



**Asia-Pacific
Economic Cooperation**

APEC Guidebook on Resilience of GVCs to Natural Disasters

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Chapter 1: Introduction**Chapter 1: Introduction**

The recent development of Information and Communications Technology (“ICT”) and logistics infrastructure has been accelerating the globalization in economic activities. Globalization of the value chain, which is a flow of goods and services from companies which have developed them to be delivered to and consumed by the customers, while creating or adding value to goods and services, has also been accelerating, and this Global Value Chain (“GVC”) has offered various benefits to the people across the world. However, the negative aspects of the GVC have also become recognized in the face of large scale natural disasters taking place in an economy whose impacts immediately spread across the world through the GVC.

The value chain largely impacts the competitiveness of enterprises. As such, many enterprises are continuously striving towards improving efficiency in value chains on a global basis.

The private enterprises have experienced natural disasters that affected their GVCs and have come to realize the necessity of improving resilience against natural disasters. For instance, many enterprises including those in automotive industry were negatively affected by the Great East Japan Earthquake and 2011 Floods in Thailand. These events have accentuated the importance of the preparedness for natural disasters, including through collaborative efforts by various stakeholders towards improving GVC resilience, as well as those by individual enterprises.

Case 1-1 : The Impact of the Great East Japan Earthquake on Automotive Industry

The Great East Japan Earthquake that took place in the March of 2011 was the first widespread, large-scale natural disaster, which Japan has experienced, since the global value chain became highly sophisticated.

The automotive industry learned that the disaster-hit Tohoku region was an critical supply base of auto components, and thus the disruption of supply in the region had global impact, and that there were serious issues in supply chain networks. Due to the damage to auto component manufacturers in the Tohoku region, automotive productions not only in Japan but also across the globe had to stop operations.

The impact was significant, and after one month from the earthquake, Japan faced 60% decrease in production, and several manufacturing locations overseas such as the ones in the Americas, Europe or Asia saw as much as a 70% decrease, and many manufacturers saw a 50% production reduction and also production stoppages that lasted from several

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days to two months.

(Source: Information collected from newspapers and automotive companies' websites)

Case 1-2 : The Impact of the Floods in Thailand

Thailand experienced US\$40 billion damages from the 2011 Floods in Thailand that lasted from June to December of 2011. Seven major industrial estates were submerged, resulting, on average, in the 29.4% year-on-year decrease in production volume from October 2011 to January 2012.

Impacts on the production volume in the electrical and automotive sectors were particularly severe, recording 15% and 45.8% volume decrease, respectively, in the same period. Disruption in Thai manufacturing in fourth quarter of 2011 caused production losses elsewhere in the region. For instance, in Japan, the manufacturing production index was contracted by 2.4% from October 2011 to January 2012, and electrical component production saw 3.7% contraction during the same period.

(Source: UNESCAP, Economic and Social Survey of Asia and Pacific 2012)

This Guidebook is intended for the policy makers responsible for disaster management, corporate development and investment promotion, as well as those in charge of trade and investment in APEC member economies. It would also be useful for academics and practitioners in relevant fields.

This Guidebook introduces a variety of illustrative cases on enhancing GVC resilience to natural disasters, while keeping conceptual discussions minimal. It is hoped that this Guidebook will serve as a referential resource for relevant officials to consider practical measures best suited to their specific situations.

The remainder of this Guidebook consists of the following chapters.

Chapter	Contents
Chapter 2	This chapter provides an overview of GVC resilience, including its definition, key points of strengthening resilience and related stakeholders.
Chapter 3	This chapter discusses the efforts by private enterprises/enterprise groups towards enhancing GVC resilience as well as the issues and limitations in such efforts.
Chapter 4	This chapter discusses the roles of governments and international organizations expected in enhancing GVC resilience to overcome the issues and limitations discussed in chapter 3.

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Chapter 5	This chapter discusses the collaborative efforts among stakeholders towards enhancing GVC resilience.
Chapter 6	This chapter concludes this guidebook.

Chapter 2: GVC Resilience and its implications on the economy and society

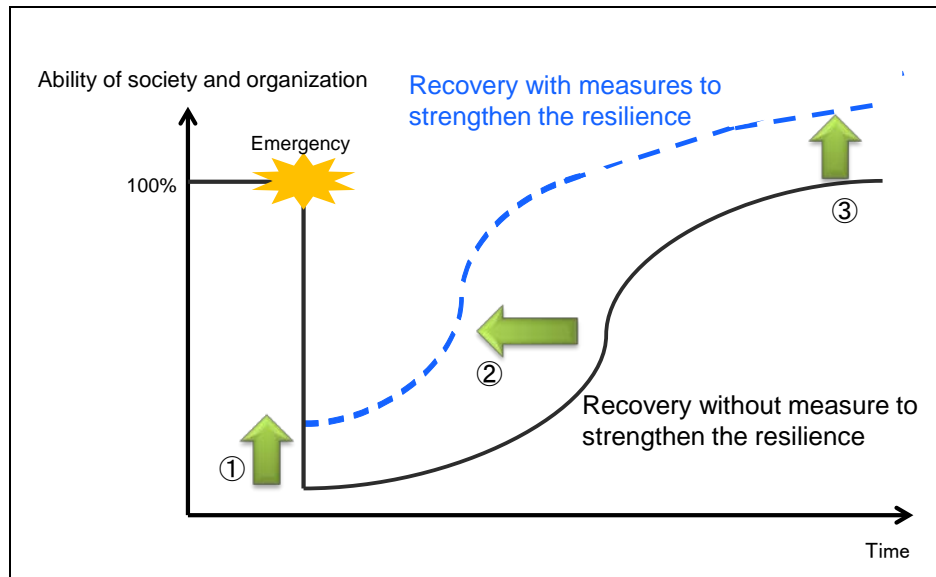
2.1 What Is Resilience?

Resilience¹ against disasters refers to the ability of a society or organization to respond to and recover from disasters and various other hazards. If societies and organizations are greatly weakened in the aftermath of disasters, and the affected societies and organizations takes a long time to recover, it may leave a lasting effect on those economies and societies.

The keys to improving such resilience depend on three points as follows:

- ① Minimizing the severity of disaster risk at the onset of a disaster (i.e. disaster prevention and disaster reduction)
- ② Accelerating the speed of recovery once disaster has struck (i.e. emergency response at the onset of the disaster).
- ③ Using crises as occasions to improve capabilities (i.e. reconstruction after a disaster)

Table/Chart 2-1 Key Points to Improving Resiliency



¹ The definition of resilience by The United Nations Office for Disaster Risk Reduction (UNISDR) is as follows: “The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.”

In March 2015, the 3rd World Conference on Disaster Risk Reduction was held in Sendai, Japan, and the Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Conference. In particular, “Build Back Better” concept, announced at the Conference at the initiative of Japan, was incorporated in the Framework, emphasizing that the “Build Back Better” concept is more about strengthening societal and organizational capacity in the face of crisis rather than merely being able to rebuild and recover to pre-disaster levels after the disaster.

Case 2-1 : Sendai Framework for Disaster Risk Reduction 2015-2030 (excerpt)

6. ...It is necessary to continue strengthening good governance in disaster risk reduction strategies at the national, regional and global levels and improving preparedness and national coordination for disaster response, rehabilitation and reconstruction, and to use post-disaster recovery and reconstruction to “Build Back Better”, supported by strengthened modalities of international cooperation.

32. ...Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

(Source: Ministry of Foreign Affairs of Japan)

2.2 Resilience of GVC and Stakeholders

As mentioned in the beginning of Chapter 1, GVC refers to the flow of goods and services from the companies which have developed them to be delivered to and consumed by their customers, creating or adding value.

In the current globalized economy, private enterprises continuously look for the ways to optimize their value chains, and allocate their resources globally to better locations for production, logistics or R&D which make more economic sense. And enterprises contribute to the economies or regions through paying taxes and creating jobs.

In view of the above, the stakeholders involved in GVC resilience are not limited to the aforementioned private enterprises or corporate groups, but also comprise governments (both central and local) and local communities and citizens, among others.

A value chain vulnerable to natural disasters will negatively affect not just the competitiveness of enterprises involved in the value chain, but it also affects all stakeholders involved. For example, when a value chain is disrupted by a natural

disaster and enterprises involved in the value chain become unable to procure essential parts, thereby becoming unable to fulfill the contractual obligation to supply its goods, and further taking a long time to recover, employment will become unstable, leading to deterioration in the vitality of local society and economy, and reduced level of services by the public sector caused by the reduced tax revenues, negatively impacting all stakeholders. Accordingly, enhancing GVC resilience is not merely a subject for individual private enterprises/corporate groups to independently work on, but entities such as private enterprises, communities and government organizations should also collaboratively work together.

Table/Chart 2-2 Negative Spiral by Vulnerable GVC and Benefits from Strengthening GVC Resilience

Stakeholder	Negative Spiral by Vulnerable GVC	Benefits Brought by Strengthening GVC Resilience
Citizens	Decrease in job opportunities, decrease in individual income. reduced level of services by public sector	Increase of job opportunities, increase of individual income
Community	Declined vitality of community through job losses	Revitalized community through job creation
Local government	Stagnation of local economy, job losses, decrease in tax revenues	Local economy development, job creation, increase in tax revenues
Central government	Slowdown in socio-economic development due to slowdown of business activities	Stable socio-economic development through revitalized enterprises

2.3 Roles of Government Agencies and International Organizations towards Strengthening GVC Resilience

As shown in Chapter 1, following the disruptions in the GVCs caused by the Great East Japan Earthquake and 2011 Floods in Thailand, private enterprises have been tackling in various ways the issue of GVC resilience as one of the important management agendas.

However, as there are issues and limitations in the efforts by private enterprises towards enhancing GVC resilience, government agencies and international organizations also have roles to play to further the process.

As mentioned in Chapter 1, Chapter 3 analyses the efforts by private enterprises

to enhance GVC resilience as well as issues and limitations related to the efforts by them. Chapter 4 proposes the roles of the government agencies and international organizations to further the efforts by private enterprises. Lastly, Chapter 5 refers to the collaboration among stakeholders such as private enterprises, governmental agencies and international organizations.

Chapter 3: Efforts towards Enhancing GVC Resilience by Private Enterprises

This chapter analyses the efforts by private enterprises/corporate groups to strengthen GVC resilience as well as issues and limitations related to such efforts.

Measures to enhance GVC resilience can involve implementing the following three types of measures from the perspective of the three key points for improving resilience mentioned in Chapter 2. In addition, a risk hedging measure through insurance is employed when risk mitigation efforts by private enterprises are thought to be unfeasible.

