

# Resilient Infrastructure Public-Private Partnerships (PPPs): Contracts and Procurement

## The Case of Japan



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# Abbreviations

- BOT** ..... build-operate-transfer
- BTO** ..... build-transfer-operate
- DRM** ..... disaster risk management
- EMDE** ..... emerging markets and developing economies
- O&M** ..... operation and maintenance
- PDCA** ..... Plan, Do, Check, Act
- PPIAF** ..... Public-Private Infrastructure Advisory Facility
- PFI** ..... private finance initiative
- PPP** ..... public-private partnership
- VfM** ..... value for money

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**The World Bank Tokyo Disaster Risk Management Hub** supports developing countries to mainstream DRM in national development planning and investment programs. As part of the Global Facility for Disaster Reduction and Recovery, the DRM Hub provides technical assistance grants and connects Japanese and global DRM expertise and solutions with World Bank teams and government officials. The DRM Hub was established in 2014 through the Japan-World Bank Program for Mainstreaming DRM in Developing Countries – a partnership between Japan's Ministry of Finance and the World Bank. For more information, visit <http://www.worldbank.org/drmhubtokyo>

**The Global Infrastructure Facility (GIF)**, a global collaborative platform, coordinates and integrates the efforts of multilateral development banks, private sector investors and financiers, and governments that seek to invest in infrastructure in emerging markets and developing economies—fostering collaborative action on complex projects. For more information, visit [www.globalinfrastructure.org](http://www.globalinfrastructure.org)

**The Global Facility for Disaster Reduction and Recovery (GFDRR)** is a global partnership that helps developing countries better understand and reduce their vulnerabilities to natural hazards and adapt to climate change. Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training, and knowledge sharing activities to mainstream disaster and climate risk management in policies and strategies. Managed by the World Bank, GFDRR is supported by 36 countries and 10 international organizations. For more information, visit [www.globalinfrastructure.org](http://www.globalinfrastructure.org)

**PPIAF**, a multi-donor trust fund housed in the World Bank Group, provides technical assistance to governments in developing countries. PPIAF's main goal is to create enabling environments through high-impact partnerships that facilitate private investment in infrastructure. For more information, visit [www.ppiaf.org](http://www.ppiaf.org)

# Executive Summary

## Key Challenges in Incorporating Resilience into Infrastructure PPPs

Resilient economic infrastructure plays an increasingly significant role in mitigating natural disaster risks, including hydrometeorological and geophysical hazards, especially in the contexts of climate variability and change. The impacts of extreme natural hazards and climate change are becoming increasingly visible over the past decades. Between 1994 and 2013, natural disasters claimed the lives of 1.35 million people, more than half of whom died in earthquakes, and the remainder owing to weather- and climate-related hazards (CRED 2015). Since 2000, an average of 341 hydrometeorological disasters (mainly floods and storms) occurred annually—a 44 percent increase from the 1994–2000 average and well over twice the frequency in 1980–89 (CRED 2015). In addition to climate variability and change, rapid urbanization is concentrating risk in vulnerable regions of the world. Without major investments in resilience, climate change may push up to 77 million people into poverty by 2030 (World Bank 2016).

In emerging markets and developing economies, the largest source of infrastructure investment is still domestic public spending. It is estimated that it will cost trillions of dollars to meet rising aspirations for better infrastructure, health, and education in these countries—more than multilateral development banks or international donors can provide by themselves. Therefore, there is an increasing demand for and attention on public-private-partnerships (PPPs) to maximize finance for development.

Most of the countries face the following key challenges in incorporating resilience into infrastructure PPPs: (a) contractual allocation of natural disaster risks between the public and private sectors; (b) management of long-term contracts under uncertainty; and (c) commercial viability and uncertainty in the cost implications of resilience investments.

## Project Framework

### Scope and Objectives of this Project

Building on the theoretical approaches to the key challenges outlined by Public-Private Infrastructure Advisory Facility (PPIAF), the World Bank's Global Infrastructure Facility (GIF) and the Tokyo Disaster Risk Management (DRM) Hub have initiated a knowledge project on “Resilient Infrastructure PPPs—Contracts and Procurement” to harness the knowledge and expertise gained from PPP projects in selected countries to help the governments of low- and middle-income countries to prepare and structure disaster-resilient infrastructure PPPs.

The overall knowledge project consists of two components: (a) knowledge development, and (b) knowledge exchange and dissemination (table ES.1). Good practices and lessons learned from case studies are incorporated into the separately developed technical guide.

**Table ES.1 Overall Scope of Resilient Infrastructure PPPs Knowledge Project of the Global Infrastructure Facility and Tokyo DRM Hub**

	Issues	Objective	Outputs
<b>Knowledge Development</b>	<ul style="list-style-type: none"> <li>Increasing climate and disaster risks</li> <li>Increasing needs in private financing and participation for infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Capture the evolution of disaster-resilient PPP projects/programs particularly focusing on their contractual and procurement structure</li> </ul>	<ul style="list-style-type: none"> <li>Case Studies of PPP projects in three countries</li> </ul>
<b>Knowledge Exchange and Dissemination</b>	<ul style="list-style-type: none"> <li>Limited capacity of policy makers, project implementation agencies from low- and middle-income countries</li> <li>No opportunities to have discussions on resilient infrastructure PPPs</li> </ul>	<ul style="list-style-type: none"> <li>Share and discuss lessons learned from the case studies among policy makers, project implementing agencies, and stakeholders from developed and emerging countries</li> </ul>	<ul style="list-style-type: none"> <li>Technical Guide</li> </ul>

Note: PPP = private-public partnership. The Tokyo DRM Hub refers a secretariat of the Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries, administered by the Global Facility for Disaster Reduction and Recovery (GFDRR), World Bank Group. The Global Infrastructure Facility (GIF) is a partnership among governments, multilateral development banks, private sector investors, and financiers and provides a new way to collaborate on preparing, structuring, and implementing complex projects that no single institution could handle on its own.

### Selection of Cases for the Japan Case Study

This report presents a case study of infrastructure PPP projects in Japan under the knowledge development component. Japan is highly exposed to natural disaster risks ranging from earthquake, tsunami, cyclone, floods, and landslides to volcanic eruptions. Japan’s experience in structuring resilient infrastructure PPPs offers policy recommendations and insights on how disaster and climate risks can be managed under PPPs. The cases selected for the Japan case study are summarized in figure ES.1.

**Figure ES.1 Cases Reviewed for the Japan Case Study, by PPP Business Model**



Note: BOT = build-operate-transfer. PFI = private finance initiative. PPP = public-private partnership. Durations within parentheses show contract period.

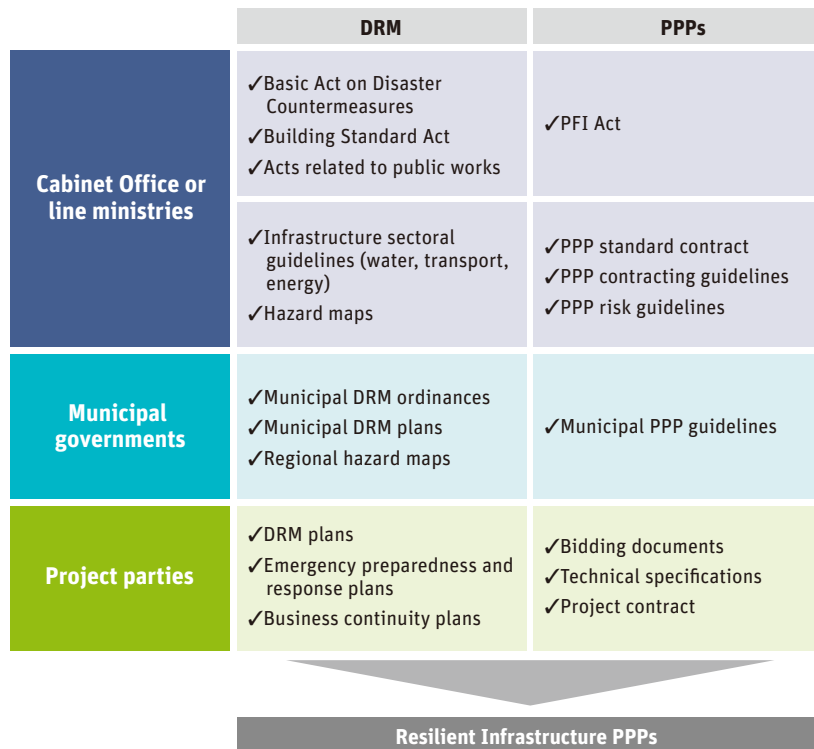


# Policy and Legal Frameworks for PPPs and Disaster Risk Management in Japan

## Underpinning Resilient Infrastructure PPPs with DRM Policy and Legal Frameworks

To promote infrastructure development via PPP, the Japanese government enacted the Act on Promotion of Private Finance Initiative (PFI Act) in 1999 and established a PPP/PFI Promotion Office, which has developed guidelines on risk allocation and contracting. Although the PFI Act does not specifically focus on DRM, public authorities embed the DRM legislations in bidding documents and technical specifications to ensure development of risk-informed infrastructure (figure ES.2). These include the 1961 Disaster Countermeasures Basic Act, the 1950 Building Standard Act, and municipal DRM plans. Instead of standardization, the bidding documents of each project and their contracts provide detailed DRM specifications considering the nature of each project and its geophysical and hydrometeorological characteristics. Also, when DRM policies and legislations are amended, private operators are required to comply with such amendments.

**Figure ES.2 Policy and Legal Frameworks for Resilient Infrastructure PPPs**



Note: PPP = public-private partnership. PFI = private finance initiative. DRM = disaster risk management.

## Understanding Risks and Open Data

A basic information database on past natural disasters and anticipated risks enables the private entities to estimate long-term disaster risks. To communicate the disaster risks to the public and encourage preparedness, Japanese municipalities produce and disseminate hazard maps on earthquakes, floods, storm surges, tsunamis, landslides, and volcanic eruptions. Sharing information from the public sector on past natural disasters can reduce uncertain risk factors for private operators. Also, open data such as hazard maps and regional DRM plans facilitate effective disaster risk assessment by insurance companies. Sendai City innovatively considers resilience when conducting a value for money (VfM) analysis in terms of the efficiency of disaster response and recovery (box ES.1).

### **Box ES.1. Case of Sendai City: Accounting for Disaster Risks in a Value for Money Analysis**

The choice of a conventional public works model or PPP is decided considering the legal regulations, urgency, and characteristics of each project, including bankability. In addition, Sendai City considers resilience and business continuity in VfM analysis by comparing two scenarios: (a) where the project is handled by a public administrator, and (b) where a private operator builds and operates the facility under the build-operate-transfer (BOT) scheme.

In the first case, disaster response would require time and human resources from Sendai City to evaluate damage, apply for a contingency budget, and submit documents to the municipal assembly. As a result, Sendai City considers the BOT model to have more advantages than traditional public works for the municipal administration, in terms of the municipality's personnel and time saving in response to a natural disaster. Notably, VfM analyses that include operational resilience in terms of the efficiency of disaster response and recovery will strengthen the project's—and the government's—disaster resilience, resulting in the selection of an effective method that will minimize social and economic loss when disasters occur.

## **Project Structuring: Contracting and Disaster Risk Allocation**

### **Defining Force Majeure**

Large-scale natural disasters that cannot be foreseen and managed by a private operator are among the risk factors in a PPP project. Therefore, defining force majeure—recognized as a large-scale disaster in a PPP project—and contractually allocating the disaster risks between the public and private entities are essential for structuring a resilient infrastructure PPP project.

The “Guidelines for Contract: Points to Consider for PPP Project Contracts” released by Japan's PPP/PFI Promotion Office defines force majeure as follows: “a natural disaster that is generated externally without any relation to the actions, such as an agreement, made by the entities and cannot be prevented even if the generally required precautions and preventive actions are taken.” More specifically, it “is not attributable to the contracting authority and the private operator; in particular, a storm, torrential rain, flood, high tide, landslide, cave-in, lightning strike, earthquake, fire, generation of poisonous gas, etc., which fall under natural disasters, as well as a disturbance, riot, war, and act of terrorism, which fall under man-made disasters.”

However, the final definition of force majeure is not confirmed until both public and private entities agree. Therefore, it is defined separately for each project by reflecting the project characteristics and site conditions. Based on lessons learned from the 2005 Miyagi Earthquake and 2011 Great East Japan Earthquake as well as the accumulation of project experience, Sendai City has iteratively clarified the force majeure provisions (box ES.2).

### **Box ES.2. Case of Sendai City: Iterative Processes to Enhance Understanding and Risk Sharing between the Public and Private Sectors**

In the chronological review of cases in Sendai, force majeure events were listed as examples in the earlier projects and defined as foreseen phenomena under normal circumstances and for which no concerned entity was responsible. Based on lessons learned from the 2005 Miyagi Earthquake, the 2011 Great East Japan Earthquake, and other disasters, force majeure provisions specified the seismic intensity, and by taking into account historical disaster damages, Sendai City also added a numerical standard that regarded an event of at least a certain level as a force majeure event. Furthermore, there was past controversy on the difference between the damage caused by a private operator due to facility defects and damage caused by a natural hazard.

Sendai City clarified in the PPP contracts that damage caused by a natural hazard will be judged based on whether similar buildings in the vicinity suffered similar damage. Such clarification of force majeure provisions resulted in

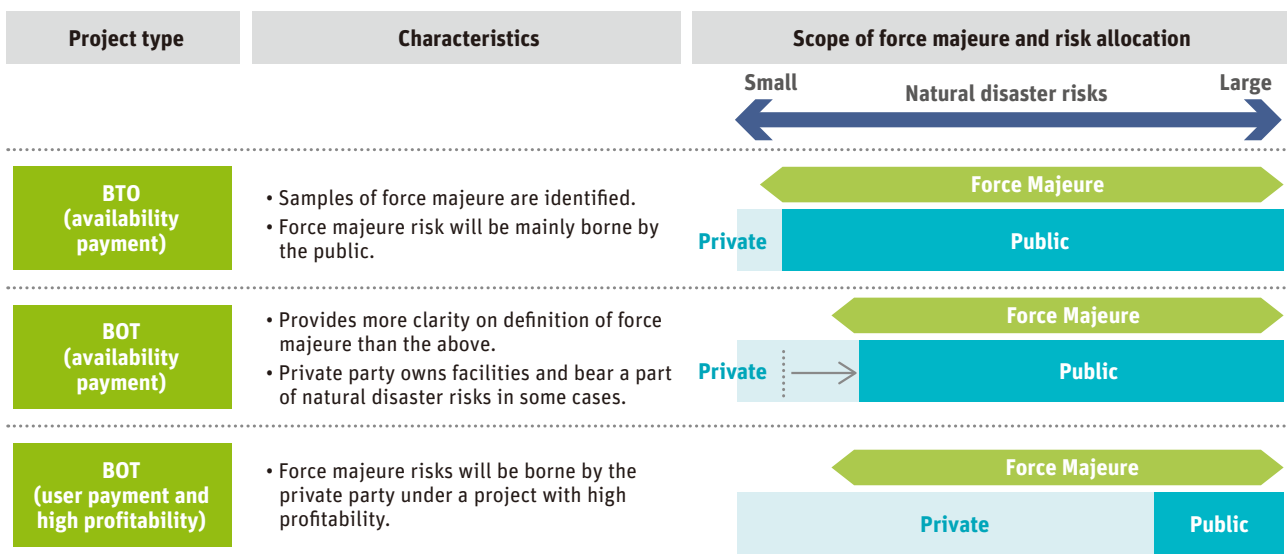
- Fewer questions and uncertainty on the DRM responsibility of the public and private sectors;
- The private sector’s clear consideration of disaster risks during the project planning stage; and
- Prompt emergency responses by the private sector.

### Risk Sharing between Public and Private Sectors

Because Japan is prone to natural disasters, the public sector has typically borne the disaster risks, and this has partly contributed to the development of PPP markets in Japan. Under the traditional public procurement in Japan, the costs of force majeure risks are 99 percent borne by the public sector. Japan’s PPP projects of the first generation—mainly build-transfer-operate (BTO) projects with availability payment (governments pay unitary charges to operators)—adopted the same risk sharing as in the traditional procurement. However, as both the public and private entities accumulate PPP experience, disaster risks that the private sector can reasonably manage have been transferred to the private sector depending on the project type and characteristics (figure ES.3).

For example, Sendai City PPPs were mostly BOT projects that transferred ownership of the assets to the private sector and elaborated upon the definition of force majeure to share risks with the private sector, if the private sector can bear these risks. In addition, profitable BOT projects allocate force majeure risks mainly to the private sector.

**Figure ES.3. Transfer of Natural Disaster Risks in PPP Projects, by Project and Payment Type**



*Note:* BOT = build-operate-transfer. BTO = build-transfer-operate. PPP = public-private partnership. “Availability payment” refers to government payment of unitary charges to operators. “User payment” refers to payment to operators from user fees.

Among the still-limited number of concession projects, risk sharing varies between road projects (with low profitability and high public nature) and airport projects (with high profitability). In the case of Aichi Toll Road Concession Project, standards for disaster recovery projects in public works were referenced to determine how additional costs resulting from natural disasters that fall under force majeure should be allocated between the public and private entities (box ES.3).

### Box ES.3. Case of Aichi Road Concession Project: Risk Sharing Policy by Circumstance

Force majeure includes a storm, torrential rain, flood, high tide, landslide, fall of ground, strike of lightning, earthquake, fire, other natural disaster, or uprising, riot, disturbance, act of war, epidemic, or other human-made disaster, of which the cause is not attributable to either the government or the concessionaire (Table ES B3.1).

**Table ES B3.1 Risk-Sharing Policy, by Disaster Type, for Aichi Toll Road Project**

Disaster type	Events for which additional costs are borne by the public sector
Earthquake	<ul style="list-style-type: none"> <li>• Damage based on normal social conventions</li> </ul>
Heavy rain	<ul style="list-style-type: none"> <li>• Maximum rainfall of 80 millimeters or more in 24 hours</li> <li>• Even if the rainfall is below the above standard, it is considered heavy rain if the hourly rainfall is significant (20 millimeters or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.</li> </ul>
Storm	<ul style="list-style-type: none"> <li>• Maximum wind speed of 15 meters per second or more (average in 10 minutes)</li> </ul>
High tide, storm surge, tsunami	<ul style="list-style-type: none"> <li>• Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively nonminor damage</li> </ul>

The public sector shall bear the cost if the concessionaire cannot foresee or cannot be reasonably expected to establish measures to prevent additional costs. More precisely, additional costs resulting from natural disasters that fall under force majeure would be borne by the public sector if (a) the disaster recovery project is in accordance with the National Government Defrayment Act for Reconstruction of Disaster Stricken Public Facilities, and (b) the public sector agrees that there were no reasonable measures that the concessionaire could have taken to prevent the additional costs from being incurred because the event was unforeseeable.

Source: Contract documents, Aichi Toll Road Project.

## Incentive Mechanisms in Procurement, Monitoring, and Payment

### DRM Tender Specifications and Evaluation Criteria during Procurement

In Japan, resilience of facilities is promoted through the overarching legislations that have been revised based on experiences from past disasters. Additionally, private operators may be asked to deal with disasters by following the project-specific specifications defined by the contracting authorities during the procurement stage. The DRM specifications usually cover robust facility designs, resilient operation and maintenance (O&M), emergency preparedness, and response planning including emergency inspection and evaluation of damages. Also, during the investor selection phase, the public and private entities discuss the definition of force majeure through questions and answers and competitive dialogues and agree on a final definition and a scheme of risk allocation that are commercially acceptable to private operators and investors.

Another approach adopted in Japan is to request that private operators submit proposals for DRM and include DRM as an evaluation criterion when assessing proposals. This incentivizes private DRM initiatives and innovation so that they can obtain higher evaluation points. For example, in the case of Sendai School Meal Supply Center PPP Project, Sendai City highly evaluated proposals on engineering measures to protect and minimize seismic risks as well as nonstructural measures and institutional arrangements that enable prompt emergency response and recovery. When disaster struck, the project recovered about 2.5 months earlier than did facilities directly operated by the government, owing to the private operator's flexible selection of suppliers for emergency goods and equipment.

## Resilience-Linked Monitoring and Payment

Case studies on Japan demonstrate merit in applying incentive mechanisms to procurement procedures that encourage private operators to effectively manage the disaster risks in their projects. According to the “Guidelines for Monitoring” released by the PPP/PFI Promotion Office, if the monitoring indicates that services have not been provided in accordance with the specifications or proposals, providing an economic motivation such as a reduction in the availability payment is considered an effective method for encouraging the appropriate performance of services.

Appropriate payment mechanisms also can incentivize the private operators to invest in DRM. For the Astronomical Observatory PPP Project, Sendai City established a policy for reducing the private operator’s contracted amount in case of facility defects that do not meet the specifications and performance standards, taking into account the importance of the facility component, degree of defects, time required for corrective actions, or other factors. Sendai City developed the approach to incentivize the private sector’s investment in DRM as a lesson learned from the facility defects in its previous Sports Facility Project, which were triggered by the 2005 Miyagi Earthquake.

## Insurance and Financial Institutions

### Insurance as a Risk Transfer Measure and Availability

In Japan, fire insurance covers damages caused by fire, winds, snows, lightning strikes, and the like but does not cover fire damages induced by disasters such as earthquakes, tsunamis, and volcanic eruptions (table ES.2). Therefore, in Japan, where there is a high risk of earthquakes, business operators may be required to add an earthquake rider to the fire insurance for the O&M period. However, earthquake insurance is not easily available in Japan because of the limited capacity of the reinsurance market and the required high premiums. As a result, private operators are concerned that if the contracting authority asks them to add an earthquake rider to their fire insurance, they may have difficulty continuing the PPP project because of reduced profitability. Hence, despite recognizing the need to obtain insurance, decisions are made by considering the regional characteristics and availability of insurance.

**Table ES.2 Insurance Typically Required of Private Operators in Japanese PPP Projects**


Phase	BTO project	BOT project	Concession project
Construction	<ul style="list-style-type: none"> <li>• Construction insurance</li> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Construction insurance</li> <li>• Public liability insurance</li> </ul>	n.a.
O&M	<ul style="list-style-type: none"> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Fire insurance (rarely, but sometimes private operators are required to add an earthquake rider to their fire insurance)</li> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Fire insurance with an earthquake rider</li> <li>• Liability insurance for facility administrators</li> </ul>

Note: n.a. = not applicable. BOT = build-operate-transfer. BTO = build-transfer-operate. O&M = operation and maintenance.

### Role of Financial Institutions in Resilience

As a requirement to secure financing from financial institutions including commercial banks, there are cases in Japan where private operators are asked by the lender’s advisers (such as insurance or engineering consultants) to assess and evaluate disaster risks, develop a business continuity plan and DRM plan, and prepare a technical due diligence report to review the engineering designs of assets during the financing stage. Also, insurance covering force majeure, as well as its premium, affects overall project cash flows. Financial institutions do not set insurance as a requirement for approving a loan but take it into consideration in credit assessment. Early involvement of financial institutions is important to help incorporate the necessary financing structures from the early stage of the project.



An aerial photograph of a long, multi-lane bridge extending across a vast blue ocean. In the foreground, a complex interchange with multiple overpasses and ramps connects the bridge to a coastal area. The coastal area includes green spaces, a circular pool, and some buildings. The sky is clear and blue. The text 'Project Framework' is overlaid in white, with a large 'I' on the left and three teal chevrons on the right.

# I Project Framework ▶▶▶

# 1. Introduction

## 1.1 Background

Resilient infrastructure plays an increasingly significant role in coping with natural disasters, including hydrometeorological and geophysical hazards, especially in the contexts of climate variability and change. In emerging markets and developing economies (EMDE), the largest source of infrastructure investment is still domestic public spending. It is estimated that it will cost trillions of dollars to meet rising aspirations for better infrastructure, health, and education in these countries—more than multilateral development banks or international donors can provide by themselves. Therefore, there is an increasing demand for and attention on public-private partnerships (PPPs) to maximize finance for development. Although PPPs are widely recognized as a way to provide public infrastructure services, climate and disaster resilience has not yet been considered in many countries under the PPP policy frameworks.

### Increasing Natural Disaster Risks and Impact of Climate Change

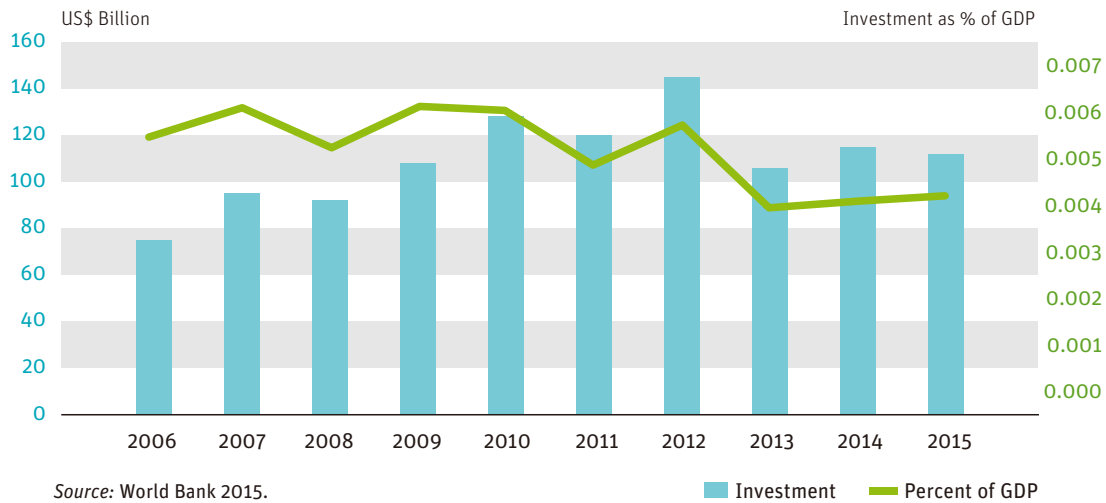
The impacts of extreme natural hazards and climate change are becoming increasingly visible over the past decades. Between 1994 and 2013, natural disasters claimed the lives of 1.35 million people, more than half of whom died in earthquakes, and the remainder owing to weather- and climate-related hazards (CRED 2015). Since 2000, an average of 341 hydrometeorological disasters (mainly floods and storms) occurred annually—a 44 percent increase from the 1994–2000 average and well over twice the frequency in 1980–89 (CRED 2015).

In addition to climate variability and change, rapid urbanization is concentrating risk in vulnerable regions of the world. By 2020, nearly 1.5 billion people are estimated to live in urban slums, where the concentration of climate and disaster risk is highest (UN-Habitat et al. 2015). Also, sea-level rise in the 136 largest coastal cities could result in losses of US\$1 trillion or more per year by 2050 (Hallegatte et al. 2013). Without major investments in resilience, climate change may push up to 77 million people into poverty by 2030 (World Bank 2016).

### Increasing Trends of Infrastructure PPPs

The number of projects using PPP as a model of service delivery has increased in EMDE. Between 2004 and 2013, G-20 (Group of 20) countries accounted for 14 of the top 20 countries in terms of PPP project numbers, based on PwC analyses. Of those, three countries (China, India, and the United Kingdom) accounted for almost half of the total number of projects carried out by the top 20 countries. EMDE have tended to focus on more-fundamental economic infrastructure such as energy and transport, while high-income countries have implemented social infrastructure PPP projects, such as schools, hospitals, and leisure facilities. In EMDE, there is a steady and recognizable demand for investment in PPP infrastructure; overall PPP investment was around US\$110 billion in 2015, a level similar to previous years (figure 1.1).



**Figure 1.1 Total PPP Investment and Share of GDP, 2006–15**

## 1.2 Challenges and Approaches to Resilient Infrastructure PPPs

This section summarizes the issues identified in past studies on structuring and implementing resilient infrastructure PPPs as well as a theoretical framework for addressing the key issues.

### Key Challenges in Incorporating Resilience into Infrastructure PPPs

In traditional public works, governments promote resilience of public services by designing and constructing infrastructure in accordance with laws and building codes that promote robust designs to protect against external shocks including natural hazards. Although infrastructure PPPs should be designed and constructed in accordance with the building codes and national infrastructure standards, disaster risks cannot be eliminated, and the risks need to be understood, contractually allocated, and managed by the public and private sectors. Based on a literature review, the key challenges for incorporating resilience into infrastructure PPPs are summarized in table 1.1.

**Table 1.1 Resilient Infrastructure PPP Issues Identified in Past Studies**

Area	Category	Issues
Policy and legal framework	Relationship between disaster management and PPP infrastructure development policy	<ul style="list-style-type: none"> <li>Climate and disaster resilience is not discussed in PPP policy framework.</li> <li>Stakeholders are not aware of importance of disaster resilience.</li> </ul>
Project Preparation and Structuring (Contracting)	How to deal with uncertain events under long-term contracts	<ul style="list-style-type: none"> <li>Contracts cannot flexibly deal with uncertain or unforeseeable risks on force majeure.</li> <li>There are no appropriate measures to compensate increased costs due to increased natural disaster risks for a private sector entity under a long-term contract.</li> <li>There are no incentives to promote resilient infrastructure development and active disaster risk management.</li> </ul>
	Clear definition of disaster risks and force majeure	<ul style="list-style-type: none"> <li>All disaster risks cannot be covered comprehensively.</li> <li>It is difficult to set appropriate standards on force majeure and exemption. Lack of international standard contracts causes uncertainty at decision making on investments.</li> </ul>
	Risk allocation	<ul style="list-style-type: none"> <li>There is no mechanism to eliminate information asymmetry on climate change by increasing transparency and disclosure.</li> <li>Risk allocation between the public and private causes moral hazard.</li> <li>The pricing mechanism by the public sector does not include costs for compensation on disaster management.</li> <li>There is insufficient risk management ability by the public sector.</li> </ul>
Procurement and Implementation	Promotion of disaster risk management	<ul style="list-style-type: none"> <li>There are no incentives for innovative private proposals based on appropriate life-cycle costs.</li> <li>There is no balancing on CAPEX and OPEX considering economic life of infrastructure assets.</li> </ul>
Risk transfer and financing	Financial products and disaster risk finance	<ul style="list-style-type: none"> <li>Limited products to mitigate disaster risks are available in the market.</li> <li>Limited financing tools benefiting disaster resilient projects are available.</li> <li>Limited availability of insurance causes high exposure to natural disaster risks in the long term.</li> <li>No insurance is available at reasonable costs.</li> </ul>

Source: PwC based on PPIAF 2016 and World Bank 2016.

Note: CAPEX = capital expenditure. PPP = public-private partnership. OPEX = operational expenditure.

The challenges highlighted in table 1.1 fall into three overarching areas of concern, further discussed below.

**Allocation of natural disaster risks between the public and private sectors.** PPP contracts often include provisions for and allocation of unforeseen risks, which are categorized under force majeure (or “acts of God” including natural disasters). Although neither the public nor the private sector is responsible for “acts of God,” the risk still needs to be contractually allocated between them in PPPs. Usually, it is difficult to identify a boundary of responsibility between the two parties as well as whether a natural hazard event can be considered force majeure. The range of responsibility that the private sector can take will depend on (a) the availability of insurance and (b) whether the private sector can reasonably estimate the risks.

