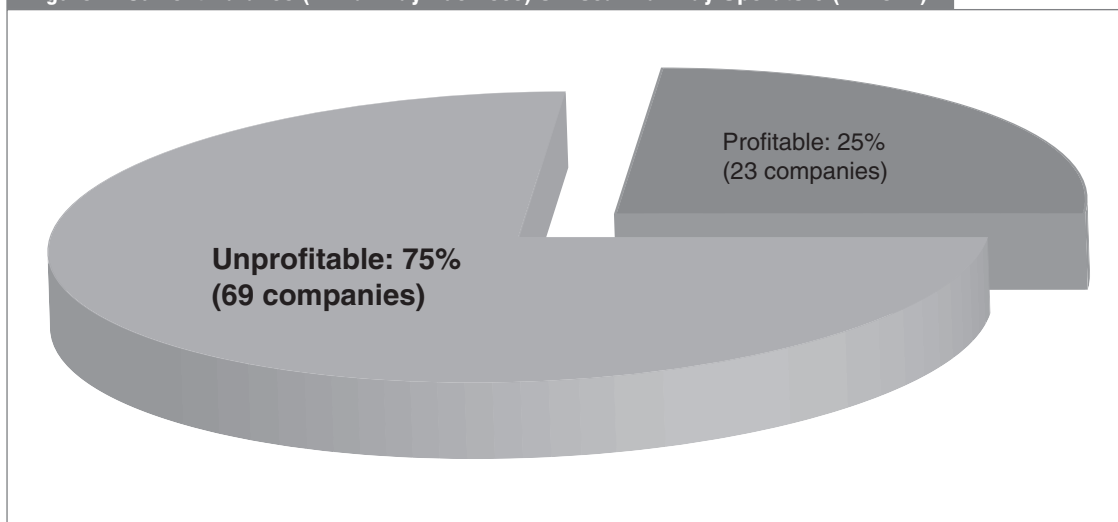


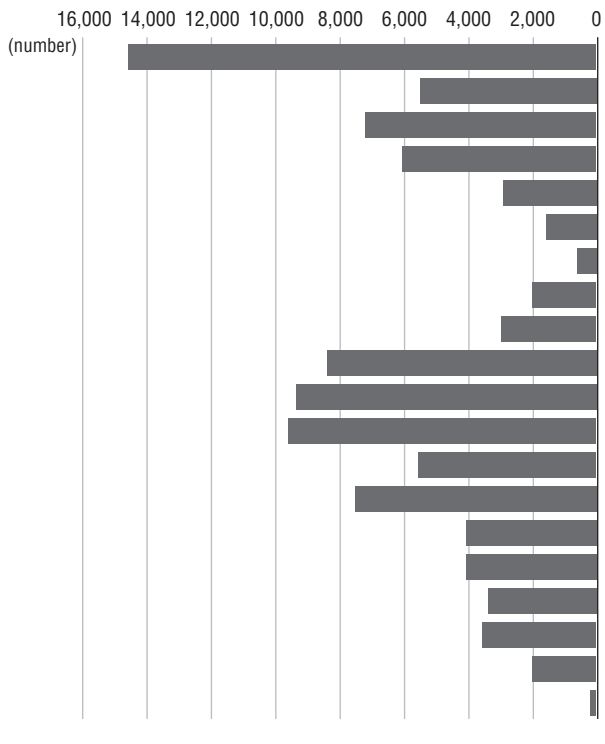
Figure 2 Railway Infrastructure Stock (Bridges and Tunnels)

