Report

2014 Global Risk Landscape

A DBJ Survey of Japan's Local Communities on Comprehensive Risk Assessment and Attitudes toward Resilience:

March 2014

DBJ Development Bank of Japan Inc.

Preface

This report summarizes the views of Japan's regional communities, as represented by local authorities and private businesses, on the overall risks confronting their region and their resilience in the face of those risks. It combines the preparation of an all-hazard risk landscape with a survey of attitudes toward *resilience:* the ability to adapt during a crisis and create a new environment of equilibrium. Such projects remain relatively rare, even among developed nations; this is the first survey of its kind to be conducted in Japan.

Japan's geophysical situation makes it especially prone to natural calamities. With the risk of natural disaster ever present, the Japanese people have grown increasingly aware of the need for disaster prevention and mitigation, and scientists and engineers have been busy developing technologies to maximize every aspect of community safety. The knowledge, culture and values of Japanese society have been enhanced as a result. Through injections of national resources, mostly into "hard" social infrastructure programs such as the Comprehensive National Development Plan of the postwar years and the Plan for National Resilience in place today, Japan has built the foundations for stability, wealth accumulation, sustainability and growth. Japan is among the best-equipped countries in the world today in regard to the prevention and mitigation of natural disasters.

In the broader view, however, it is clear that the risks to Japan go beyond the threat of natural disaster. The country faces risks involving terrorism, geopolitical relations with its neighbors, and energy procurement, as well as economic, financial, and monetary risks. New technology also engenders risks, as do a weakening population due to the country's low birth rate and overall aging, as well as the potential for nuclear disaster and climate change. No organization or regional authority can manage these risks on its own. And once such risks materialize, their impact on society is enormous.

Nevertheless, Japanese risk and crisis management gives inordinate attention to natural disasters. The risks that come with living interdependently in the global society are given scant notice, and in many cases are not acknowledged as risks at all. Resilience, a central item on the global agenda, is rarely discussed and is often misinterpreted when it is. One probable reason is that Japan's traditional framework for natural-disaster management, which focuses on the prevention and mitigation of disasters and the development of resilience, has no place for the technologies and values required to manage risk in the modern world.

An important element of this report is its all-hazard risk landscape. The information it provides will promote a deeper understanding of the relative possibility of a given risk's materializing, the extent of its impact, and its characteristics in terms of interdependency. As a society, we need to know how to strengthen our mechanisms for recognizing, managing, and mitigating the impact of risks which cross boundaries such as administrative districts and the lines between public- and private-sector responsibility. Comprehensive information is essential if we are to obtain a

complete picture, and is also critical to encouraging a robust dialogue on risk among all stakeholders. Japan has no comprehensive data at present to connect the risks that pose latent threats. The information presented here should motivate society's multiple stakeholders, including the national government, local public bodies, private companies, and citizens, to identify their level of demand for self-help and develop systems to encourage it. It should stimulate active cooperation across all entities and frameworks and promote reasonable risk-sharing wherein each entity's responsibilities are clearly spelled out.

Unfortunately, even a risk landscape cannot predict exactly when, or in what manner, a risk will occur. This makes it more important than ever that Japan create an environment which contributes organically to its crisis management capabilities as a nation. The World Economic Forum has proposed enhancing the resilience of regions and the nation as a whole, so that, in the event of a crisis, private firms will be able to keep their supply chains open and otherwise maintain business continuity, and local governments remain functioning. No one doubts that Japan will experience further crises. When the next one comes, strategic risk and crisis management – based on a shared understanding of the range of risks involved – will be crucial to minimizing preventable death and loss.

Japan must aim to thoroughly evaluate its imminent risks, prioritize their handling, and minimize their negative impact on society. But is such strategic, proactive management feasible? This is a key policy challenge that calls into question the crisis management capabilities of individual entities and the nation's governance: its ability to govern in a new era of risk. How to design a resilient society is a question that will test our wisdom as a nation.

We hope that readers of this report will share with us their impressions and opinions, as well as their ideas on how we might improve the survey in the future.

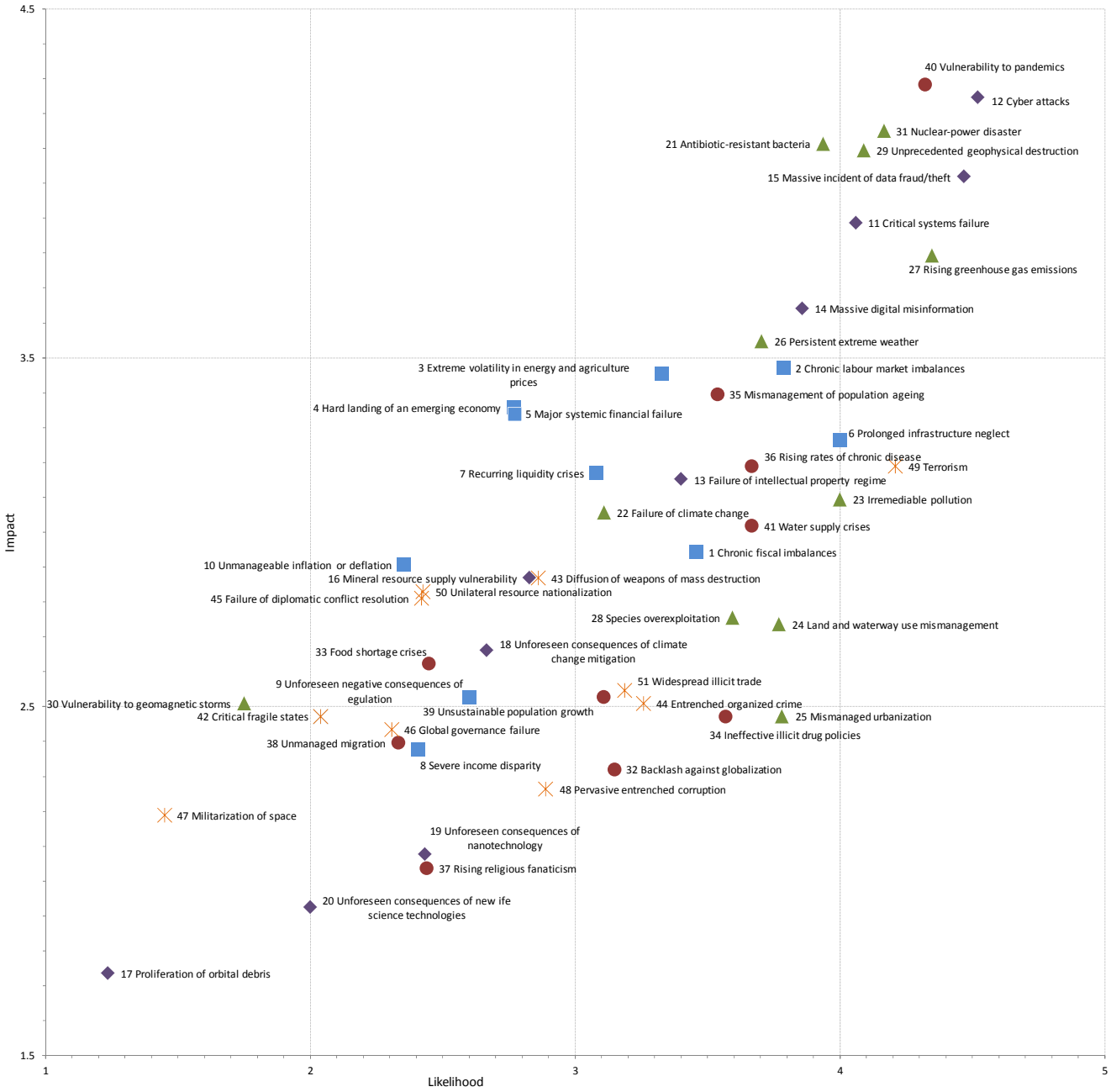
YOSHIKI HIRUMA
(Development Bank of Japan Inc.)

Cooperation in the implementation of this survey was provided by the Council on Competitiveness-Nippon (COCN) and the University of Tokyo's Policy Alternatives Research Institute.

The 2014 Global Risk Landscape: A DBJ Survey

Executive Summary

51 Risks in Landscape Format



Top Five Risks in Order of Likelihood

Ranking	2014 Global Risk Report			2013 Global Risk Report
	All	Local public bodies	Private companies	
1	Cyberattacks (several months)	Cyberattacks (several months)	Large-scale theft or unauthorized use of data (about 6 months)	Extreme income disparity
2	Large-scale theft or unauthorized use of data (about 6 months)	Nuclear disaster (more than 3 years)	Cyberattacks (several months)	Chronic fiscal imbalances
3	Increase in greenhouse gas emissions (more than 3 years)	Terrorism (about 1-3 years)	Irreparable pollution (about 1-3 years)	Increase in greenhouse gas emissions
4	Vulnerability to pandemics (about 1-3 years)	Failure to resolve long-term inflation (more than 3 years)	Serious systems breakdown (several months)	Water supply crises
5	Terrorism (about 6 months)	Large-scale theft or unauthorized use of data (about 1-3 years) Increase in greenhouse gases (more than 3 years)	Increase in greenhouse gas emissions (more than 3 years)	Mismanagement of population ageing

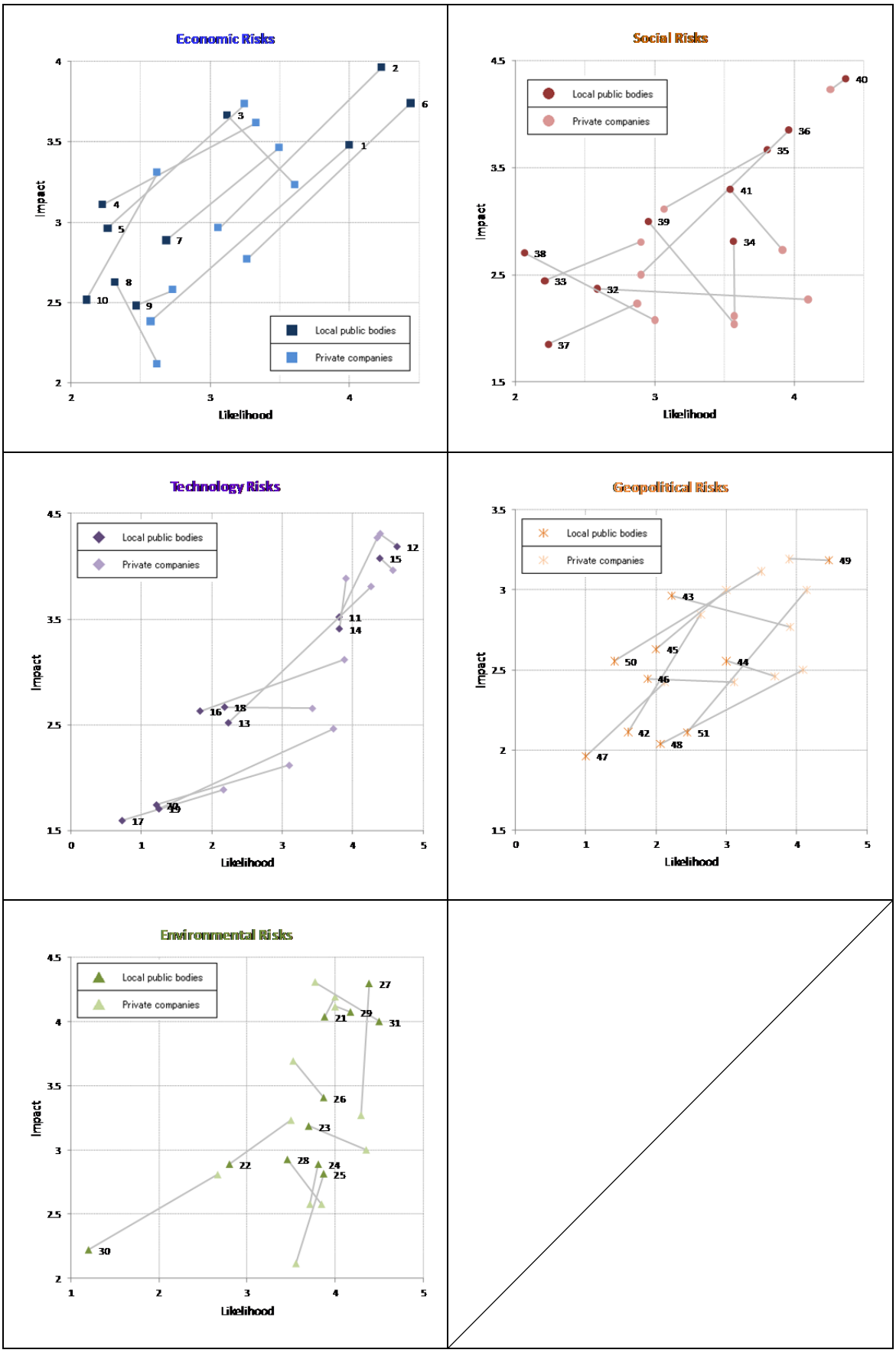
Ranking is by average score. Average times required for recovery/repair are given in parentheses.