① Strengthening Disaster Countermeasures for the Corporate Locations (factories, distribution centers, warehouse, etc.) and Functions

Various functions, such as procurement, production, distribution, sales and after-sales services, are necessary for enterprises to produce goods and services, to deliver them and to be consumed by customers.

To enhance GVC resilience, strengthening disaster countermeasure for each location and function in a value chain, and ensuring redundancy thereof if necessary, is required.

② Diversification of the Corporate Locations and Functions

When a large-scale disaster strikes, affected locations and functions can lose their functionality and that may cause disruptions in the flow of goods and services to customers.

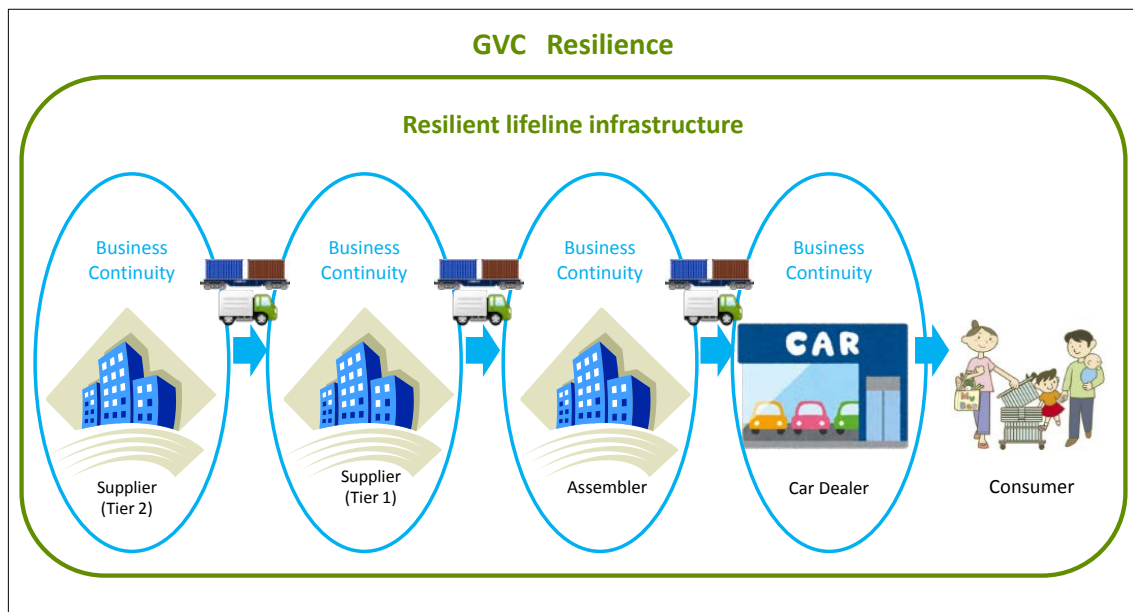
To enhance GVC resilience, creating multiple locations and functions, in anticipation of a loss of functionality of a particular site, is necessary.

③ Diversification of Suppliers

When a company procures parts and components from a single supplier, its supply may stop completely when a disaster strikes, and the company's production would halt as a result.

Therefore, to enhance GVC resilience, diversification in the procurement is necessary so as to continue supplying products to its customers.

Table/Chart 3-1 Illustration of Individual Business Continuity and GVC Resilience



3.1 Overview of the Efforts by Private Enterprises towards Enhancing GVC Resilience

In the areas prone to large-scale natural disasters, enterprises have come to spend resources on disaster risk management, recognizing the importance of the preparedness for natural disasters. Especially following the Great East Japan Earthquake and 2011 Floods in Thailand, global manufacturing enterprises such as automotive manufacturers, have placed GVC resilience as their important business agenda. They are working towards improvement of their own resilience, while at the same time working on that of the collaboration among upstream and downstream enterprises within the value chain (vertical collaboration) as well as collaboration among enterprises in the same industry or market (horizontal collaboration).

The Table/Chart below summarizes the efforts of private enterprises.

Table/Chart 3-2 Efforts of Private Enterprises towards Enhancing GVC Resilience

Outline of measures towards strengthening resilience by enterprises			Practical measures
1. Formulation and implementation of business strategy towards maintaining GVC resilience			a. BCP preparation and BCM practice after having identified important business
①	Strengthening	disaster	b. Disaster countermeasure

countermeasures for the corporate locations and functions	c. Stockpiling
② Diversification of the corporate locations and functions	d. Maintaining a production outsourcing agreement for an emergency e. Diversification of distribution hubs and freight routes f. Multi-location fabrication
③ Diversification of suppliers	g. Multi-sourcing based on the visualization and optimization of suppliers
Hedging risks that cannot be overcome by the formulation and implementation of business strategy towards maintaining GVC resilience	h. Utilizing Disaster insurance

In summary, private enterprises have placed BCP preparation and BCM practice as their core business strategy for GVC continuity, and they are working towards strengthening not only the resilience of their locations but also of the value chain that they are a part of.

This chapter analyses the efforts by private enterprises as well as summarizes related issues and limitations in the efforts.

3.2 Formulation and Implementation of Business Strategy towards Maintaining GVC Resilience

a. BCP Preparation and BCM Practice after Having Identified Important Business

BCP (Business Continuity Plan) is a roadmap that enables a business to prepare for disasters and to continue its operations under adverse conditions. BCP identifies an enterprise’s critical functions and the necessary measures to take to maintain these functions.²

The following is the steps for preparing BCP:³

² APEC (2014), How to promote Business Continuity Planning to mitigate the impact of disasters, Emergency Preparedness Working Group (EPWG).

³ APEC (2013), Guidebook on SME Business Continuity Planning, Small and Medium Enterprises Working Group (SMEWG)

10 Steps for Preparing BCP

- Step 1: Determine BCP Purpose, Scope and Team
- Step 2 Prioritized Activities and Recovery Time Objective
- Step 3 What Do You Need to Resume Key Activities?
- Step 4 Risk Assessment: Know Your Disaster Scenarios
- Step 5 Do Not Forget Pre-Disaster Protection and Mitigation
- Step 6 Emergency Response to Disaster
- Step 7 Business Continuity Strategies to Early Resumption
- Step 8 Be Financially Prepared
- Step 9 Exercise Makes Your Plan Functional
- Step 10 Ongoing Review and Improvement

(Source: APEC (2013), “Guidebook on SME Business Continuity Planning”)

BCM (Business Continuity Management) is a management process encompassing BCP preparation as well as continuous maintenance and improvement of the BCP through education, training and review, making the BCP more practical and operational.

In order to effectively allocate its limited resources, it is desirable if business portfolio of a private enterprise is reviewed and a business that is thought to be important is identified and thus prioritized for protection, on which basis BCP should be prepared, and BCM should be practiced so that the BCP becomes more practical.

Shown below is a good illustration in this regard. Based on the lessons learned from a previous disaster, a BCP was prepared after the identification of the operations that was prioritized for restoration. When faced with the next disaster event, the time required for full restoration of operations was made much shorter compared to that during the previous disaster.

Case3-1 BCP Preparation and BCM Practice for the Continuation of Core Operations

Having experienced Niigata Chuetsu Earthquake of Japan in 2003, with a seismic intensity of 5 upper, a semiconductor manufacturer in Japan took a month to restore its manufacturing lines. With lessons learned, they prepared a BCP and practiced BCM with a specific target of restoring at least one production line within 24 hours after an earthquake with an intensity of 6 upper.

They formed a crisis management committee under the direction of their management, which proceeded to take such initiatives as the compiling a manual and

implementing drilling exercises, among others. They made such investments as introducing a system that shuts down the production line as soon as it senses a preliminary tremor of an earthquake.

As a result of these efforts, when the Niigata Chuetsu-oki Earthquake in 2008 struck them again with an intensity of 5 upper, they did not suffer fatal damages and managed to restore its operation to full capacity only 4 days after the earthquake.

(Source: Cabinet Office, Government of Japan “Cases in Enterprises Business Continuation”)

<Issues and Limitations of private enterprises’ the Efforts by Private Enterprises>

With BCP/BCM taking root, it should also be recognized that BCPs prepared by individual enterprises may not function well in the face of large scale disaster, since these enterprises may rush to limited available resources at the same time. In order to avoid such potential conflicts, BCPs need to be coordinated and streamlined in anticipation of such disaster.

① Strengthening Disaster Countermeasures for the main production and distribution locations and Functions of a corporation

The strengthening of disaster countermeasures for the corporate locations and functions such as procurement, manufacturing and logistics includes measures such as “disaster countermeasure” and “stockpiling”. What is suitable may differ according to the industry as well as the operating resources, business strategies and other factors of individual enterprises.

b. Disaster Countermeasure

In order to strengthen the company’s locations and functions against disasters, private enterprises have implemented disaster countermeasures such as;

- Analysis and assessment of the disaster risks that may threaten enterprise locations and functions (e.g. hazard map preparation)
- Introduction of earthquake-resistant facilities and equipment
- Construction of anti-flood facilities and implementing flood-resistant measures (e.g. moving critical equipment and parts to the 2nd or higher floor so that they are not damaged during the floods)
- Introduction of information system for disaster prevention

< Issues and Limitations in the Efforts by Private Enterprises >

Public infrastructure such as energy, transportation, information and communication, and water and sewage supply, needs to be improved in order to strengthen resilience of the locations towards disasters, and as such, efforts by individual enterprises have limitations in implementing disaster prevention functions.

c. Stockpiling

The following practices are often performed in terms of stockpiling.

- Accumulating more inventory than the level that is sensible from the business efficiency perspective.
- Possessing critical parts and components at several locations such as factories, warehouses and sales offices.

The quantity of stockpiling can be calculated as the quantity of inventory (“BCP Inventory”) required to meet customer orders from the occurrence of disaster to the restoration of operation.

< Issues and Limitations in the Efforts by Private Enterprises >

Despite the necessity of stockpiling in anticipation of disaster is well-understood, enterprises can be reluctant to implement that, considering the economic inefficiencies in doing so.

② Diversification of the main locations and Functions of a corporation

The diversification of corporate locations and functions includes such measures as “maintenance of a production outsourcing agreement for an emergency”, “Diversification of distribution hubs and freight routes” and “multi-location fabrication.”

d. Maintenance of a Production Outsourcing Agreement in case of an Emergency

In preparation for an emergency incident, some enterprises have concluded “disaster agreement” which refers to the outsourcing of production to other enterprises in the same industry in the incident of an disaster.

Shown below is a good example in which two industry associations have signed an agreement to collaborate and outsource manufacturing when large-scale disasters strike. The agreement was signed at the association level, as individual corporations tend to have difficulties in finding partners, and in negotiating, by themselves.