Bridges (1 m or longer): 102,293

Tunnels: 4737

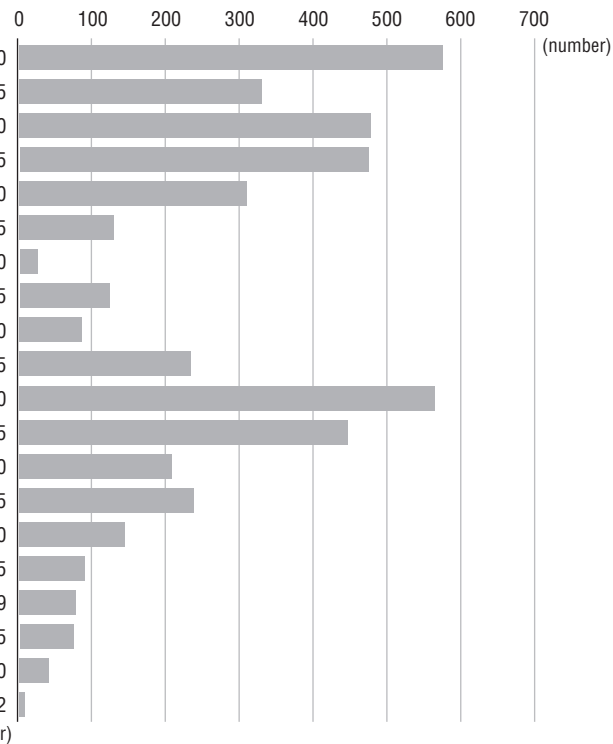
Number of bridges by fiscal year of construction

Note: 880 older bridges with no data on construction year excluded



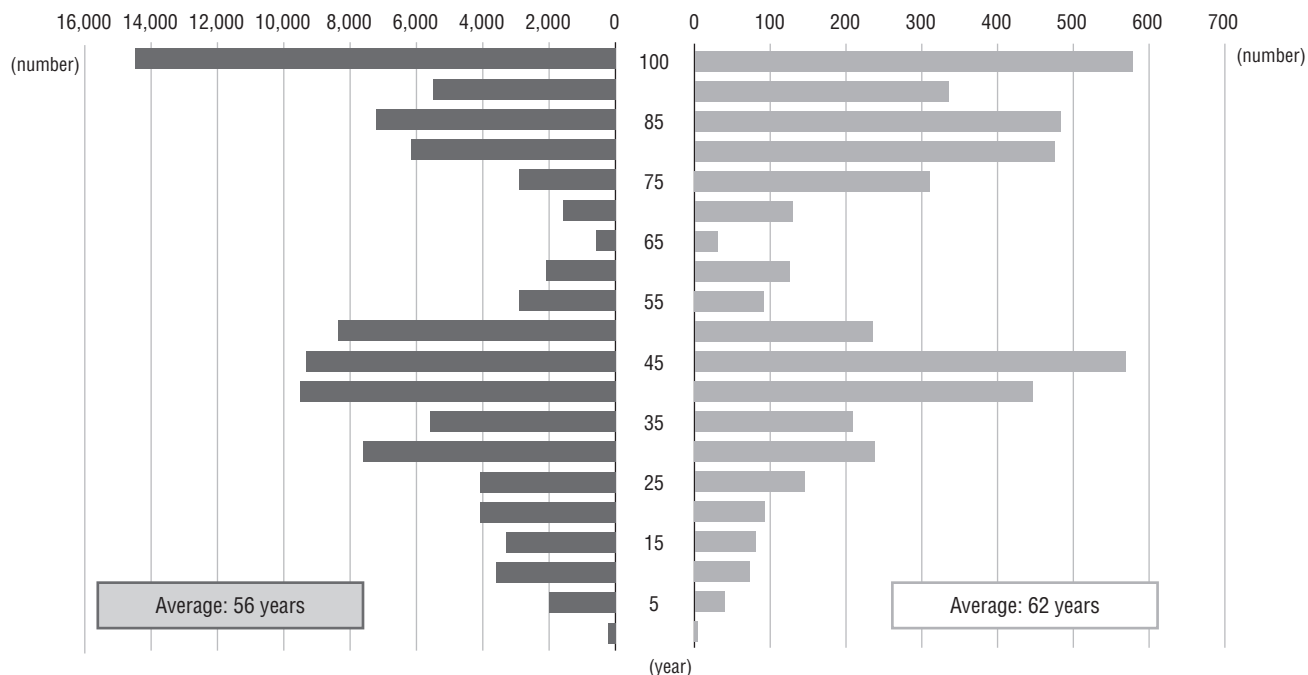
Number of tunnels by fiscal year of construction

Note: 37 older tunnels with no data on construction year excluded



Stock pyramid

Note: Average age for infrastructure when construction year known



Average: 56 years

Average: 62 years

Source: MLIT Survey

Figure 3 Projects to Secure, Maintain, and Improve Local Public Transport: Strategy for Survival of Day-to-Day Transport

Projects to Secure and Maintain Local Public Transport (FY2013 budget: ¥33.3 billion)

Support efforts implemented for day-to-day transport networks in danger of going out of business to secure and maintain best forms of transport: bus, on-demand, and remote island sea and air routes, in line with local needs based on plans for local transport, etc., at discussions with various local officials.