Top Five Risks in Order of Impact

Ranking	2014 Global Risk Report			2013 Global Risk Report
	All	Local public bodies	Private companies	
1	Vulnerability to pandemics (about 1-3 years)	Vulnerability to pandemics (about 1-3 years)	Nuclear disaster (more than 3 years)	Large-scale, systemic financial crises
2	Cyberattacks (about 6 months)	Increase in greenhouse gas emissions (no answer)	Cyberattacks (about 6 months)	Water supply crises
3	Nuclear disaster (more than 3 years)	Cyberattacks (about 6 months)	Serious systems breakdown (about 6 months)	Chronic fiscal imbalances
4	Antibiotic-resistant bacteria (about 1-3 years)	Large-scale theft or unauthorized use of data (about 1-3 years)	Vulnerability to pandemics (about 1-3 years)	Food shortages
5	Unprecedented geophysical destruction (more than 3 years)	Unprecedented geophysical destruction (more than 3 years)	Antibiotic-resistant bacteria (about 6 months)	Spread of weapons of mass destruction

Ranking is by average score. Average times required for recovery/repair are given in parentheses.

Risk Perception by Local Public Bodies and Private Companies: A Comparison



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Section I Survey Background and Purpose

1 Background

Social, political, and economic activity depends on a tremendous diversity of goods, information and systems. Yet human enterprise, with its fabric of global and structural interconnections, is under threat from all sides.

Developing and emerging nations alike are aware of the interdependent, systemic nature of these threats and the huge impact they pose to national growth and the lives of the public, thus energizing the debate over what constitutes the best means of managing crises. In its 8th Global **Risk Report, published in 2013, the World Economic Forum presented findings and proposals on** the development of flexible approaches to global risk.

In Japan, the building of national resilience is now official government policy, the Cabinet having announced the outline for a national resilience plan in December 2013. The Council on Competitiveness-Nippon has launched the Resilient Economy Working Group, and has also established the Resilient Governance Study Group in collaboration with the University of Tokyo. Resilience is increasingly on the minds of policymakers in industry, government and academia.

Ideally, Japan would address its risks on a national scale. In reality, however, systems breakdowns or other large-scale disasters will push regional communities into the front line. In our world of increasing mutual dependence, the failure of any one region to cope with risk could have broad ramifications for the country as a whole. Events in the industrial supply chain have made this markedly clear. Resilience[1], therefore – the ability to withstand and adapt to crises, and achieve rapid recovery and reconstruction – is becoming an ever more meaningful concept.

Watanabe (2012) has proposed that business continuity management be practiced on a region-wide basis, pointing out that regions play an important role in spheres where both the public and private sectors are active. Figure 1 shows the public-private structure supporting the regional community. The stakeholders surrounding the public sector (here meaning local public bodies) are shown on the left. The stakeholders surrounding the private sector are shown on the right. The group existing in the common area of this Venn diagram is the regional community.

Speaking of the motivations of commercial companies which participate in regional crisis management, Hiruma (2013a) noted:

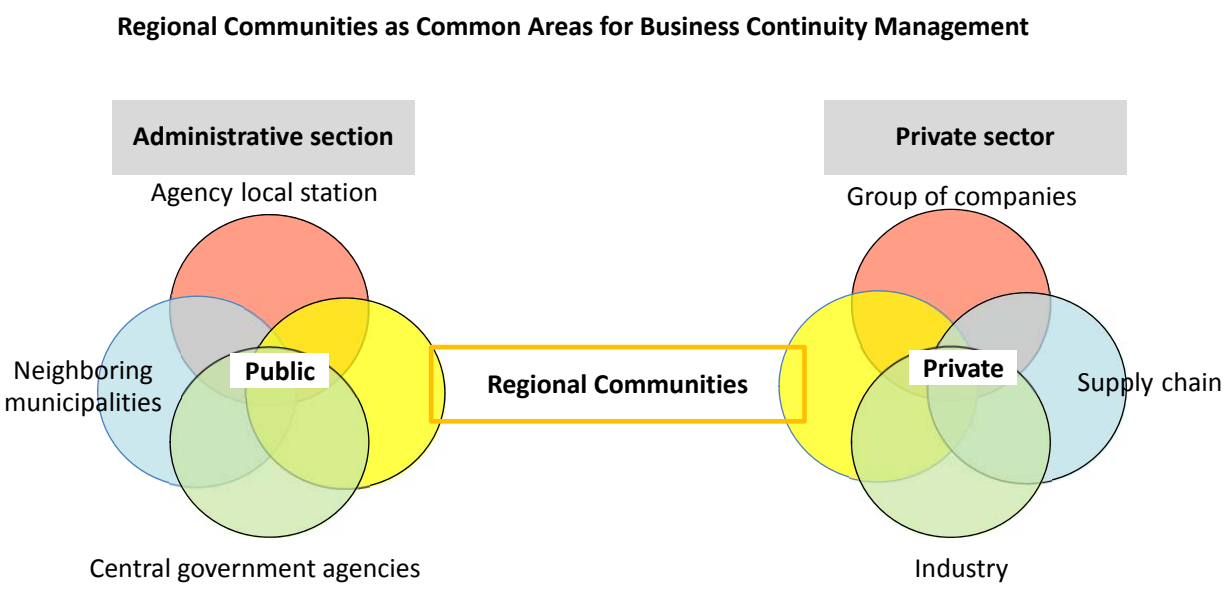
> If we assume business strategy to be the means by which companies overcome the various uncertainties involved in generating earnings, then profit is their compensation for risk (uncertainty). The essence of crisis management is to maximize, within the limits of time and

[1] In this report, “resilience” means “the ability of systems to resist (minimize the damage from) and recover from (achieve rapid recovery and reconstruction after) crises such as large-scale disasters or terrorist attacks. It is an inclusive concept encompassing the ability to ① adapt to crisis conditions, and ② create a new environment of equilibrium.” (Definition by Hiruma, 2013a.)

budget, the area occupied by controllable phenomena (which have clear causes and effects), while minimizing the area occupied by uncontrollable phenomena (whose causes and effects are unclear). The purpose of crisis management, especially as it involves private companies, may not be to minimize risk itself, but to create an optimal balance of risk, chance, and capital that is consistent with business strategy. It goes without saying that no company is self-sufficient. Every firm has need of the social capital of neighboring communities and the support of affiliates – the entities we refer to as "stakeholders." A company's competitiveness springs from the soundness of the community to which it belongs and its close ties to that community. To have a healthy company, therefore, one needs a healthy community. Residents of a region generate demand for products and provide a supportive environment for the social assets and projects on which corporate activity is based. The reverse is also true: a healthy community needs healthy companies. Companies provide local residents with the very basics of life in the form of opportunities for employment and wealth creation. This makes it essential that we apprehend the importance of managing crises from the social standpoint while approaching the problem from the corporate standpoint.

The aim of this survey has been to study the risks and resilience of regions in Japan (its prefectures and "government-designated cities"; these are cities with population greater than 500,000). We have focused on regions for four reasons: ① because regions are the first responders to actual disaster; ② because the ability of regions to respond to crises affects Japanese society as a whole; ③ because shared social capital and the activities of individual organizations are deeply interdependent, facilitating the contribution of time, space, and scale; and ④ because regions can easily separate from, or mutually engage with, other stakeholders in local communities.

Figure 1 Importance of Public-Private Collaboration in Ensuring Effective Regional Business Continuity Management



Purpose

Throughout the world, nations are formulating new approaches to crisis management. Japan can learn much from these global trends as it works out its own policies and programs. For example, Japan's Plan for National Resilience focuses on evaluating the impact and urgency of natural disaster risks in particular. Its primary objective is to promote comprehensive domestic measures to prevent or mitigate disasters, the immediate target being only those natural disasters which are infrequent and large in scale.

In contrast, the approach taken on the government level the United States, the United Kingdom, and other countries, and also by the World Economic Forum and the OECD, involves identifying and evaluating all of the risks which threaten nations, then assigning a priority to each after consulting with citizens and various stakeholders. This is the "all hazard approach."

There is no question that preparing for natural disasters, and earthquakes in particular, is an urgent issue for Japan; the threat of an earthquake originating directly beneath the Tokyo Metropolitan Area, or in the Nankai Trough, is especially troubling. But because of differences in geography and socioeconomic structure, regions within Japan will differ significantly in the way they perceive the risks posed by earthquakes (to take just a single phenomenon). Because of these differences in risk perception, we can expect each region, or entity, to have different risks that require priority attention.

Japan is exposed to risks in every sector – its society, economy, environment, geopolitics, and technology. To build resilience in the face of these risks, regional communities – including government, private business, and citizens – need to take reasonable, efficient measures for the purpose based on comprehensive evaluation of latent risk. Regional communities are the fabric of Japan and the source of its resilience in the face of risk.

With this survey, we have aimed to evaluate the risks facing the various regions of Japan and to gain a clear picture of how risk and resilience are perceived by the private and public sectors in those regions. That the survey took a comprehensive approach toward risk evaluation and opinion-gathering, rather than focusing excessively on natural disasters, marked an important departure. In specific terms, the survey throws light on differences in the perception of risk and resilience from region to region and between local public bodies and private companies. An accurate understanding of how matters currently stand will provide the basis for further policy studies leading to a stronger, more resilient Japan.

Section II Summary of Findings

Development Bank of Japan Inc. has conducted this survey in order to learn how risk is evaluated and resilience perceived in the various regions of Japan. Cooperating in the survey were Japan's wide-area autonomous bodies (its prefectures and government-designated cities), corporate members of the Council on Competitiveness-Nippon (COCN) and corporate recipients of DBJ Business Continuity Management ratings, among others. The survey adopted a comprehensive approach rather than focusing disproportionately on natural disasters.

Our objective in the survey has been to learn how risk and resilience are understood at present by regional entities in the public and private sectors.

The survey brought the following circumstances to light:

- In both the public and private sectors, cyberattacks and vulnerability to pandemics were considered the most likely global risks to occur, and to have the greatest potential impact. When thinking about risks that should be managed as a society, we need to broaden our perspective to include not only single hazards (natural disasters), but multi-hazard and all-hazard situations as well.

- On the subject of risks with the potential to cause serious human and material damage, respondents assigned high priority to the rehabilitation of healthcare, lifeline services, and other elements of critical infrastructure.

- In both the private and public sectors there was broad agreement on the importance of exchanging information as a general practice. Respondents pointed to the need to build a framework for the public sharing of information on individual organizations, and also to organize a "Regional Resilience Forum," or similar venue, to ensure that systems will *always* be in place for concrete discussions on public-private collaboration.

We offer the following proposals to serve as starting points for the development of collaborative, public-private initiatives to strengthen regional resilience, and thereby the resilience of Japan as a whole.

■ Establishment of risk scenarios and risk evaluation methods suitable for Japan, along with measures to promote their understanding

1 Risk assessment conducted on the national level

2 Establishment of risk assessment methods suitable for Japan

■ Creation of a collaborative, public-private framework for implementing strategic risk management

3 An interdependent, dynamic analytical study of critical infrastructure

4 A social impact study of crisis management, along with social implementation of strategic crisis management

1 Survey Overview

1. Subjects

   Sixty-seven wide-area autonomous bodies (47 prefectures and 20 government-designated cities) and 43 private companies, including corporate members of the Council on Competitiveness-Nippon (COCN), for a total of 110 bodies/companies.

2. Method

   Questionnaires mailed to and collected from respondents; online questionnaires.

3. Period

   Prefectures and government-designated cities: November 25th – December 25th, 2013.

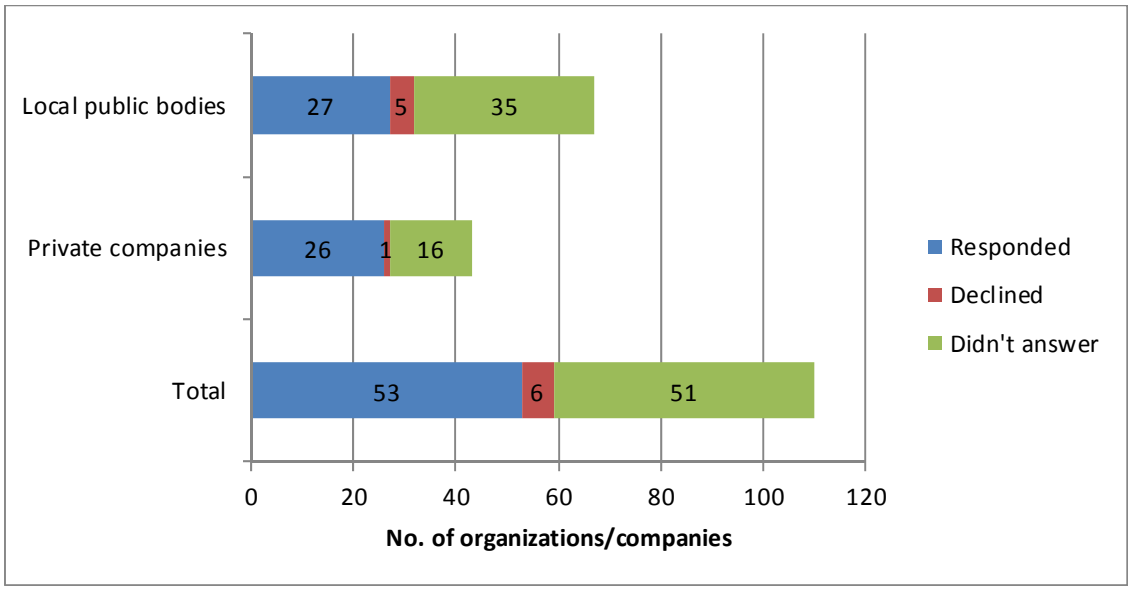
   Private companies: December 10th, 2013 – January 17th, 2014.