**Management of long-term contracts under uncertainty.** PPP contracts are typically long-term ones. For a project period that runs for 20 or 30 years, the possibility that natural disasters occur will constantly exist. Because of its public nature, it is essential to continue a PPP infrastructure project even after a natural disaster occurs. Furthermore, long-life economic infrastructure assets (for example, hydropower dams, rails, and metros) that could last for more than 50 years will likely face an increasing climate risk. In this sense, it is critical to incorporate DRM into the

project design, construction, operation, and maintenance to ensure sound and long-term implementation of PPP projects. In addition to setting appropriate design specifications to minimize structural vulnerability and exposure of infrastructure assets, a thorough review and discussion on force majeure or relief events among the public and private project stakeholders is required during the project development phase.

**Project economics and uncertainty in cost implications of resilience investments.** Investments in DRM or the costs associated with unexpected emergency response and recovery from a natural disaster can affect the project’s VfM. Disaster risks should be incorporated into early infrastructure development stages; however, it is not often within the private sector’s commercial interest to invest in measures against long-term and uncertain risks, given the uncertainty of return on investment. In addition, it is necessary to avoid moral hazard<sup>1</sup> and incentivize the private sector to lower the risk through DRM practices. A thorough examination is required to determine cost allocation between both parties as well as the nature and scope of incentives, if any, and these need to be defined in a project agreement. However, it is often difficult to define these beyond a certain level of details and scopes in contractual arrangements because of the associated uncertainty.

## A Theoretical Framework for Structuring Resilient Infrastructure PPPs

The World Bank-managed, multidonor Public-Private Infrastructure Advisory Facility (PPIAF) has developed a theoretical approach to addressing the challenges laid out in the preceding section for developing resilient infrastructure PPPs. The World Bank (2016) study identifies the measures to be taken by stakeholders at each stage of a PPP project: policy and legal frameworks, contracting, procurement, and risk mitigation and finance (figure 1.2).

**Figure 1.2 Theoretical Framework for Structuring Resilient Infrastructure PPPs**

Area \ Actor	International Organization	Awarding Authority	Private Sector
<b>Policy and Legal Framework</b>	<ul style="list-style-type: none"> <li>Foster political will on resilience</li> <li>Bolster DRM and resilience in PPP technical assistance</li> <li>Encourage emphasis on climate risk in public investment management frameworks</li> <li>Strengthen country’s capacity to make robust decisions in face of uncertainties</li> </ul>	<ul style="list-style-type: none"> <li>Introduce flexibility into existing PPP policy frameworks to enable integration of resilience</li> <li>Level the playing field on disaster risk and resilience in PPP procurement</li> <li>Review language of PPP contracts</li> </ul>	<ul style="list-style-type: none"> <li>Promote awareness of climate and disaster risk in insurance</li> <li>Support to improve disaster resilience by advisers</li> </ul>
<b>Project Preparation and Structuring</b>	<ul style="list-style-type: none"> <li>Bolster climate risk and resilience in PPP technical assistance</li> <li>Strengthen country’s capacity to make robust decisions in face of uncertainties</li> <li>Leverage climate finance and financial risk mitigation instruments</li> </ul>	<ul style="list-style-type: none"> <li>Incorporate climate and disaster resilience in project preparation and transaction structures</li> <li>Level the playing field on climate risk and resilience in PPP procurement</li> </ul>	<ul style="list-style-type: none"> <li>Shareholders: Understand implications of natural disaster for investment performance</li> <li>Insurers: Promote awareness of climate risk in insurance</li> <li>Advisers: Develop capacity on climate resilience by advisers</li> </ul>
<b>Procurement</b>	<ul style="list-style-type: none"> <li>Leverage climate finance and financial risk mitigation instruments</li> </ul>	<ul style="list-style-type: none"> <li>Incorporate climate and disaster resilience</li> </ul>	<ul style="list-style-type: none"> <li>Insurers: Promote awareness of climate risk in insurance</li> <li>Advisers: Develop capacity on resilience</li> </ul>
<b>Implementation</b>		<ul style="list-style-type: none"> <li>Harness private sector DRM expertise</li> </ul>	<ul style="list-style-type: none"> <li>Project company: Incorporate resilience measures through project life cycle</li> </ul>
<b>Risk Transfer and financing</b>	<ul style="list-style-type: none"> <li>Leverage climate finance and financial risk mitigation instruments</li> </ul>		<ul style="list-style-type: none"> <li>Lenders: Incorporate DRM and resilience in lending criteria and loan covenants</li> </ul>

Source: World Bank 2016.

Note: PPP = public-private partnership. TA = technical assistance.

<sup>1</sup> In this context, “moral hazard” occurs when the incentives to perform are distorted by removing risks and rewards.

### **Staged Approaches by Project Stakeholders**

This analysis suggests actions to be taken by stakeholders—including governments and agencies (as awarding authorities), the international organizations that support them, and the private sector—to resolve challenges that arise during various project stages. Resilience should be integrated into the preparation for and transaction of projects, including procurement at the national policy level. Furthermore, the analysis suggests introducing flexibility into PPP contract management and policy frameworks to enable integration of resilience against climate change as well as to differentiate “acts of God” from climate change. It also suggests the necessity of improving the national-level capacity to make robust decisions in the face of uncertainties through the support of international development partners.

In addition, the analysis suggests, the private sector would ideally play the following key roles in promoting resilient infrastructure PPPs:

- Private project companies incorporate resilience throughout project life cycle.
- Commercial lenders reflect resilience in lending criteria and loan covenants.
- Stakeholders such as investors understand the implications of climate and disaster risks for investment performance.
- Insurance companies incentivize resilience through insurance terms and advice on risk mitigation instruments.

### **Active Management by Public and Private Parties**

PPIAF emphasizes that, as natural disaster risks increase, there will be a need for more proactive control of PPP projects and implementation of contracts in cooperation with the public and private parties, instead of simply treating the increasing risks as acts of God (force majeure) (PPIAF 2016). In particular, the PPIAF report

- Questions the availability of mechanisms to compensate private operators for the increased cost by taking the increase in natural disaster risks into consideration for long-term contract periods;
- Suggests arrangements for compensation to the private sector to be included in contracts;
- Questions whether tight contracts can flexibly deal with uncertain and unforeseeable risks treated as acts of God, suggesting that there is a limit to treating all climate risks as acts of God; and
- Suggests the need to examine (a) whether the focus on the benchmark of economic assessment is so great that PPP procurement systems prevent private companies from offering innovative measures for climate risks that may require additional compensation, and (b) whether incentives are given to private companies to set proper life-cycle costs.

Although adaptation measures and the need for resilience are increasingly incorporated into the strategy for each sector, the strategy must be adjusted depending on the requirements for each project—for example, in terms of risk sharing—if PPPs are implemented. This is recognized as a problem that should be shared by all sectors (PPIAF 2016).

Accordingly, it is necessary to provide incentives to stimulate private investors and clarify the support provided by public entities for DRM. It is also important to clearly indicate the responsibility assumed by private operators while discussing DRM measures and formulating a legal framework and plan to implement the DRM measures as seen in Japan.

Furthermore, Japan’s Ministry of Land, Infrastructure, Transport and Tourism looks at the division of roles between the public and private sectors regarding the prevention and mitigation of disaster and climate risks (MLIT 2013). The research indicates that the public sector should take greater responsibility for responding to disasters while

emphasizing (a) the importance of dividing roles between the public and private parties, and (b) the need to provide rules that clarify the roles of private operators at the time of disaster and how they should handle the situation. It concludes that private operators should support the public entities and suggests that the costs incurred during a disaster should be borne by public entities so that private operators will not assume responsibility relating to damages and other consequences resulting from disaster prevention and mitigation activities.

### 1.3 Scope and Objectives of This Study

Building on the theoretical approaches outlined in the preceding section, the World Bank’s Global Infrastructure Facility (GIF) and the Tokyo DRM Hub have initiated a knowledge project on “Resilient Infrastructure PPPs—Contracts and Procurement” to harness knowledge and expertise learned from PPP projects in selected countries of all income levels to help low- and middle-income country governments prepare and structure disaster-resilient infrastructure PPPs. In particular, this project provides practical examples for addressing the issues identified in previous studies, including the following:

- Reflection of disaster risks in PPP legal frameworks
- Flexibility of PPP contracts in responding to disaster risks
- Scope of appropriate risk allocation including compensation to the private sector in case of a natural disaster
- Availability of risk mitigation measures in financing, such as insurance to transfer disaster risks for the private sector

This project also highlights legal frameworks for PPP and DRM, PPP procurement methods, contracts, and risk mitigation measures based on an analysis of case studies. The case studies were conducted by reviewing terms and conditions of PPP contracts such as definition of force majeure, risk allocation, and incentives as well as insurance as part of risk transfer measures.

The overall knowledge project consists of two components: (a) knowledge development, and (b) knowledge exchange and dissemination (table 1.2).

**Table 1.2 Overall Scope of Resilient Infrastructure PPPs Knowledge Project of the Global Infrastructure Facility and Tokyo DRM Hub**

	Issues	Objective	Outputs
Knowledge Development	<ul style="list-style-type: none"> <li>• Increasing climate and disaster risks</li> <li>• Increasing needs in private financing and participation for infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Capture the evolution of disaster-resilient PPP projects/programs particularly focusing on their contractual and procurement structure</li> </ul>	<ul style="list-style-type: none"> <li>• Case Studies of PPP projects in three countries</li> </ul>
Knowledge Exchange and Dissemination	<ul style="list-style-type: none"> <li>• Limited capacity of policy makers, project implementation agencies from low- and middle-income countries</li> <li>• No opportunities to have discussions on resilient infrastructure PPPs</li> </ul>	<ul style="list-style-type: none"> <li>• Share and discuss lessons learned from the case studies among policy makers, project implementing agencies, and stakeholders from developed and emerging countries</li> </ul>	<ul style="list-style-type: none"> <li>• Technical Guide</li> </ul>

*Note:* PPP = private-public partnership. The Tokyo DRM Hub refers a secretariat of the Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries, administered by the Global Facility for Disaster Reduction and Recovery (GFDRR), World Bank Group. The Global Infrastructure Facility (GIF) is a partnership among governments, multilateral development banks, private sector investors, and financiers and provides a new way to collaborate on preparing, structuring, and implementing complex projects that no single institution could handle on its own.

This report presents a case study of infrastructure PPP projects in Japan under the knowledge development component. Good practices and lessons learned from case studies are incorporated into the separately developed technical guide.

## 1.4 Selection of Cases for the Japan Case Study

The following criteria were used to select project cases under the Japan Case Study: (1) PPP business models and (2) experience of natural hazards.

### Criterion 1: PPP Business Models

Project risks, including natural disaster risks, are treated differently based on the type of PPP business model (table 1.3). Although build-transfer-operate (BTO) projects represent about 60 percent of private finance initiative (PFI) or PPP projects in Japan, the transfer of project risks to the private sector is limited under the BTO model, leaving the public party mainly responsible for natural disaster risks, in accordance with the standard conditions of public work contracts. In build-operate-transfer (BOT) and concession projects where private operators have operating rights and asset ownership, the private operators bear natural disaster risks to some extent or are responsible for a portion of risks, with a clear risk allocation between the public and private parties. Therefore, this case study focuses on BOT and concession cases.

**Table 1.3 PPP Business Models and Risk Allocation**

PPP or PFI Method	Ownership and Management Right	Project Risks	Natural Disaster Risks
<b>BTO</b> (availability payment)	The public possesses ownership and management right. Upon completion of construction, private contractors transfer its facility and are responsible only for operation and maintenance of the facility.	Contractor retrieves project costs from unitary charges paid by the public. There is limited risk allocation to a private party. The public is responsible for management.	The public mainly bears natural disaster risks, same as in the standard condition of contracts for public works, and the private contractor bears only 1/100 of the incurred costs.
<b>BOT</b> (availability payment or user payment)	Private contractors possess facilities and manage them by themselves.	Contractor retrieves project costs from user fees and unitary charges from the public. There is a risk of receiving less facility development fee and a management risk.	The private contractor is responsible for ownership and management of a facility and bears certain degree of disaster risks. The contractor can bear most of the risks as a principal implementer.
<b>Concession</b>	The public possesses facilities and separates a management right from facilities, sells its right to private contractors.	Contractor retrieves project costs only from user fees. Facility development is not necessarily included in a contract.	Risks are to be divided between the public and private parties by clearly defining the risks borne by the private.

Note: BOT = build-operate-transfer. BTO = build-transfer-operate. PFI = private finance initiative. PPP = public-private partnership.

### Criterion 2: Natural Disaster Experience

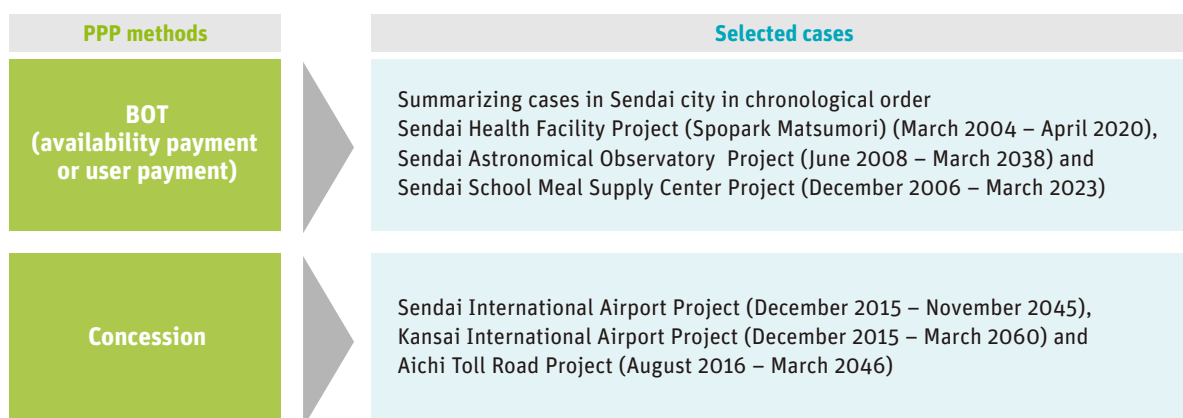
This study aims to capture key drivers for resilience and lessons learned from past natural disasters as well as the benefits accrued from PPPs. Therefore, this project mainly focuses on cases from Sendai City because the city has implemented several PFI projects and experienced large-scale earthquakes such as the Miyagi Earthquake in 2005

and the Great East Japan Earthquake in 2011. This study summarizes how Sendai City’s current project structure, formation, contracting, and implementation processes reflect lessons learned from the past disaster experience.

## Selection of Cases

The cases selected in this study are summarized in figure 1.3.

**Figure 1.3** Classification of Cases Reviewed for the Japan Case Study



Note: BOT = build-operate-transfer. PFI = private finance initiative. PPP = public-private partnership. Durations within parentheses show contract period.

## 1.5 Structure of This Report

The “Resilient Infrastructure PPPs: Contracts and Procurement—The Case of Japan” is structured as follows:

- Chapter 2, “Policy and Legal Frameworks for PPPs and DRM in Japan,” summarizes the PFI disaster-related laws and framework in Japan.
- Chapter 3, “Contracting and Disaster Risk Allocation,” examines contracting and disaster risk allocation between the public and private sectors.
- Chapter 4, “Procurement, Monitoring, and Payment Mechanisms,” reviews systems design and incentives provided in the procurement procedures.
- Chapter 5, “Insurance and Financial Institutions,” reviews the roles and benefits of insurance in infrastructure PPPs.
- Chapter 6, “Conclusions and Lessons Learned from Japan,” summarizes the implications and lessons learned for policy makers based on the results of the Japan case study.







# II The Case of Japan



## 2. Policy and Legal Frameworks for PPPs and Disaster Risk Management in Japan

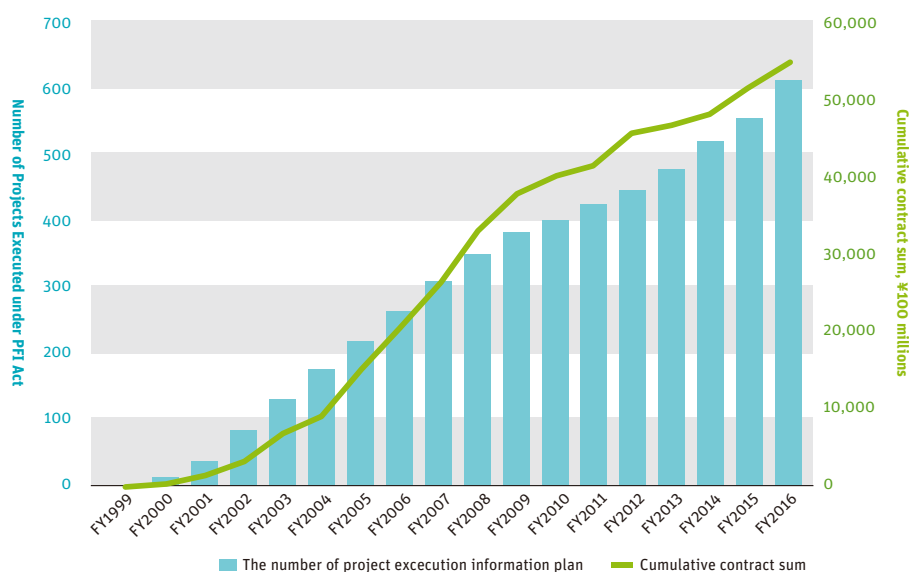
Chapter 2 describes the public-private partnership (PPP) in Japan by summarizing the current status of the PPP legal framework and the transition to developing disaster-related legal and institutional systems. This chapter also explains the size and trends of the Japanese PPP market as well as the development of the PPP framework behind such historical trends. In addition, it describes the legal framework for disaster risk management (DRM) and summarizes how disaster resilience has been embedded in the PPP-related legal framework in Japan.<sup>2</sup>

### 2.1 Overview of PPPs in Japan

#### Size and Characteristics of the Japanese PPP Market

After the Act on Promotion of Private Finance Initiative (PFI Act, hereafter) came into force in 1999, both the number and size of PPP projects have steadily increased. Since the law’s enactment, a total of 527 PPP projects have been implemented as of March 31, 2017 (Cabinet Office 2017).<sup>3</sup> A need for public works as a means to stimulate the economy (Noda 2003), coupled with increasing pressure to reduce project budgets, has meant that PFI—a form of PPP that uses private finance, management abilities, and technical capabilities in the construction, maintenance, and management of public facilities—has attracted more interest. The PPP/PFI Promotion Action Plan aims to promote PPP or PFI projects totaling ¥10–12 trillion between 2013 and 2022 (Cabinet Office 2013). In particular, the 2014–16 period saw intensive efforts (figure 2.1), and further efforts were expected during 2017–19 to meet this target.

**Figure 2.1** Growth in PPP Projects and Cumulative Contract Values in Japan, FY1999–FY2016



Source: Cabinet Office 2017.

Note: PPP = public-private partnership. Numbers do not include projects whose contracts were cancelled either during the designated service period or before disclosing implementation policies. The “PFI Act” refers to the Act on Promotion of Private Finance Initiative (Act No. 117 of 1999, amended in 2006 and 2011).

<sup>2</sup> In this chapter, to distinguish types of public-private partnership schemes, “PFI” refers to a project aligned to the PFI Act, and “PPP” includes other broad schemes related to public-private partnerships.

<sup>3</sup> The number does not include the projects whose contracts were cancelled during the designated service period or before disclosing implementation policies.

Infrastructure renovation costs (for facility renovation, maintenance, and disaster recovery costs) in Japan will reach an estimated ¥6 trillion in 2020 (MLIT 2011). Given shrinking public budgets, more PPP projects are likely to be developed to meet infrastructure needs. In addition, the wake of the 2011 Great East Japan Earthquake has highlighted not only aging infrastructure but also weakened capacity due to a declining number of public servants; therefore, PPP has been drawing more attention to make use of the “know-how” of private operators. Figure 2.1 indicates the growth in the number of projects and cumulative contract values since fiscal year (FY) 1999.

Local governments are the implementation entities for about 80 percent of PPP projects in Japan (table 2.1), which implies that PPP has mainstreamed at the local government level. Table 2.1 also explains the features of PPP projects in Japan with a focus on social infrastructure sectors. The PPP method in Japan has been commonly used in social infrastructure sectors such as education and health. The deteriorated status of public sector finances has resulted in an increased need for efficient renovation and operation and maintenance (O&M) in social infrastructure. This has meant the use of the capacity of the private sector via PPP for social infrastructure development.

Meanwhile, to develop an economic infrastructure that can yield revenue, the public sector has started to introduce the concession method to respond to the need for efficient infrastructure management by operators in light of ongoing decreases in population.

**Table 2.1** Number of Disclosed PPP Implementation Plans in Japan, by Sector

Sector	Implementation Entity			Total
	State government	Local government	Others	
Education and culture (schools, cultural facilities)	3	160	37	200
Life and welfare	0	23	0	23
Health and environment (medical facilities, waste management, funeral facilities)	0	97	2	99
Industry (tourism, agricultural promotion facilities)	0	14	0	14
City development (roads, parks, sewers)	14	116	2	132
Security (police, fire stations, prisons)	8	17	0	25
Government offices and their housing	42	14	4	60
Others	7	49	0	56
<b>Total</b>	<b>74</b>	<b>490</b>	<b>45</b>	<b>609</b>

Source: Cabinet Office 2017 (as of March 31, 2017).

Note: PPP = public-private partnership.

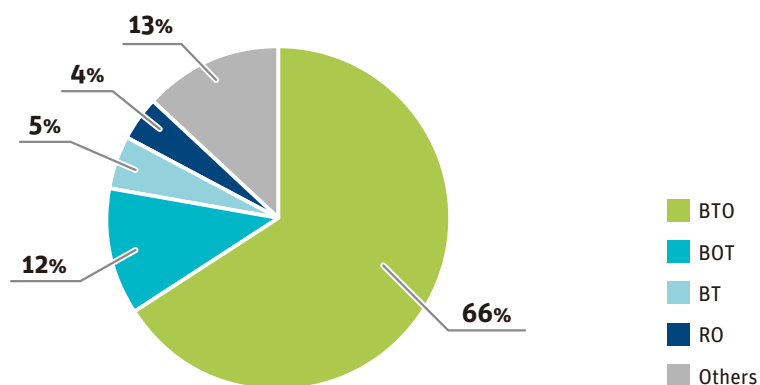
## Business Models in Japanese PPP Projects

More than 60 percent of PPP projects in Japan use the build-transfer-own (BTO) model, under which the ownership of facilities will be transferred to the public sector at the completion of construction (figure 2.2). In contrast, under the build-operate-transfer (BOT) model, the contractors own the facilities during the contract period. The BTO model

has been common in Japan because real estate acquisition taxes and property taxes are not imposed on infrastructure owned by the public. In addition, because the public has ownership of facilities built via the BTO model, potential contractors consider the tax burden on them to be lower, and unitary charges from the public will be reduced compared with other methods.

The amendment of the PFI Act in 2011 introduced the concession model. The concession model sells the management rights to a private entity whether or not new construction works are planned. Airport and toll road projects have already started to introduce the concession model, including projects such as Sendai Airport, the Kansai International Airport, and Osaka International Airport. More projects using the concession model are likely to be developed in the future alongside existing PPP models.

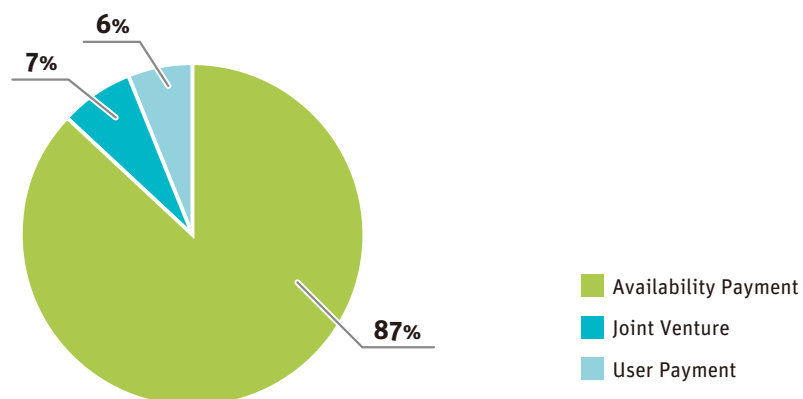
**Figure 2.2 Business Models in Japanese PPP Projects, 2016**



Source: “Number of PFI Projects by Project Structure,” [in Japanese], Private Finance Initiative Association, [http://pfi-as.jp/case/cat4692/post\\_29.html](http://pfi-as.jp/case/cat4692/post_29.html).  
 Note: BOT = build-operate-transfer. BT = build-transfer. BTO = build-transfer-operate. PPP = public-private partnership. RO = rehabilitate-operate. “Others” includes BOO (build-own-operate), DB (design-build), and so on.

There are three approaches to pay unitary charges in PPP: (a) availability payment (governments pay unitary charges to operators); (b) user payment (operators earn income from user fees); and (c) joint venture (operators receive fees from users as income, but also receive a subsidy to make up for shortfalls). Eighty-seven percent of Japanese PPP projects have introduced the availability payment method, and this approach is the premise for social infrastructure development projects in Japan (figure 2.3).

**Figure 2.3 Business Approaches in Japanese PPP Projects, 2016**



Source: Japan PFI/PPP Association 2016.  
 Note: Chart shows the methods by which charges are paid in PPPs (public-private partnerships)—that is, how payment is bundled to the private sector for capital spending as well as ongoing operation and maintenance costs.

## Selection of the Procurement Method

Typically, a procurement agency is entrusted with the selection of procurement methods for public works projects. The agency considers whether projects should be developed as a traditional public project or as a PPP based on the project's characteristics. The government prefers PPP for projects that can benefit from private sector's know-how and whose budgets exceed a certain value. It is also possible for a contracting authority to select a procurement method that considers legal framework limitations, emergency conditions, and the uniqueness of the project. Moreover, if a PPP offers an attractive project scope to private operators, it encourages private operators to participate in further such projects and will expand the PPP market.

In addition to selecting a procurement method, a value for money (VfM) analysis is conducted. A PPP is chosen as the development model when a procurement agency judges that a project is suitable for being implemented as a PPP and would yield positive effects. In the case of Sendai City, resilience is considered when conducting a VfM analysis in terms of the efficiency of disaster response and recovery.

### Box 2.1 Case of Sendai City: Incorporating resilience in VfM analysis

Although business continuity is not regularly tested through the VfM analysis, Sendai City's approach is to consider resilience during selection of the procurement method. It compares two scenarios: (a) where the project is handled by a public administrator, and (b) where a private operator builds and operates the facility under the BOT scheme. In the first case, disaster response required time and human resources from Sendai City to evaluate damage, apply for a contingency budget, and submit documents to the municipal assembly. As a result, Sendai City considers the BOT model to have more advantages for the municipal administration than traditional public works or regular BTO projects, in terms of the municipality's personnel and time saving in response to a natural disaster.

## 2.2 Legal Frameworks for PPP and DRM

### PFI Act

Japan introduced the PPP model on a large scale by enacting the PFI Act and making subsequent efforts to promote its spread. In addition to the 1999 enactment of the PFI Act, the Cabinet Office has established a PPP/PFI Promotion Office, which plays an advisory role to the prime minister and other relevant public agencies. It has developed several guidelines that help local governments understand the process of PPP projects and contracting. Moreover, the same office provides the public with information that promotes PPPs and coordinates PPP promotion across various agencies at the central government level. Given its advisory role, it neither prepares individual projects nor provides financing to PPP projects.

### Disaster Countermeasures Basic Act

The Disaster Countermeasures Basic Act (the Act, hereafter), enacted in 1961, serves as the basis for the DRM system in Japan. The Act clearly defines the roles and responsibilities of the central and local governments for all phases of DRM such as risk identification, risk reduction, preparedness, emergency responses, and recovery. Regarding activities related to disaster recovery efforts, the relevant entities of the public and private sectors will work together to implement various disaster countermeasures by ensuring the cooperation of private organizations. The Act has constantly been reviewed and amended since its enactment, taking into account the lessons learned from large-scale disasters.

In Japan, the Cabinet Office is responsible for ensuring cooperation and collaboration among related government agencies on wide-ranging issues, and it is mandated to plan basic DRM policies and responses to large-scale disasters as well as conduct overall coordination. Both prefectures and cities are responsible for leading the preparation of concrete DRM plans at the local level in accordance with the central DRM policies and plans (figure 2.4).

**Figure 2.4 Institutional DRM Responsibilities and Coordination in Japan, by Level**



Source: Cabinet Office 2016b.

Note: DRM = disaster risk management.

In addition, laws and standards related to public infrastructure, such as the Building Standards Act and infrastructure sector-specific laws and standards, have been enacted, reviewed, or strengthened with each occurrence of a large-scale disaster (as further detailed in appendix A.)

## 2.3 Risk Sharing between Public and Private Entities

### Standard Contract Condition for Public Works

In PPP projects in Japan, “division of responsibilities against force majeure among public and private entities” (defined in Article 29, Paragraph 4, of the Standard Condition of Contracts for Public Works) is used as a reference to respond to disasters resulting from force majeure. Regarding damages caused by force majeure in a public work, damages up to 1 percent of the contract value will be borne by the contractor, while the contracting authority (public sector) generally bears damages that exceed 1 percent of the contract amount. Similarly, in many PPP cases, the private operator bears expenses up to 1 percent of the amount of the initial investment cost when the facility is

damaged during construction, or the expenses up to 1 percent of the amount of the annual O&M costs when the facility is damaged during the O&M phase.

In cases where the above “1 percent rule” in the standard condition of contracts for public works is not applied, the relevant entities discuss and agree on the extent of payment increases for the private operator or the public entity. This is done by examining whether the payment of 1 percent by the private operator is appropriate while taking into account the characteristics of the relevant PPP project to determine risk sharing between the public and private entities. Thus, it can be inferred that PPP projects in Japan allocate additional costs resulting from force majeure based on the rules stipulated in the standard condition of contracts for public works.

On the other hand, for concession model projects, the rule mentioned above is not always followed. The risk sharing between the public and private entities is generally determined on a case-by-case basis without following the standard condition of contracts for public works. This is most likely because a concession model involves the sale of operating rights of public facilities to private operators; therefore, greater risks, including the events of a disaster, are to be transferred to private sectors. Concession projects are thus prepared based on the premise of disaster responses by private operators.

## Disaster Recovery Subsidy Systems in Public Works

If disaster affects a facility constructed in a public work and owned by a local government, local governments can obtain public support and subsidies from the central government to raise money for recovery costs. The definitions of eligible disasters and the defrayment and subsidy rate vary according to the type of facility (table 2.2). The defrayment rate for public civil engineering facilities such as roads, harbors, and sewerage systems as well as educational facilities is two-thirds or more, and disasters for which the central government will bear the cost for recovery are defined relatively clearly. However, for medical and welfare facilities, the subsidy is relatively small, and the definitions of eligible disasters are not clearly stipulated.