<Difference in revenues calculated in advance, subsidized assuming efficient operation. Efforts such as discounted sea and air fares for residents of isolated islands also subsidized.>

- Support efforts made by consultative councils led by prefectural governments: Securing and maintaining major bus networks straddling multiple communities, sea and air routes for isolated islands, etc.
- Support efforts made by consultative councils led by city governments: Securing and maintaining local bus and on-demand transport closely connected with arterial transport networks, such as major bus transport, etc.
- Support for special measures in efforts to secure and maintain major bus transport networks, etc., in areas affected by Great East Japan Earthquake*



Projects to Alleviate Barriers in Local Public Transport

- Programs to support efforts such as accessibility to public transport by supporting each mode

Better Accessibility

Support efforts such as improvement of accessibility to buses, taxis, ferries, rail stations, and passenger terminals.



Improved Usability

Support improvement of usability for public transport by means such as introduction of LRT, BRT, and IC cards to build towns with improved accessibility.



Improved Local Railway Safety

Support development of facilities to improve safety of local railways (Project to develop facilities for safe rail transport)

Local Public Transport Survey Projects

- Support surveys contributing to securing, maintaining, and improving local public transport.
- Support local efforts contributing to promotion of use.
- Support for special measures to find best way to secure and maintain day-to-day transport in areas affected by Great East Japan Earthquake*.

*Includes ¥2.7 billion for recovery measures budgeted by Reconstruction Agency to secure and maintain bus and other day-to-day transport in areas affected by Great East Japan Earthquake.

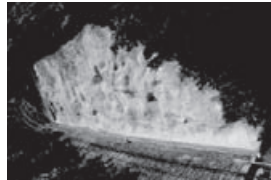
Figure 4 Overview of Support for Improving Safety of Local Railway Operators

Support given for development of equipment by local railway operators contributing to improved safety to secure safe railway transport

- | | |
|--------------------------|--|
| 1. Subsidized operators | Railway operators |
| 2. Subsidy rate | National government: 33% |
| 3. Subsidized facilities | Rails, sleepers, rock-fall protection, ATS, train radio, windbreaks, bridges, tunnels, rolling stock, etc. |



Track improvement



Slopes



ATS



Rolling stock renewal

Changes in Budgeted Amounts

Fiscal Year	2007	2008	2009	2010	2011	2012	2013
Initial budget (¥ million)	2,401	2,448	2,223	2,009	30,530 (included in total)	33,152 (included in total)	33,278 (included in total)

National Program for Subsidizing Countermeasures to Deteriorating Infrastructure

Subsidies for projects to secure, maintain, and improve local public transport

- Projects to develop facilities for safe rail transport, etc.

In FY2011, a system for consolidating existing subsidy systems for individual transport modes was established to subsidize projects for securing, maintaining, and improving local public transport, covering railways as well as air and sea routes to remote islands and bus routes (Figure 3). One part assists development of facilities for safe rail transport (Figure 4) whereby the national government supports local railway operators and the like facing the aforementioned difficult business conditions.

In these projects, the national government provides subsidies directly to operators for 33% of the cost of developing facilities and equipment contributing to improved safety of regional railways, etc. Individual operators are using the subsidies to update deteriorated railway infrastructure and rolling stock.

The 2013 budget includes ¥33.3 billion in subsidies for projects to secure, maintain, and improve local public

transport, including projects to develop facilities for safe rail transport.