A key characteristic of this agreement is the inclusion of practical provisions that ensures its effectiveness, such as a penalty upon breach of the agreement.

Case3-2 Contract Production Agreement among the Label Printers Associations

【Background】

In January 2013, Tokyo's Label Printers Association and Hokkaido's Label Printers Association signed the "Contract Production Agreement during Emergencies" (henceforth the "Agreement") which consists of seven articles, including that on ensuring access to substitute production facilities between the two associations during large-scale disasters. The agreement was signed at the association level, as small-scale corporations have been having difficulties in formulating individual BCPs due to their limitations in financial and human resources.

【The Outline of the Agreement】

The following items are written in the Agreement.

- When a member of a signatory association becomes unable to print labels due to an emergency situation such as a large-scale earthquake that has affected most or all production facilities of a geographical region in which the said signatory association is located, the said association shall ensure the said member's access to a substitute production facility of a member of the other signatory association which is located in another geographical region.
- When a member of an association seeks access to a substitute production facility before an emergency situation occurs, the two associations shall introduce a member of the other signatory association which has the required level of facility, technology and products to the said member who has requested such access.(Article 2)
- The two individual enterprises shall conclude a separate contract production agreement. (Article 3)
- The Agreement stipulates a penalty by stating that, "the contracting parties shall observe business ethics and are prohibited from making any sales effort to and receiving orders from the customers of the other party, and such actions shall incur penalty.(Article 4)."

Tokyo's label printers association is actively implementing BCPs and has also signed a similar agreement with Kyushu's label printers association.

【Expected Outcomes】

It is hoped that the Agreement will serve as a guarantee to ensure that a customer will be introduced to a substitute production facility during emergency situations.

(“Hoso Times” - February 4th 2013 Issue)

< Issues and Limitations in the Private Enterprises’ Efforts >

When such agreement is concluded between large corporations, the corporations may face the hurdle of clearing competition laws, and in the case of regulated industries, agreements between private businesses may potentially violate regulations.

Some enterprises may deem that it does not make economic sense to outsource production to other enterprises due to the need to protect intellectual property and proprietary expertise. Also for some specialized products, outsourcing manufacturing may not be feasible.

e. Diversification of distribution hubs and freight routes

Having experienced disasters that damaged shipping functions and distribution hubs or disrupted freight routes, some private enterprises have taken measures to keep substitute warehouses and establish alternative freight routes in case a disaster strikes and logistics infrastructure don’t function normally.

< Issues and Limitations in the Private Enterprises’ Efforts >

In an economy with poor transportation infrastructure such as airports, ports, and roads, it is not feasible to set alternative freight routes.

f. Multi-location Fabrication

With the aim of continuing to supply the products in case of a disaster, shift to multi-location fabrication, which is having two or more locations for mass production, is becoming an increasingly prevalent practice.

Western Digital Corporation, a HDD manufacturer headquartered in the US, offers a good illustration of how production at an undamaged location was promptly expanded during the 2011 Floods in Thailand, and how the flood impact was successfully minimized.

Case3-3 Boosting Production at Undamaged Plants Following the 2011 Floods in

Thailand

The crisis response at the Bang Pa-In factory of Western Digital Corporation (henceforth “WD”) located in Ayutthaya prefecture offers a good illustration on how WD managed to minimize the disruption to its supply chain network in the face of Thai Floods in 2011, and how it successfully maintained its competitive edge in the HDD industry.

Even before the floods occurred, WD’s Bang Pa-In factory started coordinating with the company’s Malaysian factory, and worked on its logistics in order to boost production in Malaysia in the event that the Bang Pa-In factory is shut down due to disasters. Thus, WD was able to promptly expanded production in Malaysia when the floods occurred.

While enterprises lost their competitiveness after the floods, WD was able to record its highest ever production and sales in the 3rd quarter following the floods.

(Source: Steven M. Leon. *Sustainability in Supply Chain Management Casebook: Application in SCM*. Pearson,2013)

< Issues and Limitations in the Private Enterprises’ Efforts >

Multi-location fabrication requires at least a mass-production factory in another place operated regularly at less than its full capacity. Due to the large amount of investment required for multi-location fabrication and/or resource constraints, some corporations are reluctant to invest upon considering its costs and expected benefits.

③ Diversification of Suppliers

g. Multi-sourcing based on the visualization and optimization of suppliers

Having experienced the Great East Japan Earthquake and the 2011 Thailand floods, global enterprises have realized the importance of visualizing their suppliers, and, where feasible, made their supplies multi-sourceable (i.e. the enterprises can purchase from multiple sources and suppliers), so that they can promptly procure from alternative suppliers when disasters strike.

The case below is the outlines of the multi-sourcing by Toyota, a Japanese automotive manufacturer, based on the visualization and diversification of its suppliers.

Case3-4 Supplier Visualization and Multi-sourcing

During the Great East Japan Earthquake in 2011, Japanese automotive manufacturers suffered direct damages to their production and R&D facilities as well as disruptions to their procurement of semiconductors and plastic parts. Production did not return to pre-disaster levels until six months after the event, and the industry had a domestic production of 8,398,000 units in 2011, dropped by 12.8% from 2010.

Having experienced the earthquake, Toyota has installed a new information system that is specialized in responding to disasters. The system has a database that stores information on production locations and emergency contacts relating to approximately 4,000 parts and components from not only their Tier 1 and Tier 2 suppliers with which Toyota has capital ties, but also up to Tier 10 suppliers. The database has information on 13,000 corporations and 30,000 locations.

Before the earthquake, Toyota would manually search for the suppliers producing in the area affected by the disaster every time a disaster occurred. With the new system, Toyota can quickly obtain information in regards to which production location and which components have been affected. Toyota is also moving toward multi-sourcing for critical parts and components.

【Effects】

Supplier visualization has enabled prompt and efficient decision-making, and risk dispersion can be achieved through multi-sourcing.

(Source: Nihon Keizai Shimbun (March 9, 2015))

<Issues and Limitations in the Private Enterprises' Efforts >

There may be a case where Tier 2 suppliers coincide even when an assembler had multiple Tier 1 suppliers for the same part or component, and as a result, multi-sourcing is not achieved.

For example, when two Tier 1 suppliers (located in countries A and B respectively) of a finished products manufacturer source components from the same Tier 2 supplier (located in country C), it is possible that the supplies from the two Tier 1 suppliers would stop when a disaster strikes country C. Thus, it is desirable that Tier 2 or upper-stream suppliers are diversified as well, but Tier 2 or upper-stream suppliers may not be sufficiently available yet, especially in the developing economies. Such diversification may, therefore, take place across the border.

3.3 Hedging Risks that cannot be Avoided through the Formulation and

Implementation of Business Strategy towards Enhancing GVC Resilience

Risks that cannot be managed properly by the aforementioned measures can be hedged by utilizing disaster insurance.

h. Utilizing Disaster Insurance

As it is inefficient to manage tail risks such as earthquakes, tsunamis and floods on a daily basis, most enterprises utilize insurance which enables them to hedge the said risks to a substantial extent through the payments of insurance premium. However, there are some cases where risk hedging by purchasing insurance policy may not be feasible.

< Issues and Limitations which Private Enterprises Faced >

If an area is hit by a serious disaster, insurance companies may quit underwriting the insurance for the affected area. Also, insurance companies may raise their insurance premium once a disaster strikes, and enterprises may not be able to afford it any more.

3.4 Efforts Toward Business Continuity by Small and Medium Enterprises (SMEs)

SMEs play important roles in GVCs. SMEs, unlike large enterprises, have relatively limited resources, and employing some of the aforementioned efforts towards improving resilience may not be realistic to SMEs. They may have their own priorities in implementations.

The table below shows each measure introduced above towards improving resilience. In regards to why such measures are not realistic, factors that thwart the efforts of SMEs towards improving resilience are explained below.

Table/Chart 3-3 Feasibility of Implementing Measures toward Improving Resilience by SMEs

Outline of measures towards strengthening resilience by enterprises		Priority	Reason (factors that thwart the efforts by private corporations are <u>underlined</u> .)
1. Formulation and implementation of business strategy towards maintaining GVC resilience	a. BCP preparation and BCM practice after having identified important	H	When a large corporation selects its suppliers, consideration is given to the suppliers' efforts on BCP/BCM, and as such improving resilience is a priority issue for those SMEs who wish to participate in GVCs. However, <u>SMEs may not have enough financial and human resources to work on BCP/BCM.</u>

	business		
①Strengthening disaster countermeasures for the main production and distribution locations and functions of a corporation	b. Disaster countermeasure	M	<u>Since SMEs have limited funding, investment in hardware infrastructure is given low priority, and SMEs have not taken adequate countermeasures.</u>
	c. Stockpiling	M	Stockpiling may help SMEs continue businesses in the face of a disaster, <u>but SMEs tend to be reluctant to implement due to more necessities in working capital to implement.</u>
②Diversification of the main locations and functions of a corporation	d. Maintaining a production outsourcing agreement for emergencies	H	If a corporation is providing multi-purpose products, supply disruption could lead to switching procurement sources. As such, it is desirable to conclude agreements with other companies so that business functions can be outsourced if a company cannot conduct a part of their operation due to a disaster. However, <u>SMEs tend to have difficulties in finding partners by themselves, and in negotiating, and thus supporting functions may be necessary.</u>
	e. Diversification of distribution hubs and freight routes	L	<u>As SMEs have limited funding, such efforts by individual SMEs have limitations.</u>
	f. Multi-location fabrication	L	<u>Multi-location fabrication will make little economic sense for SMEs with high investment cost due to small production volumes.</u>
③Diversification of suppliers	g. Multi-sourcing based on the visualization and optimization of suppliers	L	Multi-sourcing based on the visualization and optimization of suppliers is feasible, but <u>small lot orders may result in high transaction costs.</u>
2. Hedging risks that cannot be	h. Utilizing disaster	H	While risk hedging by insurance is desirable if funding permits, <u>recent post-disaster insurance premium hikes are increasingly making it</u>

<p>avoided through the formulation and implementation of a business strategy towards enhancing GVC resilience</p>	<p>insurance</p>		<p><u>less affordable for SMEs to use insurance.</u></p>
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(Priority : H:High, M:Moderae, L:Low)

As mentioned, the priorities from SMEs standpoint may be “a. BCP preparation and BCM Practice after having identified important business,” “d. Maintaining a production outsourcing agreement for emergencies” and “h. Utilizing disaster insurance.” The following shows the illustrative cases of the measures taken by the SMEs towards improving resilience.

The first case below is an illustration of a best practice of “a. BCP preparation and BCM practice after having identified important business.” This company successfully minimized the impact of the Great East Japan Earthquake owing to its implementations of BCP/BCM, and it managed to swiftly start its operations after the earthquake.