**Table 2.2 Disaster Recovery Defrayment and Subsidy Systems in Japan for Public Works, by Project Type**

Disaster recovery project type	Target facilities	Definitions of eligible disasters	Defrayment or subsidy rate
<b>Public civil engineering facilities</b> <i>Governing laws:</i> National Government Defrayment Act for Reconstruction of Disaster-Stricken Public Facilities	Roads, harbors, fishing ports, Sewerage systems, parks, sediment control facilities	Disasters from abnormal natural phenomena: 1. <i>Rivers:</i> water level exceeding (a) the warning water level; (b) approx. 50 percent of the river bank (where the warning water level is not determined); or (c) snowmelt for a long period 2. <i>In facilities other than rivers:</i> (a) maximum rainfall of 80 millimeters or more in 24 hours; or (b) rainfall of 20 millimeters or more per hour 3. <i>Maximum wind speed</i> of 15 meters or more (average in 10 minutes) 4. <i>High tide, wave, or tsunami</i> causing nonminor disasters 5. <i>Disasters due to an earthquake, landslide, or lightning strike</i> 6. <i>Disasters due to snow depth</i> of 1 meter or more that exceeds the average of the maximum snow depth in the past 10 years	2/3 or more
<b>Educational facilities</b> <i>Governing laws:</i> Act on National Treasury's Sharing of Expenses for Recovery of Public School Facilities Damaged by Disaster	Public school facilities (buildings, structures other than buildings, lands, facilities) Joint-use facilities (jointly used school meal preparation facility, joint school dormitories, joint training centers for industrial education)	<ul style="list-style-type: none"> <li>• <i>Rainfall:</i> (a) maximum rainfall of 80 millimeters or more in 24 hours; (b) continuous rainfall in significantly large quantity (180 millimeters or more in three days (72 hours); or (c) hourly rainfall in significantly large quantity (20 millimeters or more)</li> <li>• <i>Storm:</i> maximum wind speed of 15 meters per second or more (average in 10 minutes)</li> <li>• <i>Flood, high tide, tsunami, and other disasters</i> causing relatively nonminor damage</li> <li>• <i>Others:</i> amount of falling ash from January 1 to December 31 of that year is 1,000 grams per square meter or more</li> <li>• <i>Others:</i> eruptions, earthquakes, great fire, snowmelt, tornados, lightning strikes, and others</li> </ul>	2/3
<b>Medical facilities</b> <i>Governing laws:</i> Various laws controlled by MHLW	Public medical facilities, political medical facilities, medical personnel training facilities	Storm, torrential rain, flood, high tide, earthquakes, tsunami, eruption, and other abnormal natural phenomena	1/2
<b>Social welfare facilities</b> <i>Governing laws:</i> Various laws controlled by MHLW	Welfare facilities, nursing facilities, children's facilities, and the like	Storm, flood, high tide, earthquakes, and other abnormal natural phenomena	1/2 to 4/5
<b>Airports</b> <i>Governing laws:</i> Airport Act	Runways or landing strips	For construction required because of a disaster such as an earthquake, high tide, or an abnormal natural phenomenon, the costs for damages shall be allocated based on the following policy: <ul style="list-style-type: none"> <li>• <i>Airport set up and managed by the central government:</i> 80 percent and 20 percent of recovery costs shall be paid, respectively, by the central government and the prefecture in which the airport exists.</li> <li>• <i>Airport set up and managed by a local government:</i> 80 percent and 20 percent of the recovery costs shall be paid, respectively, by the central government and the prefecture that manages the airport.</li> </ul>	

Sources: Websites of Public Interest Incorporated Association of Nationwide Disaster Prevention (<http://www.zenkokubousai.or.jp/download/O9saigaisaitaku.pdf>); Ministry of Education, Culture, Sports, Science and Technology ([http://www.mext.go.jp/a\\_menu/shisetu/bousai/O11101/gaiyou.htm](http://www.mext.go.jp/a_menu/shisetu/bousai/O11101/gaiyou.htm)); Ministry of Health, Labour and Welfare ([http://www.mhlw.go.jp/shinsai\\_jouhou/dl/iryoushisetu\\_04.pdf](http://www.mhlw.go.jp/shinsai_jouhou/dl/iryoushisetu_04.pdf)); Iwate Prefecture ([https://www.pref.iwate.jp/dbps\\_data/\\_material/\\_files/000/000/002/418/05\\_yomikaego.pdf](https://www.pref.iwate.jp/dbps_data/_material/_files/000/000/002/418/05_yomikaego.pdf)); and e-Gov (<http://law.e-gov.go.jp/htmldata/S31/S31H0080.html>).

Note: MHLW = Ministry of Health, Labour and Welfare.



## 2.4 Disaster Risks in the PFI Act and Guidelines

The PFI Act itself does not specify the responses to resilient infrastructure development and natural disasters, but infrastructure development follows legal frameworks for DRM prepared and implemented by the central and local governments. The Fundamental Plan for National Resilience, approved by the Japanese Cabinet in 2014, aims to strengthen infrastructure resilience at the policy level by specifying policies and programs, taking into account the results of vulnerability assessments (Cabinet Office 2014). This plan focuses on both structural and nonstructural DRM measures (the latter including DRM education) and considers PPP/PFI is to be a tool for infrastructure development and managing or reconstructing aging infrastructure.

Meanwhile, guidelines for implementation of PPP projects and the PPP standard contract point out the importance of handling force majeure, including disaster risks. The guidelines are not mandatory; additional references on how force majeure is treated in other legislation can also be referred to in the development of PPP projects. Moreover, not all the agreements and rules specified in the standard contract and guidelines have to be applied to all the projects, because these are just resources to facilitate implementation. Referring to responses to disaster preparedness and force majeure applied in existing laws and regulations, the guidelines recommend further discussion to take specific features of each project into account (table 2.3).

**Table 2.3 Disaster Risk Management Guidance in the Japanese PPP Guidelines**

Guideline	Content
<b>Guideline on Risk Allocation in PFI Projects<sup>a</sup></b>	Disasters can affect any stage of PPP projects, such as planning, acquisition of lands, construction, and maintenance and operations; therefore, to avoid causing disputes over additional costs, it is recommended that, as much as possible, the agreements specify the level of disasters, the range of compensation, the guidelines on the use of insurance to compensate costs, the procedure to handle cumulative damage, and the damage reporting and confirmation process. For a definition of force majeure, the guideline exemplifies the definitions in the Disaster Countermeasures Basic Law and the cost sharing in the Construction Contract Agreement for public works (standard condition of contracts for public works).
<b>Guidelines for Contract: Points to Consider for PPP Project Contracts<sup>b</sup></b>	Private operators are required to bear a partial cost burden of any increased costs or losses, which should incentivize them to minimize losses caused by force majeure. The public sector will commonly be responsible for the remainder of the costs. The contract for public works will be used to decide the damage range.
<b>PFI Standard Contract (for public facility development and availability payment)<sup>c</sup></b>	Reflecting the contents explained in the guidelines above, this standard contract is the practical guide for availability payment PPP projects. However, there is no mandatory requirement as to its use; rather, based on this standard, it is recommended that each contract take into account the particular project details.

Note: DRM = disaster risk management. PFI = private finance initiative. PPP = public-private partnership.

a. [http://www8.cao.go.jp/pfi/hourei/guideline/pdf/risk\\_buntan\\_guideline.pdf](http://www8.cao.go.jp/pfi/hourei/guideline/pdf/risk_buntan_guideline.pdf).

b. [http://www8.cao.go.jp/pfi/hourei/guideline/pdf/keiyaku\\_guideline.pdf](http://www8.cao.go.jp/pfi/hourei/guideline/pdf/keiyaku_guideline.pdf).

c. <http://www8.cao.go.jp/pfi/hourei/keiyaku1/pdf/pficontract1.pdf>.

In this way, although the PFI Act does not specify disaster resilience in infrastructure development, disaster resilience is embedded as a part of the disaster resilience policy at the central level. While PPP/PFI has been promoted as one of the means for infrastructure development, the PFI Act and related guidelines do not set unique standards towards resilient infrastructure. The PPP contract instead conforms to existing laws and regulations on public works and DRM. Therefore, implementation guides and bidder information sheets for PPP projects usually require compliance with the standards of DRM specified in the Disaster Countermeasures Basic Act, or local DRM plans.

## 2.5 Summary and Key Takeaways

This chapter highlights the following recommendations for the policy framework of resilient infrastructure PPPs.

### Select a Procurement Method Based on Risk-Informed VfM Analysis

The choice of a conventional public works project model or PPP for procurement is decided considering the legal regulations, urgency, and characteristics of each project, including bankability. Sendai City innovatively considers resilience and business continuity in VfM analysis. The investigation and verification of VfM in terms of resilience enables the contracting authority to select the most effective method to minimize economic losses when disasters occur. It is necessary to establish an enabling environment to estimate disaster risks to quantitatively evaluate the benefits of resilience in VfM analysis. For example, a contracting authority can compile and analyze past disaster data and information and make these available to the public.

### Underpin Resilient Infrastructure PPPs with DRM Policy and Legislative Frameworks

The level of disaster resilience that PPP projects should have is specified in accordance with regulations at both the central and local government levels, similar to other public works projects. Although the PFI Act does not specifically mention disasters or resilient infrastructure development, DRM policies and legislation at both the central and local government levels are similarly applied to infrastructure PPPs in terms of both structural and nonstructural measures and standards. These include the Disaster Countermeasures Basic Act, business continuity planning guidelines, and local DRM plans and hazard maps developed by municipalities. Also, when DRM legislation is amended, private operators are required to comply with such amendments.

With respect to risk sharing and cooperation between the government and private sector in public works, the public sector often bears major disaster risks and is responsible for securing public resources for emergency response and recovery of infrastructure services in Japan. In addition to the certain level of public commitment in DRM, the guidelines for PPPs recommend appropriate risk allocation between the public and the private sectors based on the nature of projects (for example, criticality), commercial viability, and VfM.

Disaster resilience is usually ensured by complying with these construction and operation standards initially, rather than by individually adjusting the resilience requirements for each project. However, it is recommended that more-detailed standards be established that can be tailored to the characteristics of each project.

## 3. Contracting and Disaster Risk Allocation

This chapter summarizes how disaster risks are contractually defined and allocated between the public and private sectors in Japanese infrastructure public-private partnership (PPP) contracts.

### 3.1 Definition of Force Majeure

In a PPP project, roles and risks should be allocated between the public and private sectors in a long-term contract, and the provision of facilities and services should be defined. In a user payment PPP project (whereby operators earn income from user fees), a financing method such as a project finance scheme is frequently adopted where a project cash flow is used as the only source of repayment. This method is different from financing methods based on the creditworthiness of enterprises or the government. For projects that adopt project finance schemes, an appropriate plan must be established to generate sufficient cash flow for a given period of years in order to raise funds from investors and banking organizations.

Large-scale natural disasters that cannot be foreseen and managed by a private operator are among the risk factors in a PPP project. Therefore, defining force majeure—recognized as a large-scale disaster in a PPP project—and contractually allocating the disaster risks between the public and private entities are essential for structuring a PPP project.

The subsequent subsections summarize the definition of force majeure in PPP projects in Japan. They also cover the guidelines for setting this definition and review the methods for defining force majeure in actual infrastructure PPP projects.

#### Methods for Defining Force Majeure

As shown in Box 3.1, the “Guidelines for Contract: Points to Consider for PPP Project Contracts” released by the PPP/PFI Promotion Office of the Cabinet Office defines force majeure as follows: “an obstacle that is generated externally without any relation to the actions, such as an agreement, made by the entities and cannot be prevented even if the generally required precautions and preventive actions are taken.”

More specifically, it is categorized as “a natural disaster that is not attributable to the contracting authority and the private operator; in particular, a storm, torrential rain, flood, high tide, landslide, cave-in, lightning strike, earthquake, fire, generation of poisonous gas, etc., which fall under natural disasters, as well as a disturbance, riot, war, and act of terrorism, which fall under man-made disasters.”

However, the final definition of force majeure is not confirmed until both public and private entities agree. Therefore, it is defined separately for each project by reflecting the project characteristics and site conditions.

## Box 3.1 Guidelines for Risk Sharing in PPP Projects (Excerpts)

### Risks common to all phases

#### (1) Force Majeure

Force Majeure is an obstacle that is generated externally without any relation to the actions (such as contracts) made by the entities, and cannot be prevented even if the generally required precautions and preventive actions are taken. In any phase of the project, including design, securing a site, construction, maintenance, management and operation, the project can be affected by Force Majeure, such as a natural disaster that is not attributable to the contracting authority and private operators. This may result in damage to the temporary buildings in the investigation phase; damage to the construction activities in the construction phase; damage to the facilities in the maintenance and management phase; suspension and/or delay of the project during the design, site procurement and construction phases; larger costs incurred for each phase than the contract value; and other issues. Therefore, it is recommended to consider and examine who should bear the additional costs and how to extend the project period in advance, and set up a detailed agreement as much as possible.

#### (Reference)

- 1) Regarding natural disasters, item (i), paragraph 1, Article 2 of Disaster Countermeasures Basic Act (No. 223, 1961) stipulates “disaster means a storm, tornado, torrential rain, heavy snow, flood, coastal landslide, debris flow, high tide, earthquake, tsunami, eruption, landslide or other unusual natural phenomena, or a conflagration, explosion, or any other damage of similar extent from a cause prescribed by the ordinance.” Article 1 of the enforcement ordinance of the same act stipulates the “release of a large amount of radioactive materials and large-scale accidents including shipwreck involving a large number of victims” as causes defined by the ordinance. On the other hand, in some contract documents used for regular public works, a disaster is defined as “a natural disaster or man-made disaster including a storm, torrential rain, flood, high tide, earthquake, landslide, cave-in, fire, disturbance, and riot.” It is also beneficial to consider the inclusion of extraordinary long-term rainfall, long-term snowfall, avalanche, discovery of a buried cultural property, unpredictable soft ground, and eruption of poisonous gas in the definition.
- 2) To avoid a dispute when actual additional costs are required based on an agreement, it is recommended to determine which occurrences should be considered as disasters, the scope of payment, handling of the compensation by insurance, handling of accumulated damages, and the ways of notification or confirmation when damages occur and to reflect them in the agreement.
- 3) In addition to fire insurance and earthquake insurance, weather insurance has become commoditized in recent years. Combined with new insurance and financial technologies and the development of the market infrastructure, it is required to consider broad ways of mitigating risks. Therefore, it is recommended to consider and examine risk reduction measures at the point of time. It is also beneficial for the contracting authority to stipulate an agreement that will allow them to ask the private operator to submit its insurance certificate, so that disputes regarding actual additional costs that are incurred in the event of Force Majeure can be avoided.
- 4) As an example, a contract document used for regular public works contained the following clause: If any of the target objectives is damaged (excluding those that have been damaged due to the contractor’s negligence to duty of care or any damage that can be compensated by the insurance defined in the design documents) by a disaster that is not attributable to both the contracting authority and private contractor (referred to as “Force Majeure”) before delivery of the objects of the public works, the contracting authority shall pay XX percent of the contract payment.

Source: “Guideline on Risk Allocation in PFI Projects,” Cabinet Office, [http://www8.cao.go.jp/pfi/hourei/guideline/pdf/risk\\_buntan\\_guideline.pdf](http://www8.cao.go.jp/pfi/hourei/guideline/pdf/risk_buntan_guideline.pdf).

In Japan, a contracting authority generally drafts the definition of force majeure based on the guidelines listed in chapter 2, table 2.3. During the investor selection phase, the public and private entities discuss the definition through questions and answers and competitive dialogues and agree on a final definition of force majeure that is acceptable to private operators and investors (box 3.2).

### Box 3.2 Case: Invitation for Bids Q&A Example, Sendai Astronomical Observatory Project

Q: The definition of force majeure in your proposal says that the criterion concerning earthquakes should be “seismic intensity 4 or lower.” I think we should determine specific points for observation in advance for the contract. If you already have such specific observation points in mind, please let us know. I would also like to know whether this rule applies to similar earthquakes that are recorded in an instance.

A: We are planning to set up observation points on the first floor and top floor of the building. Since the exact observation points can change depending on your plan, we will discuss the issue and finalize it before concluding the contract. The rule shall apply to all seismic intensity recorded in the seismometer.

Photo 3.1 Sendai Astronomical Observatory



Source: Sendai Astronomical Observatory. ©Sendai Astronomical Observatory. Reproduced, with permission, from Sendai Astronomical Observatory; further permission required for reuse.

## Evolution of Force Majeure Based on Lessons Learned

### Build-Operate-Transfer Projects

The original definition of force majeure for PPP projects was not complete, but it has been gradually clarified through the accumulation of project experience, as seen in the case example of Sendai City, which progressively introduced the PPP model in Japan. The “Spopark Matsumori” health facility project (2004 – 2020), which uses waste heat from the “Matsumori Plant,” was an early PPP project of Sendai City. In this project, the definition of force majeure simply lists examples of disaster types and stipulates that no attribution of responsibility exists (box 3.3). For this reason, the application of this article was eventually entrusted to discussions between the public and private entities, and it might have been difficult for private businesses to determine to what extent damages would be covered by the article on force majeure before the project had even started.

### Box 3.3 Case: Definition of “Act of God,” Sendai Health Facility Project

“An act of God means a storm, torrential rain, flood, high tide, landslide, cave-in, lightning strike, earthquake, fire and any other natural disaster, or a disturbance, riot, uprising, and any other manmade disaster, which are not attributable to the city and business operators.”

Source: Project Contract, Attachment 14, List of Definitions (extracted)

#### Photo 3.2 Aerial View of Spopark Matsumori Health Facility Project



Source: City of Sendai. ©City of Sendai. Reproduced, with permission, from Sendai City; further permission required for reuse.

During project implementation, the 2005 Miyagi Earthquake occurred, which affected the project facilities. About 90 percent of the ceiling of the warm indoor pool collapsed, injuring 35 people. After the accident, the Spopark Matsumori Accident Response and Investigation Committee was established. The committee pointed out problems with the risk management between the public and private entities, and suggested clarifying the way to handle force majeure going forward.

As a result, the definition of force majeure and the disaster level at which private businesses should take measures were clarified for the New Sendai Astronomical Observatory Development and Management Project (hereafter, Sendai Astronomical Observatory Project), which was the next PPP project undertaken by Sendai City. Disaster risk management by private businesses was enhanced in this project.

In Attachment 13 of the contract, the criterion for risk sharing was defined as seismic intensity 4 (box 3.4).<sup>4</sup> This is because the costly reflector of the old astronomical observatory was damaged during the 2005 Miyagi Earthquake of seismic intensity 5, which occurred before the start of the new Sendai Astronomical Observatory Project (2008 – 2038), but the reflector had never been damaged with an earthquake of seismic intensity 4 before. Thus, it was assumed possible for companies to take necessary measures as part of regular business activities after an earthquake of seismic intensity 4 or lower.

<sup>4</sup> “Seismic intensity” is measured on the Japan Meteorological Agency’s seismic intensity scale.

## **Box 3.4 Case: Definition of Force Majeure and Related Risk Sharing, Sendai Astronomical Observatory Project**

### **Chapter 1 of Project Contract: Article 1, Definition of Terms**

“Force Majeure means a phenomenon that normally cannot be foreseen (limited to phenomena that exceed the level or range defined in the bid document or design document, if any). Such phenomena include a storm, torrential rain, flood, high tide, lightning strike, landslide, cave-in, earthquake and any other natural disaster, or a war, act of terrorism, radioactive contamination, fire, disturbance, riot, uprising, and any other man-made disaster, which are not attributable to the city and private operators. Note, however, that amendments to the law shall not be included as Force Majeure.”

### **Attachment 13: Additional Costs due to Force Majeure and Sharing the Burden for Damages (extracted)**

If an earthquake of Seismic Intensity 4 or lower has occurred or a lightning strike has occurred due to a faulty lightning protection system or insufficient measures, the additional costs and damages incurred by the private operator shall be borne by the private operator.

In this case, compared with the preceding example of the Spopark Matsumori (health facility) project in Sendai City, not only are examples of force majeure listed but the predictability is also incorporated as the basis for determining whether an event should be treated as force majeure.

Furthermore, the public sector and private sector have been attempting to clarify the scope of force majeure using numerical objective criteria. One example is the stipulation that damages and additional costs shall be borne by the private operator in case of an earthquake of seismic intensity 4 or lower or a lightning strike due to a faulty lightning protection system that could have been foreseen by the private operator. Therefore, whether a seismic event is substantially determined as force majeure depends on its seismic intensity (an earthquake exceeding seismic intensity 4 being deemed as force majeure). During the bid invitation stage for the Sendai Astronomical Observatory Project, Sendai City indicated that seismometers would be installed on the first and top floors of the building to serve as earthquake observation points that would be used to determine whether an earthquake fell under the force majeure provisions (as seen in box 3.2). The public authority also gave clear demonstrations of the observation method.

Similarly, in the Shin Nomura School Meal Supply Center Development Project (hereafter, Sendai School Meal Supply Center Project), which was launched after the Sendai Astronomical Observatory Project, clarification on the definition of force majeure was also pursued. In addition, the scope covered under force majeure for earthquakes, storms, snowfall, and terrorist attacks was clearly defined in Attachment 13 of the project contract. Here, the risk shared between the public and private entities during force majeure was clarified by defining force majeure more clearly. In particular, for earthquakes and storms, not only were the numerical criteria clearly listed, but the surrounding conditions were also used to determine whether they should be treated as a force majeure. Moreover, facility damage due to defects in maintenance were clearly differentiated from force majeure, prompting the private operator to carry out maintenance of the facilities to ensure its safety (table 3.1).

**Table 3.1 Scope of Force Majeure, Sendai School Meal Supply Center Project**

Classification	Scope of acts of God
Earthquake	It shall be regarded as Force Majeure if the earthquake has a measured Seismic Intensity of 6.5 or higher, has a Japan Meteorological Agency Seismic Intensity scale of 7, has a surface horizontal acceleration of approximately 500 gal, occurs rarely, is bigger than the Great Hanshin-Awaji Earthquake, and has damaged more than half of the surrounding buildings that were built around the same time under similar conditions equally or more severely [than] the building of the project. <sup>a</sup>
Storm	It shall be regarded as Force Majeure if the wind pressure on each part of the building exceeds the reference wind speed of 30 meters per second (average wind speed in 10 minutes at 10 meters above the ground), which is defined in the Building Standard Law, and at the same time, more than half of the surrounding buildings that were built around the same time under similar conditions have been damaged equally or more severely [than] the building of the project. Although localized seismic singularity and phenomena such as downburst shall be regarded as Force Majeure, the private operators have to probe these phenomena to contracting authority.
Snowfall	For heavy snow, the private operator can estimate whether the amount of snow will eventually exceed the design load if it was left alone and can prevent damages resulting from heavy snow by removing the snow as needed or taking other measures. Therefore, it shall not be regarded as Force Majeure even if the amount of snow has exceeded the design load.
Act of terrorism	Organized, well-planned terrorist activities that cannot be prevented despite taking crime-prevention efforts that are generally considered reasonable shall be regarded as Force Majeure.

Source: Contract documents (only those that have been disclosed), Shin Nomura School Meal Supply Center Development Project, Sendai City.

a. "Seismic intensity" is measured on the Japan Meteorological Agency's seismic intensity scale. Seismic intensity is the value observed at a site where a seismic intensity meter is installed, and may vary within the same city. It is a scale of 1 to 7, with 5 and 6 each divided into "lower" and "upper."

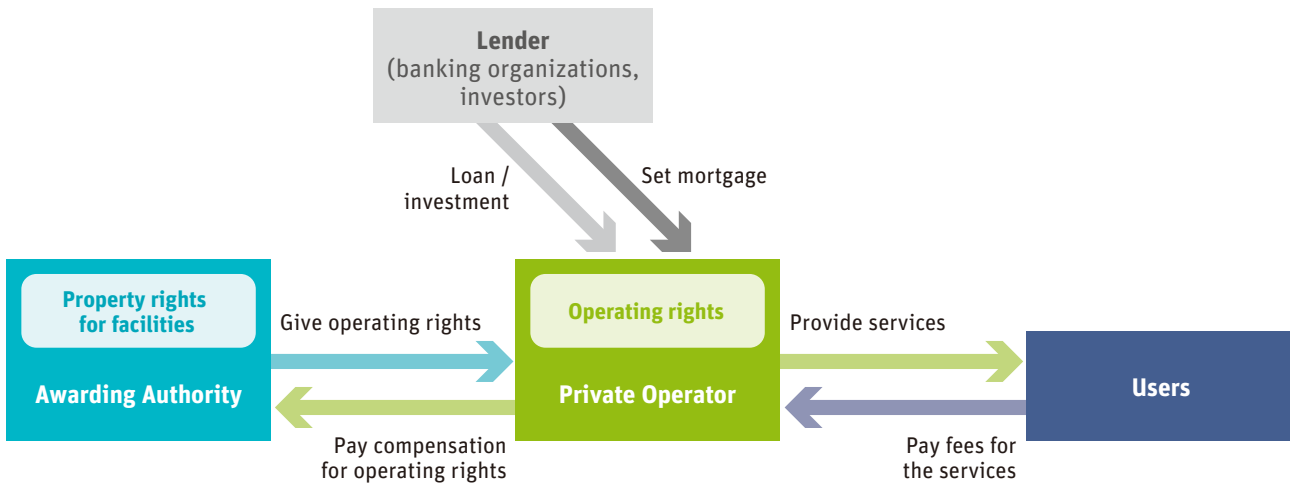
In the case examples of Sendai City, as seen above, the definition of force majeure is clarified based on the experiences of past disasters. For the Spopark Matsumori (health facility) PPP project, the scope of force majeure was not shown using objective criteria (such as numerical criteria); the article on force majeure in the contract simply listed examples of force majeure and stipulated that the entities (city and private operator) are not attributable. When the Miyagi Earthquake occurred in 2005, damage to the facilities was considered to be caused by defects that could have been attributed to the private operator. However, it was recognized that the criteria for judging a force majeure event were unclear. Having learned from this experience, the definition and risk sharing between the public and private entities have gradually been clarified for subsequent PPP projects of Sendai City.

In the case example of the Sendai Astronomical Observatory Project, the predictability factor was added to the definition and a numerical criterion (seismic intensity) added to determine whether damages from an earthquake should be borne by the private sector, thus clarifying the risk shared between the public and private entities. This allows business operators to consider and examine concrete risk reduction measures more easily when submitting a proposal for a project. For the School Meal Supply Center Project, the numerical criteria were clarified, particularly for earthquakes and storms, and the definition added a criterion that "more than half of the surrounding buildings that were built around the same time under similar conditions have been damaged equally or more severely compared to the building of the project." This clearly distinguishes the damages from force majeure from those attributed to the weakness of the facilities caused by defects in maintenance, thus incentivizing the private operator to ensure maintenance.

### Concession PPP Projects

In recent years, the concession scheme has gradually been introduced to airports in Japan. In the concession scheme, the right to operate public facilities such as water and sewerage systems, toll roads, and airports is purchased from the government by private operators, who operate and maintain the infrastructure with an income from user fees as their funds (figure 3.1).



**Figure 3.1** Structure of a PPP Concession Scheme in Japan

Source: "Concession Method," website of the PPP/PFI Promotion Office, Cabinet Office, Government of Japan, [http://www8.cao.go.jp/pfi/concession/pdf/con\\_houshiki.pdf](http://www8.cao.go.jp/pfi/concession/pdf/con_houshiki.pdf). Translation by PwC.

Note: PPP = public-private partnership.

In the concession scheme, in principle, private operators are to bear the risk of force majeure events. To make such a risky project bankable, private operators need to improve the predictability of cash flow; therefore, the definition of force majeure tends to be narrowed further.

The Sendai Airport Operation (hereafter, Sendai International Airport Project) was the first airport privatization project in Japan. A tsunami induced by the 2011 Great East Japan Earthquake inundated and damaged the electrical and mechanical equipment, ventilation system, and sanitation system in the terminal building as well as the airport rail line (Miyagi Prefecture 2012). Miyagi Prefecture expected that privatization of the airport operation would help quickly revitalize the local economy. The concession scheme was introduced in this project, which defined force majeure as shown in box 3.5.

### Box 3.5 Case: Definition of Force Majeure, Sendai International Airport Project

#### Attachment 1 of the Project Contract: List of Definitions

Force Majeure is a factor that affects the performance in this contract directly and adversely, and any of the phenomena listed below (limited to those that exceed the criteria that have been determined in advance based on the agreement between the contracting authority and the private operator with administration rights), which are not attributable to both the central government and the business operator with administration rights and can be foreseen by neither the central government nor the owner of the right, or from which, even if it was possible to foresee it, no reasonable means of preventing the occurrence of losses, damages, or failures due to the factor can be expected.

- (i) Extreme weather (including storm, lightning strike, torrential rain, strong wind, hurricane, typhoon, cyclone, abnormal heat wave, and abnormal cold wave, which are more extreme than those that usually or regularly occur in or around this airport)
- (ii) A natural disaster (including a flood, high tide, landslide, lightning strike, earthquake, fire, tsunami, and any other natural disaster that cannot be avoided and foreseen, which bring significant and inevitable damage to this airport)
- (iii) A civil war or act of hostility (including a riot, disturbance, uprising, act of terrorism, and act of war. The central government's use of this airport in such circumstance is included.)
- (iv) An epidemic (cases where quarantine is required forcibly by the law are included.)

**Photo 3.3.** Sendai International Airport Terminal Building



Source: Pixta.jp.

In the example of the Sendai International Airport Project, the criterion “even if it was possible to foresee it, no reasonable means of preventing the occurrence of losses, damages, or failures due to the factor can be expected,” has been added, which did not exist in earlier availability payment projects. In addition, force majeure is classified clearly into different types: extreme weather, natural disaster, civil war or act of hostility, and epidemic.

The earlier availability payment projects of Sendai City included storms, torrential rain, floods and other natural disasters as force majeure, but there was no differentiation between extreme weather and natural disasters. The case example of the Sendai International Airport Project also defines “epidemic,” which is an event specific to airports that should be taken into consideration. It further narrows the definition of a “natural disaster” by limiting it to those that “bring significant and inevitable harm to this airport.” Regarding the description of “extreme weather,” the provision on “more extreme than those that usually or regularly occur in or around this airport” offers a clearer definition of force majeure, prompting other PPP projects to take into account extreme weather that has been frequently seen in recent years.

Box 3.6 provides international examples of how force majeure is recommended to be defined.

## Box 3.6 Defining Force Majeure: International Examples

### Standardization of PF2 Contracts (United Kingdom)

In the United Kingdom, a guidance known as the *Standardisation of PF2 Contracts* was published in 2012 (HM Treasury 2012). In this standard contract, natural disasters are defined as “Relief Events,” which are distinguished from “Force Majeure Events.” Relief Events include direct phenomena, such as fire; explosions; lightning; storms; tempests; floods; bursting or overflowing of water tanks, apparatus, or pipes; ionizing radiation (to the extent it does not constitute a Force Majeure Event); earthquakes; and riot and civil commotion. It also includes some indirect phenomena, such as failure by any statutory undertaker, utility company, local authority, or other like body to carry out their works or provide services as well as accidental loss or damage and any failure or shortage of power, fuel, or transport.