4. Number of respondents: local public bodies and private companies

   Local public bodies: 27 (response rate: 39%).

   Private companies: 26 (response rate: 60%).

Figure 2 Response to the Survey



2 Findings on Comprehensive Risk Assessment

(1) Risk Assessment in This Survey

Local public bodies and private companies were asked to ① assess their risks from a comprehensive perspective; ② identify those which merited urgent handling; and ③ describe the socioeconomic functions required to recover from their impact.

To compare the results of risk assessments made by public and private entities, it was necessary to have a set of common criteria. As risks to be evaluated from a comprehensive viewpoint, we chose as a basis the fifty global risks cited in the World Economic Forum's 8th Global Risk Report, published in 2013 (hereinafter the "Global Risk Report"). These were complex risks which exceeded the capability of autonomous bodies or private companies to tackle on their own. To these we added the risk of nuclear disaster, which is well known to Japan, as is the difficulty of overcoming its impact. The total of fifty-one risks are shown in Figure 3.

These are risks that can affect a number of countries at once, spreading by means of shared borders, similar national circumstances, or reliance on the same critical systems. They are risks, moreover, which people can neither influence nor control, and to which Japan is not immune.[2]

In this survey, we asked the respondents to evaluate the likelihood of these fifty-one risks materializing: for local public bodies, in the regions of their jurisdiction; for private companies, in the prefectures where their headquarters and key bases of operation[3] were located. Private firms were also asked for their views on resilience, not in terms of their own resilience in the face of risk, but as an assessment of *regional* resilience from the perspective of a member of the community's private sector and a contributor to its social welfare and sustainable development.

[2] Please see p. 36 of the WEF 8th Global Risk Report.

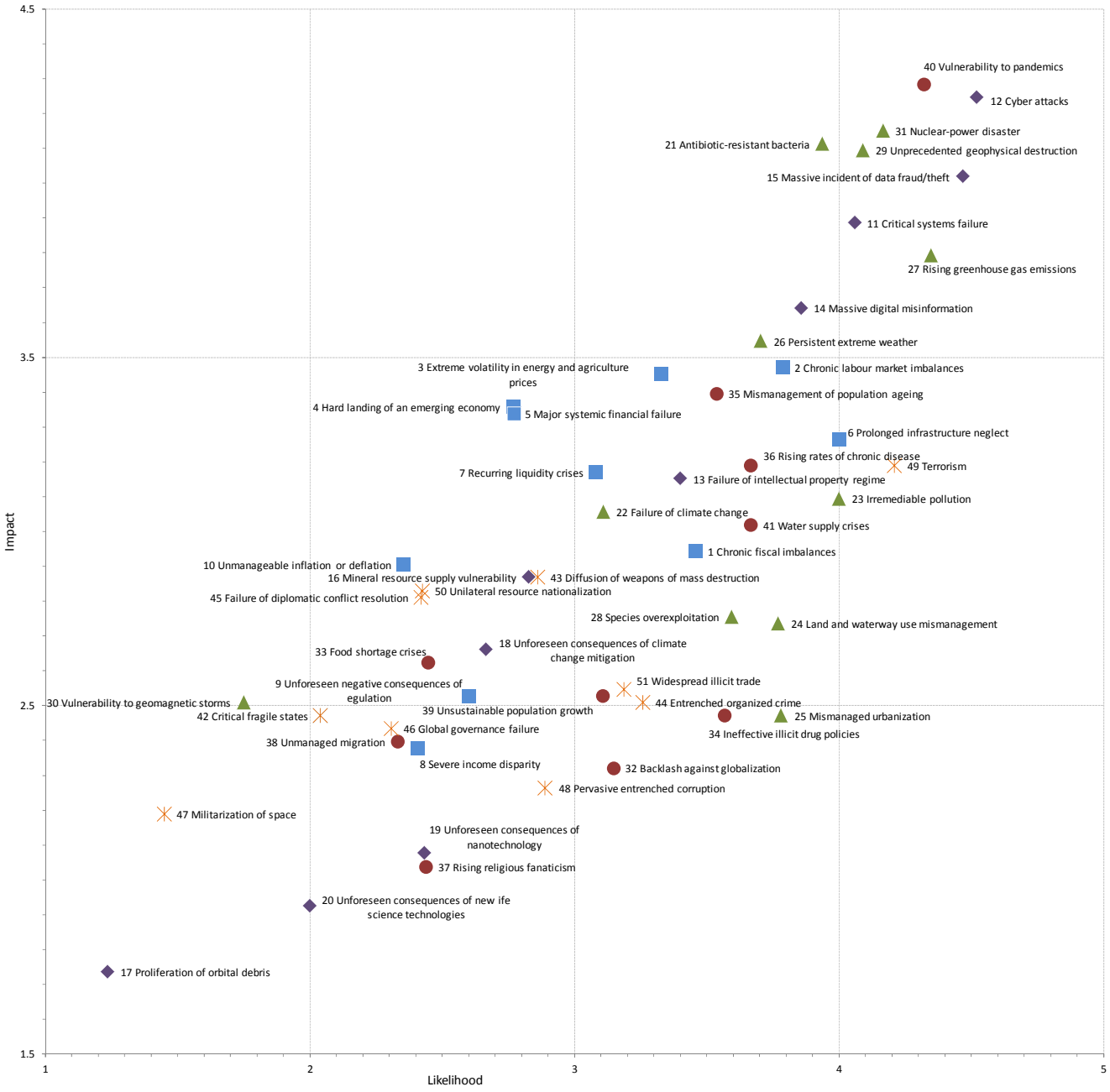
[3] Examples include domestic production bases accounting for the greater part of a company's sales, and branches employing the largest numbers of workers.

Figure 3 List and Explanation of Risks

Category	No.	Risk	
Economic risks	1	Chronic fiscal imbalances	Failure to redress excessive government debt obligations.
	2	Chronic labour market imbalances	A sustained high level of underemployment and unemployment that is structural rather than cyclical in nature.
	3	Extreme volatility in energy and agriculture prices	Severe price Fluctuations make critical commodities unaffordable, slow growth, provoke public protest and ncrease geopolitical tension.
	4	Hard landing of an emerging economy	The abrupt slowdown of a critical emerging economy.
	5	Major systemic financial failure	A financial institution or currency regime of systemic importance collapses with implications throughout the global financial system.
	6	Prolonged infrastructure neglect	Chronic failure to adequately invest in, upgrade and secure infrastructure networks.
	7	Recurring liquidity crises	Recurring shortages of financial resources from banks and capital markets.
	8	Severe income disparity	Widening gaps between the richest and poorest citizens.
	9	Unforeseen negative consequences of egulation	Regulations which do not achieve the desired effect, and instead negatively impact industry structures, capital flows and market competition.
	10	Unmanageable inflation or deflation	Failure to redress extreme rise or fall in the value of money relative to prices and wages.
Technological risks	11	Critical systems failure	Single-point system vulnerabilities trigger cascading failure of critical information infrastructure and networks.
	12	Cyber attacks	State-sponsored, state-af☆liated, criminal or terrorist cyber attacks.
	13	Failure of intellectual property regime	The loss of the international intellectual property regime as an effective system for stimulating innovation and investment.
	14	Massive digital misinformation	Deliberately provocative, misleading or incomplete information disseminates rapidly and extensively with dangerous consequences.
	15	Massive incident of data fraud/theft	Criminal or wrongful exploitation of private data on an unprecedented scale.
	16	Mineral resource supply vulnerability	Growing dependence of industries on minerals that are not widely sourced with long extraction-to-market time lag for new sources.
	17	Proliferation of orbital debris	Rapidly accumulating debris in high-traffic geocentric orbits jeopardizes critical satellite infrastructure.
	18	Unforeseen consequences of climate change mitigation	Attempts at geoengineering or renewable energy development result in new complex challenges.
	19	Unforeseen consequences of nanotechnology	The manipulation of matter on an atomic and molecular level raises concerns on nanomaterial toxicity.
	20	Unforeseen consequences of new ife science technologies	Advances in genetics and synthetic biology produce unintended consequences, mishaps or are used as weapons.
Environmental risks	21	Antibiotic-resistant bacteria	Growing resistance of deadly bacteria to known antibiotics.
	22	Failure of climate change	Governments and business fail to enforce or enact effective measures to protect populations and transition businesses impacted by climate change.
	23	Irremediable pollution	Air, water or land permanently contaminated to a degree that threatens ecosystems, social stability, health outcomes and economic development.
	24	Land and waterway use mismanagement	Deforestation, waterway diversion, mineral extraction and other environment modifying projects with devastating impacts on ecosystems and associated industries.
	25	Mismanaged urbanization	Poorly planned cities, urban sprawl and associated infrastructure that amplify drivers of environmental degradation and cope ineffectively with rural exodus.
	26	Persistent extreme weather	Increasing damage linked to greater concentration of property in risk zones, urbanization or increased frequency of extreme weather events.
	27	Rising greenhouse gas emissions	Governments, businesses and consumers fail to reduce greenhouse gas emissions and expand carbon sinks.
	28	Species overexploitation	Threat of irreversible biodiversity loss through species extinction or ecosystem collapse.
	29	Unprecedented geophysical destruction	Existing precautions and preparedness measures fail in the face of geophysical disasters of unparalleled magnitude such as earthquakes, volcanic activity, landslides or tsunamis.
	30	Vulnerability to geomagnetic storms	Critical communication and navigation systems disabled by effects from colossal solar flares.
	31	Nuclear-power disaster	Release of radioactive materials causes environmental pollution, harmful rumor of agricultural produce and resident's transfer.
Societal risks	32	Backlash against globalization	Resistance to further increased cross-border mobility of labour, goods and capital.
	33	Food shortage crises	Inadequate or unreliable access to appropriate quantities and quality of food and nutrition.
	34	Ineffective illicit drug policies	Continued support for policies that do not abate illegal drug use but do embolden criminal organizations, stigmatize drug users and exhaust public resources.
	35	Mismanagement of population ageing	Failure to address both the rising costs and social challenges associated with population ageing.
	36	Rising rates of chronic disease	Increasing burden of illness and long-term costs of treatment threaten recent societal gains in life expectancy and quality.
	37	Rising religious fanaticism	Uncompromising sectarian views that polarize societies and exacerbate regional tensions.
	38	Unmanaged migration	Mass migration driven by resource scarcity, environmental degradation and lack of opportunity, security or social stability.
	39	Unsustainable population growth	Unsustainably low or high population growth rates and sizes, creating intense and rising pressure on resources, public institutions and social stability.
	40	Vulnerability to pandemics	Inadequate disease surveillance systems, failed international coordination and the lack of vaccine production capacity.
	41	Water supply crises	Decline in the quality and quantity of fresh water combine with increased competition among resource-intensive systems, such as food and energy production.
Geopolitical risks	42	Critical fragile states	A weak state of high economic and geopolitical importance that faces strong likelihood of collapse.
	43	Diffusion of weapons of mass destruction	The availability of nuclear, chemical, biological and radiological technologies and materials leads to crises.
	44	Entrenched organized crime	Highly organized and very agile global networks committing criminal offences.
	45	Failure of diplomatic conflict resolution	The escalation of international disputes into armed con☆icts.
	46	Global governance failure	Weak or inadequate global institutions, agreements or networks, combined with competing national and political interests, impede attempts to cooperate on addressing global risks.
	47	Militarization of space	Targeting of commercial, civil and military space assets and related ground systems that can precipitate or escalate an armed conflict.
	48	Pervasive entrenched corruption	The widespread and deep-rooted abuse of entrusted power for private gain.
	49	Terrorism	Individuals or a non-state group successfully inflict large-scale human or material damage.
	50	Unilateral resource nationalization	Unilateral moves by states to ban exports of key commodities, stockpile reserves and expropriate natural resources.
	51	Widespread illicit trade	Unchecked spread of illegal traf☆cking of goods and people throughout the global economy.

(2) Findings on Risk Assessment

Figure 4 51-Risk Landscape



As a general trend, the respondents viewed cyberattacks as the risk with the greatest likelihood of occurring in their region within the next ten years (Figure 5, "Total" column).[4] Vulnerability to pandemics were seen as the risk with the greatest potential impact to the region (Figure 7, "Total" column).[5] Cyberattacks and vulnerability to pandemics were the two risks that fell within the top five in terms of both likelihood and impact.

Local public bodies and private companies shared the perception that cyberattacks, large-scale theft or unauthorized use of data – both of which involve information security – and an increase in greenhouse gas emissions were all risks with a high likelihood of occurring (Figure 5, "Local public bodies" and Private companies" columns). There was also agreement on the view that vulnerability to pandemics and cyberattacks were risks with great potential impact (Figure 7, "Local public bodies" and Private companies" columns).

In comparison with the findings of the Global Risk Survey, our survey found the majority of Japanese to be more keenly consciousness of the risk of cyberattacks and other problems involving information security. Environmental risks, such as natural and nuclear disasters, and risks affecting physical health, such as pandemics and antibiotic-resistant bacteria, also proved to be matters of deep concern to today's Japanese (Figures 4 – 8).