Case3-5 Implementation of BCP/BCM in the Face of the Great East Japan Earthquake

Suzuki Kogyo Limited (“Suzuki Kogyo”) is an industrial waste processor and recycler based in Miyagi Prefecture of Japan. Suzuki Kogyo was heavily damaged by the tsunamis triggered by the Great East Japan Earthquake. The tsunami swept away its administrative office at its intermediate processing facility and its main equipment such as heavy machinery and vehicles. Moreover, the outer walls of the processing plant were severely damaged, and facilities such as incinerators and water treatment facilities became flooded, collapsed and/or were swept away.

【BCP preparation】

As Suzuki Kogyo has paid much attention to risk management since long time ago, the damages reported from the Niigata Chuetsu-oki Earthquake in 2007 moved Suzuki Kogyo towards further increasing its risk management capabilities: Suzuki Kogyo launched internal BCP committee in 2008, and for over a year, it worked to prepare a BCP by itself. Behind this action was the sense of responsibility that companies such as Suzuki Kogyo has in times of emergency. As a result, the BCP was made to be operational, not just a plan on paper.

【BCP Implementation】

- Suzuki Kogyo executed its BCP as soon as the earthquake had stabilized (40 minutes after the first occurrence of the earthquake).
- Initially, its incineration facility was expected to be back in operation in 3 months' time after the disaster, but as all the components necessary for the repair was stored in a safe place in advance, the facility was back in operation only 38 days after the earthquake. This was achieved because its management, through interviews with its employees, was aware that most components of the incineration facility were custom-made, and thus it was difficult to procure them during disasters. Accordingly, the corporation took action to stock the necessary components beforehand.
- So as "not to inconvenience its customers in any event even when Suzuki Kogyo is affected", it had signed "Emergency Agreements" with other companies in the same sector as well as with its subcontractors. Based on these Emergency Agreements, it was able to request those companies to perform certain business functions on behalf of Suzuki Kogyo without inconveniencing its customers.
- After preparing its BCP, Suzuki Kogyo has been conducting at least three exercises a year, performing drills to role-play situations that would occur during real disasters. Thanks to these drills, individual employees came to know what to do even without manuals in an emergency situation.

【Outcome】

- The internal operation system and the cleaning services for drinking and sewage facilities recovered within 3 days of the earthquake.
- From the 6th day, Suzuki Kogyo commenced the outsourcing of the treatment operation of its intermediate processing facility which it was unable to process itself.
- Its incineration facility returned to operation one month after the earthquake, which means that Suzuki Kogyo was back to its full operational capacity, operating for 24 hours a day.

(Source: Yomiuri Shimbun (October 18, 2012))

The following case offers a good illustration on how the company managed to avoid disruption to its value chain by the “d. Maintenance of a production outsourcing agreement for emergencies” during the Great East Japan Earthquake.

Case3-6 Case Study on Production Outsourcing during the Great East Japan

Earthquake

Iwaki Die-cast Co., Ltd. (“Iwaki Die-cast”) is headquartered in Yamamoto Town, Miyagi Prefecture, Japan. It is a Tier II die-cast supplier in the automotive industry. It operates three factories in Yamamoto Town as well as one in Saitama Prefecture, Japan and one in the United States. The three factories in the Yamamoto Town were hit by the Great East Japan Earthquake on March 11. The factory closest to the ocean was swept away by resulting tsunami, and its main factory suffered from the subsidence damage. The aluminum dissolution electric furnace, which was the critical production facility for Iwaki Die-cast, suffered from the congelation damage in the furnace that was caused by blackouts, but it was able to partly resume production by the end of March, owing to the support from its customers and procurement of its own electric generators.

【Restoration: Swift Judgment and Actions】

The president was in Kyushu, Japan when the earthquake struck. He flew to Tokyo the next day, and contacted the company’s business partners and repair companies, and arranged for various restoration works. As a result of these swift decisions and actions, Iwaki Die-cast was able to procure its own electric generators and electricity supply from other companies, and started repair works on its facilities immediately after the earthquake.

The metal mold, which is a necessary component in die-casting, is the lump of a company’s accumulated know-how, and therefore, the die-cast parts suppliers are reluctant to share their metal molds with their competitors. However, upon judging that the restoration of the full production lines would take time, the president decided to share the company’s metal molds for parts that can be replicated as long as the molds are in place, in order not to disrupt its value chain and to fulfill its responsibility as a Tier 2 supplier. It could also be noted that Iwaki Die-cast had already solidified its production outsourcing with its sub-contractors in various locations.

On the other hand, the highest priority was placed on the restoration of special equipment which is required for products that no other company could produce. Owing to this prioritization, Iwaki Die-cast was able to keep its supply disruptions to a minimum.

【Outcome】

As a result of the tough decision to share the metal mold, the company’s relationship with its customers deepened and its credibility boosted. Moreover, its metal mold technologies won high recognition, leading to new orders, and the volume of orders returned to pre-earthquake levels in August, 2011, five months from the earthquake.

(Source: An interview with Iwaki Die-cast)

Many SMEs tend to be hesitant in investing towards improving resilience against natural disasters, as they are not certain as to when they could reap the benefits of such investments. However, recognizing the threats of disruptions to the GVC, in order to best utilize limited financial and human resources, some SMEs have succeeded in improving resilience through sensible investments under clear prioritization. It is hoped that successful cases such as those aforementioned in this section will become more common.

3.5 Initiatives towards Strengthening GVC Resilience as a Whole

As seen thus far, while many enterprises are pursuing efforts to strengthen their abilities for their business continuities, the attentions need to be paid, not only to the strengthening of the individual enterprise's resilience, but also to that of the corporate groups that form GVC in which it is a part of. This is because, even when an enterprise is not directly affected by a disaster, it may become unable to supply its goods and services to customers as a result of inability to procure necessary components or materials or to deliver its goods/services, owing to the value chain disruption by the disaster. Because a GVC as a whole is as resilient as the most vulnerable part of the value chain, in order to enhance GVC resilience as a whole, it is desirable if the corporate groups that form GVC, inclusive of SMEs, are coordinated in their efforts.

Case3-7 “Affiliated BCP” in the Oil Industry

In Japan, based on the experiences from the Great East Japan Earthquake, The Agency of Natural Resources and Energy is leading the efforts towards the establishment of oil supply network in emergency situation.

In order to recover the oil supply in a timely manner when massive earthquakes occurred, it is necessary to promote quick restorations of 1) the demand-supply adjustment and tank truck dispatch control functions by oil wholesalers' head offices, 2) the receiving and shipping function of refiners and oil tank facilities, and 3) the logistic, sales and other functions of transport companies, dealerships and distributors (affiliated service stations), in an integrated manner. It could be noted that these oil wholesalers, transport companies, and dealers and distributors, etc., shape the affiliates but do not necessarily have capital ties.

Each wholesaler and refiner, answering to the requests by the Agency for Natural

Resources and Energy, formulated its own “affiliated BCP” to implement in the event of a major earthquake, encompassing the entire affiliated supply network, including transport companies as well as dealerships and distributors, based on the guidelines formulated by Petroleum Association of Japan, in place of the BCPs that had been prepared independently by individual enterprise. Reviews by the committee of advisors, established under the Agency for Natural Resources and Energy, revealed the progresses that had been made, such as radical overhaul of the organizational structure of each enterprise’s crisis management division and the re-formulation of BCP with close collaboration across companies, going beyond the plans separately formulated. The committee also pointed out the necessity of the efforts to move beyond BCP as one of office documents, and of repeated practical thought exercises that involve subcontractors and affiliates, stressing the importance of continuous practical efforts.

(Source: Agency of Natural Resources and Energy)

3.6 Summary: Issues and Limitations in the Private Enterprises’ Efforts

As mentioned in this chapter, private enterprises are advancing various efforts to strengthen resilience from the perspectives of the aforementioned three key points in improving resilience (i.e., disaster prevention and disaster reduction, emergency response at the onset of the disaster, and reconstruction after a disaster). However, there are issues and limitations in the efforts by individual corporations. These issues and limitations are more serious in SMEs that have comparatively smaller business scales and less management resources than large enterprises, but SMEs do not tend to put the efforts towards strengthening GVC resilience against natural disasters with high priority. However, to the extent that SMEs participate in GVCs, their efforts towards strengthening resilience would also impact GVC resilience as a whole. Thus, collaborative efforts by GVC participants inclusive of SMEs towards enhancing GVC resilience as a whole would be worth considering. Further, there are cases of cross-border collaborations towards GVC resilience upon disaster, and it should be noted that the efforts such as these may contribute to the strengthening of competitiveness in ordinary times, as illustrated in Case 4-7.

Due to such issues and limitations, supports by governments and international organizations may carry much significance. Chapter 4 will consider the roles expected of governments and private enterprises in order to enhance GVC resilience, based on the issues and limitations in the efforts by private enterprises. Also, upon large scale disasters, BCPs prepared by individual enterprises may not effectively work and even see conflicts among BCPs, and thus, in Chapter 5, the initiatives such

as area-wide BCPs and collaborate efforts to strengthen GVC resilience, will be explored.

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Chapter 4: Efforts on Enhancing Resilience by Governments and International Organizations

4.1 Overview of Efforts on Enhancing GVC Resilience by Governments and International Organizations

Given the issues and limitations remaining in the initiatives by private enterprises towards the enhancement of GVC resilience as described in the previous chapter, it is expected that governments and international organizations will play a role in promoting efforts toward the strengthening of GVC resilience.

Some of key roles of governments and international organizations are summarized in the following.