This standard contract considers that Relief Events are likely either short-lived or lead to an alternative supply source; therefore, the contractor still can provide contracted services despite the occurrence of Relief Events. Meanwhile, Force Majeure Events are likely to have catastrophic effects in both public and private entities, and neither of the entities is likely to be in a better position to manage such risks. Such events are typically limited to wars, terrorism, and nuclear contamination.

### Legislative Guide on Privately Financed Infrastructure Projects (UNCITRAL)

The United Nations Commission on International Trade Law (UNCITRAL) published the *Legislative Guide on Privately Financed Infrastructure Projects* in 2001. This guide defines Force Majeure as risk that the project may be disrupted by unforeseen or extraordinary events outside the parties’ control. These include events such as natural disasters—floods, storms, or earthquakes—or the events that result from human action, such as war, riots, or terrorist attacks.

### Guidance on PPP Contractual Provisions (World Bank)

In 2017, the World Bank compiled the “Guidance on PPP Contractual Provisions.” In this report, sample drafting of a “Definition of Force Majeure Event” covers two types: “natural Force Majeure” (such as natural disasters and epidemics) and political Force Majeure” (such as general strikes, nationalization, and the refusal to grant licenses).

According to this report, force majeure refers to events that occur outside either entity’s control. Neither entity is better placed to manage the risk of such occurrences or their consequences, and therefore such risks will be shared.

Examples of force majeure events are listed as follows (World Bank 2017):

- (a) plague, epidemic and natural disaster, such as but not limited to, storm, cyclone, typhoon, hurricane, tornado, blizzard, earthquake, volcanic activity, landslide, tsunami, flood, lightning, drought;
- (b) fire, explosion, or nuclear, biological or chemical contamination (other than a fire, explosion, or chemical contamination caused by the negligence of the Private Partner, its contractors, or any subcontractor, supplier or vendor);
- (c) war (whether declared or not), armed conflict (including but not limited to hostile attack, blockade, military embargo), hostilities, invasion, act of a foreign enemy, act of terrorism, sabotage or piracy [in each case occurring outside the Country];
- (d) civil war, riot rebellion and revolution, military or usurped power, insurrection, civil commotion or disorder, mob violence, act of civil disobedience (in each case occurring outside the Country);
- (e) radioactive contamination or ionizing radiation [occurring outside the Country]; or
- (f) general labor disturbance such as boycotts, strikes and lock-out, go-slow, occupation of factories and premises, excluding similar events which are unique to the PPP Project and specific to the Private Partner or to its sub-contractors [and occurring outside the Country].

Sources: HM Treasury 2012; UNCITRAL 2001; World Bank 2017.

## 3.2 Risk Allocation: Contractual Concepts and Effects

Risks in PPP projects are to be assumed by the entity that can control the risks in the most efficient and effective manner. However, it is not reasonable to assume that either of the parties to a contract should bear the risks arising from force majeure, which are not attributable to either entity, although who should bear the risks remains an issue.

On the other hand, it is difficult to anticipate all possible events that may occur during a long-term PPP project and decide how the risks should be shared in advance for all cases. Measures to take for each individual project are, in principle, decided through discussions between the public and private sectors.

This section looks at contractual provisions, including how natural disaster risks are shared between the public and private sectors and which events and matters are anticipated as possible causes for terminating the contract. Furthermore, the issues are summarized by extracting concepts and backgrounds of the provisions from case examples, standard contracts, and other sources found in leading countries that have implemented PPP projects.

### Contractual Provisions

Project contracts contain provisions set for cases in which additional costs are required or services cannot be provided because of the occurrence of force majeure. More specifically, provisions are set for procedures, handling of liabilities, division of responsibility for damage, and changes in contractual conditions for the design and construction and operation and maintenance (O&M) phases.

Major items specified in contractual provisions are as follows:

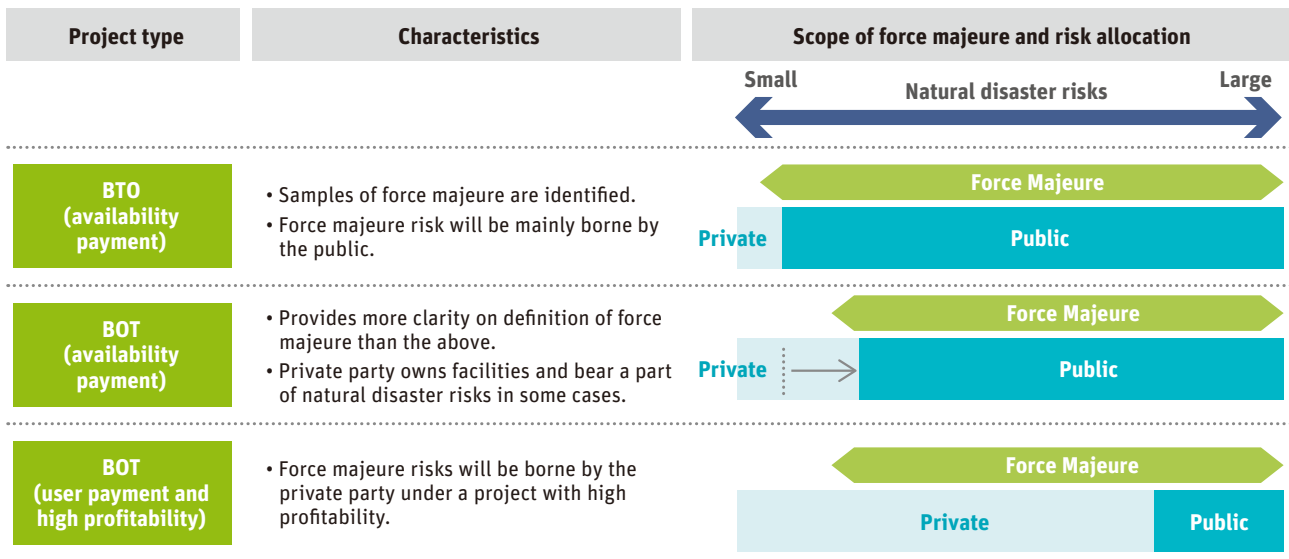
- Details of damages and additional costs to be covered, as well as risk allocation between the public and private sectors
- Changes in obligation to provide services
- Changes in date scheduled for delivery of facilities
- Changes in the operating period
- Handling of insurance

### Risk Sharing between the Public and Private Entities

The scope of force majeure, as well as natural disaster risks to be contractually shared between the public and private entities, are dependent on the ownership of facilities, profitability, and other characteristics.

Under the traditional public procurement in Japan, the costs of force majeure risks are 99 percent borne by the public sector. Examples of force majeure events are defined in the contract, but most natural disaster damages are interpreted as force majeure in reality. Japan's PPP projects of the first generation, mainly build-transfer-operate (BTO) projects with availability payment, adopted the same risk sharing as in the traditional procurement. On the other hand, Sendai City PPPs, as described in the previous section, were mostly build-operate-transfer (BOT) projects that transferred ownership of the assets to the private sector and elaborated upon the definition of force majeure to share risks with the private sector, if the private sector can bear these risks. In addition, profitable build-operate-transfer (BOT) projects allocate force majeure risks mainly to the private sector (figure 3.2).

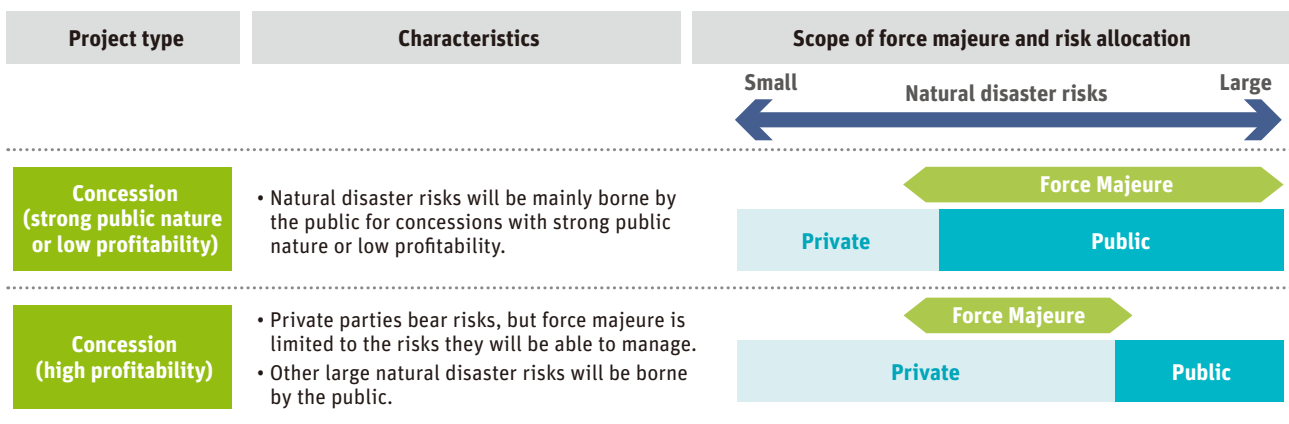
**Figure 3.2** Transfer of Natural Disaster Risks in BTO and BOT Projects, by Project Characteristics



Note: BOT = build-operate-transfer. BTO = build-transfer-operate.

Among the still-limited number of concession projects, risk sharing varies between road projects (with low profitability and high public nature) and airport projects (with high profitability), as shown in figure 3.3.

**Figure 3.3** Transfer of Natural Disaster Risks in Concession Projects, by Project Characteristics



### Damages and Additional Costs

Risks are shared between the public and private entities for damages and additional costs resulting from force majeure. Compensation for lost earnings may become a point for discussion if the private sector’s profit-making business is included. However, the risk of lost earnings is not shared, and private businesses bear such risk in most cases.

For damages or additional costs incurred by private businesses resulting from force majeure, risks are shared between the public and private entities as defined below for availability payment and concession projects.

### Availability Payment Projects

As described earlier, many Japanese cases, especially availability payment PPP projects, require the public sector to bear the primary responsibility for risks resulting from force majeure and the private sector to bear the secondary

responsibility in accordance with standard stipulations for public works. Because economic incentives are limited for private businesses to minimize damage resulting from force majeure, contracts generally specify obligations for minimizing the damage so that moral hazard can be avoided. Although a cap is typically set on risk bearing for a private operator (equivalent to the small percentage of the annual payment amount), a project with a small annual payment may force the private sector to bear a greater share of the increasing cost than a standard contractual definition, thereby serving as an appropriate incentive (table 3.2).

Furthermore, as in the case of Sendai City, some BOT projects provide private sectors with proprietary rights for facilities to increase their ownership awareness during the project period. Risks for certain disasters (for example, earthquakes of seismic intensity 4 or below) are assigned to private operators clearly to urge them to take appropriate disaster risk management (DRM) measures.

**Table 3.2 Risk Sharing Policy, by Project Phase, Sendai Health Facility Project**

Category	Risk sharing policy
Construction phase	<ul style="list-style-type: none"> <li>• Up to 1 percent of the initial capital investment costs shall be borne by the private operator, and the remaining amount shall be borne by the city.</li> <li>• However, if the amount covered by the insurance policy that had to be obtained under the project contract exceeds 1 percent of the initial investment costs, the excess shall be deducted from the amount of costs borne by the city.</li> </ul>
O&M phase	<ul style="list-style-type: none"> <li>• Up to 1 percent of the amount equivalent to the annual O&amp;M costs shall be borne by the private operator, and the remaining amount shall be borne by the city.</li> <li>• However, if the amount covered by the insurance policy that had to be obtained under the project contract exceeds 1 percent of the amount equivalent to the annual O&amp;M costs, the excess shall be deducted from the amount of costs borne by the city.</li> </ul>

Source: Contract documents, Spopark Matsumori Health Facility Project, Sendai City.

Note: O&M = operation and maintenance.

### User Payment Projects

Some user payment PPP projects, as well as the accompanying projects including profit-making facilities, require private operators to bear the risks resulting from force majeure. For instance, all risks resulting from force majeure are borne by the private operator in the Haneda International Airport Terminal Building Project because it is a user payment project and high profit is expected.

### Concession Projects

Some concession projects define the risks shared between the public and private entities in accordance with the nature of the facility—whether it is basic infrastructure or a private profit-making facility. For instance, the Sendai International Airport concession project defines three types of risks to be shared depending on the situation (including national government intervention for continuing services) so that the runway and other airport facilities needed for aircrafts to take off and land can be operated on the occurrence of force majeure (box 3.7). On the other hand, the Sendai International Airport Terminal Building Project, which generates income, requires the concessionaire to bear all costs for disasters resulting from force majeure regardless of the situation and to continue services on its own responsibility because the government does not provide any business continuity measures.

**Box 3.7 Case: Risk Sharing, Sendai International Airport Project**

**Runways**

Three types of policies cover different situations for risk sharing between the public and private sectors when force majeure occurs. Additional costs for disasters resulting from force majeure are borne by the concessionaire; however, if the damage is massive and if government interventions are implemented two-thirds of the additional costs for recovering the facilities commissioned to the operator will be borne by the government and one-third by Miyagi Prefecture based on the Airport Act. Furthermore, if an event makes it impossible for the operator to run the airport, emergency measures will be implemented so that the government can operate the services until the situation improves. Thus, the public sector will bear more risks if “government interventions”—which has a stricter definition than force majeure—are implemented, or if critical emergencies have occurred from.

**Table B3.7.1 Risk Sharing Policies, by Circumstance, Sendai International Airport Project**

Status	Definition	Risk sharing policy
Occurrence of force majeure	<p>Force Majeure is a factor that affects the performance in this contract directly and adversely, and any of the phenomena listed below (limited to those that exceed the criteria that have been determined in advance based on the agreement between the contracting authority and the private operator with administration rights), which are not attributable to both the government and the concessionaire and can be foreseen by neither the central government nor the owner of the right, or from which, even if it was possible to foresee it, no reasonable means of preventing the occurrence of losses, damages, or failures due to the factor can be expected.</p> <ul style="list-style-type: none"> <li>(i) Extreme weather (including storm, lightning strike, torrential rain, strong wind, hurricane, typhoon, cyclone, abnormal heat wave, and abnormal cold wave, which are more extreme than those that usually or regularly occur in or around this airport)</li> <li>(ii) A natural disaster (including a flood, high tide, landslide, lightning strike, earthquake, fire, tsunami, and any other natural disaster that cannot be avoided and foreseen, which bring significant and inevitable damage to this airport)</li> <li>(iii) A civil war or act of hostility (including a riot, disturbance, uprising, act of terrorism, and act of war. The central government’s use of this airport in such circumstance is included.)</li> <li>(iv) An epidemic (cases where quarantine is required forcibly by the law are included.)</li> </ul>	Additional costs shall be borne by the concessionaire.
Circumstances in which “government interventions” are implemented	The government implements measures to continue services <i>in the event that all or most of the additional costs required for restoring the facilities damaged by force majeure are not covered by insurance.</i>	The government shall take “government interventions” to restore facilities commissioned to the operator by bearing the required costs based on the Airport Act so that the operator can continue its services. The operator shall take necessary measures so that the government can receive the benefits covered by the operator’s insurance.
Critical emergency situations	<p>The following events or equivalent situations are considered emergency situations:</p> <ul style="list-style-type: none"> <li>• Any situation that may significantly prevent the concessionaire from conducting operation safely</li> <li>• Any event that may jeopardize the national security or the safety of the airport</li> <li>• Any event that may cause damage to human bodies, lives, and properties within the airport</li> </ul>	<ul style="list-style-type: none"> <li>• If any emergency situation is recognized, the government can decide whether to order the suspension of the operating right for the period and scope necessary.</li> <li>• In this case, the government can operate the suspended airport services.</li> <li>• If the operating right is suspended, the government shall be responsible for compensating the operator for losses that would normally occur.</li> </ul>

**Terminal Building Services**

Private businesses shall bear all costs for disasters resulting from force majeure.

Source: Contract documents, Sendai International Airport Project.

Depending on the scale of the project, the costs borne by private operators are limited to those that could have been avoided. Moreover, the government can step in, if necessary, in case of emergencies. For instance, in the Kansai International Airport concession project—a large-scale project in which the concession right of the airport was priced at approximately ¥2.2 trillion—the amount to be borne by the operator in the event of force majeure was highly debated (photo 3.4). After a series of discussions between the public and private entities, it was decided that in principle, New Kansai International Airport Company (the contracting agency) would have no obligation to pay for services performed by the operator. However, the company is required to bear risks if the physical damage to airport facilities resulting from force majeure exceeds the amount covered by the operator’s insurance (table 3.3). Insurance advisers were hired to examine the possibility of insurance coverage in advance and show numerical estimates indicating the extent of risks (maximum costs) that the private sector should bear according to the insurance market.

**Photo 3.4** Kansai International Airport



Source: Kansai International Airport. ©Kansai International Airport. Reproduced, with permission, from Kansai International Airport; further permission required for reuse.



**Table 3.3 Risk Allocation Policies, by Circumstance, Kansai International Airport Project**

Status	Definition	Risk allocation policy
Occurrence of force majeure	Definition of force majeure is limited as below: <ul style="list-style-type: none"> <li>• Extreme weather</li> <li>• Natural disaster</li> <li>• Civil conflict or hostile action</li> <li>• Epidemic</li> <li>• Radioactive contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Additional costs shall be borne by the concessionaire.</li> <li>• If the costs required to recover the airport facilities exceed ¥10 billion and it is estimated that it will take a year or more to recover major functions of the airport and if the operator takes responsibility for restoring the facilities, the portion that exceeds ¥10 billion shall be compensated by New Kansai International Airport Company. On the other hand, if the Company takes responsibility for recovery, an insurance company shall directly pay the benefits covered by the operator's insurance to the Company.</li> </ul>
Emergency situations	The following events or equivalent situations are considered emergency situations: <ul style="list-style-type: none"> <li>• Any situation that may significantly prevent the concessionaire from conducting operation safely</li> <li>• Any event that may jeopardize national security or the safety of the airport</li> <li>• Any event that may cause damage to human bodies, lives, and properties within the airport</li> </ul>	<ul style="list-style-type: none"> <li>• The Company can decide whether to order the suspension of the operating right for the period and scope necessary.</li> <li>• The Company can operate the obligatory services based on the suspended operating right. The Company can also ask the operator to cooperate with the Company to provide the obligatory services.</li> <li>• If the operating right is suspended due to emergencies, additional costs or damages incurred by the operator shall be compensated by the Company.</li> </ul>

Source: Summary of contract documents, Kansai International Airport Project.

In the case of Aichi Toll Road Concession Project, standards for disaster recovery projects in public works are referenced to determine how additional costs resulting from natural disasters that fall under force majeure should be allocated between the public and private entities. More precisely, additional costs resulting from natural disasters that fall under force majeure will be borne by the public sector if (a) the disaster recovery project is in accordance with the National Government Defrayment Act for Reconstruction of Disaster Stricken Public Facilities, and (b) the public sector agrees that there were no reasonable measures that the concessionaire could have taken to prevent the additional costs from being incurred because the event was unforeseeable. Specific standards for each disaster type are indicated in an assessment policy for the reconstruction of disaster stricken public facilities. In particular, risks shared between the public and private entities are clarified by incorporating numerical standards for heavy rain and storm (table 3.4). As for the accompanying sub-project components, the concessionaire bears the risks to raise the operator's awareness of the need for disaster risk control.

**Table 3.4 Risk Sharing Policy, by Circumstance, Aichi Toll Road Project**

Status	Definition	Risk sharing policy										
Main project	<p>Force Majeure includes a storm, torrential rain, flood, high tide, landslide, fall of ground, strike of lightning, earthquake, fire, other natural disaster, or uprising, riot, disturbance, act of war, epidemic, or other human-made disaster, of which the cause is not attributable to neither the government nor the concessionaire.</p> <table border="1" data-bbox="384 526 933 1243"> <thead> <tr> <th data-bbox="384 526 547 607">Type of disaster</th> <th data-bbox="547 526 933 607">Events for which additional costs are borne by the public sector</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 607 547 674">Earthquake</td> <td data-bbox="547 607 933 674"> <ul style="list-style-type: none"> <li>• Damage based on normal social conventions</li> </ul> </td> </tr> <tr> <td data-bbox="384 674 547 1010">Heavy rain</td> <td data-bbox="547 674 933 1010"> <ul style="list-style-type: none"> <li>• Maximum rainfall of 80 millimeters or more in 24 hours</li> <li>• Even if the rainfall is below the above standard, it is considered heavy rain if the hourly rainfall is significant (20 millimeters or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.</li> </ul> </td> </tr> <tr> <td data-bbox="384 1010 547 1111">Storm</td> <td data-bbox="547 1010 933 1111"> <ul style="list-style-type: none"> <li>• Maximum wind speed of 15 meters per second or more (average in 10 minutes)</li> </ul> </td> </tr> <tr> <td data-bbox="384 1111 547 1243">High tide, storm surge, tsunami</td> <td data-bbox="547 1111 933 1243"> <ul style="list-style-type: none"> <li>• Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively nonminor damage</li> </ul> </td> </tr> </tbody> </table>	Type of disaster	Events for which additional costs are borne by the public sector	Earthquake	<ul style="list-style-type: none"> <li>• Damage based on normal social conventions</li> </ul>	Heavy rain	<ul style="list-style-type: none"> <li>• Maximum rainfall of 80 millimeters or more in 24 hours</li> <li>• Even if the rainfall is below the above standard, it is considered heavy rain if the hourly rainfall is significant (20 millimeters or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.</li> </ul>	Storm	<ul style="list-style-type: none"> <li>• Maximum wind speed of 15 meters per second or more (average in 10 minutes)</li> </ul>	High tide, storm surge, tsunami	<ul style="list-style-type: none"> <li>• Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively nonminor damage</li> </ul>	<p>The public sector shall bear the cost if the concessionaire cannot foresee or cannot be reasonably expected to establish measures to prevent additional costs. Definitions of disasters caused by heavy rain, storm, high tide, storm surge, and tsunami are shown in the summary on the left. Numerical standards are set for heavy rain and storm as a specific indicator of the scope of disaster.</p>
Type of disaster	Events for which additional costs are borne by the public sector											
Earthquake	<ul style="list-style-type: none"> <li>• Damage based on normal social conventions</li> </ul>											
Heavy rain	<ul style="list-style-type: none"> <li>• Maximum rainfall of 80 millimeters or more in 24 hours</li> <li>• Even if the rainfall is below the above standard, it is considered heavy rain if the hourly rainfall is significant (20 millimeters or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.</li> </ul>											
Storm	<ul style="list-style-type: none"> <li>• Maximum wind speed of 15 meters per second or more (average in 10 minutes)</li> </ul>											
High tide, storm surge, tsunami	<ul style="list-style-type: none"> <li>• Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively nonminor damage</li> </ul>											
Sub-projects	<p>The operator shall bear all additional costs resulting from force majeure in the accompanying projects (parking areas and the like) and optional projects implemented along roads.</p>	<p>The public sector may bear the additional or revised costs resulting from force majeure if the costs are not covered by “reasonable” insurance as requested by the public sector from the operator or exceed the limit covered by the insurance.</p>										

Source: Contract documents, Aichi Toll Road Project.

### Lost Earnings

Risks related to profitability are borne by the private sector in concession and user payment projects, and discussions should focus on whether lost earnings should be compensated after the occurrence of force majeure. In the case of the Sendai Health Facility Project, lost earnings were addressed as follows: “Lost earnings resulting from force majeure will not be compensated for private profit-making facilities.”

### 3.3 Disaster Response in Contracts

Given that PPP projects tend to require long-term contracts, large-scale natural disasters that were unforeseeable at the time the contract was concluded may possibly occur during the contract period especially in the contexts of climate change and variability. Most contracts include a clause that requires discussion between the public and private entities if any adjustment is required. However, none of the contracts examined for this case study included any particular description of measures to be taken if natural disaster risks increased during the contract period. The following sections provide examples of how disaster response is contractually handled in infrastructure PPPs.

#### Grace Period for Performance of Services

When the performance of services becomes difficult because of force majeure, many projects have established rules for private entities to notify public authorities immediately in writing, detailing what services can no longer be performed and the reasons thereof. For the duration of such a period, private entities are exempt from contractual obligations. Detailed criteria for making decisions, however, are not indicated in cases where the performance of services becomes difficult, so decisions are made individually. Contract provisions tend to stipulate that the necessary scope and length of any grace period should be discussed by both public and private entities.

The Sendai International Airport project provides a specific example in which the length of a grace period (the number of days required for recovery) was estimated based on past disasters. At the airport, an area that had been affected in 2011 by the Great East Japan Earthquake, debris brought on by the tsunami piled up on the runways, and drainage canals were damaged when the area was hit by the earthquake; However, the runways were not destroyed and could still be used without conducting any recovery work.

Therefore, the time and costs required for the removal of debris and other works were used as the criteria for estimating the time required for recovery, which was then set as the period in which the Sendai International Airport concession project was exempted from performing its obligations after the earthquake (box 3.8). An appropriate grace period can be set out based on the lessons learned from past disaster experience depending on the nature of the infrastructure.

#### **Box 3.8** Contractual Provisions for Grace Periods or Performance Exemptions in Sample Japanese PPP Projects

##### Case: Sendai Health Facility Project

If it becomes difficult for the private operator to carry out the construction or the O&M of facilities due to the risks caused by Force Majeure or if additional costs are incurred, the private operator is required to notify Sendai City. After this notification, if it becomes impossible to carry out the project due to Force Majeure, the private operator is exempt from its obligation to perform services.

##### Case: Sendai International Airport Project

If additional costs or losses are incurred for this project due to Force Majeure, and all or part of the project ceases, regardless of whether the government has implemented interventions, the concessionaire may request deliberations from the government regarding the following two points:

- Extension of agreement through deliberations in cases where the government acknowledges the necessity of collecting losses or increased costs incurred by the concessionaire due to Force Majeure

- Exemption of the concessionaire or building and facility operators from performing contractual obligations that cannot be performed due to impediments caused by Force Majeure until the impediments are removed, or the contract is cancelled

If Force Majeure continues for more than three months, the concessionaire may request deliberations from the government for the revision of the contract. If the government acknowledges the occurrence of significant changes in the environment due to impediments caused by Force Majeure, the government and the concessionaire may revise the contract to the extent necessary upon deliberation.

### **Case: Kansai International Airport Project**

The concessionaire may be exempt from contractual obligations that have become difficult to perform due to Force Majeure, to the extent and period necessary.

### **Case: Aichi Toll Road Project**

If it becomes difficult to perform all or part of the O&M services due to the occurrence of Force Majeure or when costs increase due to Force Majeure, the concessionaire should notify the public corporation in writing. With this notice, if the private operator cannot perform its obligations for the project, for which it has been granted the administration right, due to Force Majeure, the private operator is exempt from performing the said obligations.

*Sources:* Contract documents for Sendai Spopark Matsumori Health Facility Project, Sendai International Airport Project, Kansai International Airport Project, and Aichi Toll Road Project.

## **Compensation for Services during the Exemption Period**

If private businesses are exempt from providing services because of force majeure, compensation for services is paid based on the following examples from other countries (Allen & Overy 2013):

1. The public sector does not pay any compensation for services that were initially agreed, including facility construction costs and O&M costs, to the private sector (example: Bulgaria).
2. The public sector pays compensation for services to the private sector in accordance with the original payment schedule (example: Czech Republic).
3. The public sector pays the revised compensation for services to the private sector (debt services are paid, but the reduced part of O&M costs is not paid) (example: the Netherlands).

Force majeure is not attributable to the private sector. Additionally, when the private sector is exempt from the performance of obligations, the case does not fall under the nonperformance of services. Therefore, compensation for services should not be reduced, as seen in example 1 above. On the other hand, in example 2, the public sector pays for services that it did not receive.

Most of the availability payment projects in Japan fall under example 2 (box 3.9). In the event of disasters that were considered as force majeure, compensation for services was paid as long as business operators were not at fault. However, when there is no clear provision regarding force majeure, the decision on whether the case falls under force majeure is generally left for the public and private entities to determine, which takes time in many cases.

### **Box 3.9** Case: Compensation for Services during Exemption Period on an Availability Payment Project, Sendai Health Facility Project

Even when all or part of the services cannot be performed due to Force Majeure, compensation for services is to be continuously paid as usual on the condition that the business operator should attempt to remove the influence of Force Majeure with maximum effort.

While the project contract and the service level requirements stipulate policies on emergency responses to be taken by private businesses when disasters occur, detailed and specific response methods are not provided.

*Source:* Contract documents, Sendai Spopark Matsumori Health Facility Project.

## Changes in Contract Terms

With the occurrence of force majeure, terms of payment that were initially agreed upon may be changed in accordance with the specific circumstances of each project (box 3.10). Risk sharing between the public and private entities for these items also needs to be provided in the project contract. For example, when force majeure causes a delay in the completion of a facility that makes it difficult for private operators to meet the date of delivery, an arrangement is usually made to extend the date and to avoid incurring late charges.

In some cases, the O&M phase of projects and the payment due date for compensation for services (business rights) are also extended to ensure that the revenue that was initially projected is achieved and to explore possibilities of a rate revision to cover increased costs.

### **Box 3.10** Contractual Provisions for Changes of Payment Terms under Force Majeure

#### Case: Kansai International Airport Project

**Extension of the due date for payment:** As a measure for situations in which performing services becomes difficult due to Force Majeure, when it has been determined there is reasonable need to extend the payment due date for administration rights and change the payment schedule, the said changes shall be implemented.

#### Case: Aichi Toll Road Project

**Possibility of rate change:** The public corporation and the concessionaire must confer on the payment policy for increased costs incurred due to Force Majeure. If an agreement is not reached within 60 days, the public corporation will notify the concessionaire of its policies on actions to be taken. In this case, the public corporation shall provide policies on sharing the increased costs with the concessionaire within the scope of the aforementioned policies on sharing risks for Force Majeure.

An extension of the project term and a rate increase on the grounds of Force Majeure are not to be conducted in principle; however, these can be performed when the public corporation gives approval. If the concessionaire requests a change in the original proposal in order to mitigate the influence of Force Majeure, the public corporation shall sincerely consider what actions to take.

*Sources:* Contract documents for Kansai International Airport Project and Aichi Toll Road Project.

Photo 3.5 Aichi Toll Road



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## Circumstances Leading to Contract Cancellation

After the occurrence of force majeure, the performance of services may be stopped permanently, or the continuing the project may lack economic rationality because of excessive costs. In such cases, the project contract may be canceled in part or in its entirety according to provisions (table 3.5). In addition to cases where a request for cancellation can be submitted by the public sector, there are some cases where either side can submit a request for cancellation.

Regarding the amount to be paid to private operators upon the cancellation of a contract, the public sector shall pay the amount equivalent to purchasing the facility and other rational costs according to provisions.