[4] For the Global Risk Report, respondents drew on their own area of expertise to rank from one to five the possibility of risks materializing within the coming ten years. For this survey, respondents involved in policy-making or business management were asked to answer in consideration of the systems by which their own organizations handled risks having a possibility of materializing within the coming ten years.

[5] For the Global Risk Report, respondents drew on their own area of expertise to rank from one to five the global impact of risks if they should take place. For this survey, respondents rated impact on their own region, defined as the extent of potential damage to people, property, and the economy.

Figure 5 Top Five Risks in Order of Likelihood

Ranking	2014 Global Risk Report			2013 Global Risk Report
	All	Local public bodies	Private companies	
1	Cyberattacks (several months)	Cyberattacks (several months)	Large-scale theft or unauthorized use of data (about 6 months)	Extreme income disparity
2	Large-scale theft or unauthorized use of data (about 6 months)	Nuclear disaster (more than 3 years)	Cyberattacks (several months)	Chronic fiscal imbalances
3	Increase in greenhouse gas emissions (more than 3 years)	Terrorism (about 1-3 years)	Irreparable pollution (about 1-3 years)	Increase in greenhouse gas emissions
4	Vulnerability to pandemics (about 1-3 years)	Failure to resolve long-term inflation (more than 3 years)	Serious systems breakdown (several months)	Water supply crises
5	Terrorism (about 6 months)	Large-scale theft or unauthorized use of data (about 1-3 years); Increase in greenhouse gases (more than 3 years)	Increase in greenhouse gas emissions (more than 3 years)	Mismanagement of population ageing

Figure 6 Top Five Risks in Order of Likelihood (Average Scores)

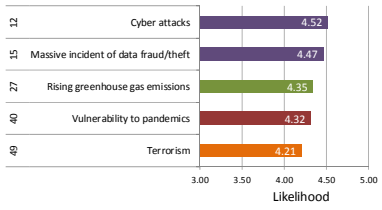
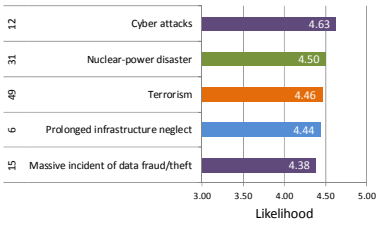
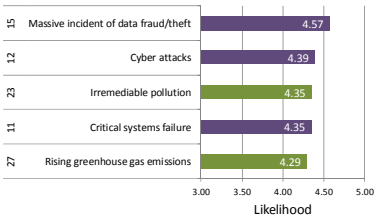
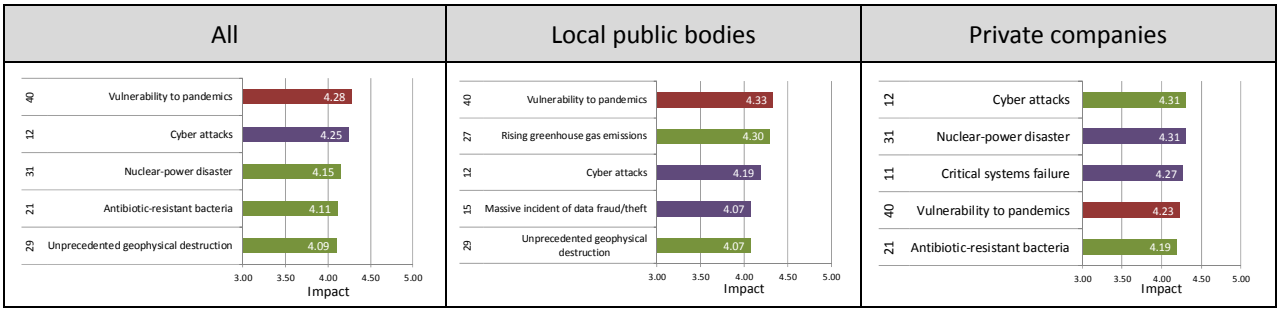
All	Local public bodies	Private companies
		

Figure 7 Top Five Risks in Order of Impact

Ranking	2014 Global Risk Report			2013 Global Risk Report
	All	Local public bodies	Private companies	
1	Vulnerability to pandemics (about 1-3 years)	Vulnerability to pandemics (about 1-3 years)	Nuclear disaster (more than 3 years)	Large-scale, systemic financial crises
2	Cyberattacks (about 6 months)	Increase in greenhouse gas emissions (no answer)	Cyberattacks (about 6 months)	Water supply crises
3	Nuclear disaster (more than 3 years)	Cyberattacks (about 6 months)	Serious systems breakdown (about 6 months)	Chronic fiscal imbalances
4	Antibiotic-resistant bacteria (about 1-3 years)	Large-scale theft or unauthorized use of data (about 1-3 years)	Vulnerability to pandemics (about 1-3 years)	Food shortages
5	Unprecedented geophysical destruction (more than 3 years)	Unprecedented geophysical destruction (more than 3 years)	Antibiotic-resistant bacteria (about 6 months)	Spread of weapons of mass destruction

Figure 8 Top Five Risks in Order of Impact (Average Scores)



3 Risk and Resilience Issues Requiring Priority Action

(1) Perceptions of Risk Likelihood and Resilience

i. Risks with a high likelihood of materializing in the region within the next ten years

After evaluating the 51 risks in the Risk Landscape, the respondents selected from five to ten with the greatest likelihood of materializing in their region within roughly the next ten years ("high-likelihood risks").

The risks most frequently cited were prolonged abnormal weather, unprecedented geopolitical breakdown, cyberattacks, vulnerability to pandemics, and large-scale theft or unauthorized use of data. Climate change and natural disasters were also chosen by large numbers of local public bodies and private companies (Figure 9, "All").

Local public bodies and private firms were in general agreement on the top five risks in this category. There were differences, however: local public bodies showed concern over mismanagement of population ageing, while private firms were more concerned with large-scale theft or the unauthorized use of data.

Figure 9 Response Distribution (Risks in Terms of Likelihood)

Multiple responses

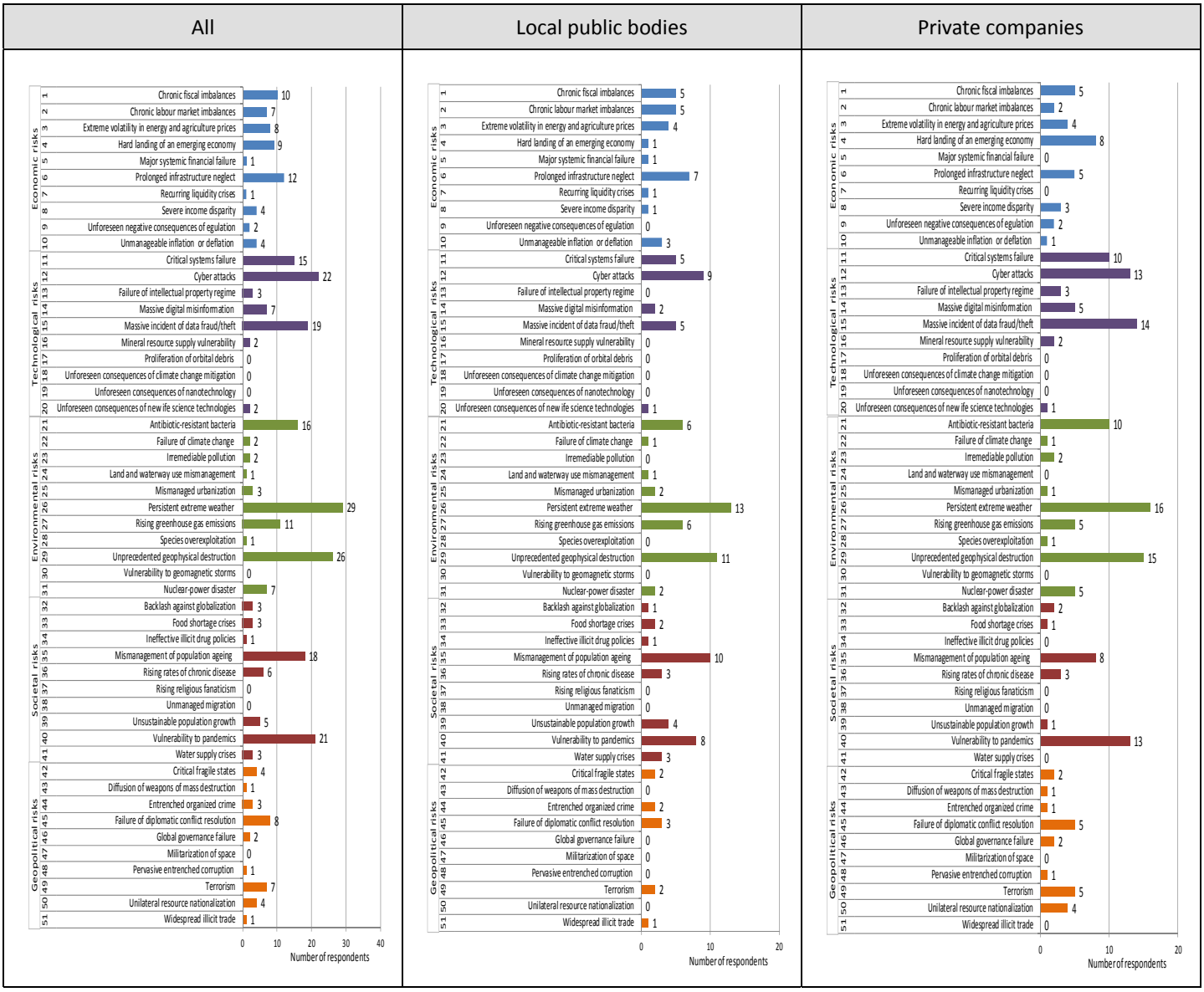


Figure 10 Top Five Risks in Terms of Likelihood

Ranking	All	Local public bodies	Private companies
1	Prolonged abnormal weather	Prolonged abnormal weather	Prolonged abnormal weather
2	Unprecedented geopolitical breakdown	Unprecedented geopolitical breakdown	Unprecedented geopolitical breakdown
3	Cyberattacks	Mismanagement of population ageing	Large-scale theft or unauthorized use of data
4	Vulnerability to pandemics	Cyberattacks	Cyberattacks
5	Large-scale theft or unauthorized use of data	Vulnerability to pandemics	Vulnerability to pandemics

ii. High-likelihood risks: recovery periods and necessary socioeconomic functions

a. Recovery periods

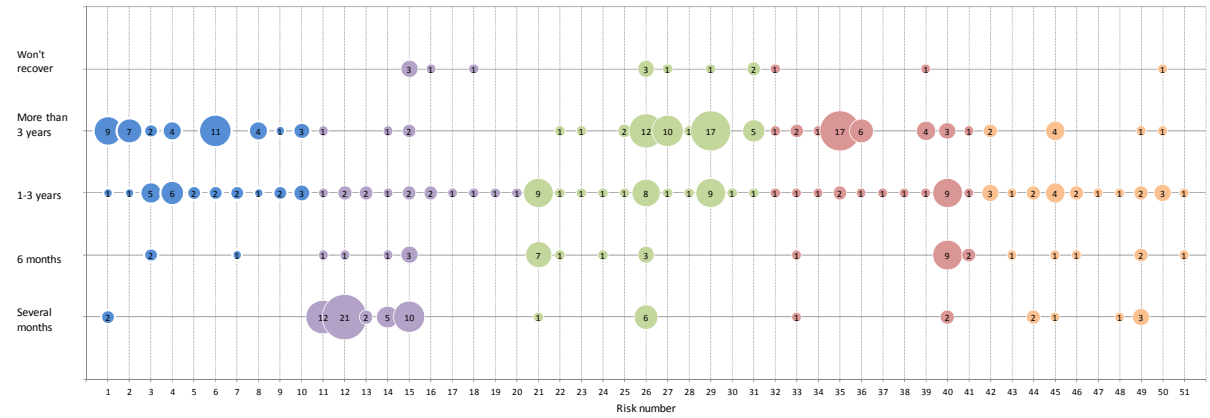
Cyberattacks and other technology risks were viewed as highly probable (see **i** above). But with the overwhelming majority of respondents foreseeing a recovery period of just several months, we can see a strong tendency to regard technology risks as highly "recoverable" compared with other types.

On the other hand, both the public and private sectors indicated that prolonged abnormal weather or unprecedented geopolitical breakdown would require at least three years for recovery. The two groups showed similar agreement on the mismanagement of population ageing, which was also judged as needing three years or more for recovery.[6]

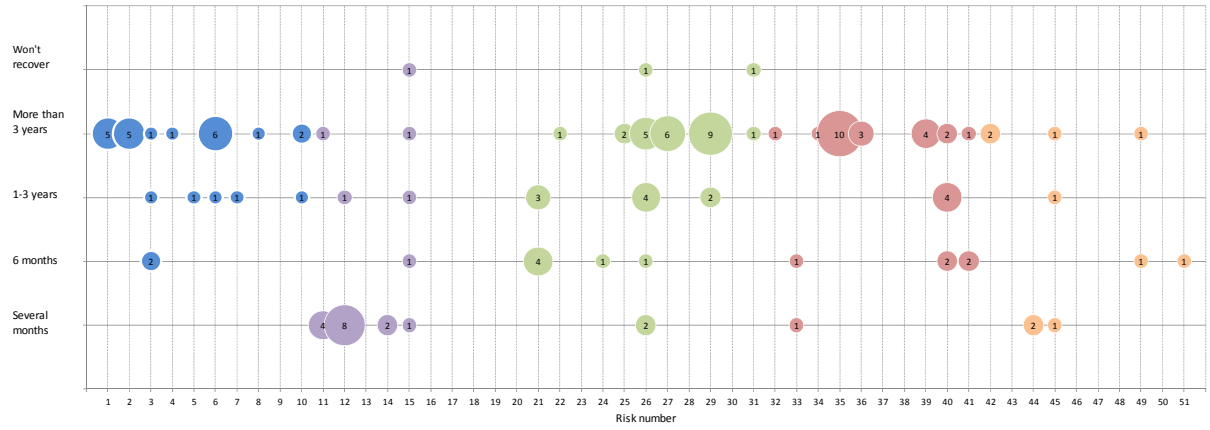
[6] In Figure 11, figures within circles indicate number of responses (same applies to Figures 12, 15 and 16).