Roles of governments and international organizations for the strengthening of GVC resilience

- (1) *Develop disaster-resistant lifeline-infrastructure*
Support enterprises in their "Disaster countermeasures" and in the promotion of "Diversification of distribution hubs and freight routes"
- (2) *Strengthen support for local SMEs*
Provide technical support to SMEs in their "BCP preparation and BCM practice" after having identified important business", and set up a mechanism for incentivizing SMEs to work towards disaster prevention and disaster reduction
- (3) *Promote inter-corporate coordination during emergencies (e.g., contract production agreements)*
Improve the environment for promoting cooperation among private enterprises during emergencies
- (4) *Improve the availability of disaster insurance for private enterprises*
Establish a public reinsurance by government agencies for promoting casualty insurance

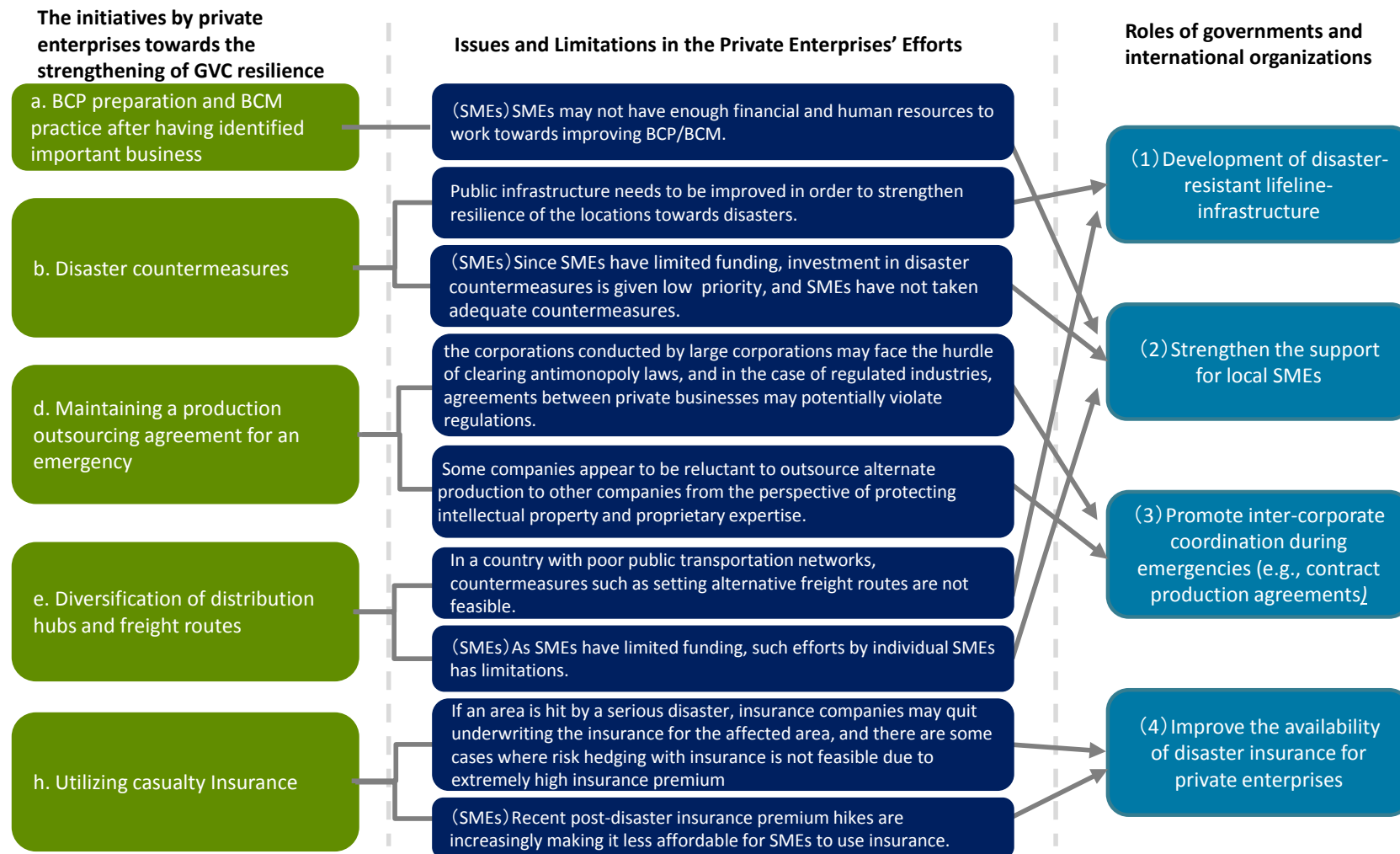
Chart 4 - 1 shows the roles expected of governments and international organizations to promote actions against the issues and limitations in the private enterprises' efforts toward the enhancement of GVC resilience. While what is most important to enhance GVC resilience is the commitment of private enterprises, governments and international organizations has their roles, thereby developing an environment where corporations can make business investment with confidence. In

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addition, providing the right incentive for private enterprises to take actions to promote enhancement of GVC resilience as a whole will also help.

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Table/Chart 4-1 Issues and Limitations in the Private Enterprises' Efforts and the Roles of Governments and International Organizations



※As stated in the chapter 3, “c. Stockpiling”, “f. Multi-location fabrication” and “g. Multi-sourcing based on the visualization and optimization of suppliers” are the strategic matters of individual enterprises, leaving limited roles in what governments and international organization could do to support. Therefore those initiatives have been omitted.

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In order to promote GVC resilience against natural disasters, a master plan at an economy-wide level is indispensable in the first place, and individual policies and measures should be planned and implemented under the master plan.

The Government of Japan has developed “Fundamental Plan for National Resilience” with the aim of promoting initiatives for building resilience in light of the experience of the Great East Japan Earthquake.

Case 4-1 Fundamental Plan for National Resilience by the Japanese Government

In light of the experience of the Great East Japan Earthquake, the Japanese Government developed an Fundamental Plan for National Resilience by setting specific goals to be achieved and key performance indicators (“KPIs”) for avoiding the worst events which should never happen, with the objective of promoting initiatives for building economy-wide resilience.

With the Fundamental Plan, the Japanese Government promotes and supports the actions of government offices, municipalities, and related organizations.

In developing the Fundamental Plan, the Japanese Government firstly set four basic principles as follows: (1) Prevent human loss by any means, (2) Avoid fatal damage to important functions for maintaining administration as well as social and economic systems, (3) Mitigate damage to property of the citizenry and public facilities, and (4) Achieve swift recovery and reconstruction. Based on the basic principles, the Japanese Government set up eight “Goals to be achieved in advance”, 45 “Worst events that should never happen” that will interfere with the goals, and 15 events selected among the above 45 events as what should be intensively addressed in light of the significance of the national roles, emergency levels, and the significance of the influence. In the Fundamental Plan, the Japanese Government assumed the following “Worst events that should never happen” in light of the strengthening of the resilience of the global value chain, developed the corresponding concrete measures and KPIs, and developed efforts in terms of both hardware and software with the collaboration of the public and private sectors.

Goals to be achieved in advance	Worst events that should never happen	Concrete measures	Example of related government ministries/ agencies and KPI
Prevent economic activities (including	Loss of international competitiveness resulting from corporations' lowering of productivity due to the interruption of	Development of BCPs for individual firms and collaborations thereof to ensure	[Cabinet Office] Ratio of BCPs developed Large enterprises: 45.8% (2011)→53.6% (2013)→almost 100% [2020] Medium-sized enterprises:

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supply chains) from failing even after a large-scale natural disaster.	supply chains	supply chains resilience	20.8% (2011)→25.3% (2013)→50% [2020]
	Suspension of energy supply required to maintain socioeconomic activities and supply chains	Development of collaborative plans to continue oil supplies in case of disaster, alliance plans, re-development of BCPs by oil refiners and wholesalers	[Ministry of Economy, Trade and Industry] Target average number of days taken for restoration of petroleum product supply assuming a devastating disaster: 7.5 days (2013)→3.3 days (2014)→1 day [2018]→1 day [2019]
	Breakdown of major land and sea transport networks such as separation of a major route in the Pacific belt zone	Promotion of measures to strengthen the disaster handling ability of transportation facilities	[Ministry of Land, Infrastructure, Transport and Tourism] Ratio of BCPs developed for international strategic ports and harbors, international hub ports and harbors, and important ports and harbors: 14% (2013)→36% (2014)→100% (2016)

The strengthening of national resilience is a form of national risk management and is a project of evolving the mid- and long-term strengthening of national resilience through the continuous cycles of the reviews of the actions executed and formulations of better actions for the next fiscal year based on such reviews, where the leadership of the government is essential.

(Source: Fundamental Plan for National Resilience- Creating a Strong and Resilient Country 2014 (June 3 2014), 2015 (June 16,2015), Decisions by the Cabinet of japan,)

The next section discusses the examples of specific measures corresponding to the four types of roles of governments and international organizations.

4.2 (1) Development of Disaster-Resilient Lifeline-Infrastructure

In order for private enterprises to enhance their disaster prevention functions by taking “b. Disaster countermeasures” for their facilities, infrastructure of energy, transport, information, water and sewage supply, etc., needs to be developed. The development of transport infrastructure such as roads is also necessary for them to implement the “e. Diversification of distribution hubs and freight routes.” However, because infrastructure is difficult for private enterprises to develop independently due to the large amount of capital investment required, it is necessary for governments to play a role in infrastructure developments.

Such infrastructure developments should be implemented with the objective of

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strengthening resilience of following four lifeline-infrastructures with priorities.

Priority fields in the development of disaster resilient lifeline-infrastructure

- ① **Energy infrastructure:** Enhancement of the resilience of networks of electricity, natural gas, etc. to avoid disruption of energy supplies in the event of a disaster
- ② **ICT infrastructure:** Development of the system for collection, analysis, and broadcasting of disaster information and safety information in times of emergency
- ③ **Transport infrastructure:** Decentralization of transport networks, allow people and goods to be exchanged via alternative routes even if a certain route became disconnected by a disaster
- ④ **Water infrastructure:** Strengthening water and sewage networks to avoid disruption of water supply/discharge in times of emergency

The development of lifeline infrastructure can accelerate expansions by the global enterprises into the economy/region resulting in virtuous cycles of accelerated investments leading to the invigoration of local societies and communities.

If the vulnerability of lifeline infrastructure is revealed by a disaster, corporate activities may stagnate, with the disaster-hit corporations leaving or the number of foreign companies expanding in the economy/region coming to a halt, which may have a serious impact such as local economic stagnation and the loss of employment.

In relation to this development of lifeline infrastructure, the declaration by APEC leaders in 2013 recognized the importance of examining long-term asset value, lifecycle cost⁴ etc., in a comprehensive and holistic manner in planning infrastructure projects, as well as the importance of improving government expertise to do so. In light of this affirmation, APEC Guidebook on Quality of Infrastructure Development and Investment was developed, with the objective of deepening understandings on the concept and concrete measures to ensure quality of

⁴ Lifecycle cost includes cost incurred throughout the lifecycle, from procurement/manufacturing to disposal.

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infrastructure.

This guidebook refers to the importance of the consideration towards safety including resilience to disasters in an infrastructure project, and deems that in infrastructure development, project formulation and implementation eyeing on the strengthening of the resilience is important.

① Strengthening Resilience of Energy Infrastructure

One of the most important efforts that governments are expected to make is to strengthen energy supply networks, including electricity and natural gas, to avoid supply disruption at the time of disaster.

In Japan, the government has been working to strengthen the oil supply network, involving the oil industry as a whole. Oil is the indispensable resource in the reconstruction of the disaster-impacted area, for supporting residents' day-to-day lives as well as for transportation of aid-material, etc. It is also used as material for plastics and other industrial products, and its supply disruption will impact economic activities tremendously. It is, therefore, important that not only private oil companies but also the government take the lead in preventing supply disruptions from natural disasters.