**Table 3.5 Contract Cancellation Reasons and Effects, Sample Japanese PPP Projects**

Project	Reasons for cancellation or termination	Effects of cancellation or termination	Remarks
Sendai Health Facility Project	<ul style="list-style-type: none"> <li>When Sendai City concludes that due to an occurrence of Force Majeure, the continuation of the project is difficult, or additional costs to be paid by the City are considerable, the City may cancel (terminate) the contract after conferring with the private operator.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to the commencement of the facility operations, the City may receive the completed part of the facilities by paying the amount of the initial investment costs multiplied by the percentage of work completed at the facilities, etc. When the private operator receives an indemnity from insurance due to the termination of the contract caused by Force Majeure, the amount equivalent to the insurance payment, etc., is deducted from the purchase price.</li> <li>When operations have already commenced, the City purchases facilities for the amount calculated by deducting the total amount of all insurance, and the bond or indemnity received by the private operator or its member companies due to the occurrence of the said Force Majeure from the unpaid amount of the initial investment costs. The City pays the said amount and the financial charges incurred to a reasonable extent due to the termination of this contract to the private operator. The City also pays unpaid compensation for services relating to the operations of facilities up to the termination date of the contract to the private operator after reducing the necessary amount.<sup>a</sup></li> </ul>	—
Sendai Astronomical Observatory Project	<ul style="list-style-type: none"> <li>When an agreement is not reached on the changes in this project contract and on the payment of increased costs within 60 days from the date that Force Majeure occurs, Sendai City may cancel the entirety of the project contract after notifying the business operator.</li> <li>When facilities are damaged or destroyed due to Force Majeure, Sendai City may cancel the contract without requesting repairs or renovation from the private operator after conferring with the private operator.</li> </ul>	<ul style="list-style-type: none"> <li>Sendai City acquires the right of ownership upon the delivery of facilities (the completed portion if the construction is incomplete) from the business operator and takes over the remaining portion of the facility construction costs among the service purchase costs.</li> <li>The City pays the amount calculated by deducting the insurance amount received by the private operator from the remaining amount of facility construction costs among service purchase costs. Charges incurred in relation to the procedures for terminating the business relationship and profit or loss from valuation, etc., following the adjustment made by the private operator are in principle paid by the private operator.</li> </ul>	—
Sendai School Meal Supply Center Project	<ul style="list-style-type: none"> <li>When an agreement is not reached on changes in this project contract and on the payment of increased costs within 60 days from the date that Force Majeure occurs, Sendai City may cancel the entire project contract after notifying the private operator.</li> </ul>	<ul style="list-style-type: none"> <li>Sendai City acquires the right of ownership upon the delivery of facilities (the completed portion if the construction is incomplete) from the private operator and takes over the balance portion of the facility construction costs among service purchase costs. If the private operator has already started maintenance and operation services, Sendai City pays the costs required to terminate the maintenance and operation services to the private operator. The payment method is determined through deliberations between the City and the private operator.</li> </ul>	—

Project	Reasons for cancellation or termination	Effects of cancellation or termination	Remarks
Sendai International Airport Project	<ul style="list-style-type: none"> <li>When the airport is destroyed due to Force Majeure, the implementation agreement terminates as a matter of course.</li> <li>When the government implements interventions due to Force Majeure, but the recovery schedule for this project cannot be established, or the resumption of this project based on a recovery schedule turns out to be unfeasible or extremely difficult, the government terminates the agreement.</li> </ul>	<ul style="list-style-type: none"> <li>When facilities are destroyed due to Force Majeure, the administration right terminates as a matter of course. The government pays the concessionaire the amount corresponding to the remaining period of duration out of the value of the concession right paid by the concessionaire.</li> <li>When the implementation agreement is cancelled due to Force Majeure, following the decision made by the government, the concessionaire is to relinquish the concession rights or gratuitously convey the concession rights to a third party appointed by the government. Losses incurred by the government and the concessionaire due to the said Force Majeure are absorbed by each entity, and no compensation for damage is paid to either entity.</li> </ul>	The implementation agreement can be cancelled by the government only. (There is no statement that mentions that the concessionaire can request the cancellation of the agreement.)
Kansai International Airport Project	<ul style="list-style-type: none"> <li>When the execution of this project becomes difficult due to Force Majeure, and the recovery of facilities and the performance of contractual obligations cannot be completed within a year from the occurrence of Force Majeure, the agreement can be cancelled.</li> </ul>	<ul style="list-style-type: none"> <li>When the agreement is terminated due to Force Majeure, following the decision made by New Kansai International Airport Company, Ltd., the concessionaire relinquishes the concession rights or gratuitously conveys the concession rights to a third party appointed by New Kansai International Airport Company, Ltd. New Kansai International Airport Company, Ltd. returns the unreturned portion of the performance bond as on date of the cancellation to the concessionaire.</li> <li>In this case, New Kansai International Airport Company, Ltd. and the concessionaire absorb the losses that they themselves incurred due to the cancellation or termination of the implementation agreement. However, if they are unable to restore the facilities within a year from the occurrence of Force Majeure due to gross negligence or the intent of the concessionaire, the prescribed forfeit is paid to New Kansai International Airport Company, Ltd.</li> </ul>	Cancellation of the agreement can be requested from both sides.
Aichi Toll Road Project	<ul style="list-style-type: none"> <li>When the public corporation or the concessionaire conclude the continuation of the project is difficult or requires enormous costs due to the occurrence of Force Majeure, the project agreement can be terminated upon deliberation between the two entities.</li> </ul>	<ul style="list-style-type: none"> <li>When the contract is cancelled, the public corporation is to cancel the concession rights granted for the facilities (toll roads).</li> <li>The concessionaire must deliver the facilities to the public corporation in conformance with the service level requirements. When the facilities do not conform to the service level requirements during the O&amp;M phase and the lack of conformance is the fault of the concessionaire, the concessionaire is required to pay the costs of repairs, etc.</li> <li>The concessionaire is required to pay a forfeit to the public corporation amounting to 10 percent of the annual payment for the concession rights of each facility regardless of the time of cancellation. The concessionaire is also required to pay the public corporation 10 percent of the renovation service costs for the facilities to be renovated.</li> </ul>	Cancellation can be requested from both sides.

Source: Contract documents of each project.

Note: — = not available. O&M = operation and maintenance. PPP = public-private partnership.

a. "Reasonable Financial Charges" of this project were not defined in detail. "Reasonable Financial Charges" include break funding costs in some other PPP projects in Japan.



### Box 3.11 Contractual Effects of Force Majeure: International Examples

#### Standardization of PF2 Contracts (United Kingdom)

In the *Standardization of PF2 Contracts* (HM Treasury 2012), the financial effects of delays caused by Relief Events (defined in box 3.6) are borne by private contractors, and the public authority will not pay any compensation on the occurrence of such delays. Therefore, although a contractor needs to cease the operation when disasters occur, the public authority does not offer the private contractor any contract extensions. This is because such compensation will reduce the incentives for a contractor to manage effects caused by natural disasters, which might result in restoring services very slowly. For instance, if an extension were given, then although a contractor does not receive the unitary charge during a Relief Event, its revenue period would remain intact. Moreover, the public authority would be taking on more risks of the occurrence of Relief Events.

However, according to the same standard contract, “if a Relief Event occurs prior to Service Commencement any long-stop termination date will be put back by a period equal to the relevant delay. Liquidated damages prior to Service Commencement are designed to compensate the Authority for specific losses due to late Service delivery so that if the Contractor fails to commence provision of the Service due to a Relief Event, the Authority will still suffer this loss.” Additionally, since the public authority will not compensate any loss resulting from natural disasters, a contractor is expected to have loss-of-profit or business interruption insurance to compensate for any such loss.

Regarding termination of contracts, it is stressed that in most cases termination should not follow a Relief Event although a contractor may fail to deliver contracted services due to a Relief Event. In the past, discussion centered on the notion that a termination right should exist for instances where Relief Events were prolonged. However, there may be no incentive for a contractor to control Relief Events, and the effects of Relief Events may be short and can be coped with by alternative sourcing of the supply concerned by a contractor; therefore, termination is the last resort.

In sum, the standard private finance initiative (PFI) contract in the United Kingdom specifies that a private contractor takes on most natural disaster risks, but this is to incentivize private contractors to handle such risks better. Moreover, a mature insurance market exists to mitigate such risks for private contractors. In addition, a policy of no termination by the authority can be a guarantee for private operators that find themselves in a breach of contract due to natural disasters. In the United Kingdom, natural disasters are considered preventable and relatively easy to recover from, but there is a different view in Japan toward natural disasters, which explains the different ideas on disaster risk allocation that have arisen in two countries.

#### Legislative Guide on Privately Financed Infrastructure Projects (UNCITRAL)

The *Legislative Guide on Privately Financed Infrastructure Projects* (UNCITRAL 2001) notes that there is often no single solution to cover the entire category of risks, and special arrangements are often made to deal with each of them. For example, the entities may agree to make contractual arrangements providing solutions for some of their adverse consequences, such as contract extensions to compensate for delay resulting from events or even some form of direct payment under special circumstances. If the public authority wishes to extend a greater degree of protection to the lenders, the guarantees may cover the project company’s permanent failure to repay its loans. In such a case, however, it is advisable not to remove the incentives for the lenders to arrange for the continuation of the project. Therefore, in any event, full loan guarantees by the public authority amounting to a total protection of the lenders against the risk of default by the project company are not a common feature of infrastructure projects carried out under the project finance modality.

Furthermore, the Guide notes that certain natural disasters such as storms, cyclones, and floods may be normal conditions at a particular time of the year at the project site. As such, any public service provider would expect to assume that those natural disasters are likely to happen. However, the situation might differ depending on whether the facilities are permanently owned by the contracting authority or whether there is a requirement to transfer them to the contracting authority at the end of the project period. In the latter case, the contracting authority is authorized to make arrangements to assist the concessionaire to repair or rebuild infrastructure facilities damaged by natural disasters or similar occurrences defined in the project agreement, provided that the possibility of such assistance was contemplated in the request for proposals. In some countries, the contracting authority is authorized to agree to pay compensation to the concessionaire in case of an interruption of the work for more than a certain number of days up to a maximum time limit, if the interruption is caused by an event for which the concessionaire is not responsible.

### Guidance on PPP Contractual Provisions (World Bank)

The World Bank's "Guidance on PPP Contractual Provisions" closely makes the case that the public sector bears the costs of damages caused by force majeure. If the revenue of the private contractor is paid by the public authority, then the possible options for cost allocation between the public authority and the private contractor are as follows:

- The private contractor continues to be paid as if it is performing in full.
- The private contractor is paid an adjusted amount to cover debt service costs (but not the O&M cost savings that may arise from not performing or lost profit).
- The private contractor is not to be paid at all. This will in part depend on the availability of insurance (such as business interruption insurance).

The availability of insurance for the events is a key when deciding the type of cost allocation. If there was insurance for a specific political or natural event, it could not be regarded as force majeure, therefore the private contractor is likely to be required to bear all the cost. Conversely, "uninsurable" events are treated as force majeure, so that the private contractor will not be required to cover all of the cost. It should be noted here that "uninsurable" typically does not mean that insurance is not available at all (further detailed in chapter 7 of this report).

The Guidance highlights the following important aspects to be considered when deciding the effect on the contract and compensation (World Bank 2017):

- "Interim costs compensation – Despite compensation being granted through one or more of the above means (such as by way of an extension to the operating period or increased tariffs), additional costs (e.g. for capital works), may nevertheless need to be incurred by the Private Partner before any actual compensation is received. One way for Contracting Authorities to address this, which is not uncommon in certain developed jurisdictions, is for the Private Partner to have an obligation to seek financing for such additional costs on the best possible terms. If such financing is not available or the Contracting Authority rejects the terms, the Contracting Authority either becomes the lender of last resort or is required to make an upfront payment" (24).
- "Increased finance costs pre-completion – If Force Majeure delays completion of the PPP Project asset, the Private Partner will not be able to commence service operations and start earning revenue to meet its debt service obligations. It may incur additional interest and commitment fees and costs of rescheduling its repayment obligations. If the Private Partner adds in some contingency pricing against this risk, this will have value for money implications for the Contracting Authority" (23).

In contrast to the United Kingdom's *Standardization of PF<sub>2</sub> Contracts*, the World Bank's Guidance introduces several relief mechanisms for private partner nonperformance other than the extension of time performance. For instance, the private contractor may be liable to pay liquidated damages to the contracting authority if it fails to meet certain construction phase milestones (such as the scheduled date for commencing operations). However, in the context of a force majeure event, the contractor may typically want to be expressly relieved from such requirements to the extent that these relate to the obligations it is unable to fulfill because of the event. Additionally, the contracting authority usually expressly grants the private contractor an extension of time in respect of delays to the commencement of operations that are attributable to force majeure events during the construction phase.

As highlighted above, the World Bank's Guidance identifies the possibility that value for money will decrease if the private contractor bears all the force majeure risks and compensation for the damage. The public authority should cover part of the compensation for any damage caused by uninsurable force majeure events.

Sources: HM Treasury 2012; UNCITRAL 2001; World Bank 2017

## 3.4 Summary and Key Takeaways

### Definition of Force Majeure

In the chronological review of cases in Sendai, force majeure events were listed as examples in the earlier projects and defined as foreseen phenomena under normal circumstances and for which no concerned entity was responsible. Based on lessons learned from the 2005 Miyagi Earthquake, the 2011 Great East Japan Earthquake, and other disasters, force majeure provisions specified the seismic intensity, and by taking into account historical disaster damages, they also added a numerical standard that regarded an event of at least a certain level as a force majeure event. Furthermore, there was past controversy on the difference between the damage caused by a private operator due to facility defects and damage caused by a natural hazard. Sendai City clarified in the PPP contracts that damage caused by a natural hazard will be judged based on whether similar buildings in the vicinity suffered similar damage. Such clarification of force majeure provisions resulted in

- Fewer questions and uncertainty on the DRM responsibility of the public and private sectors;
- The private sector's clear consideration of disaster risks during the project planning stage; and
- Prompt emergency responses by the private sector.

For concession cases, a reasonable definition of force majeure and risk sharing from the viewpoint of profitability was clarified based on opinions of private operators and lenders.

### Risk Sharing between Public and Private Sectors

When allocating risks between the public and private sectors in infrastructure PPPs several major issues are to be considered, as summarized below.

#### Positioning Infrastructure PPPs as Public Services

It is necessary to decide on a form of risk sharing that is cognizant of the nature of infrastructure projects. For example, in the case of infrastructure that must continue to function without suspension during disasters, it is necessary for the contracting authority to be involved in securing business continuity since it is important to restore such projects promptly to avoid any interruptions to public services. Illustrations from an airport project in Japan include the following:

- Runways are part of the infrastructure at airport facilities that need to be restored urgently after disasters because they are necessary for transporting search and rescue personnel, emergency reliefs, and goods.
- A terminal building is often a for-profit business, and it is assumed that the public entity will not be involved in the recovery of commercial business such as terminal building operations.
- An airport is a large-scale public service project. Given that airport infrastructure cannot be transferred easily and risks cannot be shared and diffused, risk sharing by the public entity was considered appropriate to a certain extent.

#### Consistency with the Overarching Legislations

Public works are designed, constructed, operated, and maintained in compliance with the risk allocation specified in the relevant legislation in Japan (for example, the Disaster Countermeasures Basic Act and each sector-specific law). Infrastructure PPPs follow the overarching laws, which are listed in tender specifications issued during the procurement stage.

## Acceptance or Avoidance of Risks by Private Operators

**Evaluation of disaster risks.** Risk sharing by the public and private entities is considered, based on an evaluation of disaster risks and the significance of impacts and damages on the project in terms of technical and commercial viability. The project stakeholders often refer to the hazard maps developed and disseminated by the public sector as well as the historical disaster databases when evaluating the disaster risks at the project level.

**Project profitability.** In the case of highly profitable projects, it is considered that all force majeure risks should be borne by private operators. It is necessary to analyze whether projects have appropriate business structures from which the private entity can obtain a return on investment and how much revenue can be generated. This is because it is usually expected that private operators can improve their ability to enhance profits and minimize expenditures, compensating their losses by their own efforts even when a force majeure event occurs. Therefore, it is critical to consider whether a project has enough profitability to enable the private operator to establish a risk-informed financial plan. In particular, since it is not easy to predict natural hazards without a certain degree of uncertainty, it is reasonable for project entities to consider whether risks can be comprehensively avoided taking into account the project profitability.

**Availability of insurance.** In cases where natural disaster risks are borne by private operators, an important criterion is whether insurance can be purchased at a reasonable cost. In some countries where insurable events can be insured at a reasonable cost in the insurance market, the insurable events are not force majeure but should be borne by private operators. The availability of insurance for the events is key when deciding the type of cost allocation.

In Japan, because force majeure events are widely understood and there have been many cases where the public entity has borne almost all force majeure risks, private operators are not necessarily required to bear risks even if such risks can be insured. Furthermore, there are many cases where a contracting authority determines the necessary insurance during the procurement preparation stage. The contracting authority confirms the availability of insurance in the market and carries out a market sounding to identify suitable conditions for procuring insurance. Furthermore, it is important to establish standards that take region-specific insurance markets into account. For example, there may be cases where it is considered difficult to insure earthquake risks in Japan at a reasonable cost. As a result, if private operators are required to pay a premium, such costs may be an excessive burden.

Recent large-scale concession projects have implemented a burden ratio to limit the amounts to be borne by the private operators. This was aimed at limiting the burden on private operators to an appropriate level while taking into account market availability for procuring insurance. By implementing such measures, private operators have less uncertainty for risks to be borne by them and can take suitable risk mitigation measures. Financial institutions have highlighted the importance of ensuring that the public entity bears risks that cannot be reasonably insured to increase the possibility of viable financing arrangements and ensuring value for money.

**Bankability.** Financial institutions that finance projects analyze a cash flow of risk scenarios in detail, which includes an assessment of both disaster risks and the level of risks that private operators can accept. For earthquakes, financing levels are decided based on the probable maximum loss (PML) computed by the casualty insurance company and by calculating other necessary fixed expenses. It is necessary for the public sector to establish an appropriate level of risk allocation to the private sector, maintaining project bankability.

**Understanding of risks through dialogues and open data.** It is important to enhance understanding about the risks that the private sector is responsible for so that it promotes appropriate DRM measures and investments by the private sector. Also, early information disclosure as well as dialogues between the public and private sector can contribute to appropriate risk allocation schemes. Specifically, the following steps have been identified in the cases

highlighted earlier:

- *Ensure understanding of risks among the public and private sectors:* In the case of the Spopark Matsumori (health facility) project in Sendai, both Sendai City and the private operators lacked the awareness to identify risks and prepare measures, which increased the chances of defects in the private operator's facility structure and construction works; consequently, these defects led to damage during the 2005 Miyagi Earthquake. Subsequently, the development of the New Sendai Astronomical Observatory Project reflected lessons learned from the earlier experience. Risk workshops were held periodically in which Sendai City staff responsible for the project and representatives of the private operator discussed the possible occurrence of risks including earthquakes. The workshops allowed both Sendai City and the private operator to review and operate the project by recognizing disaster risks more clearly.
- *Facilitate proactive DRM measures and investments by the private sector:* Reflecting the fact that the damage on the Spopark Matsumori PPP Project was caused by defects on the part of the private operator in constructing facilities, the risks to the project, including the possibility of collapsing ceilings, were identified and addressed in the design and construction of the facility. Countermeasures for such risks were considered. In addition, a policy was established that if a facility failed to meet the specified standards, the contracted amount for the facility's construction would be reduced based on the degree of importance of the facility, the degree of failure, time needed for improvement, and other factors. The same policy would be applied if defects were caused by the failure of maintenance services, which encouraged the private operator to be more proactively involved in DRM. In addition, based on the damage suffered by Sendai Astronomical Observatory from earlier earthquakes, the seismic intensity to which the private operator could respond was identified and reflected in the specifications.
- *Provide early disclosure and dialogues:* In the Kansai International Airport Project, a project scheme including risk allocation between the public and private entities was disclosed at an early stage, and efforts were made to refine the scheme while continuing the dialogue with private companies. Such efforts secured a suitable competitive environment and enabled international private players to participate in this project.

## 4. Procurement, Monitoring, and Payment Mechanisms

The benefit of introducing public-private partnerships (PPPs) is that it enables the contracting authority to maximize value for money (VfM) by encouraging private operators to exercise their own ideas and efforts and to implement methods for efficient, effective facility construction and project operation. The same way of thinking applies to disaster response, which requires efficient, effective disaster risk management (DRM) and improvement of VfM by using the efforts of private operators when disasters occur.

In Japanese PPP projects, having accumulated various disaster responses handled by private operators, a contracting authority expects that private operators would be accustomed to emergency responses and are capable of responding promptly. In addition, in constrained circumstances where government agencies need time to execute disaster response procedures stipulated in the contract, awarding authorities appear to expect prompt disaster responses by agile, flexible private operators.

The efficient and effective handling of disaster responses by private operators is expected to improve VfM. Hence, this chapter describes methods to motivate private operators to implement disaster responses. In Japan, it is common practice to incentivize private operators through procurement procedures. Furthermore, efforts are being made to strengthen DRM by private operators through monitoring and payment mechanisms.

### 4.1 Incentive Mechanisms in Procurement

#### Specifications on DRM

Resilience of facilities is promoted through the overarching legislations that have been revised based on experiences from past disasters. Additionally, private operators may be asked to deal with disasters by following the project-specific specifications defined by contracting authorities during the procurement stage. The specifications are the minimum requirements to be fulfilled by private entities, which are expected to attain this minimum level without failure. When defining the specifications, setting them too high may lead to deterioration of VfM because of the associated costs and create a barrier for the private sector's participation in PPP. For this reason, it is important to set a reasonable and acceptable service level for private sectors based on communication between the contracting authority and private entities, such as competitive dialogues and Q&A sessions during the procurement stage.

The specifications on DRM cover emergency response, inspection and evaluation of damages, robust facility designs, and robust operation and maintenance (O&M) system, as two of the Sendai City examples illustrate (boxes 4.1 and 4.2).

### Box 4.1 Case: Specifications on Emergency Response and Business Continuity, Sendai Astronomical Observatory Project

#### Operation Level Requirements (extracted)

Security service level requirements

- In the event of an emergency such as an occurrence of an accident, crime, and disaster, the police and the person in charge at the municipality will be notified.
- In the event of an earthquake or a disaster caused by wind and floods while security services are being provided by automated alert when the observatory is closed or at night, or in the event that such a situation is likely to occur, the staff in charge will immediately hasten to the scene, verify the situation and take initial measures.

#### Development and Maintenance Level Requirements (extracted)

Information systems: display-type information service system

- A system should be established where information can be continuously displayed by installing equipment that can supply electricity for a certain period, even during emergencies such as disasters.

Source: Contract documents, Sendai Astronomical Observatory Project.

### Box 4.2 Case: Design Specifications on Seismic Resilience and Emergency Response, Sendai School Meal Supply Center Project (excerpts)

#### Design Level Requirements

- Basic requirements for safety
  - » Regarding resistance to flood, wind, snow, cold, and lightning, the necessary functions should be secured in compliance with the Standards for Basic Functions of Government Facilities.
- Basic requirements for structural planning
  - (B) Required functions
 

Facilities with required functions shall have the following levels or higher. Levels of items that are not stated below shall be at the same level as the Basic Standards for Basic Functions of Government Facilities.

    - (1) Seismic and structural safety: Seismic and structural safety of facilities shall be classified as Class II in the Standards for General Seismic Plans of Government Facilities.
    - (2) Classification of seismic safety performance of nonstructural components: Seismic safety performance of nonstructural components at facilities shall be classified as Class A in the Standards for General Seismic Plans of Government Facilities.
    - (3) Seismic measures for facilities: Regarding seismic measures for facilities, the seismic class shall be Class Otsu in the Standards for General Seismic Plans of Government Facilities. In consideration of their disaster prevention abilities, water tanks, heat source equipment, power source equipment and anti-disaster facilities are all characterized as important equipment.

#### Security Service

- Response to emergencies
  - A. An emergency system for the security service for facilities (a system where people can arrive at the scene within 30 minutes) should be established for when persons in-charge are absent.
  - B. Prompt and appropriate initial action should be taken, including reporting to the agencies concerned if necessary.

#### Required Level Concerning Operation Services

- Response to emergencies
  - (1) A manual should be prepared in advance for responding to emergencies such as earthquakes, fire and accidents, and approval should be obtained from the municipality.

Source: Contract documents, Sendai School Meal Supply Center Project.

## Evaluation Criteria on DRM

One approach to ensuring private operators' performance on DRM is to make it compulsory for private operators to invest in DRM through the specifications. Another approach is to request that private operators submit proposals for DRM and include DRM as an evaluation criterion when assessing proposals.

The latter incentivizes private operators to propose and implement appropriate DRM measures so that they can obtain higher evaluation points. This approach is effective for the contracting authority when proposals of specific methods for dealing with disasters are expected from private operators. Details of the proposals from private businesses will finally be evaluated by the contracting authority.

Another advantage of this approach is that the proposals from private businesses can be evaluated based on their balance between quality and price. When the price of a proposal is too high, the points for price will be reduced despite its high quality, which may lower its overall evaluation score (where both prices and quality are taken into account) compared with other bidders. Therefore, this approach can lead to obtaining practical cost-balanced proposals. The case study projects provide specific details of such evaluation criteria (box 4.3).

For Sendai's school meal supply center project, for example, private operators took into account the seismic risks and proposed efforts—such as taking measures to prevent equipment mounted on the ceiling from falling and using durable materials—to endure earthquakes of a certain magnitude. For the Aichi toll road project, an evaluation revealed that, under the category of “ensuring the safety of roads,” a private operator proposed specific measures and approaches to deal with large-scale disasters and prevent traffic accidents. Additional proposals concerned the functions of primary emergency transportation roads, the formulation and implementation of a business continuity plan, and the expansion of emergency stockpile warehouses. Also, under the category of “risk countermeasures,” a private operator's inclusion in the proposal of specific insurance coverage details was highly evaluated. As these examples show, evaluations were conducted on DRM measures and plans and on risk transfer policies with insurance.

When evaluating the criteria using a score, there is a way to avoid subjectivity. It is common to set up a third-party committee in Japan to evaluate PPP projects—including experts from different backgrounds such as professors, lawyers, and financial specialists—to increase the objectivity of the evaluation. In addition, for instance, at the screening of Sendai International Airport case, the evaluators had various types of expertise, and the final scored evaluation eliminated the extreme scores (namely, the evaluators' maximum and minimum scores) and averaged the other scores. In addition, each evaluated item had a maximum score, and such information was publicly open for bidders before they submitted their proposals. This system eliminated excessive bias in the scores for each item.

### Box 4.3 Private Operator Evaluation Criteria on DRM from Japanese PPP Projects

#### Case: Sendai Health Facility Project, Criteria for Choosing Successful Bidder (extracted)

- Risk management planning
  - » Viewpoint of evaluation
    - Whether an effective backup system is secured for continuing operations when an incident occurs
  - » Point of evaluation (example)
    - Whether project safety is assured by obtaining other insurance than is obligated

#### Case: Sendai Astronomical Observatory Project, Criteria for Choosing Successful Bidder (extracted)

- Risk management planning



- » Whether measures for mitigating risks have been developed, such as establishing an effective risk management system or obtaining additional insurance

#### **Case: Sendai School Meal Supply Center Project, Criteria for Choosing Successful Bidder (extracted)**

- Facility preparation
  - » Whether structural proposals are presented to prevent or mitigate seismic disasters
  - » Whether practical proposals are presented to maintain the functions of each facility (e.g., electric, mechanical and cooking equipment) or to recover and restore those facilities in case of a disaster
- Maintenance
  - » Maintenance service system
  - » Whether proposals are presented for measures, systems, etc., to promptly recover or restore functions in case of an emergency such as earthquake
- Other operational services
  - » Whether efforts have been made to promptly deal with natural disasters or accidents such as food poisoning, to share information with business operators accurately and to communicate and appropriately cooperate with the municipality

#### **Case: Sendai International Airport Project, Criteria for Selecting Entities with Preferential Negotiating Rights (extracted)**

- Proposals for safety and security
- Basic concept regarding measures for addressing problems (e.g., incidents or accidents, disasters, and epidemics)
- Evaluation points
  - » Whether safety and security maintenance operations have policies that establish a highly reliable implementation system by securing qualified individuals and selecting appropriate contractors
  - » Whether necessary and adequate self-check functions have been proposed
  - » Whether measures to address problems have been examined sufficiently

#### **Case: Kansai International Airport Project, Criteria for Selecting Entities with Preferential Negotiating Rights (extracted)**

- Items examined during first and second evaluations
  - » Evaluation details
    - Appropriateness of basic project implementation policies and project plans
  - » Evaluation items (safety and assurance, environmental measures and coexistence with local communities)
    - Measures for addressing problems (e.g., incidents or accidents, disasters, and epidemics)

#### **Case: Aichi Toll Road Project: Criteria for Selecting Entities with Preferential Negotiating Rights (extracted)**

##### Crisis management

- Whether proposals are specific, feasible, and meet the required level
  - » Whether implementation and communication systems are feasible, specific and in a form that is suitable for crisis management operations
  - » Whether proposals are specific and highly reliable (certain) for addressing individual and specific problems (e.g., traffic accidents, snowfall, torrential rain, and reckless driving) in crisis management operations
  - » Whether the implementation of efficient and effective operations has been proposed
- Whether proposals are efficient and effective when they exceed the required level, and whether they are feasible and specific

Sources: Project documents.

Note: DRM = disaster risk management.

Box 4.4 summarizes the use of DRM evaluation criteria to screen the concessionaires bidding to participate in two airport PPPs: the Kansai International Airport Project and the Sendai International Airport Project.

#### **Box 4.4 Concessionaire Screening Using DRM Evaluation Criteria in Airport PPP Projects**

##### **Case: Evaluation of a Concessionaire for Kansai International Airport<sup>a</sup>**

Nine Japanese companies and 11 international companies declared their intent to participate in the project and passed the participation eligibility screening. In particular, the contracting authority hoped to attract international operators by specifying risk allocation between the public and private entities. That the announcement attracted interest from many international companies proves that private operators judged that the implementation policy was appropriate. Subsequently, a tender document was distributed, and three companies participated in the competitive bidding.

The only private operator that passed the first screening was ORIX-VINCI Airports Consortium. The criteria for the first screening contained evaluation on several components—proposed operating right price, appropriate business policy and plan, and the basics on running operation (technical and logical aspects)—by scoring each component on a 100-point scale. Three operators submitted their proposals, and another two did not meet the requirement for the representing entity in joint venture. After competitive dialogue between each of the private entities and the contracting authority, a second screening was executed that included activities such as site inspection of the participant and interviews of the stakeholders.

A key point of the screening was that, although it was not restricted to natural disasters, it gave a positive evaluation to private operators that secured stable and reliable operation by allocating sufficient funding for DRM as well as reserve funding for airport operation. It also gave a positive evaluation to private operators that prioritized safe and secure airport operations by executing maintenance and renovation investment in a preventive and systematic manner. A safety control plan and the securing of a system for executing an appropriate business continuity plan were also positively evaluated (such items adding points worth up to 10 percent of the total maximum score).

##### **Evaluation of a Concessionaire for Sendai Airport<sup>b</sup>**

Four consortiums participated in the first screening for the project, and all groups passed it. Three consortiums participated in the competitive dialogue with the participants before the second screening, which helped secure competition. The result of the screening was that Tokyu-Maeda-Toyotsu Group was selected as the preferred bidder.