Figure 11　Response Distribution (Recovery Period for High-likelihood Risk)

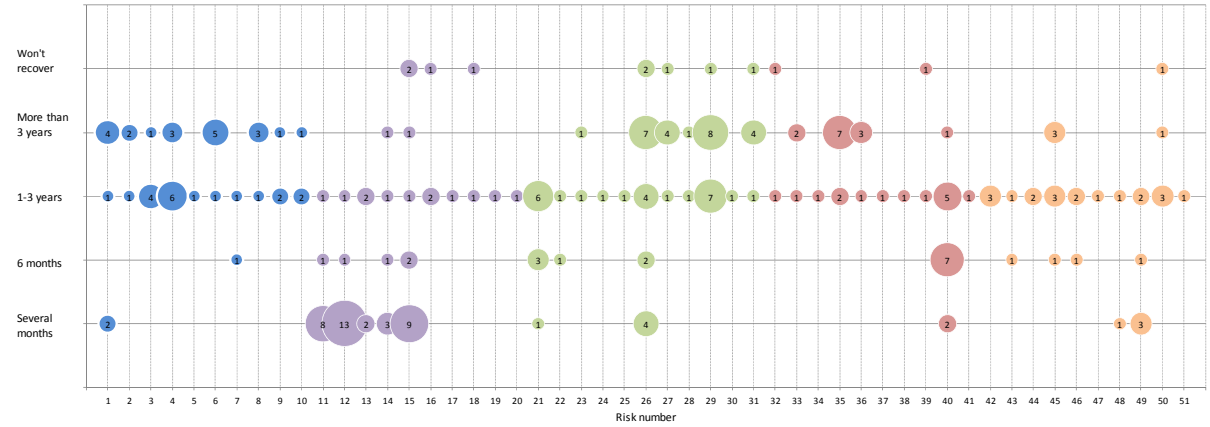
【All】



【Local Public Bodies】



【Private Companies】



The vertical axes of Figure 11 (“Response numbers”) indicate the following periods.
1. Several months.　2. About six months.　3. 1-3 years.　4. More than 3 years.　5. Won’t recover.

See Figure 4 or Figure 9 for horizontal axes (“Risk number”).

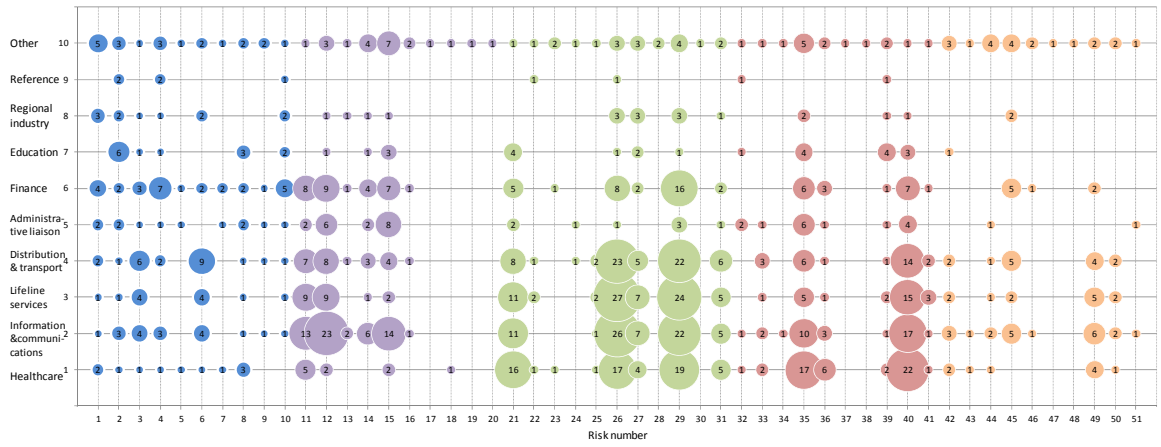
b. Socioeconomic functions required for recovery

In general, both public- and private-sector respondents viewed technology risks (such as cyberattacks) and environmental risks (such as prolonged abnormal weather) as less important than risks to information and communications, lifeline services, and distribution and transportation (Figure 12). The findings showed, however, that financial services were an important element of the former group of risks, and medical services of the latter. In regard to the mismanagement of population ageing – a social risk – there were mixed responses as to the socioeconomic functions these required. There was a shared sense that recovery would call for a variety of flexible approaches.

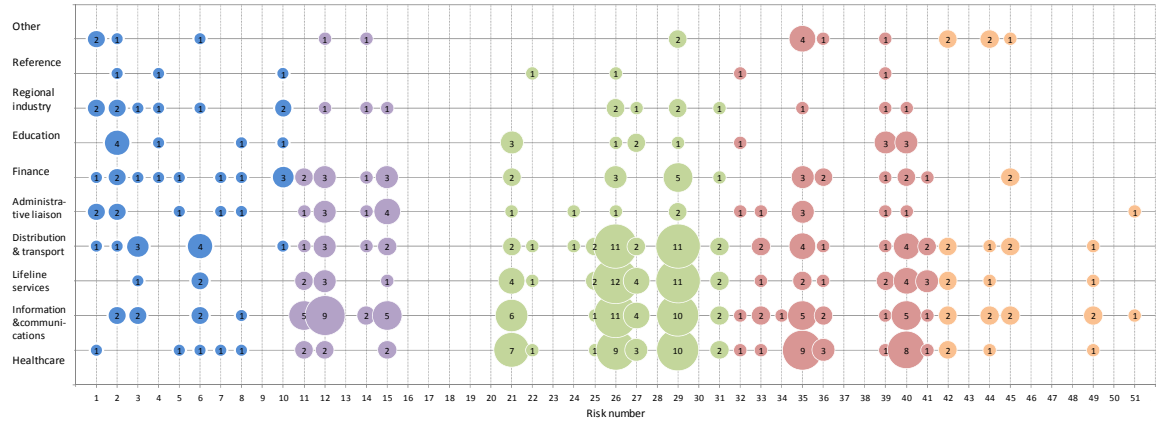
In regard to the large-scale theft or unauthorized use of data, private firms pointed to public certification authorities, action by individual companies, and security organizations as necessary socioeconomic functions.

Figure 12　Response Distribution (Necessary Socioeconomic Functions for Recovery from High-likelihood Risk)　*Multiple responses*

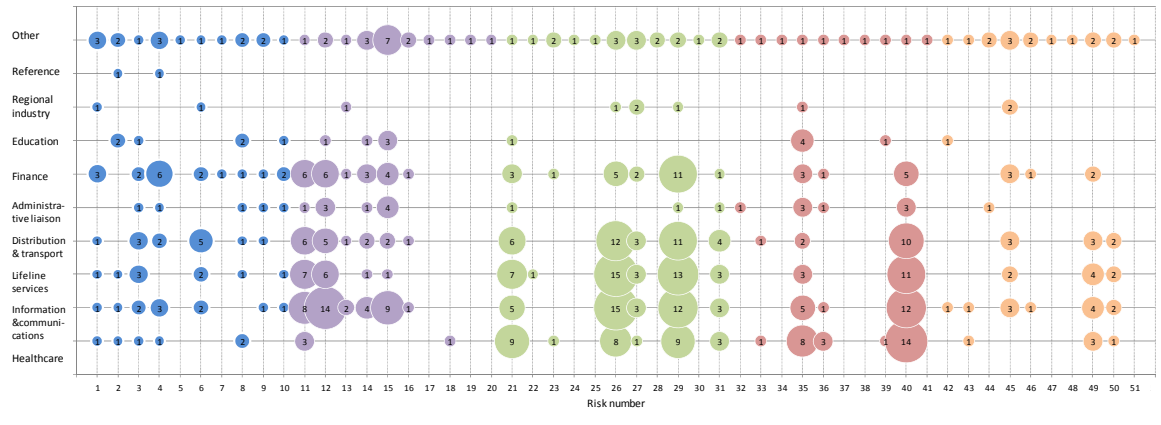
【All】



【Local Public Bodies】



【Private Companies】



The vertical axes of Figure 12 (“Response numbers”) indicate the following.

1. Medical services (hospitals, welfare and care facilities, pharmaceutical sales).　2. Information and communication (telephone, internet connections, broadcasting.　3. Lifeline services (electricity, water, gas).　4. Distribution and transportation (roads, ports and harbors, railways, airports, transport industry).　5. Liaison services (family registry, taxation, etc.).　6. Financial services (settlements, loans, etc.).　7. Educational services (entrance and continuance support, attraction of universities and research institutes, etc.).　8. Leading regional industries.　9. Tourism services.　10. Other.

See Figure 3 or Figure 10 for horizontal axes (“Risk number”).

(2) Perceptions of Risk Impact and Resilience

i. Risks likely to have a serious impact if occurring in the region within the next ten years

After evaluating the 51 risks in the Risk Landscape, the respondents selected from five to ten with the potential to exert the most serious impact were they to materialize in the region within roughly the next ten years ("high-impact risks").

Unprecedented geopolitical breakdown, nuclear disasters, vulnerability to pandemics, and terrorism were among the top five mentioned by respondents in both the public and private sectors. The two groups diverged in that irreparable pollution was cited by local public bodies and serious systems breakdown by private companies (Figure 13).

Figure 13 Response Distribution (High-impact Risks)

Multiple responses

All	Local public bodies	Private companies

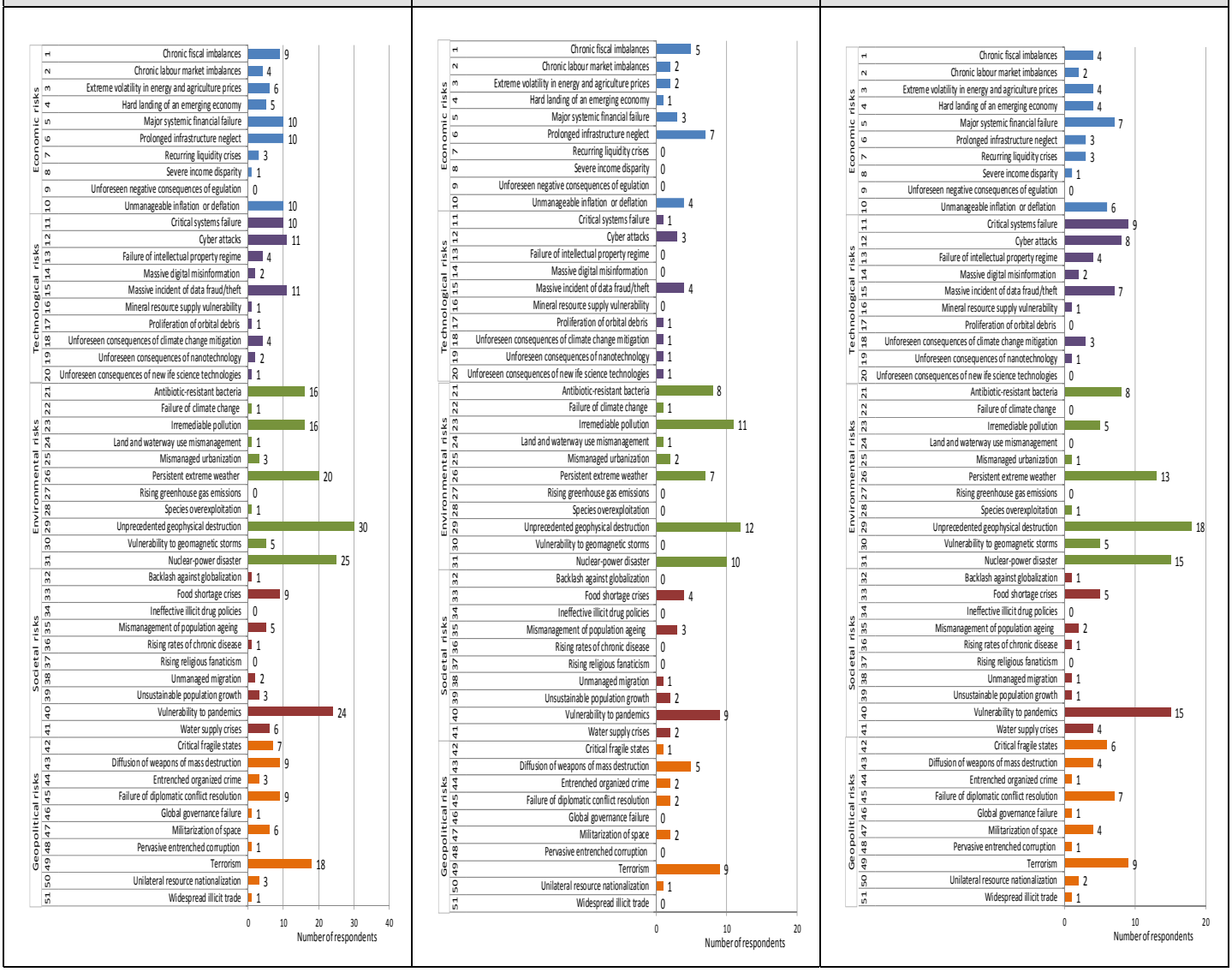


Figure 14 Top Five High-impact Risks

Ranking	All	Local public bodies	Private companies
1	Unprecedented geopolitical breakdown	Unprecedented geopolitical breakdown	Unprecedented geopolitical breakdown
2	Nuclear disaster	Irreparable pollution	Nuclear disaster
3	Vulnerability to pandemics	Nuclear disaster	Vulnerability to pandemics
4	Prolonged abnormal weather	Vulnerability to pandemics	Prolonged abnormal weather
5	Terrorism	Terrorism	Serious systems breakdown Terrorism