- Expansion of subsidies for projects to restructure railway business

From FY2013, the subsidy to develop facilities for safe rail transport is being expanded for operators restructuring their railway business as defined in the 2008 Act on Revitalization and Rehabilitation of Local Public Transportation Systems. Under this system, plans approved by the national government to restructure the business of railways in danger of going out of business are given priority support using a comprehensive framework of legal exemptions, budgeting, tax systems, and regional fiscal measures. Specifically, the community works hand-in-hand with the operator to revitalize railways. This is done while maintaining railway transport through operational structure changes, such as implementing public-private partnerships where the local government owns the infrastructure, etc., and a private-sector operator runs the services. Currently, four regional railways, including Wakasa Railway in Tottori Prefecture, are implementing projects to restructure their railway business.

Figure 5 Summary of Projects to Restructure Railway Business

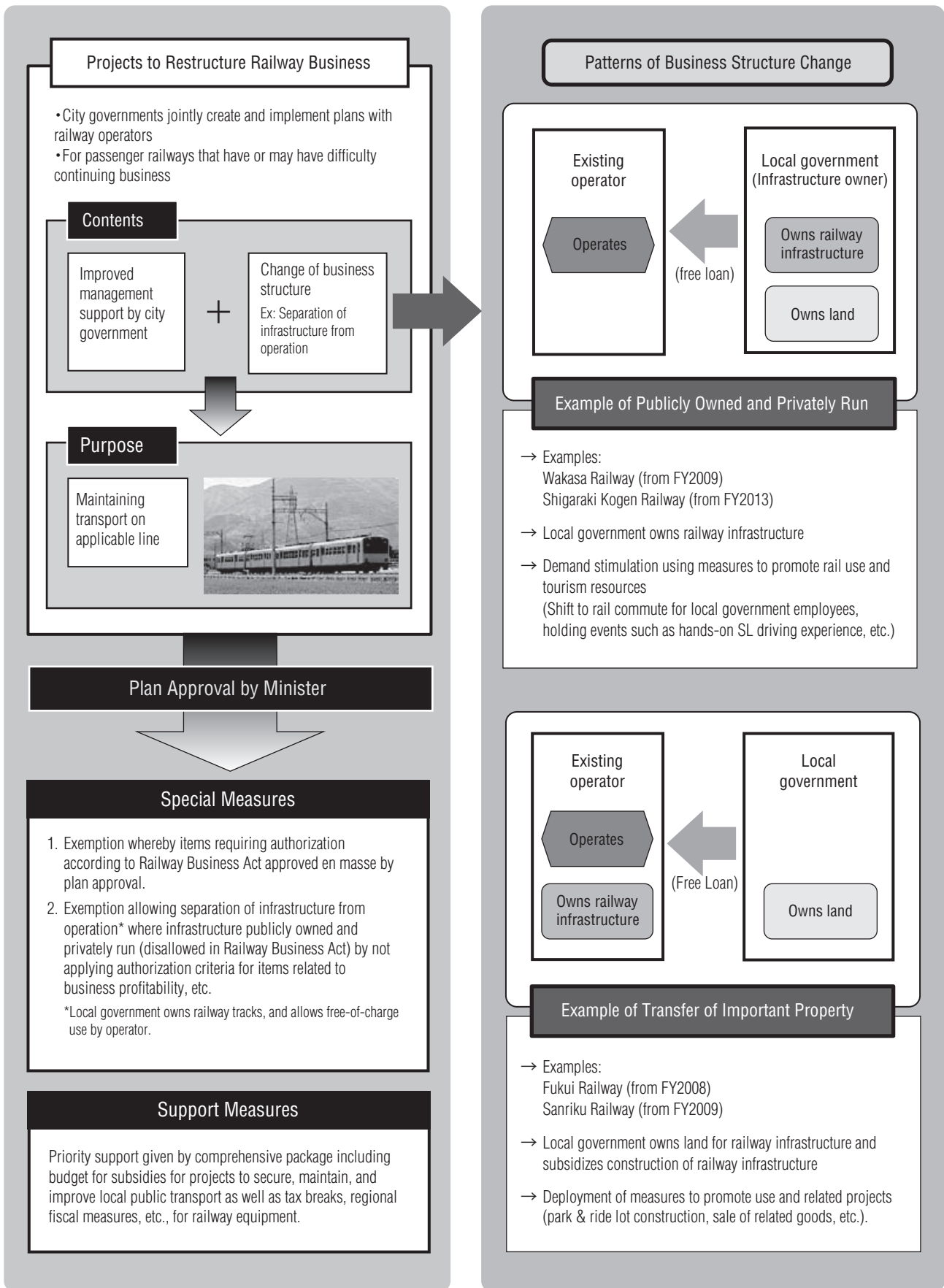
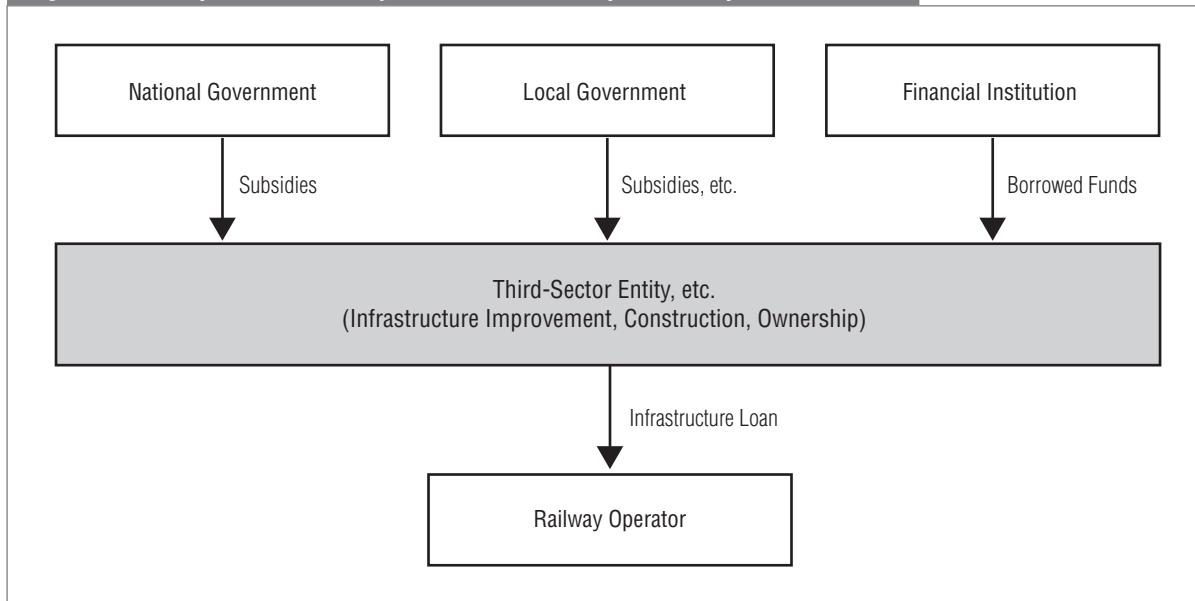