In the quantitative evaluation in the second screening, all consortiums proposed a concession fee greater than zero yen for the revenue and expenditure in the Sendai Airport Specified Operation Project, which had been posting losses for three consecutive financial years. Therefore, it was judged that VfM had been considered in the proposals. The preferred bidder presented a value of ¥2.2 billion.

During the second screening, the following proposal items received positive evaluations: proactive detailed measures to prevent security incidents and accidents, to minimize damage from disaster, and to obtain insurance. (Because the airport is located in an area struck by the Great East Japan Earthquake in 2011, standards relating to tsunami and other DRM were clearly indicated in the conditions to obtain insurance for this project.) The preferred bidder also established a “Sendai Operation Center” that included aviation security, security guards, DRM, and facility management departments for the safe operation of the airport. Such plans contributed to the positive evaluation.

a. *Source:* Results of objective screening for selection of private operators, including results of the first screening by New Kansai International Airport Company (NKIAC).

b. *Source:* Ministry of Land, Infrastructure, Transport and Tourism, [http://www.mlit.go.jp/report/press/kouku05\\_hh\\_000070.html](http://www.mlit.go.jp/report/press/kouku05_hh_000070.html).

## Disclosure of Disaster-Related Information

To minimize the uncertainties of risks assumed by private operators, efforts have been made to properly disclose the information held by public entities about past disasters. For example, for the Sendai International Airport concession project, details were disclosed concerning the safety management at airport facilities and the inspections and examinations conducted after the Great East Japan Earthquake (box 4.5). In addition, information about past earthquake damage was disclosed in the local DRM plan prepared by the municipality where the airport is located.

### Box 4.5 Treatment of Disaster Risk-Related Questions on Application Guidelines for Sendai International Airport Project

Question: “Regarding the criteria that you have indicated we should refer to, please give us more information on those that are not available on the Internet or sold as publications (such as guidelines on the facility maintenance inside the airport, regulations concerning aeronautical safety services, criteria for the establishment of a safety management system at the airport, and a tsunami evacuation plan for Sendai International Airport).”

Question: “Regarding civil engineering, construction, electricity, and machine equipment, please provide drawings and specifications on the inspection, structural verification, and functional recovery after the Great East Japan Earthquake.”

The contracting authority replied that information would be disclosed in the second evaluation for both questions.

*Source:* Project documents on questions and answers on Sendai International Airport Project.

## 4.2 Incentive Mechanisms in Monitoring and Payment

The contracting authority needs to conduct appropriate monitoring to make sure that disaster responses are performed as initially planned based on the specifications and the proposals from private operators.

According to the “Guidelines for Monitoring” released by the PPP/PFI Promotion Office (Cabinet Office 2015), monitoring is “an important method to confirm whether the provision of appropriate and reliable services that conforms with the contract has been ensured with regard to the public services performed by private operators; and indicates an act of monitoring (measuring and evaluating) the level of public services provided by private operators under the responsibility of the administrators.”

If the monitoring indicates that services have not been provided in accordance with the specifications or proposals, providing an economic motivation such as a reduction in the availability payment is considered an effective method for encouraging the appropriate performance of services. The “Guidelines for Monitoring” states that the implementation of this method needs to be considered while paying attention to several points (box 4.6).

#### **Box 4.6 Recommended Handling of Service Defaults by Private Operators in PPP Projects, per Monitoring Guidelines (excerpts)**

- Method for dealing with cases where appropriate public services are not provided
  - » Ensuring the performance of appropriate public services when such services are not provided (default of obligation)
- (1) A reduction in the availability payment must be provided as an economic motivation for encouraging proper improvement. When this method is used to ensure the performance of appropriate services, it may be necessary to set the time period for improvement.
- (2) It should be noted that the method of reducing the availability payment may worsen the financial condition of the private operator in the short run and may cause them to lose the ability to ensure the service level expected by contracting authority. However, the level of public services can be maintained or improved by introducing, for example, a system where reducing points are given according to the state of the default of obligation, and the availability payment is reduced when the points reach the specified level (penalty point system), instead of immediately reducing the availability payment. Another example is a system where recovery points are offered when a private business operator provides public services at a higher level than required, and the recovery points can be offset with reducing points (recovery point system).
- (3) In accordance with the basic principle of respecting the independence, originality and ingenuity of private entities, it is recommended that a contracting authority develop a scheme on the condition that it will take responsibility in improving the performance of obligations if a default of obligations is ascertained. It is also important to clarify the procedures for the above beforehand.
- (4) A PPP project contract must clarify the requirements for the default and provide procedures, etc., in the event that the administrator and private operator are involved in it.

Source: Cabinet Office 2015.

Many PPP projects in Japan have provisions for reducing the availability payment, a form of economic motivation for private operators. The Spopark Matsumori Accident Response and Investigation Committee, which (as discussed in chapter 3) was established in 2005 after a ceiling collapsed at Spopark Matsumori (Sendai Health Facility Project), made seven proposals on management to minimize the influence of the accident. One of the main measures taken in response includes the “restructuring of a mechanism for the payment (stricter penalty).” As a result, the contracting authority started considering a reduction in the availability payment when the specifications of the services were not achieved. In this case, a point of consideration is whether the scope for reducing the availability payment includes not only the payment for maintenance cost but also the payment for capital expenditure (the so-called unitary payment).

Since facilities are delivered to the public sector before the start of operations for projects that adopt the build-transfer-operate (BTO) scheme, payment for facilities is a fixed claim for private operators, and it is difficult to include it as part of the amount to be reduced. Build-operate-transfer (BOT) projects, however, may introduce a unitary payment system to provide strong motivation for private operators to maintain service levels.

The New Sendai Astronomical Observatory Improvement and Management Project, which adopted the BOT scheme, included development costs as part of the amount to be reduced (box 4.7). This is an example of providing stronger motivation for private operators to implement appropriate DRM measures including other incidents. However, it should be noted that the reduction of the availability payment will not be made when the specifications of the services were not achieved because of force majeure.

### Box 4.7 Contractual Provisions for Availability Payment Reduction, Sendai Astronomical Observatory Project (excerpts)

Attachment 10: Monitoring and reducing the amount of service purchase costs

Section 4: Reducing the availability payment

#### 1. Reducing the amount equivalent to development costs

When it is concluded that the specifications are not fulfilled, the amount of development costs shall be reduced, depending on the importance of the facility, the extent to which the specifications is not achieved, and time required for improvement. This method also applies to cases where the specifications and other specifications are not achieved due to the non-performance of maintenance services.

Specifically, the reduction amount is calculated by multiplying the following: “hourly unit price per m<sup>2</sup> of the room,” “time subject to the reduction amount,” “area of the room that cannot be used” and “coefficient of the reduction amount” according to the importance of the room (refer to the formula below).

$$\text{Reduction amount} = \text{Hourly unit price per m}^2 \text{ of the room} \times \text{Time subject to the reduction amount} \\ \times \text{Area of the room that cannot be used} \times \text{Coefficient of the reduction amount}$$

“Hourly unit price per m<sup>2</sup> of the room” is the total amount equivalent to the development costs divided by the floor space of the facility and the time (in one hour units) from the opening of the facility until the termination of the project period.

“Time subject to the reduction amount” is determined according to the response time from when staff acknowledge that the facility has not fulfilled the specifications until each step is taken, as well as the required response time set by the importance of each room.

In principle, the importance of each room is as indicated in the material called “Specifications for each facility” in the Specifications for Facility Building and Maintenance. The importance of the rooms that are combined or newly established based on the proposal from the private operator is to be determined through deliberations in consideration of the importance of the combined room and the frequency of usage of the new room.

Source: Contract documents, Sendai Astronomical Observatory Project.

For an educational facility PPP project in Sendai City (the School Meal Supply Center), more attention was focused on reducing disaster risks through the mechanism for the availability payment (box 4.8). If a school meal supply service is maintained or quickly restored because of the ingenuity and efforts made by the business operator during a disaster caused by force majeure, points for reducing the compensation amount are decreased, which indicates that responses to disasters and other risks for force majeure are being taken into consideration.

#### **Box 4.8 Contractual Provisions for Availability Payment Reduction, Sendai School Meal Supply Center Project (excerpts)**

Attachment 10: Monitoring and reducing the amount of service purchase costs

Section 4: Reducing the availability payment

(4). Cases of decreasing the amount of recovery points for outstanding service performance and the method of reduction

When the private contractor provided outstanding services, which are shown in the following a) or b), the contracting authority may decrease the amount of recovery points upon request from the private contractor. This relief measure through decrease of recovery points is maximum 30 points and cannot be applied to the case when critical issues occurred in providing the school meals.

a) The private contractor can receive relief measures to decrease recovery points by 10 to 20 points in the case where the high quality services which exceed the level of business requirement specification and the level suggested in the proposal, as explained in the following cases. In this case, the decreased amount of recovery points shall be notified to the private contractor within 7 days after submission of the work record.

(omitted)

3) the case where the private contractor sustain or immediately restore the school meal supply service when Force Majeure occurs

b) In the case where the total of the recovery points every 3 months for the preceding year was 20 or less, 20 points shall be subtracted as a remedy measure when the recovery points exceed 50 points.

*Source: Contract documents, Sendai School Meal Supply Center Project.*

When the Great East Japan Earthquake struck the area in 2011, the School Meal Supply Center at Sendai responded quickly and was restored more than two months faster than other similar facilities that were affected and directly managed by Sendai City. This was mainly owing to independent actions for recovery taken by the private operator that were not restricted to administrative budgetary procedures while municipal staff had to deal with many affected buildings and infrastructure. Because the private operator had an economic motivation such as a reduction in the availability payment, they responded quickly to restore the facility. Another reason for the speedy recovery is that the private operator had the flexibility to procure materials required for recovery by using its supplier network.

Box 4.9 provides international examples on developing incentive mechanisms.

## Box 4.9 Incentive Mechanisms in Procurement, Monitoring, and Payment: International Examples

### Incentives for Private Operators through Procurement Process

#### Standardization of PF2 Contracts (United Kingdom)

In the *Standardization of PF2 Contracts* (HM Treasury 2012), incentives to private operators are strongly related to the effects on contracts. It states that since the financial effects of delays caused by Relief Events are borne by private contractors, the public authority will not pay any compensation on the occurrence of such delays. Therefore, although a contractor needs to cease the operation when disasters occur, the contractor cannot expect any compensation from the public authority. The lack of support incentivizes a contractor to manage effects caused by natural disasters, in order to resume their service and keep the profit loss minimum. Allocating natural disaster risks to contractors is to incentivize private contractors to handle such risks better.

#### Legislative Guide on Privately Financed Infrastructure Projects (United Nations Commission on International Trade Law)

The *Legislative Guide on Privately Financed Infrastructure Projects* (UNCITRAL 2001) introduces a few contractual examples during the procurement process to incentivize private contractors to handle the risks related to disasters. For example, the entities may agree to make contractual arrangements providing solutions for some of their adverse consequences, such as contract extensions to compensate for delay resulting from events or even some form of direct payment under special circumstances. If the public authority wishes to extend a greater degree of protection to the lenders, the guarantees may cover the project company's permanent failure to repay its loans. In such a case, however, it is advisable not to remove the incentives for the lenders to arrange for the continuation of the project. Therefore, in any event, full loan guarantees by the public authority amounting to a total protection of the lenders against the risk of default by the project company are not a common feature of infrastructure projects carried out under the project finance modality.

Furthermore, the *Guide* notes that certain natural disasters, such as storms, cyclones, and floods, may be normal conditions at a particular time of the year at the project site. As such, any public service provider would expect to assume that those natural disasters are likely to happen. However, the situation might differ depending on whether the facilities are permanently owned by the contracting authority or whether there is a requirement to transfer them to the contracting authority at the end of the project period. In the latter case, the contracting authority is authorized to make arrangements to assist the concessionaire to repair or rebuild infrastructure facilities damaged by natural disasters or similar occurrences defined in the project agreement, provided that the possibility of such assistance was contemplated in the request for proposals.

The contracting authority will be expected to assume those risks that relate to events attributable to its own actions, which includes inadequacy of technical specifications provided during the selection process. Therefore, the contracting authority needs to set appropriate specification requirements for the private contractors to respond to disasters.

### Disclosure of Disaster-Related Information

#### “Guidance on PPP Contractual Provisions” (World Bank)

Many jurisdictions have policies, laws, or regulations imposing disclosure obligations on contracting authorities and/or ensuring the public has access to public procurement information for public policy reasons. Therefore, these policies can be applied to disaster-related information. Mandated proactive disclosure can be incorporated into either of the following: the country's freedom of information (FOI) legislation; PPP policies, laws, and regulations; procurement legislation; public financial management (PFM) legislation; sector-specific legislation; and legislation relating to budget transparency. Some jurisdictions have even developed standard clauses related to transparency and confidentiality in PPP contracts.

There may also be international financial institutions and multilateral agencies supporting the PPP project that, as a condition of their support, require contracting authorities to comply with their own policies on transparency. However, the information disclosed under such policies does not usually include disclosure of commercially sensitive or proprietary information.

Sources: HM Treasury 2012; UNCITRAL 2001; World Bank 2017.

## 4.3 Summary and Key Takeaways

The previous sections introduced the incentives for private operators to invest in DRM through procurement procedures (including specifications and evaluation criteria), monitoring, and payment mechanisms. It is important to consider these factors in an integrated manner. The payment mechanism needs to be coordinated with specifications, and monitoring is required to confirm compliance with specifications because these are closely connected and cannot be separated.

Therefore, to secure effective DRM investments, emergency response, and recovery by private operators, it is important to prioritize and narrow the monitoring indicators in accordance with the specifications, as well as to develop payment mechanisms that follow the monitoring indicators. Although the priority lies with the public sector's DRM efforts and creation of incentives for the private sector, the methods summarized below could serve as a reference for countries that will introduce PPP for the first time in the future.

### Encouragement of private sector innovation through payment mechanisms

The private operator can be incentivized to invest in DRM throughout the project life cycle through contractual implementation of a payment reduction mechanism applicable not only to performance but also to the infrastructure asset itself to ensure compliance with the specifications during both the construction and O&M phases. As a result, a private operator proposed obtaining earthquake insurance. Furthermore, when an earthquake struck Sendai, the private sector proactively and immediately implemented emergency response and recovery works as in the case of Sendai International Airport Project.

### Encouragement of private sector innovation through evaluation criteria

Incentives can be contained in the evaluation criteria for strict DRM and additional procurement of insurance to motivate the private sector's investments in DRM as in the case of Sendai Astronomical Observatory Project.

The evaluation criteria for selecting successful bidders also introduced a mechanism to award higher, more favorable evaluation scores for innovative efforts on DRM. Although the evaluation criteria on DRM are not so detailed and the scores on DRM are relatively minor relative to the overall technical scores, contracting authorities are increasingly evaluating the DRM measures proposed by private entities. When disaster struck, the PPP facility recovered about 2.5 months earlier than directly operated facilities by the government, owing to the flexible selection of suppliers for goods and equipment in the case of Sendai School Meal Supply Center Project.

In the selection criteria for preferred bidders, a more favorable evaluation is to be given to proactive measures to minimize damages at the time of a natural disaster, as well as to emergency backup systems. For example, proposals to facilitate disaster recovery in coordination with the local government in order to promptly resume operations were welcomed in the case of Sendai International Airport Project.

### Evaluation based on life-cycle costs and innovation to secure a balance between capital and O&M costs.

Project costs are evaluated considering the project duration, so that the evaluation is made based on the life-cycle cost. Furthermore, specifications require a certain level of facility construction (capital cost), and the contracting authority expects private sector proposals that exceed the expected cost to ensure efficiency and effectiveness.



## Dialogues during the procurement stage

The feedback from the private sector is collected at an early stage through Q&As held at the time of disclosure of tender documents and the competitive dialogue. Such steps facilitate the specification on risk allocation. Furthermore, as it is not easy to anticipate force majeure events without uncertainty, the risk taking by the public sector is important while considering the profitability of projects. In addition, the maximum amount of damage to be borne by a private operator was regulated in that the amount of a loss exceeding the amount of insurance obtained by the concessionaire would be paid by the public sector. This scheme that specified the risks allocated to the private entity contributed to participation by international operators in the bidding as seen in the Kansai International Airport Project.

## Specifications on DRM

Tender specification on DRM were developed and iteratively reviewed based on lessons learned from the past natural disasters including the Great East Japan Earthquake. The specifications on DRM cover robust facility designs, resilient O&M, emergency preparedness and response planning including emergency inspection and evaluation of damages.

# 5. Insurance and Financial Institutions

During public-private partnership (PPP) projects, risks are allocated between the public and private entities. A common practice is to enter into insurance contracts to secure business continuity when risks would have serious impacts if they materialize or to cover risks for which neither the public nor the private entity is responsible, such as force majeure events.

Insurance contracts are classified into those that are mandatory and those that are voluntary for private operators. Risks are transferred to the insurance company by paying a premium. This chapter studies the responses to changes in insurance availability during a long contractual period as well as the handling of insurance by public and private entities.

## 5.1 The Public Sector Role on Insurance

In PPP projects, where the construction and operation and maintenance (O&M) of facilities are comprehensively commissioned to private operators, project contracts require the operators to obtain insurance for the construction phase as well as the operation, maintenance, and management period to ensure continuity of public service (table 5.1). For either of these periods, they often must obtain damage insurance for the property and for third entities.

**Table 5.1 Insurance Typically Required of Private Operators in Japanese PPP Projects**

Phase	BTO project	BOT project	Concession project
Construction	<ul style="list-style-type: none"> <li>• Construction insurance</li> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Construction insurance</li> <li>• Public liability insurance</li> </ul>	n.a.
O&M	<ul style="list-style-type: none"> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Fire insurance (rarely, but sometimes private operators are required to add an earthquake rider to their fire insurance)</li> <li>• Public liability insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Fire insurance with an earthquake rider</li> <li>• Liability insurance for facility administrators</li> </ul>

Note: n.a. = not applicable. BOT = build-operate-transfer. BTO = build-transfer-operate. O&M = operation and maintenance.

### Insurance and Value for Money

In general, fire insurance covers damages caused by fire, winds, snows, lightning strikes, and the like but does not cover fire damages induced by disasters such as earthquakes, tsunamis, and volcanic eruptions. Therefore, in Japan, where there is a high risk of earthquakes, business operators may be required to add an earthquake rider to the fire insurance for the O&M period. However, earthquake insurance is not easily available in Japan because of the limited capacity of the reinsurance market and the required high premiums. As a result, private operators are concerned that if the contracting authority asks them to add an earthquake rider to their fire insurance, they may have difficulty continuing the PPP project because of reduced profitability. Thus, given Japan's high risk of large-scale damages caused by earthquakes, there is a need to study the necessity of asking private operators to obtain earthquake insurance while taking into consideration the circumstances of individual projects.

## Insurance for Seismic Risks

### Build-Operate-Transfer Model

In the build-operate-transfer (BOT) model, which requires private operators to bear all the maintenance risks, they often must obtain various types of insurance to bear those risks.

### Build-Transfer-Operate Model

With the BTO model, the facility is owned by the public sector during the O&M period. Therefore, the public sector, which is eventually liable for damages, often bears the risks, and the business operators are rarely required to obtain many types of insurance. One possible reason is because when a building suffers from a disaster, all or part of the damages caused by the disasters can be covered by mutual aid fund from a public mutual aid program. This is based on Article 263-2 of Local Autonomy Act (“a local public entity is allowed to have a mutual aid program with other ordinary local public entities to cover property damages caused by fire, flood, earthquake, and other disasters”).

For infrastructure owned by the central government, the public and private entities have the same understanding that in the event of a disaster, the central government is eventually liable for the damages caused by the disaster. In addition, the central government has properties with various functions throughout the country, allowing for a certain level of risk dispersion in terms of area. There is also sometimes a belief that if the central government paid the premium for national insurance through service compensation (as it does under the BOT model), the value for money (VfM) would drop instead.

For infrastructure owned by local public entities, little of the damages can be covered by relief money for seismic disasters under the mutual aid insurance program.<sup>5</sup> In a few cases, additional insurance has been obtained to cover disaster risks in the construction phase, and there are limited cases where adding an earthquake rider to fire insurance is required for both construction and operation of public office buildings via PPP.<sup>6</sup>

### Concession Model

With the concession model, a private organization purchases the right to operate a public facility or the like from the public sector and continues to run the infrastructure with fare revenues. Compared with the more common BOT and BTO models, the business operator bears more risks, including the risk of low demand. Therefore, there are cases where private operators are not required to obtain insurance for facilities in projects where the risks caused by force majeure, such as a large-scale disaster, are not transferred to private operators. However, in concession projects, such as those for airports, private operators are required to obtain corporate fire insurance, corporate property insurance, and wooden structure insurance for facilities for which they have purchased the operation rights, as well as earthquake insurance.

## 5.2 The Private Sector Role on Insurance

Even if private operators are not required by the public entity to obtain insurance to reduce disaster risks, they may obtain such insurance after proposing it to the public entity. In fact, private operators are expected to show ingenuity and obtain insurance to reduce disaster risks while taking into consideration the insurance market situation and

<sup>5</sup> “Relief Money for Seismic Disasters under the Mutual Aid Insurance Program” [in Japanese], Mutual Aid Insurance Agency, Zenkoku Shiyu Bukken Saigai Kyousaikai, <http://www.city-net.or.jp/products/earthquake/index.php>.

<sup>6</sup> For example, the PPP project for construction of the Kudan Common Government Office Building No.3, Chiyoda Ward Office.

efficient risk bearing. For example, in Sendai City’s Astronomical Observatory Project, the private operator proposed adding an earthquake rider to its fire insurance even though it was not required to do so by the public authority.

The policy on whether to request the private operator to obtain insurance may depend on the characteristics of the infrastructure sector and its profitability. For example, concession projects for airports and the like are expected to have a positive cash flow. Private operators are thought to have a certain level of risk-bearing capacity and are assumed to want to pay the insurance premium in preparation for disaster risks. However, in concession projects where profitability is expected to be low, operators are unlikely to want to pay the high premium during the operation period and may try to limit the scope of insurance.

### 5.3 Insurance Policies for Additional Cost Deduction

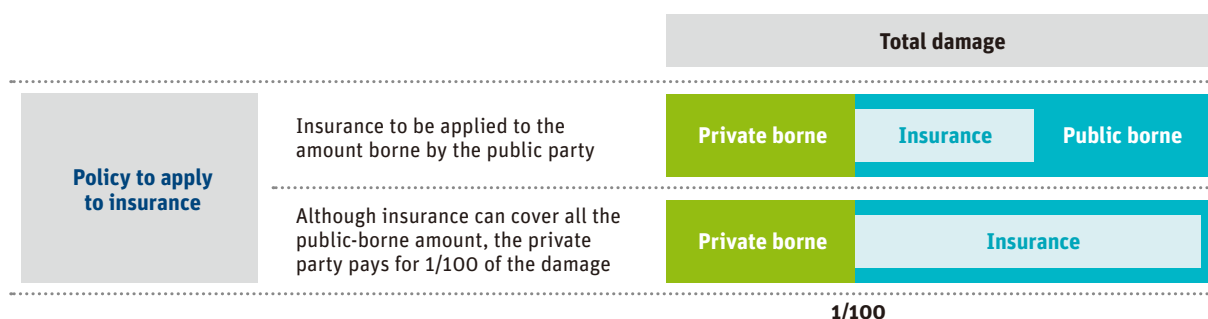
When additional costs are incurred due to force majeure, the policy for allotting insurance payout is roughly classified into four types. In Japanese PPP projects, the allotment of payout is determined by setting the threshold levels for risk bearing between the public and private entities based on the criterion that 1 percent of the total damage is paid by the private sector according to the risk-bearing policy for public works contracts (policies 1–3).

In many concession projects, however, private operators are supposed to pay damages caused by force majeure and, without setting the threshold levels for risk bearing between the public and private entities, the payout is basically made to the private operators (who have the operating rights and who paid the insurance premium (policy 4). However, if the public sector is involved in restoring the facility, part of the insurance money is paid to the public sector.

#### Policy 1: Insurance Payout First Deducted from Damages

In early PPP projects in Japan, based on the concept for public works contracts, it was common that the private operator paid 1 percent of the additional cost incurred from the damages while the public sector paid 99 percent of it. The most common policy for allotting a payout is to cover the amount paid by the public sector. In this case, the amount of money paid by the private operator equals 1 percent of the additional cost, regardless of whether the additional cost is covered by insurance (figure 5.1). In other words, this policy type does not reduce the burden on the private operator even though it has paid the insurance premium.

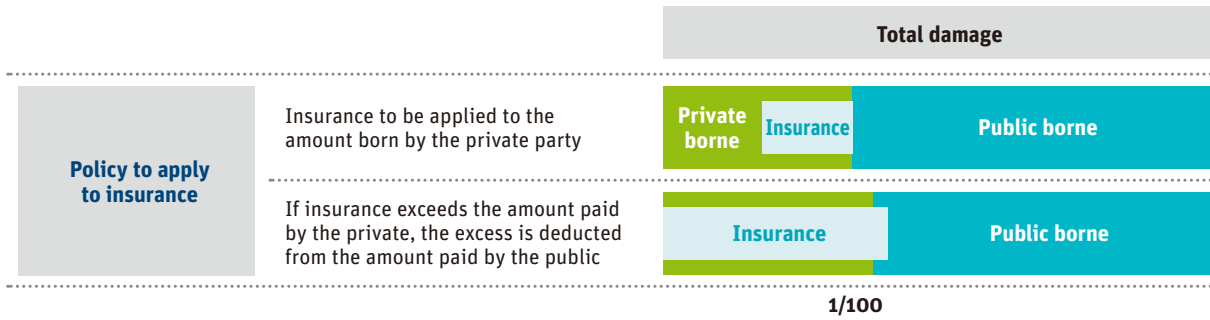
Figure 5.1 Payout Allotment Policy 1



#### Policy 2: Received Money Deducted from Amount Paid by Private Sector

In the second type of policy, the payout is first allotted to cover the additional cost paid by the private operator, so the private operator can expect a reduction in its burden. If the payout exceeds the amount of money paid by the private sector, the excess is deducted from the amount of money paid by the public sector (figure 5.2).

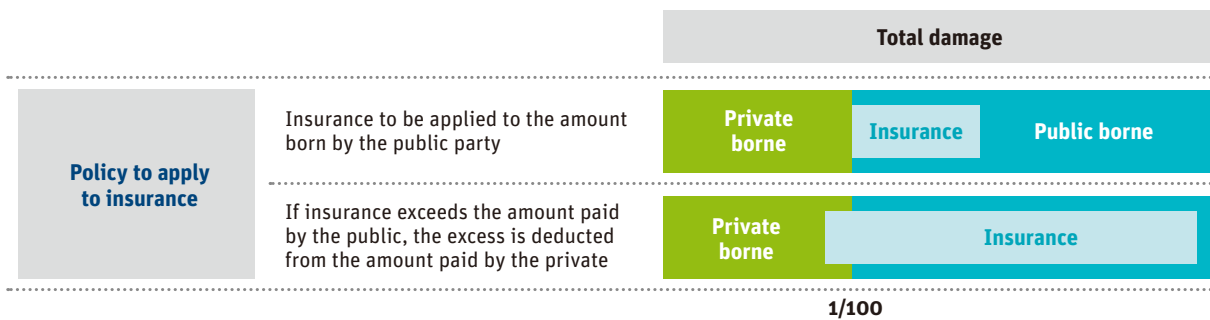
**Figure 5.2 Payout Allotment Policy 2**



### Policy 3: Payout First Allotted for Damages Paid by Public, the Balance Deducted from Damages Paid by Private Sector

In the third type of policy, the payout is first allotted for the additional cost paid by the public sector, and if the payout exceeds the amount of money paid by the public sector, the balance (if any) is deducted from the amount paid by the private operator (figure 5.3).

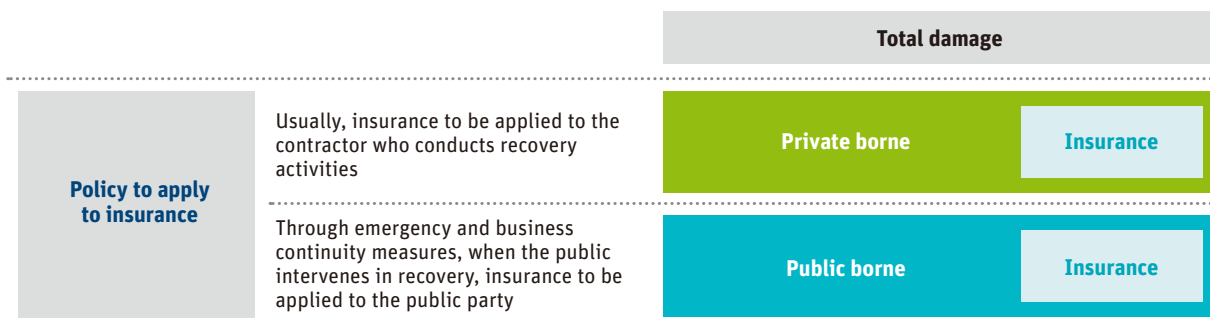
**Figure 5.3 Payout Allotment Policy 3**



### Policy 4: Payout Allotment in Concession Projects

The fourth type of policy applies to concession projects. When damages are incurred owing to force majeure, the entity with the right to operate the facility pays the cost for recovery and receives the payout paid based on the insurance policy. However, if the public sector is involved in recovery to ensure project continuity or in case of an emergency, the payout is allotted to the public sector (figure 5.4).

**Figure 5.4 Payout Allotment Policy 4: Concession Projects**



## 5.4 Insurance Availability

### Characteristics of Insurance Products for Disasters in Japan

Fire insurance and earthquake riders can cover a wide range of property damage, including those caused by wind and flood disasters and earthquakes or disasters arising therefrom. However, fire insurance and earthquake riders only cover property damage. In PPP projects, a disaster may damage not only the property but also other facilities related to the project. Moreover, the insurance product lineup offered by insurance companies is the same regardless of the project model (concession or BOT).

#### Construction Insurance and Fire Insurance

Damages caused by winds and floods are covered by common construction insurance, fire insurance, and other types of insurance to compensate for property damage. In many PPP projects, it is mandatory to obtain such property insurances. However, fire, explosion, rupture, damage, burial, and other damages caused by earthquakes are usually not covered.

#### Earthquake Rider

In general, as previously mentioned, damages due to tsunami, eruption, and other disasters caused by earthquakes are not covered by common fire insurance. Therefore, some disaster risks, such as earthquakes and tsunami, should be covered by adding an earthquake rider to the fire insurance. In most cases, earthquake riders use the reduced payment method or limited payment method. With the reduced payment method, the amount of money to be paid as insurance is calculated by deducting the amount of money to be paid by the private operator (deductible) from the amount of damages incurred by an earthquake and multiplying the resulting value by the predetermined reduction rate. With the limited payment method, the amount of payout to be made is calculated by deducting the amount of money to be paid by the private operator from the amount of damages incurred, but a maximum payment limit is set. Setting the deductible to a high value can reduce the premium.