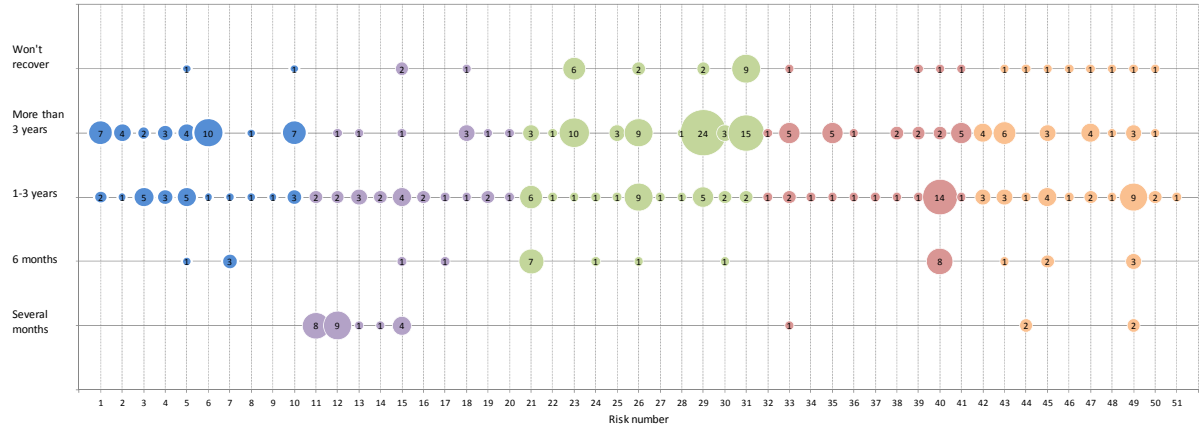
ii. High-impact risks: recovery periods and necessary socioeconomic functions

a. Recovery periods

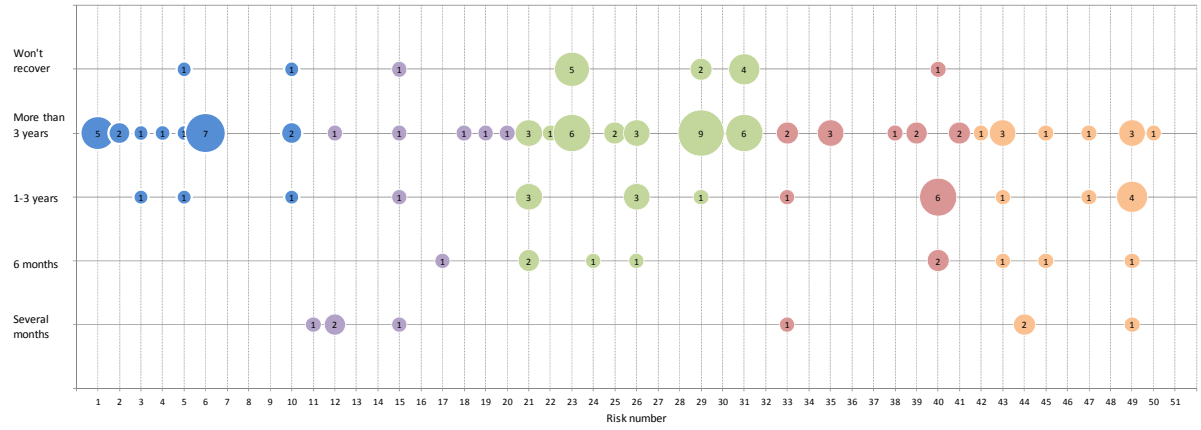
For unprecedented geopolitical breakdown and nuclear disaster, both public- and private-sector respondents foresaw that recovery would take upwards of three years or not be possible at all. In this respect there were no major differences between the two groups (Figure 15).

Figure 15　Response Distribution (Recovery Period for High-impact Risk)

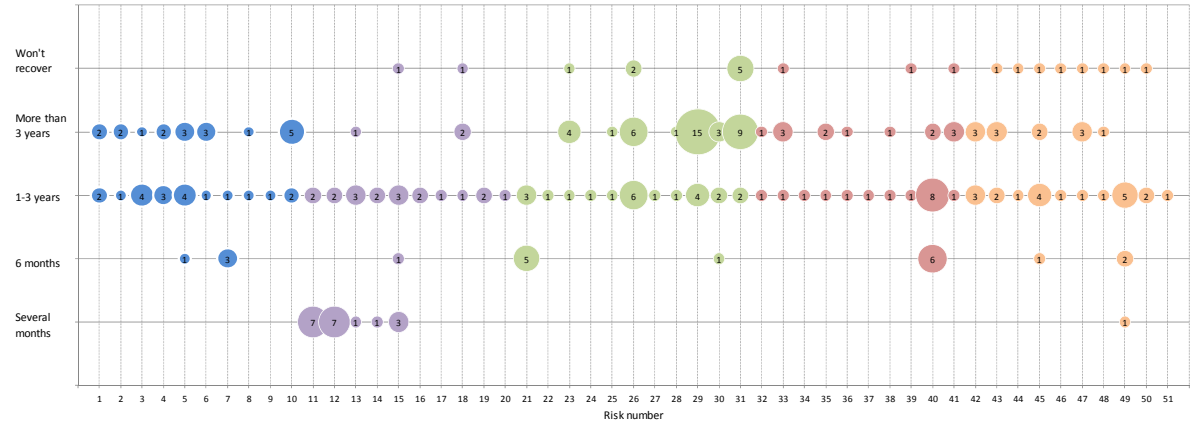
【All】



【Local Public Bodies】



【Private Companies】



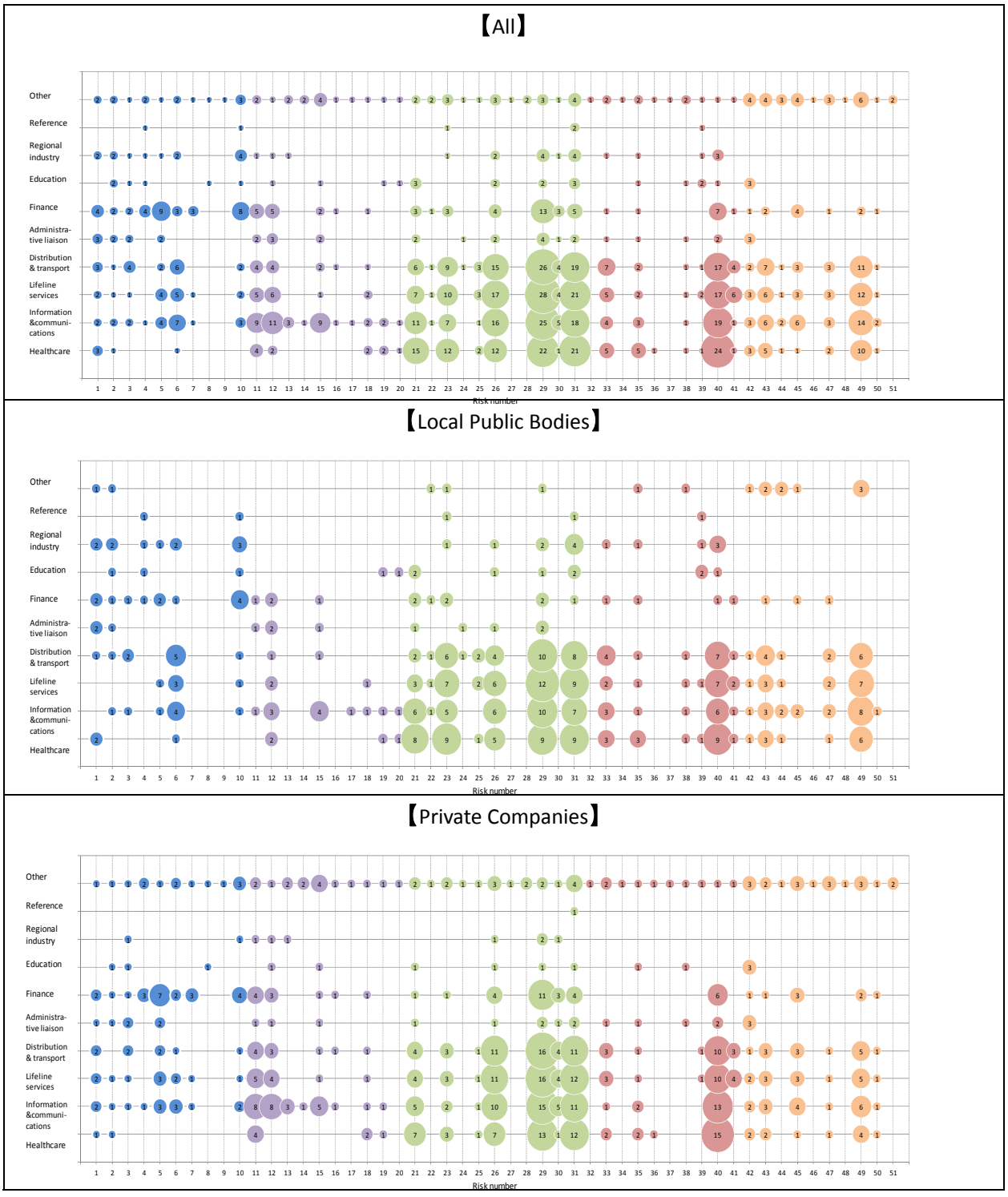
The vertical axes of Figure 15 (“Response numbers”) indicate the following.
1. Recovery will take several months.　2. Recovery will take about 6 months.　3. Recovery will take 1-3 years.
5. Recovery not possible.
See Figure 3 or Figure 13 for horizontal axes (“Risk number”).

b. Socioeconomic functions required for recovery

On the subject of environmental risks such as natural or nuclear disasters, and health-related risks such as pandemics or antibiotic-resistant bacteria, both public- and private-sector respondents pointed to the need for medical services, information and communication, lifeline services, and distribution and transportation. Upon materialization of any of these risks, loss of life is the immediate concern. The findings thus showed the respondents to be well aware of need for an institutional response, including the provision of emergency care and other medical services and the establishment of disaster response headquarters, along with information and distribution functions to support these activities.

Figure 16　Response Distribution (Socioeconomic Functions Required for Recovery from High-impact Risk)

Multiple responses



The vertical axes of Figure 16 (“Response numbers”) indicate the following.

1. Medical services (hospitals, welfare and care facilities, pharmaceutical sales.　2. Information and communications (telephone and internet connections, broadcasting.　3. Lifeline services (electricity, water, gas).　4. Distribution and transportation (roads, ports and harbors, railways, airports, transport industry).　5. Liaison services (family registry, taxation, etc.　6. Financial services (settlements, loans, etc.).　7. Educational services (school entrance and continuance support, attraction of universities and research institutes, etc.).　8. Leading regional industries.　9. Tourism services.　10. Other.

See Figure 3 or Figure 13 for horizontal axes (“Risk number”).

4. Differences in Risk and Resilience Perception by the Public and Private Sectors

(1) Strengthening Regional Resilience: Expectations from the Public and Private Sectors

Survey participants were asked to describe how local public bodies and private companies could best take action to strengthen regional resilience. This was a free-response question.

The question drew various responses. Local public bodies wanted private companies to improve their crisis-response capability by preparing business continuity plans and conducting disaster drills. They called on private firms to take part in building a framework for public-private cooperation through contracts and agreements, the regular sharing of information, and the use of private resources in the building of infrastructure.

Private companies desired that local public bodies, and the national government, assist in building a cooperative framework not only through means such as information disclosure, but also by sharing ideas and information. They also spoke of the need for the swift disclosure of information, restoration of infrastructure, easing of regulations, and financial support in times of emergency.

What local public bodies expect from private companies

- Improved crisis-response capability: Preparation and review of business continuity plans; regular drills; adequate stores of emergency provisions, materials and equipment.
- Systems and frameworks enabling local authorities and private firms to make a united response to crises: Execution of disaster support agreements to serve as frameworks for joint action when disaster strikes.
- Adequate technology, personnel, machinery, and equipment; provision of necessary corporate information; project proposals by private business; use of private resources to build social capital through new investments and subsequent maintenance and management …… etc.