Figure 6 Subsidy Scheme for Projects on Overall Safety of Railway Infrastructure

The 2013 and onwards expansion entails the national government increasing its subsidy from 33% to 50% when local governments in poor financial condition (latest financial capability index <0.46) provide subsidies to railway operators running projects to restructure their business. This measure makes it easier to subsidize regional railways facing difficult conditions, and should advance projects aiming to improve safety.

Projects for dealing with deteriorating railway infrastructure

Relatively small-scale work that can be completed in 1 year is conducted as projects to develop facilities for safe rail transport. Conversely, projects for dealing with deteriorating railway infrastructure are covered by a subsidy for reinforcing and improving large infrastructure, such as aged bridges and tunnels. Izu Kyuko has been using this subsidy since FY2008 to reinforce and improve the Yatsu Tunnel (2796 m) where reinforcing is being implemented using methods such as adding steel supports and spraying mortar over existing concrete lining.

This system uses a 5-year plan as the basic policy for infrastructure construction, items to focus on, and overall outline for reinforcing and improving greatly deteriorated infrastructure. It applies to local railway infrastructure that has exceeded the design life evaluated objectively based on the Maintenance Standards for Railway Structures, etc. Subsidies are provided to third-sector bodies and others who then make loans to private-sector railways owning the infrastructure (Figure 6). Up to 33% of the subsidies come from the national budget, which must be either matched or exceeded by funding from local governments. The initial budget for FY2013 is ¥83 million.