#### Profit Insurance

The losses incurred by the equipment and material vendors, and business interruption due to the suspension of power service, water supply and sewerage service, and other public services may lead to a prolonged sales slump, and the sales loss may exceed the property loss. In many Japanese PPP projects, the lost profits are not included as damages even if the public sector pays damages and additional costs. Therefore, if the loss due to business interruption caused by a disaster can be covered, it is recommended that the sales loss due to business interruption be covered by the profit insurance.

In the insurance market, profit compensation is not included in property insurance and requires a separate insurance policy; therefore, private businesses need to obtain two types of insurance, resulting in an increased cost burden. According to a Cabinet Office report, 96 percent of Japanese companies have bought property insurance, but only 44 percent have bought profit insurance (Cabinet Office 2016a).<sup>7</sup> In addition, companies consider earthquake insurance to be expensive, and it is considered financially difficult for companies that have bought earthquake insurance to also buy profit insurance. The report also shows that, of the 36 percent of companies that have bought earthquake insurance, only 13 percent have bought profit insurance.

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<sup>7</sup> In the United States, property insurance and profit insurance are offered as a package under one insurance policy, so more companies can afford to buy profit insurance.

In Japan, there is a growing interest in compensation for lost sales due to business interruption after the Great East Japan Earthquake in 2011. However, Japanese insurance companies have been limiting the underwriting of such insurances, and it is difficult to cover losses due to business interruption by purchasing earthquake insurance from overseas insurance companies and transferring the risks to them. More companies are taking more proactive DRM measures and obtaining risk finance against earthquakes, and the reinsurance and alternative risk transfer (ART) markets are growing steadily (box 5.2). Therefore, more companies are expected to buy profit insurance (METI 2006).

### Box 5.1 Alternative Disaster Risk Finance Products

If disaster risks were underwritten only in the insurance market, relying on the abovementioned types of insurance would be a fundamental measure to reduce disaster risks. In Japan, however, there is an increasing interest in alternative risk transfer (ART) methods, by which risks are transferred to the entire capital market.

The main advantage of ART is that, unlike insurance, it does not require damage assessment, so payments are made quickly. For example, weather derivatives use the weather as an indicator, and a payout is made when the specified threshold value is exceeded. There is no need to assess whether the damages are caused by force majeure. An option fee is paid to purchase the option to execute the right, and a judgment is made based only on whether an objective value has been exceeded, making it possible to differentiate risks clearly. However, it must be noted that the option fee depends on the finance market situation and may be affected by elements other than the probability of disasters.

Overseas investors have an increasing interest in financial products related to Japanese disaster risk coverage to stabilize their portfolios. The use of ART, which has not been implemented in many infrastructure operations in Japan, may be an effective solution for the private sector to underwrite disaster risks in the future.

**Table B5.2.1** Types of Alternative Risk Transfer Methods

Method	Description
Cat bond	<ul style="list-style-type: none"> <li>A catastrophe bond (cat bond) is a bond issued by insurance companies, reinsurance companies, and ordinary companies to avoid or reduce losses caused by earthquakes, hurricanes, and other major disasters and is a means of securitizing major disaster risks.</li> <li>A cat bond is used to transfer major disaster risks to the bond investors, or the third entity.</li> </ul>
Weather derivatives	<ul style="list-style-type: none"> <li>Weather derivatives are financial derivatives that represent weather phenomena, such as abnormal weather and bad weather, in indexes based on weather data, including temperature, rain, and snow data. Money is paid based on the difference between the predetermined indexes and indexes obtained based on the actual weather phenomenon.</li> </ul>
Captive	<ul style="list-style-type: none"> <li>A captive is an insurance company that is founded by a company and operates only for the parent company. The risks borne by the parent company are transferred to the captive with insurance contracts.</li> <li>Captives can offer insurance policies that are not easily available in the insurance market and pursue lower premiums than existing insurance premiums.</li> </ul>

Source: MLIT 2006.

### Earthquake Riders to Public Liability Insurance

Earthquake riders to public liability insurance are not available in the market, and it is considered difficult to cover third-entity damages caused by earthquakes and similar disasters. When the ceiling of the facility constructed in the Sendai Health Facility PPP Project collapsed after the service began, the Spopark Matsumori Accident Response and Investigation Committee was formed to study risk management measures. The committee discussed the need for insurance to cover third-party damages caused by a disaster but concluded that it would be difficult for regular insurances to provide such compensation.

## Premiums

### Differences by Disaster Type

Insurance payments for damages caused by earthquakes tend to be large, and the insurance premiums and payments for earthquake coverage differ greatly from those for other disaster types. After the 2011 Great East Japan Earthquake, some insurance companies have had difficulty underwriting earthquake insurance because of the reinsurance market situation.<sup>8</sup> In addition, the insurance premium is the same regardless of the PPP model, such as concession and BOT.

In Japan, the premium for earthquake insurance is high because earthquakes occur frequently. After the Great East Japan Earthquake, the premium for earthquake insurance rose further, and it is now more expensive for private operators to obtain earthquake insurance. Therefore, the operator needs to consider carefully whether earthquake insurance should be obtained from the perspective of commercial viability. The premium is expected to remain high for the time being, which will likely cause a decline in the VfM.

### Differences by Region

The premium rate for earthquake insurance differs depending on the seismic risk of each area. The premium tends to be higher in areas with a high disaster risk and limited capacity of reinsurance. Currently, the premium is said to be high in the Kantō area and other areas with a high seismic risk.

### Premium Review and Commercial Viability

The insurances that private operators obtain are renewed every year. The insurance companies review the premiums periodically, and if the premium rises at the time of renewal, an additional cost needs to be paid from the cash flow of the project, which can decrease the profit of the private operator.

## Market for Earthquake Insurance

As mentioned earlier, private operators are concerned that adding an expensive earthquake rider to their fire insurance would reduce the commercial viability. Private operators have a growing interest in earthquake insurance, but the supply capacity and the number of insurance companies that can underwrite earthquake insurance in the reinsurance market has grown sluggishly, resulting in a supply shortage in some areas (table 5.2).

**Table 5.2** Recent Status of the Earthquake Insurance Market in Japan

Factor	Status
Demand and supply	<ul style="list-style-type: none"><li>• There is a need for earthquake riders for seismic risks, but the supply cannot meet the demand because of rising premiums and insufficient supply capacity on the insurance company side.</li></ul>
Insurance company supply capacity	<ul style="list-style-type: none"><li>• The insurance companies have difficulty underwriting new policies. They need to make a large payout if an earthquake occurs, so they need to conduct careful screening to underwrite earthquake riders.</li><li>• Some insurance companies have difficulty offering new insurance policies, especially in areas from Kantō to Chūbu and Kansai.</li></ul>
Reinsurance market situation	<ul style="list-style-type: none"><li>• In general, the insurance companies do not bear all the risks associated with the earthquake insurance that they have underwritten but instead transfer the seismic risks to reinsurance companies. However, Japan has few reinsurance companies, and there are insufficient reinsurance opportunities available.</li><li>• For seismic risks, Japan actually has the world's largest protection gap (difference between uninsured and insured damages), so overseas reinsurance companies see this as a good opportunity to enter the Japanese reinsurance market.</li><li>• The growth of the reinsurance market in Japan is a good opportunity to expand the availability of earthquake insurance.</li></ul>

Sources: Meeting documents on risk finance concerning large-scale natural disaster (Cabinet Office) and interviews with experts.

<sup>8</sup> Information from interviews with industry experts.



## Box 5.2 Insurance for Infrastructure PPPs: International Examples

### Standardization of PF<sub>2</sub> Contracts (United Kingdom)

*Standardization of PF<sub>2</sub> Contracts* (HM Treasury 2012) obliges private contractors to insure both construction and operation periods. Required insurances should include third-entity liability insurance, contractors' "all risks" insurance, and property damage insurance during operation. However, if a private contractor purchases insurance to cover all identified risks, it will reduce the VfM; therefore, the public entity may consider providing private operators with the minimum protection. Against the three insurances mentioned above, the public authority will provide the relief in case of nonavailability of insurance and a significant increase in insurance premium in the insurance market. When insured risk becomes uninsurable, the authority will no longer ask a contractor to insure the same risk. Meanwhile, when terms and conditions become uninsurable during the insured period, the authority will not take its uninsurability as breach of contract. If such terms and conditions become uninsurable, the public authority will reduce the risk to a private contractor by reducing the value of the unitary charge.

When an insurance premium significantly goes up, a private contractor is responsible for 15 percent of the increase. This arrangement aims to encourage and incentivize private contractors to look for cheaper insurance when renewal is due. The remaining 85 percent of the cost burden will be borne by the public authority. Thus, contractors in general are affected by significant changes in premiums and factor such risks into business planning. Although the public sector in Japan takes responsibility for some elements of relief when disaster risks themselves are passed to private contractors, contractors in the United Kingdom will take natural disaster risks and mitigate such risks with insurance coverage. Given the limited availability of insurance, the public authority would provide the minimum relief for private contractors to reduce such risks.

### Legislative Guide on Privately Financed Infrastructure Projects (UNCITRAL)

The *Legislative Guide on Privately Financed Infrastructure Projects* (UNCITRAL 2001) explains the necessity of insurance as follows:

Except for cases in which the Government provides some form of direct support, privately financed infrastructure projects are typically undertaken at the concessionaire's own risk, including the risk of losses that may result from natural disasters and other exempting impediments, against which the concessionaire is usually required to procure adequate insurance coverage. Thus, some laws expressly exclude any form of compensation to the concessionaire in the event of loss or damage that result from the occurrence of exempting impediments. It does not necessarily follow, however, that an event qualified as an exempting impediment may not, at the same time, justify a revision of the terms of the project agreement in order to restore its economic and financial balance. (145)

### Guidance on PPP Contractual Provisions, 2017 Edition (World Bank)

In the "Guidance on PPP Contractual Provisions, 2017 Edition" (World Bank 2017), insurability is a key that determines the allocation of compensation for the damage caused by force majeure. Usually, the contracting authority bears the compensation when the risk is "uninsurable," defined as follows:

- (a) the unavailability of insurance on the international insurance market by insurers of an adequate credit rating/reputable insurers of good standing; and
- (b) where insurance premiums are prohibitively high (not merely more expensive)—for example, at such a level that the risk is not generally being insured against in the worldwide insurance market with reputable insurers of good standing by contractors in the same country. (27)

Equity investors and lenders may seek protection in the PPP contract for the private contractor in case required insurance cover becomes unavailable, less extensive, or more costly. This is because uninsurability makes the private contractor bear the uninsurable risk, which will be reflected in an expensive premium (if indeed it is bankable).

Sources: HM Treasury 2012; UNCITRAL 2001; World Bank 2017.

## 5.5 Role of Financial Institutions in Disaster Risk Management

In PPP projects, project monitoring with financing from private financial institutions is important to confirm the financial, technical, environmental, and social soundness of the projects. Today, it is common for financial institutions to request that private operators formulate DRM plans such as business continuity plans and emergency drill plans (frequency) when they are developing a proposal. In so doing, several types of considerations must be kept in mind.

### Disaster risk assessment in cash flow analysis

In financing for PPP projects in Japan, although there are some regional characteristics, earthquakes and tsunamis are always included in the risks that must be assumed. Some financial institutions have incorporated risk scenarios based on the assumption that a major earthquake or tsunami occurs every 30 years. In studying the different types of disasters that must be dealt with, it is important to take regional characteristics into due consideration.

When conducting cash flow analysis for each risk scenario, it is important to determine how much is covered by insurance. For seismic disasters, the probable maximum loss (PML) value is obtained and theoretical damages are taken into consideration. In addition, the expense items that always appear in a cash flow (concession fee, tax, fixed labor cost, and other expenses) are calculated to analyze each risk scenario quantitatively. Cash reserves for disasters, additional subordinate financing by sponsors, and payments for commissioned projects that can be withheld or deferred are closely examined and incorporated into contracts to make the project more resilient to disasters.

### Business models and nature of public works

In BTO (availability payment) projects, the public sector bears 99 percent of the risks for force majeure, and for the remaining 1 percent that the private business is required to deal with, the use of reserves and support from sponsors is stipulated. In user payment projects, the impact of force majeure on the cash flow is studied in detail. Also, financial institutions pay attention to the nature of public works. Even for the same type of airport infrastructure, the availability of support from the public sector can differ, for example, between an irreplaceable national hub airport and a regional airport that can be replaced by other transportation means.

### Due diligence and monitoring on DRM

In user payment projects, reports are obtained from independent insurance consultants or engineering consultants employed as lender's advisers before a financial close as well as during the construction and O&M phases. In addition to assessment by independent consultants, financial institutions assess risks on their own based on their experience and other methods. Based on the results of due diligence and monitoring before financial close and during the construction and O&M phases, financial institutions may request that the private operators implement preventive or corrective actions (for example, develop a business continuity plan) to enhance the resilience of the projects.

### Insurance and bankability

In many PPP projects, the public sector is required to obtain the necessary insurance. Financial institutions do not set this as a requirement for approving a loan, but insurance is taken into consideration in credit assessment. If insurance is obtained, it is assumed that risks are calculated as a cost.

Insurance covering force majeure, as well as its premium, affects overall cash flows and the project's business. For example, when profit insurance is obtained, the premium is high, which causes the cash flow to decline. The appropriate insurance to purchase is discussed between the financial institution and private operator, bearing in mind the project's commercial viability. For all projects except user payment projects, a high premium is paid by the public sector. If the private operators need to pay high premiums, the VfM may decline and it may no longer be advantageous to commission the PPP projects, which in turn would also be unwelcome for the public sector. Correspondingly, there is a belief that premiums should be paid by the public sector if the probability of occurrence is low and it is difficult to obtain insurance with a reasonable premium.

## 5.6 Summary and Key Takeaways

### Consider value for money and commercial viability when requiring or purchasing insurance for infrastructure PPPs

In infrastructure PPPs, each entity controls the risks that can be taken by themselves through their effective efforts on facility development, operation, and maintenance. Although insurance contracts are arranged for risks when significant impacts are anticipated, the insurance premiums can be highly expensive and do not necessarily contribute to enhance the VfM. Therefore, whether to require the private entities to obtain insurance for the infrastructure projects shall be carefully studied. In addition, there is a requirement that insurance voluntarily procured by private operators be an efficient and effective means of improving the VfM. Appropriate risk management should be considered through various instruments (for example, insurance, structural or nonstructural DRM measures, and reserves or contingency funds for reconstruction).

### Consider risk profiles and insurance availability

Japan is a particularly earthquake-prone nation, so there may be cases where it is difficult to obtain insurance for seismic risks at a reasonable cost; hence, despite recognizing the necessity of obtaining insurance, decisions need to be made by taking into account the regional characteristics and availability of insurance.

### Financial institutions encourage DRM measures by the private sector

For financing arrangements, financial institutions request risk assessments and due diligence from independent insurance and technical advisors and require private entities to enhance DRM measures such as business continuity plans and emergency preparedness and response plans. Early involvement of financial institutions is important to incorporate necessary structures for financing from the early stage of the project.

# 6. Conclusion and Lessons Learned from Japan

Based on the case studies described in the preceding chapters, this final chapter summarizes the lessons learned from Japan and implications for infrastructure public-private partnership (PPP) project development at each stage of a PPP project (figure 6.1).

**Figure 6.1 Overview of Japan’s Lessons Learned from Infrastructure PPP Projects**

	Risk sharing between public and private sectors	Measures to incentivize private sector DRM	Disaster risk finance and insurance
Policy and Legal Framework	<ul style="list-style-type: none"> <li>✓Disaster Countermeasures Basic Act is the fundamental basis for DRM and resilience in Japan.</li> <li>✓Develop a legal framework that takes into account project characteristics for each sector and indicate the possibility of risk sharing and intervention by a public entity.</li> <li>✓PFI projects are to comply with the DRM policy and legal frameworks.</li> <li>✓Prepare PPP guidelines on risks and standard contracts.</li> <li>✓<i>Establish a forum for the public and private entities to enable flexible responses to increasing climate risks.</i></li> </ul>		<ul style="list-style-type: none"> <li>✓<i>Expand the insurance (including reinsurance) market</i></li> </ul>
Project Preparation and Structuring (Contracting)	<ul style="list-style-type: none"> <li>✓Evaluate the disaster risks and identify the scope of risk sharing between the public and private sectors.</li> <li>✓When considering risk sharing to maximize VfM, review structural and nonstructural DRM measures, nature of the project, project profitability, and the private sector’s capacity to absorb the risks.</li> <li>✓Organize workshops to enhance understanding on disaster risks to promote DRM.</li> <li>✓Depending on country and regional characteristics, define force majeure based on risk assessment to minimize uncertainty among both public and private sectors in preparing for and responding to a natural disaster.</li> </ul>	<ul style="list-style-type: none"> <li>✓Transfer a certain degree of natural disaster risk to private operators to promote their efforts on resilience and innovation.</li> <li>✓Disclose information on past disaster damage, and encourage DRM efforts from the private entities.</li> <li>✓Incentivize the private operators to proactively develop DRM measures by introducing a monitoring and payment mechanism to reduce facility development fees in case of noncompliance with the specifications on DRM. This would incentivize the private sector’s DRM.</li> </ul>	<ul style="list-style-type: none"> <li>✓Encourage to insure insurable risks.</li> <li>✓Identify insurable risks that can be insured at a reasonable cost to maximize VfM.</li> </ul>
Procurement and Implementation	<ul style="list-style-type: none"> <li>✓Decide appropriate project schemes and risk sharing through Q&amp;A sessions between the public and private entities at a selection stage.</li> <li>✓Evaluate technical robustness and price in the context of life-cycle costs.</li> <li>✓Evaluate both structural and nonstructural DRM measures.</li> </ul>	<ul style="list-style-type: none"> <li>✓Set evaluation criteria on DRM measures such as BCPs and additional insurances.</li> <li>✓Encourage private operators to procure robust materials and use supply chains for risk reduction and quick emergency response and recovery.</li> </ul>	<ul style="list-style-type: none"> <li>✓Consider whether agile disaster recovery is possible by using insurance or derivatives.</li> </ul>
Financing	<ul style="list-style-type: none"> <li>✓In addition to predictability, determine the scope of risk sharing based on the potential impacts</li> <li>✓Taking into account the possibility of fund raising, use the risk assessment conducted by financial institutions.</li> </ul>	<ul style="list-style-type: none"> <li>✓Financial institutions are to require the private operators to prepare a BCP, DRM plans, and risk reduction investments.</li> <li>✓<i>Consider preferential finance and insurance arrangements (such as lower interest rates, lower premiums) for companies with robust DRM system including a BCP.</i></li> </ul>	<ul style="list-style-type: none"> <li>✓Arrange financing based on the results of project’s risk assessment.</li> <li>✓<i>Develop innovative financial products.</i></li> </ul>

*Note:* Italicized items have not been implemented in Japan, but are under consideration for the future. BCP = business continuity plan. DRM = disaster risk management. PFI = private finance initiative. PPP = public-private partnership. VfM = value for money.

## 6.1 Policy and Legal Frameworks


### Create Synergy between PPP and Disaster-Related Policies and Legislation

To promote infrastructure development via PPP, the Japanese government has enacted the PFI Act, published guidelines on risk allocation and contracting, and published a standard contract (as detailed in chapter 2). The Japanese government also analyzed actual projects to understand useful lessons for other implementation agencies (as covered in chapter 3). However, the importance of climate-resilient infrastructure within the legal and policy framework on PPP (such as the Act on Promotion of Private Finance Initiative [PFI Act]) is unclear. Instead, the importance of disaster resilience has been manifested in other policies developed by the government or municipalities, thus ensuring the public sector’s commitment to developing resilient infrastructure (figure 6.2).

For instance, the principal legal framework related to infrastructure development standards, such as disaster-related laws and the Building Standard Act, has been developed and continuously revised to reflect lessons learned from the past disasters. This legal framework is the basis for public infrastructure projects. During the development of PPP projects, public authorities embed the principles of this framework in bidding documents (that is, documentation that defines the specifications of disaster risk management [DRM] standards) to ensure development of risk-informed infrastructure because PPP is one of the forms of public procurement.

Instead of standardization, details of the specifications of resilience are provided in the bidding documents of each project and their contracts, taking into account the geophysical and hydrometeorological characteristics as well as the nature of the projects.

**Figure 6.2 Policy and Legal Frameworks for Resilient Infrastructure PPPs**

	DRM	PPPs
<b>Cabinet Office or line ministries</b>	<ul style="list-style-type: none"> <li>✓Basic Act on Disaster Countermeasures</li> <li>✓Building Standard Act</li> <li>✓Acts related to public works</li> </ul>	<ul style="list-style-type: none"> <li>✓PFI Act</li> </ul>
	<ul style="list-style-type: none"> <li>✓Infrastructure sectoral guidelines (water, transport, energy)</li> <li>✓Hazard maps</li> </ul>	<ul style="list-style-type: none"> <li>✓PPP standard contract</li> <li>✓PPP contracting guidelines</li> <li>✓PPP risk guidelines</li> </ul>
<b>Municipal governments</b>	<ul style="list-style-type: none"> <li>✓Municipal DRM ordinances</li> <li>✓Municipal DRM plans</li> <li>✓Regional hazard maps</li> </ul>	<ul style="list-style-type: none"> <li>✓Municipal PPP guidelines</li> </ul>
<b>Project parties</b>	<ul style="list-style-type: none"> <li>✓DRM plans</li> <li>✓Emergency preparedness and response plans</li> <li>✓Business continuity plans</li> </ul>	<ul style="list-style-type: none"> <li>✓Bidding documents</li> <li>✓Technical specifications</li> <li>✓Project contract</li> </ul>
		
<b>Resilient Infrastructure PPPs</b>		

Note: PPP = public-private partnership. DRM = disaster risk management.

In a PPP, it is necessary that both the public and private entities have a common understanding of risk sharing and share important information. Although the guidelines developed by the Cabinet Office serve as a useful tool for implementation, the contracting authorities should also take into account geophysical, hydrometeorological, and project characteristics and incorporate them into procurement and contracting. Therefore, it is essential that contracting authorities have the capacity and knowledge to understand disaster risks. An effective, specialized capacity-building program for the contracting authorities may be required to evaluate natural disaster risks and subsequently structure projects and develop risk-informed bidding documents.

### **Box 6.1 Selection of Procurement Methods**

Selection of the procurement method for public works is important to ensure infrastructure resilience. In Japan, there is a general understanding that, regardless of disaster risks, a public entity should bear general project risks for public projects of importance, that is, infrastructure that cannot cease operations at any times. Therefore, such projects should be implemented as traditional public works projects, or the public should share such risks with the private operator.

During the selection of the procurement method, beyond the aforementioned consideration, value for money (VfM) will also be examined. The most effective procurement method to reduce the economic impact of disasters can be selected if the examination takes account both structural and nonstructural measures for resilience to maintain business continuity.

## **Understand Risks and Open Data**

A basic information database on past natural disasters and anticipated risks enables the private entities to estimate long-term disaster risks. Sharing information from the public sector on past natural disasters can reduce uncertain risk factors for private operators. Because hazard maps and regional DRM plans developed by municipal governments result in effective disaster risk assessment by insurance companies, it is important for the public sector to develop and share disaster risk information proactively.

In addition, it is important for the government to develop case studies and summarize lessons learned from past disaster-affected projects and share success stories and know-how accumulated by awarding authorities, such as Sendai City, with potential implementation agencies and private operators. The central government will have a significant role to play in building such system.

## **Respond to Increased Climate Risks in the Future**

Given the long contract periods typically seen in PPP projects, it can be estimated that natural disaster risks would increase during the contract period because of climate change. However, none of the case studies from Japan incorporated future climate risks and risk reduction measures. In the current PPP contracts in Japan, the scope of the private sector's responsibility in responding to disasters depends on the results of discussions between the public and private entities.

Given the uncertainty of climate change impacts at the project level, climate-risk-informed risk sharing between the public and private sectors as well as methodology to define risk sharing will be required for future projects. These should cover eventualities when climate change indicators exceed the originally estimated levels, private sectors have prolonged project losses for a certain period, and private operators cannot continue construction or operations because of weather extreme or increased cost of risk. Both public and private entities need to agree on and identify necessary steps for negotiating the contract in case of significant changes in project preconditions and environment for the comfort of the private sector. If necessary, such discussion points should be incorporated into the PPP standard contract and guidelines.

## 6.2 Contracting and Risk Allocation

### Clarify the Scope of Force Majeure in Contracts

Although there is a certain understanding of the definition of force majeure and risk sharing between public and private entities, these concepts are not always clearly defined in a contract. When natural disasters occur, both entities need to discuss the response and recovery works to be implemented; however, unclear risk-sharing arrangements make it difficult for both entities to act promptly. Moreover, without clear definition, the private entity lacks a strong incentive to respond to disasters when a public authority bears most of the risks in public works. And when a private operator needs to bear most of the risks, the possibility of overburdens may result in reduced willingness to invest in projects.

Clear definitions of risk and identification of private operators' duties in a contract would avoid situations where private operators excessively bear uncertain risks. This practice also enhances their DRM awareness, which can contribute to early disaster response and recovery. Table 6.1 presents the sample provisions related to force majeure that can be included in a contract.

**Table 6.1** Sample Contractual Provisions of Force Majeure

Objective	Sample provision	Remarks
(i) Definition: Specify that certain natural disaster risks are to be borne by the private entity	<p><i>Specify the level of risk at which the private entity is responsible for additional costs and/or damage caused by force majeure events:</i></p> <p>The contractor bears the costs and damage caused by earthquakes of seismic intensity 4 or below), lightning that is attributable to inadequate maintenance of lightning protection equipment, or inappropriate response to an event.</p>	<ul style="list-style-type: none"> <li>Specify the magnitude of an earthquake based on the impact on a project. Based on lessons learned from a seismic event in the past, for example, the private entity was responsible for any damage caused by an earthquake below the seismic level that would damage the large telescope, which was an important project asset.</li> <li>A seismic intensity level is not always adopted as an indicator to measure the impact on a project.</li> </ul>
	<p>Force majeure on earthquakes includes the following level of phenomena: above the instrumental seismic intensity of 6.5, the degree of seismic level 7 by the Japan Meteorological Agency, ground horizontal acceleration 500 gal, a more disastrous earthquake than the Great Hanshin-Awaji Earthquake, whose seismic impact was unusual.<sup>a</sup></p>	<ul style="list-style-type: none"> <li>Refer to the past large earthquakes, determining not only the seismic intensity but also the ground horizontal acceleration as the criteria for determining force majeure and the impact on a project.</li> </ul>
	<p>Risks concerning a maximum rainfall of 80 millimeters or more (24 hours average) will be borne by the public.</p> <p>Even if the rainfall is below the above standard, this is considered as heavy rain if the average hourly rainfall is significant (20 millimeters or more).</p>	<ul style="list-style-type: none"> <li>Apply the same standards used in traditional public works procurement, and limit the risks to be borne by the private operator.</li> </ul>

Objective	Sample provision	Remarks
(ii) Methodology: Specify the methods for determining force majeure	<i>Provision on how to measure the scale of earthquake:</i> Install seismometers on the first and the top floors of a designated building.	<ul style="list-style-type: none"> <li>Develop detailed provisions through dialogues between the public and private entities for mutual understanding.</li> </ul>
	<i>Provision on how to measure a rainfall:</i> Hourly rainfall is observed at the nearest weather observation station (managed by a public corporation) from the damaged location.	<ul style="list-style-type: none"> <li>Clearly define the methodology for determining a force majeure event in the contract.</li> </ul>
(iii) Differentiate: Clearly differentiate baseline conditions, O&M requirements, and force majeure	<i>Defects and force majeure:</i> Force majeure is applied to the following case: more than a half of the buildings built at the same time in similar conditions underwent the same degree of damage or more damage that was undergone by the project assets.	<ul style="list-style-type: none"> <li>Add an explanatory note to distinguish the private operator's defects and force majeure.</li> <li>The building comparison is only applicable when there are buildings in similar conditions.</li> </ul>
	<i>Distinguish baseline characteristics and force majeure:</i> Example: The contractor bears responsibility for maintaining reclaimed land, including responding to ground subsidence at the airport during the O&M phase. The contractor bears the related O&M costs within the range specified in the specifications.	<ul style="list-style-type: none"> <li>Any obvious and apparent ground subsidence at the project site should be handled by the contractor; such subsidence should be distinguished from force majeure.</li> <li>However, when an unforeseen event causes ground subsidence that the contractor cannot handle, any related additional damage and costs will be borne by the public entity.</li> </ul>

Note: O&M = operation and maintenance.

a. "Seismic intensity" is measured on the Japan Meteorological Agency's seismic intensity scale. Seismic intensity is the value observed at a site where a seismic intensity meter is installed, and may vary within the same city. It is on a scale of 1 to 7, with 5 and 6 each divided into "lower" and "upper." Gal is a unit of gravitational acceleration equal to 1 centimeter per second. The Great Hanshin-Awaji Earthquake reached the maximum "7" on this scale.

## Define and Allocate Risks between Public and Private Entities to Maximize VfM

Because Japan is prone to natural disasters, the public sector has typically borne the disaster risks, and this has partly contributed to the development of PPP markets in Japan. However, case studies indicate that, as both the public and private entities accumulate PPP experience, disaster risks that the private sector can reasonably manage have been transferred to the private sector. Before allocating risks between public and private entities, it is important to

- Identify the level and scope of risks that can be managed by private entities and private financiers;
- Review the availability of risk transfer measures such as insurance at a reasonable cost; and
- Review the project's financial capacity (for example, profitability) to absorb the associated costs.

Factors to be considered when allocating risks between the public and private entities are summarized in table 6.2. Although private operators can bear a certain level of risk, there is a need to have a system for public entities to bear and compensate for the risks that have a critical impact on projects and that cannot be borne by private operators.