What private companies expect from local public bodies

- Local public bodies seem to have a fair number of opportunities to share information with the national government. They need more opportunities, however, to share information with private firms. A better foundation must be built for public-private alliance on the regional level.
- Disclosure of the nature of risks recognized by the national government and local public bodies, and the status of measures to handle those risks.
- Accurate understanding of states of emergency, both when they occur and in their

aftermath, along with swift provision of information to private firms and citizens (residents).

- Speed is essential when getting out information during an emergency. There is no need for government authorities to guarantee the accuracy of all information they provide; rather, they should send out information as they receive it, noting when something is a "prompt report" or "unconfirmed information," and let private firms decide whether to act on it or not. Private firms want to receive unprocessed information rather than having it appended with optimistic conjectures on the impact of the emergency, the extent of evacuation areas, and so on. They want government establish a framework for the rapid sharing of broad-ranging information across administrative jurisdictions.

(2) Risk Perception: A Public-Private Comparison

Based on the results of the respondents' assessment of the 51 risks (see Section II-2), we analyzed the differences in risk perception between local public bodies and private companies.

Figure 17 shows the differences in how identical risks are perceived by local public bodies and private companies, as represented by their relative positions on a risk map. Local public bodies are represented by the lighter-colored plots; private companies by the darker-colored ones. The straight lines joining the plots indicate the difference in risk perception between the two groups: the longer or more inclined the line, the greater the difference in risk perception. The numbers in the graphs indicate risk numbers (Figure 3).

While it is difficult to make generalizations applying to all risks, there were several interesting cases where the two groups differed in their degree of caution, and others where both showed strong concern (Figure 18).

- Local public bodies showed strong concern about risks to which the public expects the government to respond. These include fiscal imbalances, the labor market and other aspects of the economic environment, as well as risks involving the management of social infrastructure and policies on the elderly and health care.

- Private companies were strongly concerned about economic and other local issues in their business locations overseas, as well as operational issues such as the management of intellectual property and the securing of resources.

- Both groups were keenly concerned about the issues of information security, damage to health, earthquakes and other natural disasters, and nuclear disaster.

Figure 17 Comparison of Risk Perception by Local Public Bodies and Private Companies

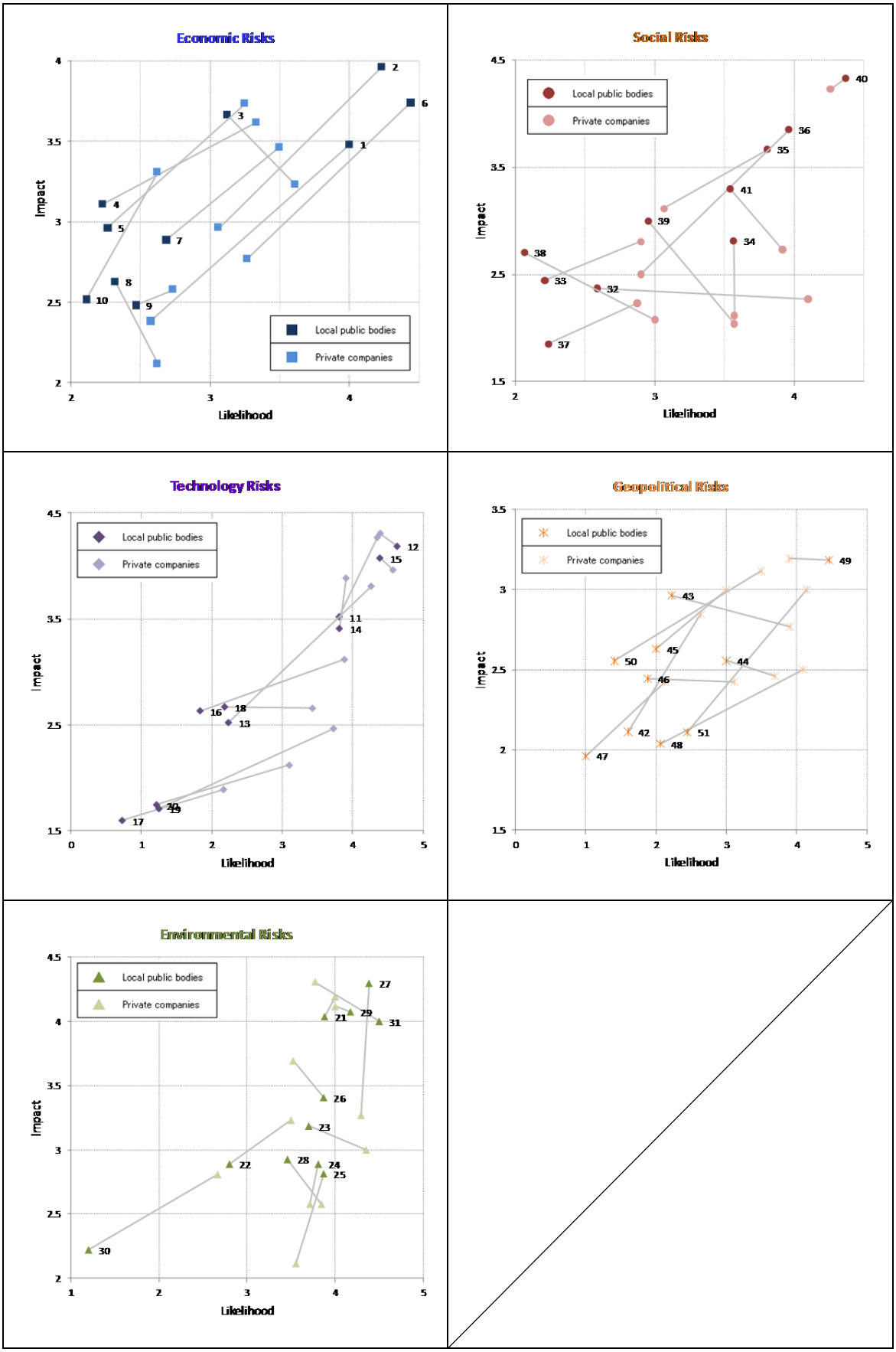


Figure 18 Perceptions of Risk in the Public and Private Sectors: Differences and Commonalities

Risk category	Of serious concern to local public bodies	Of serious concern to private companies	Of serious concern to both groups
Economic risk	• Chronic fiscal imbalances (No. 1) • Chronic imbalances in the labor market (No. 2) • Failure to resolve long-term inflation (No. 6)	• Hard landing of emerging economies (No. 4) • Large-scale, systemic financial collapse (No. 5) • Uncontrollable inflation or deflation (No. 10)	(No conspicuous pattern)
Technology risk	(No conspicuous trend)	• Inadequate management system for intellectual property (No. 13)	• Breakdown of important systems (No. 11) • Cyberattacks (No. 12) • Extensive dissemination of erroneous electronic data (No. 14) • Large-scale theft or unauthorized use of data (No. 15)
Environmental risk	• Increase in greenhouse gas emissions (No. 27)	(No conspicuous trend)	• Antibiotic-resistant bacteria (No. 21) • Unprecedented geopolitical breakdown (No. 29) • Nuclear disaster (No. 31)
Societal risk	• Mismanagement of population ageing (No. 35) • Increase in chronic illness rate (No. 36)	(No conspicuous trend)	• Vulnerability to pandemics (No. 40)
Geopolitical risk	(No conspicuous trend)	• Weakening of leading nations (No. 42) • Unilateral nationalization of resources (No. 50) • Spread of improper trading (No. 51)	• Terrorism (No. 49)

Section III Conclusions

General Summary

The aim of this survey was to gain information on regional perceptions of risk and resilience. A 51-risk landscape was created which comprised the 50 risks listed in the Global Risk Report plus the added risk of nuclear disaster.

The survey targeted local public bodies and private companies in Japan. Both of these groups proved to be keenly aware of risks to the information sphere, such as cyberattacks, as well as the risk of pandemics. The results suggest that Japan's conventional crisis measures, focusing as they do on the prevention and mitigation of natural disasters, are inadequate to meet these needs. The policies set forth in the government's Plan for National Resilience are not exempt from this appraisal. Where high-impact risks were concerned, the respondents voiced the need for a resilient basic infrastructure: medical services, information and communication, distribution and transportation, and other functions which support a region's social and economic activities. Up to now, Japan has based its policies in these areas on the specific assumption of natural disaster. Changing conditions, however, call for the development of an *all-hazard* response capability, meaning the capacity to deal with all types of risk – economic, technological, environmental, social, geopolitical and more. Essential to this process is an accurate understanding of the risks that confront one's own community.

Japan's many initiatives to date have included advance measures to protect against damage, emergency measures to prevent the spread of damage, and measures for recovery and reconstruction. With these as a foundation, policy-makers must now embark on the design of a new, all-hazard system for crisis management.

Promoting an Understanding of Risk Scenarios and Risk Assessment Methods

The response rate for this survey was low. Some of those who did reply answered the questions on likelihood, only to leave blank spaces in the sections concerning impact, stating they were "unable to answer" or were "unable to judge." There may have been problems in the survey method itself, involving the clarity of the risk descriptions or the ease of providing responses. There may also have been issues on the respondent side: the lack of an organization responsible for managing comprehensive risk, for example, or the lack of clear criteria for risk evaluation. A certain level of guidance – basic scenarios for the risks surrounding Japan, or basic criteria for risk evaluation – would probably have enabled us to obtain clearer results on regional differences and other matters.

In designing the basic risk scenarios and assessment criteria for this survey, we referred to the Global Risk Reports of the World Economic Forum. The United States, the United Kingdom and other countries use similar surveys, called "national assessments." In addition to

evaluating the risks confronting the nation and setting forth policies on those for which measures are most urgently needed, these also provide guidelines on risk assessment methods and other relevant issues.

Japan would benefit from developing some common guidelines on basic risk scenarios and risk assessment methods, and ensuring that these are well understood. With greater comprehension, the general public will be better able to understand the results when risk assessments are performed. Such guidelines will make it easier to explain (for example) why a certain measure is taken to address a certain risk, or why one's own local authority employs a particular measure while others do not. The result will be greater dialogue on risk by both public and private entities, and greater symmetry of information in ordinary times.

■ **Building a Framework for Public-Private Collaboration**

Representatives of both the public and private sectors were questioned on the subject of resilience. Both groups proved to be cognizant of the importance of cooperation.

In the United States, the Department of Homeland Security's Critical Infrastructure Partnership Advisory Council (CIPAC) facilitates Government Coordinating Councils (GCC) comprising government agencies, state and local authorities, infrastructure managers and others, and Sector Coordinating Councils (SCC) made up of representatives of the private infrastructure sector, in their efforts to strengthen resilience in designated critical infrastructure sectors.[7]

In the United Kingdom, "first responders" are include local public bodies, the police, fire brigades, emergency services, and hospitals. "Second responders" are persons who offer assistance or information, from sectors such as electricity, gas, water and sewer services, telephone services, and transportation. These groups, and sometimes others, work through Local Resilience Forums established in each region.[8]

Using these examples as a reference, Japan should combine the building of public-private collaborative frameworks with the building of resilience and security for companies involved in critical infrastructure of importance to national security.

[7] See Homeland Security, NIPP2013 *Partnering for Critical Infrastructure Security and Resilience*, pp. 10-12.

[8] Abe, Akihiro, *Legislation of the British Commonwealth Nations (the United Kingdom, New Zealand, Canada) on States of Emergency: Exercise of Emergency Authority during Major Disasters and Management Framework for States of Emergency*; National Diet Library surveys, Research and Legislative Reference Bureau, *Foreign Legislation* 251 (March, 2012), p 70.

Section IV Outlook for the Future

The Council on Competitiveness-Nippon (COCN) and the Policy Alternatives Research Institute (PARI) of the University of Tokyo were instrumental in planning, implementing, and analyzing the results of this survey. Based on discussions carried out at the Resilient Governance Study Group, a joint research body of COCN and PARI, and drawing upon the initiatives of other developed nations, particularly in fields concerning risk assessment, risk governance, and resilience, we propose the following four actions as matters of priority for Japan.

Proposals

1 **Carry out a national risk assessment**
2 **Establish suitable risk assessment methods for Japan**
3 **Carry out an interdependent dynamic analysis of critical infrastructure**
4 **Conduct a social impact study for crisis management and social implementation of strategic crisis management**

Proposal 1

Carry out a national risk assessment

✦ National risk assessment: From a focus on natural disasters to an all-hazard approach ✦

Japan needs to encourage a national dialogue on the subject of risk. To this end, we propose conducting out a national risk assessment, focusing on crises which pose a threat to the nation. The assessment should take the all-hazard approach that was used for this survey.

In implementing this survey, we compared the policies of the Cabinet Secretariat on Japan's national resilience with the general trend of policy initiatives for crisis management overseas. The concept of national resilience was first put forward by the Risk Response Network, an arm of the World Economic Forum. In consciously using this term, the Cabinet Secretariat, in drafting the Plan for National Resilience, appears to have studied the general trend of schemes advanced by other countries and international institutions on crisis management, national security, and emergency response, and attempted to synchronize those policies with its own.