Case4-2 Collaborative Efforts of the Oil Industry

After the Great East Japan Earthquake, oil becomes especially crucial for economic activities in Japan, which accounts for 40% of the primary energy supply. The Japanese government (the Agency for Natural Resources and Energy), therefore took a leadership role in strengthening the oil supply network, involving the oil industry as a whole, to prevent supply disruptions during natural disasters. The illustrative effort is the strengthening the "Oil Supply Infrastructure", summarized below, along with the "Affiliated BCPs" referred to in Case 3-7.

Targeting the industrial complexes, housing oil refineries and industrial material manufacturing, the Agency evaluated the impacts of a massive earthquake to the business continuities of the businesses establishments inside such industrial complexes, utilizing the results to determine what efforts should be undertaken through public-private sector collaboration in order to implement measures to reduce impacts from the forthcoming earthquake. Based on the evaluations of the resilience of oil storages against land liquefaction and seismic capacity of facilities, etc., the Agency is supporting oil wholesalers in their efforts to strengthen the resilience of their refineries and oil storages, including the assistances for 1) countermeasures against

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earthquake, land liquefaction and tsunami, 2) installations of safety shutdown system for their facilities, and 3) reinforcement of back-up receiving-shipping capacity.

(Source: Agency for Natural Resources and Energy of the Ministry of Economy,
Trade and Industry)

② Strengthening Resilience of ICT Infrastructure

One of the most important tasks, expected to be carried out by the government, is to improve the resilience of ICT infrastructure for sharing and providing information possessed by public organizations, local governments, private companies and individuals at the time of disaster among the stakeholders.

With support from Japan, ASEAN members are making efforts to strengthen the resilience of the ICT infrastructure and to utilize it for disaster prevention and reduction. The following is a case example in Indonesia.

Case4-3 ASEAN Smart Network Initiative

In 2013, the Japanese government proposed the “ASEAN Smart Network Initiative,” which contributes to building high-speed and multi-functional ICT infrastructure to cover the entire ASEAN region. As part of the initiative, Japan promotes the spread of Internet-based applications for disaster prevention and reduction to establish ICT infrastructure in ASEAN members. The disaster prevention information system consistently handles the gathering, analyzing and transmission of disaster prevention information to residents and neighboring organizations in a timely and secure way. The disaster prevention information system is quite promising as an effective disaster prevention and mitigation measure to improve the resilience of the information infrastructure in ASEAN members, which are exposed to a range of natural disasters. Under the said initiative, the Ministry of Internal Affairs and Communications (MIC), the Japanese government, conducted a “Research study for introducing ICT system to be used in the field of disaster prevention in Indonesia” in 2012, and now the system for flood prevention in the Special Capital Region of Jakarta has been introduced and operated as detailed below.

【Case in Indonesia】

In Indonesia, disaster prevention measures, such as the conveyance of appropriate information to residents, are challenges. Repeated floods are the biggest problem among natural disasters particularly in Jakarta, where residents and companies in industrial parks have often suffered significant damage from floods. Jakarta’s Regional Disaster Management Agency, (BPBD DKI Jakarta) used to spend a significant amount of time to

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identify flooding spots and areas and engage in initial measures, as they gathered disaster information from local authorities manually and managed the data in MS Excel format. Since the “disaster prevention information system” (the “System”) began full-scale operations in December 2013, information sharing among concerned parties has been improved, and they are now able to respond to disasters more quickly.

When officials at the BPBD DKI Jakarta confirm local data that have obtained through email and fax from local disaster officers and input it into the System, the System automatically sends texts or short messages through SMS to the manager of local authorities in charge of disaster management in the area where the water level is higher than that which poses a potential risk of flooding. The manager of local authorities can then encourage proper and quick initial responses, such as a mandatory evacuation order, to minimize the damage. In the flood that occurred in January 2014, for example, they could collect and deliver information quickly on a real-time basis through the system, and could securely and effectively coordinate overall mitigation activities.

The aforementioned activities promote building a network through high-speed and multifunctional ICT infrastructure, thus contributing to improving the resilience to disasters.

(February 5, 2014 and March 23, 2015, Press releases from Fujitsu Limited:
ASEAN Smart Network Initiative website, Ministry of Internal Affairs and Commu-
nications, Government of Japan)

③ Strengthening Resilience of Transport Infrastructure

Transportation infrastructure, such as roads, bridges and railroads, plays various roles after disasters, for instance, as a path for rescue teams or relief supplies, or as a transportation route for construction material and equipment at the time of recovery. Therefore the disruption of transportation infrastructure interrupts the movement of people and goods, causing tremendous damage to economic activities. However, there is an enormous cost to prevent all the roads, bridges and railroads from being damaged by earthquakes and floods. It is necessary, therefore, to continuously invest in infrastructure according to the government’s focus and priority.

The Transportation Working Group (TPTWG) and the Emergency Preparedness Working Group (EPWG) of APEC proposed a framework in 2014 to strengthen supply chain resilience from the standpoint of transportation policy. This framework promotes the APEC Seven Principles of Global Supply Chain Resilience

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which are as follows: 1.Support planning and business continuity management, 2.Leverage regional cooperation to support the supply chain, 3.Share information and knowledge, 4.Recognize and promote best practice in human resource and capacity development 5.Promote disaster risk management and hazard mapping, 6.Promote best practice policy, regulation and, flexibility, 7.Promote critical infrastructure and inter-modalism. APEC-wide and economy-level capacity building are underway to support this multiyear initiative.

4.3 (2) Strengthening the Support for Local SMEs

It tends to be difficult for SMEs to undertake “BCP preparation and BCM practice” because of limited financial resources and expertise. Due to financial constraints, many SMEs have not invested much in “disaster countermeasures” to “strengthening their locations and functions.”

In order to improve the situation, the government should play the following role.

The Government’s Roles in Assisting Local SMEs

- ✓ Provide information and support for the SMEs to undertake prevention or mitigation of the damage caused by a disaster through BCPs/BCMs.
- ✓ Provide a framework in which SMEs can be incentivized to invest in preventing or mitigating the damage caused by a disaster.

In economies and regions where global companies operate, the government can take a lead to foster SMEs in the upstream part of the value chain for them to participate in the GVC and thereby invigorating local community, and creating a virtuous cycle.

APEC Emergency Preparedness Working Group (EPWG) conducted a survey titled “BCP Status of the Private Sector in the APEC Region 2011” and revealed the state of BCP formulations among enterprises inclusive of SMEs in APEC region and argued for expanding the public support systems and resources available to SMEs in APEC region to enhance BCP awareness and provide necessary skills and knowledge. In 2013, APEC Small and Medium Enterprises Working Group (SMEWG) published a “Guidebook on SME Business Continuity Planning” to

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support the efforts of SMEs. In addition in 2014, it published “How to promote Business Continuity Planning to mitigate the impact of disasters: A guide for government officials” so that the government officials could refer to good illustrative examples of BCP formulations aimed at mitigating the impacts from natural disaster.

The Singapore government is implementing measures to encourage SMEs to promote BCP/BCM through the Singapore Business Federation, private enterprise organization.

Case 4-4 Singapore Government Supports for SMEs to Introduce BCP/BCM

The Singapore government, in collaboration with a private enterprise organization, the Singapore Business Federation (SBC), provides support to domestic SMEs to introduce BCP and BCM. They are specifically engaged in the following activities:

- ① Raise public awareness of BCM by recognizing companies that actively participate in BCM through the BCM Award and BCM Ambassador Program
- ② Support SME (companies with sales of \$1 million or less and less than 200 employees that are at least 30% owned by local shareholders) to obtain ISO22301 by providing 70% of training-related costs, consulting costs, and licensing costs

It is expected that these programs will raise the awareness of SMEs of disaster risk management and help promote international trust for SMEs in Singapore.

(Source: SBC Homepage)

The Development Bank of Japan Inc., a government-affiliated financial institution of Japan, provides a framework for giving companies an incentive to make disaster prevention and disaster-reduction efforts, by establishing concessional terms for loans to finance initiatives for improving resilience against natural disasters based on uniquely-developed BCM ratings.

Case4-5 Financial Assistance Service Using BCM Ratings by the Development Bank of Japan Inc.

The Development Bank of Japan Inc. (DBJ), is a highly specialized bank that provides integrated investment and loan services.

【Background】

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In order to meet societal demands, companies are expected to formulate BCP and practice BCM, and properly manage tail risks to minimize damage to their business assets and continue or quickly restore their core businesses. On the other hand, business management and evaluation thereof are executed by focusing on financial indicators, and in general financial transactions, companies' efforts in disaster prevention, disaster reduction and business continuity (i.e., non-financial information) are not fully evaluated. To address this, DBJ hammered out a policy to provide assistance that leverages financial techniques to progressive companies that are engaged in initiatives for disaster prevention, disaster reduction and business continuity, as well as companies that are looking into promoting such initiatives in the future.

【Outline】

DBJ Enterprise Disaster Resilience Rated Loan Program is the world's first financing program (launched in FY2006) that can be utilized for preparatory measures against disasters, and adopts the specialized approach of "BCM Ratings", which involves evaluating companies and selecting those engaged in high-level initiatives in disaster prevention and business continuity measures based on an evaluation system developed uniquely by DBJ and setting the lending terms according to such evaluation. The Program has the following two major characteristics.

- ① BCM screening is conducted in parallel with ordinary company screening.
 - BCM screening involves evaluation of two fields—i.e., *evaluation of disaster prevention measures* and *evaluation of business continuity measures (in both tangible and intangible aspects)*—on a 100-point scale with respect to a total of 100 evaluation items.
 - As a result of BCM screening, companies are classified into four ranks, from "Rank A" (i.e., companies that are granted a special interest rate) to "Rank D" (i.e., ineligible companies, which failed to meet the criteria for disaster prevention measure items).
- ② Post-financing discipline is enforced through monitoring
 - DBJ gives feedback regarding the BCM evaluation results and notifies the key points in the evaluation and matters expected in the future. DBJ also explains other companies' superior initiatives and the latest trends relating to disaster prevention and business continuity.
 - After financing is provided, BCP monitoring is conducted on an ongoing basis into the future.

As of the end of March 2015, the Enterprise Disaster Resilience Rated Loan Program

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has provided financing in 189 cases totaling 191.1 billion yen on a cumulative basis, indicating that loans provided under the Program are steadily on the increase.