**Table 6.2 Determining Factors in Risk Allocation between Public and Private Entities in PPP Projects**

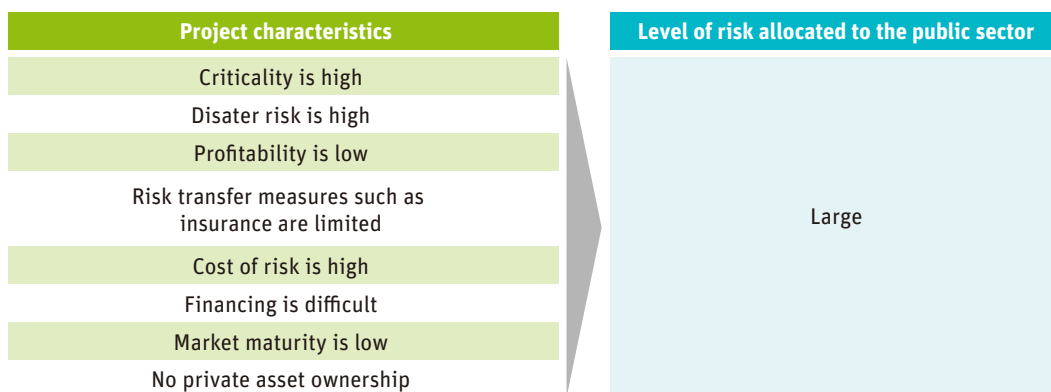
Factor	Principles	Examples of risk allocation
Nature and criticality of public service	The public sector will intervene and assure the continuity of critical infrastructure that cannot stop operations in the aftermath of a disaster.	<ul style="list-style-type: none"> <li>Airport projects are an important infrastructure facility for national and regional economic and security activities. Interventions and emergency measures will be taken by the government to mitigate the impacts of disasters on runways and risks can be borne by the public.</li> <li>On the other hand, passenger terminal buildings are considered to be for-profit projects, and the public sector will not intervene to ensure business continuity.</li> </ul>
	A large-scale public infrastructure cannot be easily relocated, and risk sharing and diffusion are difficult.	<ul style="list-style-type: none"> <li>The public sector bears a certain level of risk on airport concession projects.</li> </ul>
Disaster risks	When estimated damage poses a severe impact on a project, the public sector is responsible. In case of minor impacts or damage, the private sector is responsible for emergency response and recovery.	<ul style="list-style-type: none"> <li>The 2005 Miyagi Earthquake, of seismic intensity 5, damaged the main facility of Sendai's astronomical observatory, while no facilities have been damaged by earthquakes of seismic intensity 4 or below. Based on the experience and lessons learned, it was determined that the private operator be capable of absorbing the damage and impacts from hazards that are less than seismic intensity 4.</li> </ul>
Value for money and resilience	In addition to robust engineering design and materials, maintaining business continuity and enhancing resilience during the O&M phase is critical. A VfM analysis should take into account both structural and nonstructural DRM measures that can minimize economic losses from disasters as a result of appropriate risk allocation to the private operator.	<ul style="list-style-type: none"> <li>Sendai adopted PPP as the most efficient model for procuring school facilities because it was estimated to save public costs of responding to a natural disaster (for example, human resources and time required for damage and needs assessment, coordination with the municipal assembly) by sharing the responsibility of emergency response and recovery with the private operator.</li> </ul>
Project profitability	Natural disaster risks are borne by the private sector when private operators are able to increase profitability and decrease costs by their own initiatives or innovation.	<ul style="list-style-type: none"> <li>Unforeseeable and unavoidable risks were borne by the public sector since it was difficult to identify a reasonable range of unforeseeable events. The probability of avoiding risks was considered when analyzing project profitability.</li> <li>Because price increases on road concession projects are not usually at the discretion of the private sector, natural disaster risks are mainly borne by the public sector. National standards on public construction, which identify the public sector as a main natural disaster risk bearer, elaborate on risk allocation between public and private entities. On the other hand, a private entity shall bear all additional costs resulting from force majeure for any subprojects initiated by the entity.</li> </ul>
Insurance as a risk transfer measure	Risks that can be mitigated by reasonably priced insurance are borne by the private sector.	<ul style="list-style-type: none"> <li>In an airport concession project, the contracting authority identified the level of insurance to be purchased by the private operator, beyond which excess damage will be borne by the public sector.</li> <li>The contracting authority used an adviser to analyze the insurance market to identify the availability of insurance.</li> <li>In the case of countries like Japan that have a limited reinsurance market for earthquake insurance, excessive burden on the private sector is unrealistic.</li> </ul>
Acceptability of cost of risk	When the costs of measures to avoid or minimize expected risks are acceptable to the private sector, risks are borne by the private sector.	<ul style="list-style-type: none"> <li>Contractual provisions on unavoidable risks are not common. However, risks that can be avoided by a private operator with implementation of DRM measures are borne by the private operator.</li> <li>With a mechanism to compensate private operators for additional costs associated with DRM measures, risks can be reasonably allocated to the private sector.</li> </ul>

Factor	Principles	Examples of risk allocation
Bankability	Ensure appropriate risk allocation between the public and private entities to secure reasonable project finance and to avoid an excessive financial burden on the private sector.	<ul style="list-style-type: none"> <li>Carry out a cash flow analysis of disaster risk scenarios and determine possible project financing through a dialogue between public and private entities.</li> </ul>
Maturity of the market or track record of private entities and know-how	When the private sector's market maturity is high and the private sector has accumulated experience in managing risks, risks are borne by the private sector.	<ul style="list-style-type: none"> <li>When a private sector has borne similar risks on earlier projects and accumulated knowledge on DRM, risks are borne by the private operator.</li> <li>With increasing private sector involvement in infrastructure PPPs, transferring of natural disaster risks to private operators is increasingly considered. In Sendai, the definition of force majeure was reviewed, and certain natural disaster risks were allocated to the private sector. By allocating the risks to the private sector, the contracting authority encouraged active involvement of the private sector in DRM.</li> </ul>
Greenfield or brownfield asset ownership	If infrastructure is newly developed and owned by the private sector, risks are allocated to the private sector.	<ul style="list-style-type: none"> <li>In the case of greenfield infrastructure projects owned by private operators, the operators will have knowledge of the physical and operational resilience of infrastructure and will control the maintenance of the infrastructure. Certain risks can therefore be allocated to the private sector.</li> </ul>
Future impacts on the project	To deal with unknown risks in the future, a mechanism to measure impacts on project profitability over a certain period and a flexible mechanism to trigger negotiation between the entities should be developed.	<ul style="list-style-type: none"> <li>It is difficult to define all possible future risks, so impacts on the project's profitability, which can result in business continuity difficulties for a private operator, are measured to trigger a negotiation between the entities if required.</li> <li>As assumptions and preconditions of a contract can be changed over a period of long-term contracts, critical factors are monitored to trigger negotiation between public and private entities to maintain contractual flexibility.</li> <li>Future climate risks with deep uncertainty can be dealt with using a similar structure.</li> </ul>

Note: DRM = disaster risk management. O&M = operation and maintenance. PPP = public-private partnership. VfW = value for money.

A relationship among the factors highlighted in table 6.2 to help determine the level of risk allocation to the public or private sector is summarized in figure 6.3. Risk allocation for each project should be defined after comprehensive consideration of these factors.

**Figure 6.3 Principles of Disaster Risk Allocation to the Public Sector in PPP Projects**



Note: PPP = public-private partnership.

## Use Iterative Processes to Enhance Understanding and Risk Sharing between the Public and Private Sectors

In the case of Sendai's Health Facility project, both Sendai City and the private operators lacked awareness on understanding and preparing for risks, which led to damage to the assets from the 2005 Miyagi Earthquake. Learning from the experience, for the New Observatory project, Sendai conducted risk workshops during the project development stage to identify risks for the public and private entities. Both entities clearly recognized the significant impact of disaster risks, which was reflected in the development and operation of resilient infrastructure. As a result, private operators were able to promptly manage recovery and reconstruction after the Great East Japan Earthquake.

## 6.3 Procurement, Monitoring, and Payment

### Conduct Dialogues between Public and Private Entities to Facilitate Project Structuring

Effective dialogues between public and private entities during the procurement phase enable development of a mutually agreed-upon definition of force majeure and allocation of risk that can help attract the private sector's investment in PPP projects. In Japan, several question-and-answer sessions are conducted after the request for information (RFI) is issued, which enable enhanced mutual understanding between the public and private entities.

A procurement authority aiming for a competitive bid environment should share the expected project structure at an early stage of the procurement process and conduct dialogues with the private entities to gain an understanding on the commercial viability of DRM measures that a private operator can invest in and implement as part of the project.

### Incorporate DRM into Evaluation Criteria of Bid Proposals

Some projects incentivize private DRM initiatives and innovation by requesting proposals from the bidders on risk-informed infrastructure designs as well as by setting high evaluation points for strict DRM and additional insurance. The procuring authorities require design and construction of infrastructure in compliance with the relevant laws and regulations (such as building regulations and the Disaster Countermeasure Basic Act). The procuring authorities also ask the private sector to take into account resilience throughout the life cycle of infrastructure assets. A creative example includes a case where a private entity chose earthquake-resistant construction materials to minimize the potential damage.

It is recommended to proactively use the private sector's know-how and networks for quick disaster response and recovery. For example, a private operator can often access financing and insurance faster than a public entity in some cases to raise funds for reconstruction. It is important to include nonstructural DRM measures in the evaluation criteria, in addition to structural DRM measures such as engineering design and materials.

Table 6.3 summarizes the lessons learned from the impact of the Great East Japan Earthquake on the Shin Nomura School Meal Supply Center Development Project in Sendai City.

**Table 6.3 Lessons Learned from Japan on Evaluation Criteria in a Disaster-Affected Project: Sendai School Meal Supply Center**

Phase	Practices, results, and lessons
Contractual arrangement	<ul style="list-style-type: none"> <li>Evaluate proposals on engineering measures to protect and minimize seismic risks; evaluate nonstructural measures and institutional arrangements that enable prompt emergency response and recovery.</li> <li>Reduce penalty points when a private operator continues services or immediately recovers after a force majeure event by using innovative measures.</li> <li>The contract noted that the “City and a private operator shall take immediate measures according to the appropriate procedures in order to remove impact of force majeure immediately and need to make efforts to minimize damages from force majeure events to the other entity.”</li> </ul>
Disaster response	<ul style="list-style-type: none"> <li>City officials were preoccupied with emergency response across the city, so the private operator took an initiative to restore the damaged facilities.</li> <li>A private operator was able to procure materials for emergency response and reconstruction in a flexible arrangement via its own procurement network. On the other hand, a facility owned and managed by the city required administrative processes and longer time for recovery because of inflexible contract management systems in the public sector.</li> <li>The PPP project achieved recovery 2.5 months earlier than the facilities managed by the city.</li> <li>The associated costs of emergency response and recovery were covered by insurance.</li> </ul>
Lessons learned	<ul style="list-style-type: none"> <li>It is possible to have early recovery of facilities by using the private sector’s know-how and flexibility, such as its own procurement network for obtaining recovery materials etc.</li> <li>Compared with the constraints in annual budgets faced by the public sector, a private operator can ensure funds for reconstruction by using insurance.</li> </ul>

## Payment Mechanisms to Incentivize DRM

The project development phase should include mechanisms to encourage innovation from private operators. For example, appropriate payment mechanisms can incentivize the private operators to invest in DRM. General economic incentives include bonus payments and strict penalties (table 6.4).

**Table 6.4 Payment Mechanisms Used as Incentives**

Incentive	Action	Remarks
Bonus provision	Provide bonus payments or reduce penalty points if the required service is appropriately managed during the operation and maintenance phase.	<ul style="list-style-type: none"> <li>If the project does not include any profit centers, additional funds will be required for bonuses, which can be a hurdle for flexible or prompt response.</li> <li>No budgetary arrangements will be required for reduction of penalty points.</li> </ul>
Strict penalty	Reduce service payment with failure of performance of private operator.	<ul style="list-style-type: none"> <li>The impact of reducing service payments on debt financing should be considered.</li> <li>The penalty shall be defined depending on the importance of the service to ensure its effectiveness as an incentive.</li> </ul>

For the Astronomical Observatory Project, Sendai City established a policy for reducing the private operator’s contracted amount in case of facility defects that do not meet the specifications and performance standards taking into account the importance of the facility component, degree of defects, time required for corrective actions, or other factors. Sendai City developed the approach to incentivize the private sector’s investment in DRM as a lesson learned from the facility defects in the Sports Facility Project, which were triggered by the 2005 Miyagi Earthquake (table 6.5).

**Table 6.5 Lessons Learned on Incentive Mechanisms in Disaster-Affected Projects**

Phase	Practices, results, and lessons
<b>Sports Facility Project, Sendai City</b>	
Contractual arrangement	<ul style="list-style-type: none"> <li>• The contract provided for no reduction in design or construction fees. There was little economic incentive to conduct appropriate monitoring of assets.</li> </ul>
Disaster event	<ul style="list-style-type: none"> <li>• The ceiling collapsed during the Miyagi earthquake (concluded to be a latent defect on the part of the private operator).</li> </ul>
Lessons learned	<ul style="list-style-type: none"> <li>• There is a need to restructure the mechanism of service payments, enabling more appropriate management and monitoring to minimize the effects of accidents.</li> </ul>
<b>Astronomical Observatory Project, Sendai City</b>	
Contractual arrangement	<ul style="list-style-type: none"> <li>• The contract provided for possible payment reduction in design or construction fees.</li> <li>• The private operator is exempted from responsibility for force majeure.</li> </ul>
Disaster response	<ul style="list-style-type: none"> <li>• The private operator took initiative to reconstruct the facility after the disaster after the 2011 Great East Japan Earthquake.</li> </ul>
Lessons learned	<ul style="list-style-type: none"> <li>• Monitoring and disaster response measures were considered in advance, and a private operator responded to the damage caused by the disaster proactively and flexibly, allowing city officials to handle other disaster-related matters.</li> <li>• It is important to allow a private operator to own assets, strengthen ownership, and develop a business continuity plan and a disaster response plan in advance.</li> </ul>

In the build-transfer-operate (BTO) project model, the ownership of facilities is handed over to the contracting authorities before the operation and maintenance (O&M) phase begins; therefore, it is difficult to include payment reduction mechanisms for the engineering designs of assets. Build-operate-transfer (BOT) projects, however, may introduce a unitary payment system to incentivize private operators to maintain the certain service levels.

## 6.4 Disaster Risk Finance, Insurance, and Financial Institutions

### Insurance Availability and VfM

Although every risk in PPP projects is allocated to the public and private sector, it is effective to insure the risks when the risks have significant impact on the projects and are not attributable to either entity. This would secure business continuity of projects.

In general, insurance against property damage is widely purchased. PPP projects may experience not only property damage but also other damages during implementation; therefore, projects should have suitable insurance coverage (for instance, third-entity liability insurance, liability insurance for airport management for airport projects). Furthermore, the economic losses caused by damage to suppliers of equipment and materials as well as interruption of utility services such as electricity, water supply, and sewerage may have prolonged impacts on the project’s business continuity. In such cases, profit losses may exceed the value of the property damage. Therefore, it is ideal to insure against business interruption losses.

Meanwhile, because Japan is prone to earthquakes, the premiums for earthquake insurance have significantly increased. Although interest in earthquake insurance has grown among project operators, such insurance is not

readily available owing to capacity issues with suppliers and a weak reinsurance market that can bear such risks. Therefore, even if private operators insure against earthquakes, they may end up with higher costs relative to the period before several large-scale earthquakes occurred. Increased costs for earthquake insurance may lead to a deterioration of VfM. Therefore, the awarding authorities and private operators need to consider the cost-effectiveness of an insurance coverage.

## Encourage DRM by Financial Institutions

As a requirement to secure financing from financial institutions including commercial banks, there are cases where private operators are asked by a third entity (such as insurance consultants or technical advisers) to assess and evaluate disaster risks, develop a business continuity plan and DRM plan, and prepare a technical due diligence report to review the engineering designs of assets during the financing stage. Financial institutions also ask the private operators to disclose the details of DRM measures. When disaster risks are to be allocated to private operators in PPP projects, it is important to confirm whether these risks are acceptable to the financial institutions, as providers of the project funds, in terms of project bankability.

From the perspective of securing repayment sources, financial institutions have a strong incentive to promote stable projects and possess know-how on cash flow management (for example, secure cash reserve, insurance coverage, and measures to postpone payment to subcontractors for a certain period). During the dialogues with financial institutions, private operators shall seek advice from the financial institutions and develop a robust income and expenditure plan that can enable investments in DRM measures including emergency response.

Moreover, the PPP project framework includes a concept known as the direct agreement, which allows direct discussions on business continuity measures between a contracting authority and a financial institution. This framework contributes to smooth financing arrangements and securing business continuity at times of disasters.

Box 6.2 discusses potential financial products that may be developed in the future to incentivize resilience investments in infrastructure PPPs.

### Box 6.2 Innovative Financial Products for Future Development

As discussed in the case studies, disaster risks were properly evaluated in a number of cases, especially in Sendai. However, because of an upper limit on the order price of a PPP project, there have been a limited number of cases where projects utilized risk hedging and innovative disaster risk finance measures, including insurance based on a quantitative assessment and evaluation of natural disaster risks at the project level. In addition, there is a common understanding and belief among the private operators that the public sector should bear disaster risks, especially when a large-scale disaster occurs.

As a result, the availability of innovative disaster risk finance products that incentivize investments in resilience in infrastructure PPPs is limited in Japan. Although the reinsurance market especially on earthquake insurance in Japan has a little capacity to accept new insurance, it would be effective to use investors' funds from capital markets. In the future, it will be necessary to identify the merits of alternative risk transfer approaches such as catastrophe bonds (cat bonds), weather and climate derivatives, and improvements required to expand such risk alleviation measures. Financial incentives to enhance disaster resilience and increase availability of financial products that consider disaster resilience should be promoted. For example, lowering premium prices by providing a preferential interest rate for resilient infrastructure services (for example, business continuity planning) may be considered.

As private participation in this market increases, it may be possible to promote the development of new financial products. PPP projects need to be structured more attractively to ensure that willing private operators bear a certain level of risks.

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# Appendix A:

## Legal and Policy Frameworks in Japan for Public-Private Partnerships and Disaster Risk Management

### A.1 PPP-Related Laws and PPP Promotion System

Japan introduced the public-private partnership (PPP) model on a large scale by enacting the Act on Promotion of Private Finance Initiative (Act No. 117 of 1999) (PFI Act, hereafter) and subsequently promoting its spread (table A.1). In addition to the enactment of the PFI Act, the PPP/PFI Promotion Office was established under the Cabinet Office. The PFI Promotion Office plays an advisory role to the prime minister and other public agencies. It has developed several guidelines that help local governments understand the PPP project and contracting process (table A.2). The same office also provides the public with information that promotes PPP, and coordinates the PPP promotion across various agencies at the central government level. Given its advisory role, the Promotion Office neither prepares individual projects nor provides financing to PPP projects.

**Table A.1 PPP-Related Legal and Financial System in Japan**

Year	Action	Content
1999	Act on Promotion of Private Finance Initiative (PFI Act) enacted	This Act aimed to promote development of public infrastructure by using private financing and management and technical capacity.
2011	Concession model introduced	To promote the concession model, the above Act enabled private operators to decide the level of user fees and to collect them, as well as to take out mortgages for operating rights in public infrastructure. This amendment to the PFI Act allowed private operators to submit unsolicited proposals, while at the same time requiring the public sector to respond to such proposals from private entities.
	Unsolicited proposal specified	This amendment to the PFI Act allowed private operators to submit unsolicited proposals, while at the same time requiring the public sector to respond to such proposals from private entities.
	Eligible sectors for PPP projects expanded	Ships, aircraft, and satellites were added to the list of sectors eligible for PPP projects.
2013	Private Finance Initiative Promotion Corporation of Japan established	The public-private fund was established to expand financial arrangement opportunities for user payment PPP projects.
2015	System introduced to deploy retired public servants to concession projects	A system to allow retired public servants with expertise to work on concession projects was established.

Note: PPP = public-private partnership.

**Table A.2 PPP/PFI Promotion Office Guidelines to Support PPP Projects in Japan**

Year	Guideline	Content	Any description of force majeure?
2001 (amended 2007)	Guideline on process of PPP projects	Guideline on implementing PPP projects that explains the procedure and the key points to be followed for preparing and implementing projects	No
2001	Guideline on risk allocation in PPP projects	Guideline that explains risk allocation considerations in PPP projects	Yes
2003	Guideline on VfM	Guideline that explains the assessment of VfM (value for money), which will be calculated upon selecting an operator	No
2003	Guideline on Contracting	Guideline that includes an overview of objectives, applicable laws, and important points to be stipulated in a contract	Yes
2003	Guideline on Monitoring	Guideline on considerations in monitoring in PPP projects	No
2015	Guideline on operating right and operation of public facilities	Guideline on important considerations and discussion points for the preparation and implementing of concession projects	Yes
2010	PPP Standard Contract (for public facility development with availability payment)	Prepared as a sample contract for availability payment contracts, but it is recommended that contracts be prepared based on the characteristics of individual projects	Yes

Note: PPP = public-private partnership. VfM = value for money. “PPP/PFI Promotion Office” refers to the Private Finance Initiative Promotion Office under the Cabinet Office.

The introduction of the concession model (defined and further discussed in chapters 1 and 2 of this report) has helped prepare a base for private financing to fund existing infrastructure elements that have high profitability. The Private Finance Initiative Promotion Corporation of Japan was established in 2013 with public-private investment to provide funding support. The establishment of this agency has helped prepare the framework to support more user payment projects (including concession projects) by providing financing to private operators, and to further develop infrastructure with PPP models.

## A.2 Disaster-Related Laws

### Disaster Countermeasures Basic Act

The Disaster Countermeasures Basic Act (Act No. 223 of 1961) (the Act, hereafter) serves as the basis for Japan’s disaster risk management (DRM) system. The Act clearly defines the roles and responsibilities of the central and local governments for all phases of disasters such as prevention, emergency responses, recovery, and reconstruction. Regarding activities related to disaster recovery, the relevant public and private entities will work together to implement various disaster countermeasures by ensuring the cooperation of private organizations (Cabinet Office 2015a).

This Act, which is the pivotal legislation for disaster countermeasures systems in Japan, was enacted in 1961, taking into account the lessons learned from the Isewan Typhoon (also known as Typhoon Vera) in 1959. This Act aims to protect citizens’ lives, livelihoods, and property from natural disasters and to contribute to public welfare. It clearly stipulates the responsibilities of DRM administration, development of comprehensive and strategic DRM structures, social welfare, and other issues. It primarily focuses on seven points:

- (1) Clarifying the definition of the responsibilities for DRM
- (2) Disaster-related organization (development and promotion of comprehensive DRM administration)
- (3) Planning disaster response (development and promotion of systematic DRM measures)
- (4) Promotion of disaster countermeasures
- (5) Protection of affected people and their livelihoods
- (6) Financial measures
- (7) Disaster emergency

The Act has frequently been reviewed and amended since its enactment, taking into account the lessons learned from large-scale disasters. For example, after the Great Hanshin-Awaji Earthquake in 1995, an amendment in the same year included the codification of disaster relief requests for the Japanese Self-Defense Forces (JSDF). Similarly, after the Great East Japan Earthquake in 2011, the same Act was amended significantly in 2011 and 2012. Since then, measures against large-scale disasters have been taken by reviewing this Act almost every year.

**Table A.3 Major Revisions of the Disaster Countermeasures Basic Act, 1961–2016**

Year of major revision	Details of revision
Enacted 1961	<ul style="list-style-type: none"> <li>• Clarification of responsibilities of DRM administration</li> <li>• Development of comprehensive and strategic DRM structures</li> </ul>
1995	Establishment of DRM mechanisms based on volunteer groups and private organizations, loosening requirements for the establishment of an Extreme Disaster Management Headquarters led by the prime minister, and codification of disaster relief requests for the JSDF
2011	Wide-area response for large-scale disaster and improvement of regional DRM capabilities
2012	Procedure for affected people to stay beyond the municipal and prefectural borders (enhancement of the measures concerning support activities mutually done by local governments, and the like)
2013	Measures for ensuring smooth and safe evacuation of residents, improving protection of affected people, and so on
2014	Strengthening of measures against unattended cars to promptly clear them from the roads for emergency vehicles
2015	Preparations for disaster waste disposal on a routine basis
2016	Promotion of reform to enhance regional autonomy and independence (delegation of powers and administrative work to provincial and local government)

Source: Cabinet Office 2016b.

Note: DRM = disaster risk management. JSDF = Japanese Self-Defense Forces.

In Japan, the Cabinet Office, which is responsible for ensuring cooperation and collaboration among related government agencies on wide-ranging issues, is mandated to undertake the planning of basic DRM policies and responses to large-scale disasters, as well as to conduct overall coordination. In this structure, the Central DRM Council (with the prime minister as the chair and including all Cabinet members) decide DRM policies at the national level, which are then accordingly carried out by respective ministries and agencies.

The Act mandates the formulation of DRM plans. The Basic DRM Plan is the highest-level plan prepared by the

Central DRM Council. Under the Basic DRM Plan, every designated government and public agency<sup>9</sup> prepares a DRM Operation Plan, while every local government entity prepares a Local DRM Plan. Since DRM Plans are formulated on a municipal government basis, municipal DRM agencies stipulate specific tasks to be performed for DRM in that region in their DRM plans, in accordance with the circumstances of each region.

## Risk Approach in Disaster-Related Laws

In Japan, which frequently suffers from natural disasters including earthquakes, laws and standards have been enacted, reviewed, or strengthened with each occurrence of a large-scale disaster by repeating the PDCA (Plan, Do, Check, Act) cycle to avoid the same tragedy in the future. As table A.4 indicates, the Building Standards Act related to infrastructure and PPP facilities has been revised after each major earthquake.

**Table A.4 Relationship between Major Earthquakes and Quake-Resistant Standards in Japan, 1948–2013**

Earthquake event	→	Result
1948: Fukui Earthquake	→	1950: Enactment of the Building Standards Act
1978: Miyagi Earthquake	→	1981: Amendment of Order for Enforcement of the Building Standards Act, introduction of current earthquake engineering laws
1995: Great Hanshin-Awaji Earthquake	→	1995: Act on Promotion of the Earthquake-Proof Retrofit of Buildings 2000: Amendment of the Building Standards Act
2004: Chūetsu Earthquake	→	2005: Partial amendment of the Act on Promotion of the Earthquake-Proof Retrofit of Buildings
2011: Great East Japan Earthquake	→	2013: Partial amendment of the Act on Promotion of the Earthquake-Proof Retrofit of Buildings

The Building Standards Act was last amended in 2012.<sup>10</sup> There were many instances of collapsing ceilings and falling escalators in large buildings during the Great East Japan Earthquake in 2011. The 2012 amendment stipulates that the elevator hoistway area should not be included in the total area when calculating the floor area ratio. In addition, a partial amendment of the Act on Promotion of the Earthquake-Proof Retrofit of Buildings was passed in 2013 in response to the Great East Japan Earthquake. This Act makes it obligatory to test the earthquake resistance of the design of certain buildings used by the public. These buildings include hospitals, schools, and nursing homes that require special attention on users during evacuation, as well as waste management or other storage facilities that handle a certain amount of hazardous materials.

As these examples show, the Japanese government anticipates the potential risks of the next disaster based on experience from past disasters, and promptly includes the lessons from such past experiences in legal systems and implementation plans to ensure that public facilities take strict measures against disasters.

<sup>9</sup> There are 24 ministries and agencies designated as government organizations and 66 organizations (including independent administrative agencies, Bank of Japan, Japanese Red Cross Society, NHK, electric and gas companies, and Nippon Telegraph and Telephone Corp. [NTT]) designated as local public corporations (Cabinet Office 2015a).

<sup>10</sup> “Partial Amendment of the Ordinance for Enforcement of Building Standards Act” (2012) by the Ministry of Land, Infrastructure, Transport and Tourism.

## Disaster Risk Assessment in Municipal Legislation (Case of Sendai City)

Sendai City, a municipality and one of the autonomous communities affected by the Great East Japan Earthquake, has also increased its resilience by learning from past disasters and amending relevant laws.

In accordance with the provisions of Article 42 of the Disaster Countermeasures Basic Act (Act No. 223 of 1961), the municipality formulated the Sendai City Local DRM Plan in 1964, in which the Sendai City DRM Council has defined local risk reduction investment, emergency response, and recovery efforts (Sendai City 2014). This DRM plan has also been amended thoroughly with each occurrence of a large-scale disaster—most recently in 2016—showing that the local government is treating past disasters as potential future disaster risks and taking necessary measures against them.

**Table A.5** Formulation and Revision of Sendai City Local DRM Plan

Earthquake event	→	Result
1995: Great Hanshin-Awaji Earthquake	→	1997: Total revision (seismic disaster countermeasures)
2011: Great East Japan Earthquake	→	2013: Total revision (seismic/tsunami disaster countermeasures)

Source: Sendai City 2014.

The Sendai City DRM plan describes and addresses possible earthquake, high winds and floods.

### Earthquake

The Headquarters for Earthquake Research Promotion, which falls under the Ministry of Education, Culture, Sports, Science and Technology (MEXT), releases the results and findings of research on earthquakes.<sup>11</sup> The Sendai City Local DRM Plan uses these research data as the basis for making plans for possible disasters, drawing a long-term perspective from the assessments from earthquake sizes (magnitude) and probability of occurrence within a certain period. The Plan focuses on earthquakes that can affect Sendai City out of all the earthquakes in major active fault zones and trench-type earthquakes that are indicated in the research results.

For example, the Sendai City Local DRM Plan lists earthquakes in the waters off Miyagi Prefecture as trench-type earthquakes. In this region, inter-plate earthquakes with magnitudes of 7.1–7.4 have been occurring repeatedly in specific areas since 1885. It is estimated that the average occurrence interval is approximately 38 years, and the probability of an earthquake with a magnitude of 7.0–7.3 occurring is 60 percent in the next 30 years and 80 percent in the next 50 years, excluding those that occur repeatedly.

### Wind and Flood Damages

The Sendai City Local DRM Plan identifies possible danger areas for flooding, landslides, storms, and tornados that can occur in the city in the future based on past precipitation, wind speed, and topological characteristics. With respect to flooding, for example, the plan estimates flooded areas through computer simulations using statistical precipitation from previous extreme rains. The probability of flooding is calculated based on the results of simulations using different rainfall conditions for each river. Possible submerged areas identified by the simulations are shown in flood and sediment disaster-hazard maps that are distributed to the communities and citizens.

<sup>11</sup> The Headquarters for Earthquake Research Promotion is directed by the Earthquake and Disaster-Reduction Research Division, Research and Development Bureau, of MEXT.

As for sediment disasters, hazardous areas are pointed out in the Act on Promotion of Sediment Disaster Countermeasures for Sediment Disaster Prone Areas and the three major acts for prevention of sediment disasters (the Sand Control Act, the Landslide Prevention Act, and the Act for Prevention of Disasters Caused by Steep Slope Failure).

Most of these areas are also shown in flood and sediment disaster-hazard maps and similar maps. Moreover, this DRM plan uses data on population and building distribution across these danger areas to identify potentially hazardous factors in wind and flood damage to the city by combining these possible danger areas and the social conditions such as population and building distribution. It is likely that Sendai City's continuous efforts toward improvements via the PDCA approach helped minimize damages during the Great East Japan Earthquake.

### **World Bank DRM Hub, Tokyo**

The World Bank Tokyo Disaster Risk Management (DRM) Hub supports developing countries to mainstream DRM in national development planning and investment programs. As part of the Global Facility for Disaster Reduction and Recovery, the DRM Hub provides technical assistance grants and connects Japanese and global DRM expertise and solutions with World Bank teams and government officials. The DRM Hub was established in 2014 through the Japan-World Bank Program for Mainstreaming DRM in Developing Countries – a partnership between Japan's Ministry of Finance and the World Bank.

### **GIF**

The Global Infrastructure Facility (GIF) is a global collaborative platform that facilitates the preparation and structuring of complex PPPs in infrastructure and the mobilization of capital from the private sector and institutional investors.

### **GFDRR**

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership that helps developing countries better understand and reduce their vulnerabilities to natural hazards and adapt to climate change. Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training, and knowledge sharing activities to mainstream disaster and climate risk management in policies and strategies. Managed by the World Bank, GFDRR is supported by 36 countries and 10 international organizations.

### **PPIAF**

PPIAF provides technical assistance to governments to support the creation of a sound enabling environment for the provision of basic infrastructure services by the private sector. PPIAF also supports the generation and dissemination of knowledge on emerging practices on matters relating to private sector involvement in infrastructure.

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