Measures in FY2012 supplementary budget

In addition to this existing subsidy system, another ¥4.5 billion was allocated in the FY2012 supplementary budget including subsidies for projects to improve the overall safety of railway infrastructure. These funds are earmarked for urgent and sweeping update of deteriorating infrastructure.

Applicable projects are those for evaluating the soundness of railway infrastructure or for dealing with deterioration by repair, reinforcement, etc., (urgent projects for safety evaluation and countermeasure studies), as well as those for reinforcing and improving infrastructure found to be deteriorated through use exceeding the design life based on the Maintenance Standards for Railway Structures, etc., (projects for urgent countermeasures to deterioration). Both are projects conducted by small- and mid-size railway operators. The subsidy is up to 33% or 40%, depending on the operator's financial situation, and local governments must provide an equal or greater subsidy.

Tax Breaks

In addition to subsidies, tax breaks are also provided for construction of facilities to improve railway safety.

Because local railways facing difficult business conditions can find it hard to cover expenses, such as property taxes that increase with construction of new facilities, a tax exemption reducing the tax base to 33% for 5 years on depreciable property helps contribute to improved railway safety through acquisition of subsidies for projects to secure, maintain, and improve local public transportation. Furthermore, the tax base is reduced to 25% for 5 years for operators running projects to restructure railway business.

Figure 7 Regional Fiscal Measures for Supporting Local Railways (MIC)

The infrastructure of local railways supporting the day-to-day lives of local residents is deteriorating, while these railways face difficult business conditions; securing safe operation by means such as updating infrastructure is becoming a major issue. In this situation, regional fiscal measures to subsidize investment in local railways by local governments are scheduled for introduction in FY2013.

• **Subsidies for Local Railways (General)**

Expenses Subsidized by Local Governments



- If appropriating local government bonds: Apply normal local allocation tax at 100% appropriation rate and 30% redemption for principal and interest
- If not appropriating local government bonds: Apply special local allocation tax (30% allocation rate)

Regional Fiscal Measures

In addition to national government subsidies, support from local government is indispensable in maintenance of local railway infrastructure.

However, local governments commonly have poor finances, making it difficult for them to secure resources to support local railways. Therefore, MLIT cooperated with the Ministry of Internal Affairs and Communications (MIC) to create regional fiscal measures in FY2013, such as budgeting local allocation tax to local governments by paying 30% of subsidies provided by local governments for investment expenses of local railway operators (Figure 7). These measures were the first of their kind for local railways.

Creation of Database on Status of Infrastructure Inspections

A decision was also made in the FY2012 supplementary budget to create a database for small- and mid-size railway operators, covering items such as inspection results for railway structures. The aim is to promote strategic maintenance/management and updating of railway structures and to study appropriate maintenance and management of such structures by the national government.

Study Group on Standards for Maintenance and Management of Railway Structures

In January 2013, MLIT established a council for measures to deal with aging of social capital, and is studying measures in a ministry-wide manner. The purpose of the council, headed by the Minister for MILT, is to promote strategic maintenance/management and updating of social capital from the perspective of protecting citizens' lives. As part of

the railways activities, an examination committee (chaired by Professor Katsuya Okada of Kokushikan University) on technical standards for maintenance and management of railway structures was started in April 2013 to study the adequacy of such standards and make revisions if necessary.

Conclusion

As described, MLIT is working hard on countermeasures to deal with deteriorating infrastructure from various perspectives. However, many problems still need to be dealt with concerning deterioration of railway infrastructure, and such problems will become more severe in the future.

Small- and mid-sized railway operators in particular are often fully occupied in just making relatively small-scale urgent repairs due to the difficult business conditions they face. The large-scale repairs to infrastructure needed in the near future may overburden these operators, affecting their ability to remain in business.

What support to provide in the coming era of large-scale renovations is a major issue for the national government to consider. ■



Shuji Takahara

Mr Shuji Takahara is the Director of Railway Industries Division in the Railway Bureau at MLIT.