DBJ aims to develop and nurture financial services in which companies that are resilient—a socioeconomic requirement—receive recognition through such financial assistance (note: resilience refers to the ability of a society/organization to adapt to and recover from natural disasters and all other types of disasters, as well as the ability to evolve to gain more resilience in response to disasters).

(Source: interview with DBJ)

As explained above, assisting SMEs in improving their resilience against disasters by providing direct financial assistance to SMEs for developing BCP and implementing BCM and giving incentives indirectly such as better terms of finance will result in greater resilience of economies in the region as a whole.

4.4 (3) Promote Inter-corporate Coordination during Emergencies (e.g., Contract Production Agreements)

Many manufacturers that experienced the Great East Japan Earthquake and 2011 Floods in Thailand have concluded “emergency contract production agreements” with other companies in the same industry as well as companies in other industries outside the region to avert disruptions in production activities in the event of a disaster, etc. As this kind of initiative is difficult to undertake once disaster strikes, it is preferable to select counterparties and engage in negotiations in peaceful times.

However, there is a risk of infringement of competition laws if large enterprises are involved, and in the case of regulated business, there is a risk of violation of regulations by agreements between private businesses, so companies need to be thoroughly cautious when working on production agreements, etc. so as not to violate relevant regulations. Some companies appear to be reluctant to outsource alternate production to other companies from the perspective of protecting intellectual property and proprietary expertise.

Therefore, in order to promote inter-corporate coordination during emergencies (e.g., contract production agreements), it is important for the government to proactively work on clarifying the interpretation of competition laws and other laws in advance and mitigate the concerns by private enterprises in their collaborations. In addition, government actively working towards the protections of intellectual properties and deregulations in emergency situations could also promote their

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collaborations.

The promotion of inter-corporate coordination will bring about benefits and create a virtuous cycle in that it will enable disaster-affected companies to continue their businesses and protect employment even after the disaster occurred.

The Japan Fair Trade Commission has compiled hypothetical cases to clarify the treatment of inter-corporate coordination in an emergency under the Antimonopoly Act based on experiences in the Great East Japan Earthquake.

Case4-6 Compilation of Hypothetical Cases Related to Great East Japan Earthquake

Since the Great East Japan Earthquake in 2011, trade associations and multiple business operators have undertaken such initiatives as supplying goods and services by collaborating with each other to secure the supply of materials, etc. required for recovery and reconstruction and minimize the impact of disruptions in the supply chain on production activities.

The Japan Fair Trade Commission has dealt with inquiries from companies, business associations, relevant government ministries and agencies to resolve concerns related to such initiatives under the Antimonopoly Act.

In March 2012, Japan Fair Trade Commission summarized its views under the Antimonopoly Act, as the “Hypothetical Q&As in Emergency Situations”, based on real-case inquiries from companies, etc. to enable companies to promptly take action without falling into trouble under the Antimonopoly Act.

This collection of hypothetical scenarios warns that, to take this kind of approach, it needs to be limited to the minimum period required, e.g., to the period during which emergency supplies are needed for recovery. It also warns that it will be problematic under the Antimonopoly Act, for example, if such initiatives involve the coercion of participation and compliance or are discriminatory, and if trade associations or multiple business operators restrict the price, supply quantity, etc. by taking advantage of the shortage of supplies, etc. after the disaster.

(Source: Japan Fair Trade Commission)

Providing platforms to promote cross-border, inter-regional collaboration is also effective in promoting inter-corporate coordination. The Otagai Project for enhancing collaboration between SMEs in Japan and their counterparts in Thailand takes a unique approach to boosting competitiveness through cluster tie-ups between the

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two countries, and is currently applying this approach to the ASEAN region, in addition to Thailand.

Case4-7 Otagai Project: Collaborative Activity by Japan • ASEAN

【What is the Otagai Project?】

In 2011, the Great East Japan Earthquake and the Thai great floods led to the launch of this project as a platform for Japan and Thailand to share production networks on an Asia-wide scale and better complement each other's industries. The Project has since expanded across the ASEAN region, and is moving on to the stage of promoting collaboration between industrial clusters in Japan and ASEAN to boost their respective competitiveness.

The Otagai Project is an approach where individual regions in Japan and ASEAN members coexist to achieve a new stage of growth, by covering one another's weakness with one another's advantages, and enhancing the competitiveness of both sides by collaborations mainly with local SMEs.

【Characteristics of Otagai Project】

- From complementing industries to complementing competitiveness: The Otagai Project was originally launched for the purpose of complementing the production activities of SMEs in Japan with those of Thailand and vice versa based on the experience of disruptions in supply chains caused by large-scale natural disasters. Companies that participated in the Project have since recognized that there were *strengths* and *weaknesses* that varied from company to company even in the same industry, and realized that it is possible to boost competitiveness by compensating for each other's *weaknesses* while leveraging on each other's *strengths* through inter-company tie-ups. Accordingly, the current Otagai Project serves as a mechanism that complements competitiveness, not just industry.
- Assistance in making plans: Assistance is provided to make specific plans, instead of providing subsidies, financing schemes and other options to assist the overseas expansion of SMEs. As a project for this purpose, a local network is in place for building a sustainable business model in Thailand.
- Cluster approach: SMEs with superior technologies and know-how form a cluster through collaboration, and thereby bring about *innovation* in every sense of the word.

Governmental and international organizations can help promote strengthening the resilience of corporations against natural disasters by providing platforms to promote

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cross-border intercorporate coordination, which will help promote the international competitiveness of local SMEs. Local SMEs' participations in GVCs will help promote regional economic development. To this end, there are many lessons to be learnt from the case study of the Otagai Project.

(Source: Otagai Project website and an interview with the project office)

4.5 (4) Improving the Availability of Disaster Insurance for Private Corporations

Once a disaster has occurred in a region, the availability of insurance is reduced by the exclusion of such a type of disaster from insurance coverage, higher cost of insurance premiums and other causes; as a result, companies may pull out from the disaster-affected country/region, or exclude the country/region from their list of new candidate locations for overseas expansion. Therefore, in economies/regions where it is difficult to hedge against risks by insurance, initiatives to improve the availability of insurance for private corporations (especially SMEs), such as public and government agencies providing insurance, may be worth considering.

If the availability of disaster insurance improves, it will bring about benefits and create a virtuous cycle in that companies will put that economy on their list of new candidate locations for overseas expansion, and if the influx of overseas companies accelerates, it will promote investments in the economy and stimulate the community.

4.6 Summary: Roles Expected of Governments and International Organizations

As explored in this chapter, there are four types of roles that governments and international organizations are expected to play in mitigating and overcoming the issues and limitations remaining in the initiatives by private enterprises towards enhancing GVC resilience, i.e. (1) development of disaster-resilient life-line infrastructure, (2) strengthening the support for local SMEs, (3) promoting intercorporate coordination during emergencies (e.g., contract production agreements) and (4) improving the availability of disaster insurance for private enterprises.

Once a large-scale disaster occurs, vulnerable life-line infrastructure will not only inhibit attractions of private enterprises in the affected area, but also cause closures of the disaster-affected enterprises as well as further diminishing the number of enterprises starting businesses in the region. In this regard, strengthening resilience of life-line infrastructure could serve as an important factor in enhancing the attractiveness as the investment destination in ordinary times. In addition, by setting up a mechanism for incentivizing SMEs to work towards disaster prevention,

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it is hoped that SMEs' reliabilities as credible suppliers in emergency situations as well as their competitiveness will improve and that their participations in GVC will be promoted. Further, ensuring regulatory environment that will enable inter-corporate coordination during emergencies is important role the government should play.

As above, governments and international institutions are expected to play important roles in mitigating and overcoming the issues and limitations in the initiatives by private enterprises and in strengthening of GVC resilience in the economy/region.

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Chapter 5: Initiatives among Stakeholders Collaborating to Reinforce Resilience

So far we have examined initiatives to enhance resilience against natural disasters by enterprises/corporate groups, as well as causes of stagnation and efforts by governments and international organizations to improve resilience. In this chapter, we will focus not on efforts by individual stakeholders, but rather on collaborative initiatives among stakeholders to reinforce resilience.

In large-scale and widespread natural disasters in 2011 such as the Great East Japan Earthquake and the 2011 Floods in Thailand, the impact and damage were greater than imagined. Furthermore, the recovery and reconstruction period lasted very long time, which limited the efforts of individual stakeholders in increasing resilience and highlighted the necessity of collaboration among stakeholders to improve resilience before a disaster strikes.

Drawing on this lesson, efforts to improve resilience should be carried out within the respective economies and regions in a cross-organizational manner. In addition, as previously mentioned, the resources available to private enterprises for the purpose of resilience improvement are limited, as is the case with governments and international organizations. Thus collaboration among stakeholders serves to reduce the overlapping of efforts among individual stakeholders, clarifies the priorities of necessary measures, and is also effective in increasing efficiency.

5.1 Outline of Initiatives among stakeholders collaborating to reinforce resilience

As explained in Chapter 2, a decline in the competitiveness of companies can have a serious influence on stakeholders in the form of a decrease in employment and tax revenues, etc., which can lead to reduced vitality of a region/economy. Accordingly, improvement in the resilience of GVC against disasters is not an issue which can be left to the self-help of corporations, but should be addressed by corporations, the community and government entities alike by joining forces.

“Kyoto BCP,” an endeavor by Kyoto prefecture, Japan, provides valuable implications for understanding the concept of collaboration among stakeholders.