In Figure 19, the Plan for National Resilience is shown in overview and compared with the programs of other countries. Differences are evident in many areas, including risk targets, scenarios, and progress management. Its fundamental principles make clear that the government regards the Plan for National Resilience as an extension of Japan's disaster prevention and mitigation measures. Much more than the schemes of other countries, Japan's policies remain weighted toward the exigencies of large-scale natural disasters. Risk surveys carried out by the World Economic Forum and the OECD display a consciousness of global interdependence and the needs of a global agenda, as do the resilience policies of other developed nations. There is a growing recognition of the association between crisis management capability – as typified by

resilience – and the competitiveness of companies, economies, and nations as a whole. Japan, however, by framing the Plan for National Resilience as an extension of natural disaster-centered prevention and mitigation schemes, continues to think in terms of a local agenda. Its policy approach has room for improvement.

Figure 19 Comparison of the Plan for National Resilience with Crisis Management Precedents in Other Developed Nations and Institutions

Based on Hiruma (2013b), COCN (2013)

	Plan for National Resilience (Japan)	Crisis management initiatives of other nations (Summary of information)
Targeted risks	All natural disasters (Earthquakes, tsunami, storm and flood damage, etc.)	All hazards (Social, economic, environmental, natural, technological, etc.)
Risk scenario	45 absolutely unacceptable situations (Worst-case scenarios)	Relative likelihood and relative impact
Basic objectives	• Protecting lives to the maximum extent • Protecting vital national and social functions from fatal damage • Minimizing loss to citizens' assets and public facilities • Promoting rapid recovery and reconstruction	• Citizens' health and safety • Economic stability • Environmental safety • Social and political security • Protection of national sovereignty and territorial safety
Background understanding and targets	Prevention and mitigation of disasters; implementation of the Plan for National Resilience (As a local agenda)	Establishment of national resilience (As a global agenda)
Progress management	*Management of individual measures* (Individual targets) Indexes are set for each measure in each program so that progress and achievement levels can be tracked and managed. *Management of individual programs* (Representative indexes, etc.) Representative indexes are selected for each program to create a picture of progress and achievement levels; these are tracked and managed. *Overall management* (Program progress index, etc.) Overall management is practiced using progress indexes integrating all of the individual indexes in each program (Changes in indexes, rather than absolute values, are significant.)	① Identification of things requiring protection on the national and community levels ↓ ② Analysis of risks posing threats to the above (All-hazard) ↓ ③ Risk assessment (Relative likelihood and impact) ↓ ④ Capability assessment ↓ ⑤ Implementation of measures (Risk controls and financial measures) ↓ Continuation of ①～⑤ cycle
Distinguishing features	The plan makes it possible to gain an overview of the measures as a whole and to pinpoint areas which are inadequate. In addition, through the use of indexes and other barometers one can grasp current achievement levels and manage the progress of each individual measure and program.	A PDCA cycle for crisis management which prioritizes risks to be managed over the mid-to-long term (5-10 years). It targets all hazards, defines what the national government needs to protect, and takes an all-government approach while being based on a consensus of citizens, private companies and all other stakeholders.
Source(s)	Minutes of the Cabinet Secretariat's Liaison Conference with Related Government Agencies on the Promotion of the Plan for National Resilience (December 2013 guidelines).	FEMA: *Crisis Response and Disaster Resilience 2030* et al UK: Civil Contingencies Act et al Netherlands: National Security Strategy Germany: Verteidigungspolitischen Richtlinien OECD: *Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework, 2012* World Economic Forum: *Global Risk Report* et al

Proposal 2

Establish suitable risk assessment methods for Japan

✦ From risk landscape to risk assessment ✦

The purpose of this survey was to create a risk landscape, which is different from a risk assessment. Assessments are conducted objectively using established evaluation methods and criteria. They are used in certain industries, such as manufactured goods, foodstuffs, and chemicals, as a means of evaluating risk.

Vulnerability assessments are central to the planning and implementation of policies for the Plan for National Resilience. Their sole utility is in managing the progress of projects carried out in the administrative jurisdiction of individual government agencies. They do not provide essential information needed to assess risk for Japanese society as a whole, and they differ substantively from the specialized risk evaluation techniques used by international institutions and other developed nations. The procedure for performing a vulnerability assessment includes the "execution of measures to avoid a worst-case scenario which must not occur." To say a scenario "must not occur" is equivalent to saying its risk likelihood must be reduced to zero. Japan no longer needs to assess its vulnerability to "a worst-case scenario which must not occur." It needs a new approach, such as the one in this survey, in which we evaluate a risk's relative likelihood and its relative impact if it does occur (Hiruma, 2013b; COCN (2013).

As yet, however, there are no global standards for the performance of all-hazard risk assessment. Evaluation criteria vary considerably among the many countries and institutions carrying out assessments. Yet there are some aspects of risk assessment which all countries have in common:

① All-hazard: Risks are identified not only in regard to natural disasters, but also to society, the economy, the environment, technology and other areas.

② Likelihood of occurrence: A mid-to-long time base is used, ranging from five to ten years.

③ Evaluation criteria: These are defined by concepts integrating several standards of value, including human life, the economy, the environment, society, and credit.

④ Relativity: Risks are assigned "relative" positions in terms of the key points of likelihood of occurrence and degree of impact.

Hashimoto (2013) points out that in Japan, "an overly compartmentalized bureaucracy (and research system) is an impediment to ①, while in regard to ③, an overemphasis on worst-case hypotheses makes it easy to ignore likelihood (frequency)." Hiruma (2013b) notes that "Japan first needs to establish a risk assessment method which meets the conditions of Japanese society. In evaluating risk, the countries of Europe and North America rely on criteria which differ according to the history, cultural background, and modern-day policy issues of each country. Their threshold values for national risk evaluation – likelihood and impact – may not be the best to evaluate risk in

Japan."

Identifying the threshold values for an assessment requires considerable research and development. For national risk assessments in particular, this means subjecting Japan's risks to an overall evaluation and prioritizing them for the purpose of making policies or decisions; it also amounts to information content as a form of external strategy. There is a need to greater transparency in the very governmental and political decision-making processes that go into determining the national budget, as well as for concrete results. But by targeting all hazards, diverse stakeholders will come to understand that amidst budget limitations and a host of other restraints, crisis management requires that policies be assigned priority. It is then that risk governance on a risk/return basis becomes possible.

If Japan is to succeed in implementing comprehensive crisis management, it will need to develop risk assessment criteria that meet the needs of Japanese society. Evaluations should be undertaken by the national government, municipalities and the private sector. This must be an ongoing activity, so that crisis management is improved throughout the whole of Japanese society through the PDCA (plan-do-check-act) method. Essential to the process will be "resilience forums" or other venues enabling dialogue with multi-stakeholders at each level of society. A system of this sort is already at work in the United Kingdom, where it enjoys legal guarantees within the framework of national security strategy. The development of theories on crisis management, and a feedback loop for its practice, is a job that must be taken on by society as a whole.

Proposal 3

Carry out an interdependent dynamic analysis of critical infrastructure

✦ Use big data, modeling, and numerical analysis technology to identify social bottlenecks ✦

✦ Make communities more effective, efficient, and ultimately resilient by investing in potential bottlenecks before they occur ✦

If there is anything that characterizes our world today, it is its interdependence. Organizations have come to cluster in industries where they can exercise their core competencies, while engaging in outsourcing at the same time. This has resulted in a blurring of the lines between one's own group's fields of activity and those of other groups. To shed light on the relationship between cause and effect, we must take an overall, structural perspective, applying the "system of systems" concept.

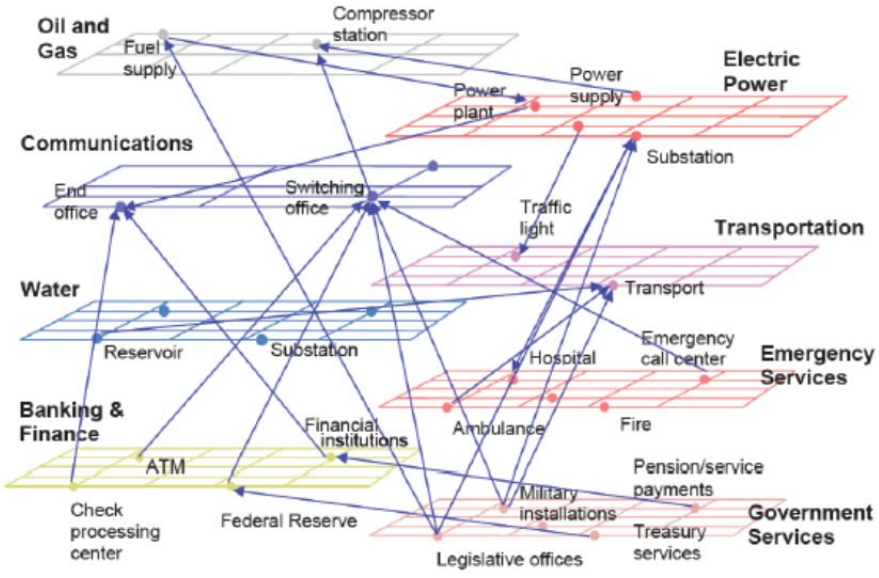
Luckily, the advancement of information technology has led to a flourishing discussion on the use of big data. The subject of some past research in Japan (in regard to critical infrastructure, information security and other matters), big data deserves a new interdependency analysis, or dynamic risk assessment, such as that mapped in Figure 20.

The principal objective of an interdependency analysis is to provide a scientific basis for cost-effectiveness analyses and decisions on orders of priority. In assigning priorities for risk assessment as described in Proposal 2, intelligence – meaning data on which to base one's decisions – is essential. And, from the perspective of society as a whole, an interdependency analysis allows us to identify, through scientific evaluation and verification, the points where there are bottlenecks or obstacles to the resilience of the system as a whole.

Figure 20 A Dynamic Interdependency Analysis of Critical Infrastructure

Conceptual Diagram: OECD (2012)

Identifying Bottlenecks and Prioritizing their Resolution



Proposal 4

Conduct a social impact study for crisis management and social implementation of strategic crisis management

✦ Identify key performance indicators for crisis management and make a social impact analysis to find investment effect ✦

✦ Strategic crisis management: Risk control and risk finance ✦

Hiruma (2013a) points out the importance of developing "financial techniques to encourage self-help (loans based on business continuity management ratings) and a social environment conducive to proactive investment" as means of strategic crisis management. Within the process, there must be "social implementation of total crisis management combining the social techniques of risk control and risk finance." He continues: "When evaluating risk for an infrequent tail event (by multiplying the scale of damage at the time of occurrence by the likelihood of occurrence), the risk is often found to be 'minor,' with the result that needed countermeasures are put off for another time. The utility of this concept in prioritizing risk is limited to disasters of a scale that permits autonomous recovery and reconstruction." Nor does it provide a quantitative evaluation of the effectiveness of money invested in crisis management and resilience. These are obvious reasons why it will not lead to active investment in this field.

In light of the increasing importance of evaluating impact on the environment, society, and governance ("ESG") as put forward in the integrated report – in other words, of evaluating the non-financial and intangible, rather than the financial or tangible as is currently done – it may be is worth positioning the corporate and social value of "resilience" as part of this trend. Were it possible to evaluate the social impact of (companies') business continuity plans and actions, and (government's) various policies to manage disaster, some of the capital now flooding global markets could be invested on a level commensurate with anticipated returns. The biggest factor limiting investment in crisis management is the burden such investment places on public resources. By facilitating the use of market functions to promote investment in crisis management, social impact analyses can do much to ease that burden.

The survey has shown that regional disparities in risk should be viewed as business opportunities. This is especially true for finance and insurance, where there is great potential in the development of risk finance products. Making a region's risks into a financial product, to be transferred to or swapped with other regions, will ease the risks borne by any one region. Designing such a system will lead to a thinner, broader spread of risk across Japan as a whole. From a still broader perspective, there is a need for businesses which make portfolios of Japanese risks, turn them into financial products, and transfer them overseas, particularly to foreign reinsurance markets. In combination with crisis management plans, investments in resilience, and other forms of risk control, getting involved in risk financing – the financing of residual risk, for example – will be an appropriate role for the finance and insurance sector.

In Conclusion

In the Global Risk Report for 2013, Japan ranked a modest 67th in risk management effectiveness – a markedly low assessment in relation to other developed countries. When, in 2012, the OECD's High Level Risk Forum conducted a survey of current crisis management systems focusing on the current status of risk assessment, Japan was not among the countries studied. The reasons for Japan's non-inclusion? Its systems did not meet the standard for evaluation, and it did not share its information with counterparts overseas.

In today's "new era of risk," an age of "resilient dynamism" where "crisis is the new normal," Japan's challenges go beyond the manifold issues entailed in crisis management. Japan is approaching a critical juncture which will bear upon its competitiveness and creditworthiness as a nation. In this report, we have stressed the importance of ① discussion keeping soundly in line with a global agenda; ② social implementation of crisis management adapted for all hazards, not only natural disasters, which utilizes the experience of a world leader in policy issues and is suited to Japanese society; and ③ a change in the country's crisis-management mode, from "Made in Japan": high-quality measures, both hard and soft, based on the experience gained from frequent disasters, to "Made *with* Japan": cooperation with the larger Asian region, particularly those within the Asian monsoon zone. We will be happy if this survey can play a role in achieving these objectives.

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