Case 5-1 “Kyoto BCP” Initiatives

【Background】

Kyoto has historically had an active manufacturing industry, and many manufacturers on a global scale headquarter there today. As a result, from the perspective that the early

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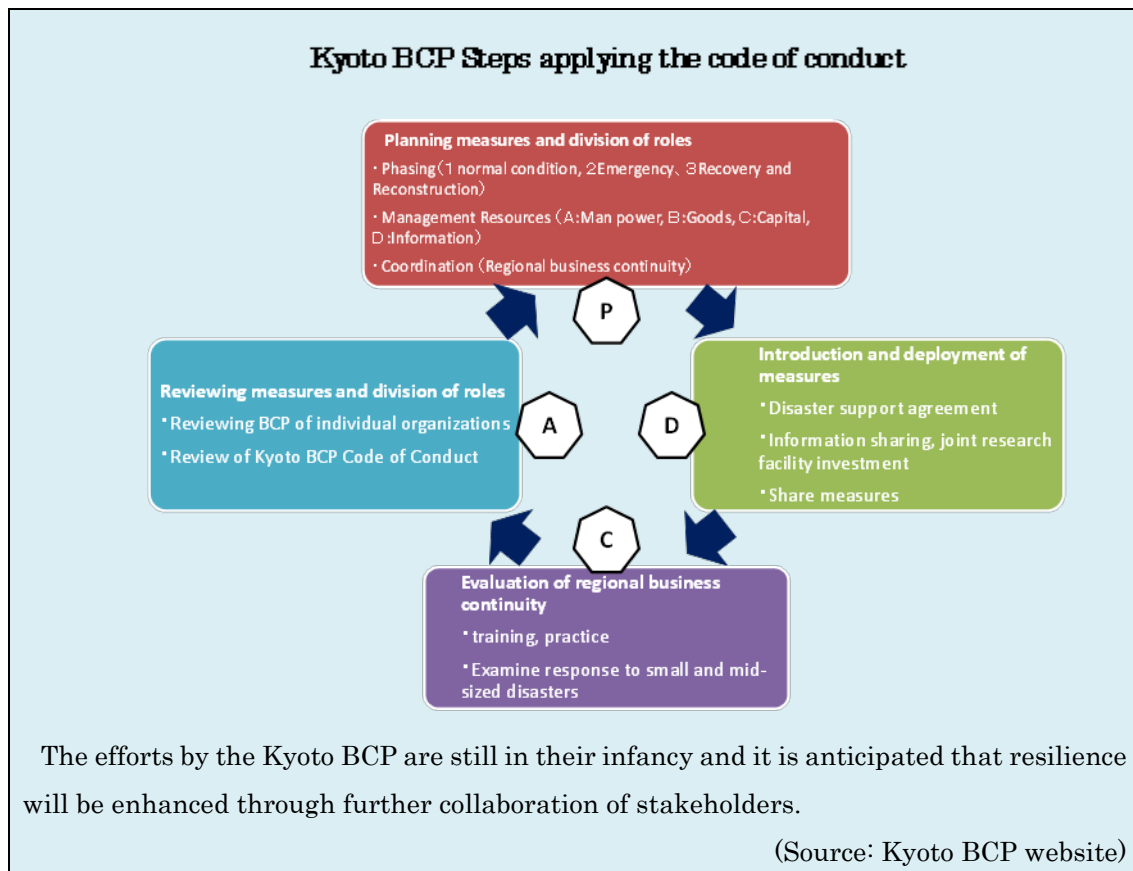
recovery of corporations after the occurrence of a large-scale, widespread disaster would lead to the sustenance and growth of the vitality of the community and society overall, the “Kyoto BCP Code of Conduct” was established in June 2014.

The “Kyoto BCP” surpasses conventional disaster preventive measure frameworks, applying the principles of BCP throughout all of Kyoto area, to protect the vitality of the community, as a whole, from disaster, and to build resilience at early stage, even in cases where vitality is diminished. As an impending initiative, this code of conduct has been established as the fundamentals of regional collaboration BCP that will protect employment and financial activity, which are essential to recovery and reconstruction.

【Characteristics of Kyoto BCP】

- ① Diversity in the nucleus of initiatives: Proactive BCP efforts of various corporations are fundamental, while collaboration within the community aims to maintain and improve the “power of Kyoto” by integrally combining methods such as efforts by companies, collaboration between companies (clients, business partners, partner organizations, related companies, industry), efforts by various government agencies, concerted efforts by cooperating companies, and efforts between cooperating companies and government agencies.
- ② Continuous revision of code of conduct: the code of conduct is based on social conditions, scientific knowledge, and experience gained from practice, etc., and is originally intended to be revised. Government agencies and related organizations continually inspect the code of conduct during times of normal conditions and update the code of conduct after training and practicing the codes with a view to maintain and improve the “power of Kyoto” in order to identify any problems or issues, then amending any portions as necessary.
- ③ Spiral up by means of the PDCA cycle: Become aware of PDCA cycle spiral up by referencing the “Steps applying the code of conduct” below and utilize them as a guide for various activities of initiatives.

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5.2 Intra-regional Collaboration among Stakeholders

This section will look at the benefits resulting from regional collaboration by introducing BCP/BCM initiatives within industrial parks in Japan and Area BCP efforts in ASEAN as specific examples of intra-regional collaborative efforts.

In industrial zones and industrial clusters such as industrial parks, practicing BCP/BCM at the regional level in addition to BCP/BCM at the individual company level enables further enhancement of resilience against disasters. For the realization of regional BCP/BCM, various stakeholders' interests should be coordinated, and the presence of a facilitator with a common purpose of promoting BCP/BCM is essential, and in the case of the Chubu region of Japan, the Chubu Bureau of Economy, Trade and Industry within the Ministry of Economy, Trade and Industry plays that role.

Case 5-2 Regional Collaboration BCP in the Chubu Region

【Background】

The Chubu area, which is at a high risk in the case of an expected occurrence of Nankai Trough Earthquake (*1), has one of the highest manufacturing industry concentrations anywhere in the world, resulting in the perspective that the continuation of industrial

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activities here in times of disaster is essential. Accordingly, the Chubu Bureau of Economy, Trade and Industry has initiated the intra-regional collaborative BCP efforts which aim to build a “Disaster Resilient Manufacturing Chubu.”

【Aim of intra-regional collaborative BCP】

Intra-regional collaborative BCP works with companies, governmental and infrastructure-related entities to assist companies in carrying out initiatives they normally cannot do individually or those that would increase efficiency and effectiveness if collaborated within the region, in addition to promoting the BCP/BCM of individual companies, in order to help supplement the limitations the BCP/BCM of individual companies and strengthen the capacity of business continuity among companies. By committing to enhance the business continuity, private companies across the region, companies in the area will be able to gain the confidence of their business partners, and thus be able to secure and expand client reach. In addition, it will enhance the resilience of the region.

【Benefits of intra-regional collaboration BCP/BCM】

Intra-regional BCP/BCM aims to supplement the limitations of the BCP/BCMs formulated by individual enterprises and government agencies, through coordination among stakeholders and promotions of collaborative efforts among private sectors, public sectors, and public-private sectors. Specific benefits include enhancement of information sharing within region, inter-corporate sharing of corporate responsibilities such as securing evacuation sites and firefighting capabilities, enabling to fulfill the functions that an individual stakeholder is incapable of offering.

【Key points of regional collaboration BCP】

- There are few industrial agglomerations and municipalities that provide opportunities for companies within industrial agglomerations, or companies and government organizations, to exchange information and hold discussions on a regular basis; in order to promote intra-regional BCP/BCM, firstly it is necessary to provide opportunities for discussions and information sharing among private enterprises, and among them and government organizations;
- It is unrealistic to expect individual enterprises to set mode of actions based on unified principles, it is necessary for private enterprises to realize what is considered necessary and feasible for the region through training and other practices and realize the importance of collaboration;

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- Training and other practices and continuous evaluations of the same are necessary in order to improve the effectiveness of intra-regional collaboration BCP.

In order to carry out the above, it is pertinent for the government to actively lead by providing opportunities for discussions and reaching out to private enterprises for participations.

(Source: Report – Toward Establishing Intra-Regional Collaboration BCP based on Collaboration with Corporate Groups and Governmental Agencies – Spread of Regional Collaboration BCP and Survey Toward Preparing Support Functions, March 2015, issued by the Chubu Bureau of Economy, Trade and Industry within the Ministry of Economy, Trade and Industry)

(*1) Nankai Trough Earthquake is the earthquake that is anticipated to occur along the southern coast of Honshu island of Japan bringing severe damages to those cities in this region.

Efforts for intra-regional collaboration are gradually expanding in Japan, and it is hoped that the wide-spread adoptions of the similar efforts will be seen globally in the future.

The Japan International Cooperation Agency (JICA) has implemented pilot projects for disseminating the concept of “Area-based BCM”, under which local enterprises, government bodies, etc., work in collaboration, in three ASEAN members.

Case 5-3: Area-based BCM led by JICA

JICA firstly studied the industrial agglomerated areas and surrounding social infrastructures in ten ASEAN countries and collected the information necessary to evaluate natural disaster risks in these areas. It then put together the guideline, under the new concept known as “Area-based BCM”, to formulate and implement the Area-based BCM in order that the stakeholders can make joint efforts for planning and achieve business continuity and disaster recovery in disaster-affected areas in the case of a natural disaster. JICA also formulated Area-based BCM in the below three pilot areas.

- Indonesia: An industrial agglomerated area distributed over Karawang regency, Bekasi

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regency, Kota Bekasi, and the surrounding area

- The Philippines: An industrial agglomerated area distributed over Cavite state, Laguna state, the southern part of Metro Manila, and the surrounding area, and
- Vietnam: An industrial agglomerated area distributed in Haiphong city and the surrounding area

【Area-based BCM processes】

- ① Understanding the risks and impact of natural disasters in the relevant area (Creating hazard maps, analyzing risks, and verifying risk scenarios)
- ② Deepening understanding of strategy among stakeholders (Stakeholder meetings and identifying the scope of the BCP)
- ③ Formulating the Area-based BCP
- ④ Implementing and reviewing the Area-based BCP
- ⑤ Establishing a monitoring system

【Benefits of Area-based BCM】

Area-based BCM will enable various types of stakeholders to participate in this initiative through the cooperative and harmonized approach such as public-private partnership, multi-sectorial collaboration, collaboration between global corporations and SMEs.

The collaboration among stakeholders will facilitate information sharing among them and foster risk-based decision-making. The importance of infrastructure such as life-line through Area-based BCM will be realized and resilience of the area will be strengthened.

Those stakeholders participating in the Area-based BCM can also prepare individual BCM and disaster prevention measures in proper manner, leading to improvement of regional resilience.

(Source: An interview with JICA)

As described above, efforts towards intra-regional collaboration and Area-based BCP/BCM to strengthen collaboration among stakeholders will promote stakeholders' initiatives to enhance resilience, will resolve conflicts among individual BCP/BCMs, and will enable more effectiveness and efficiency of such initiatives compared with those undertaken by individual stakeholders. The benefits of Area-based BCP/BCM for each stakeholder may include the following.

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Benefits of Area-based BCP/BCM for Stakeholders:

【Government bodies】

- It enables a shared understanding of the risks of natural disasters in the region, which allows investments aimed at improved resilience such as infrastructure building according to a clear priority order.
- It provides a venue for continued discussions among stakeholders, which enables consistent efforts toward strengthening resilience.
- The establishment of communication channel that broadcasts disaster information enables prompt response to natural disaster, minimizing damage.

【Private enterprises】

- It invigorates enterprises' information exchange with other stakeholders, which leads to quicker and greater amounts of information sharing with government bodies and other corporations regarding natural disasters.
- It allows enterprises to be aware of natural disasters anticipated in the region, which leads to planning and implementing more effective BCPs/BCMs.
- It enables an enterprise to make requests to the government bodies jointly with other corporations about transportation and communication infrastructure investments in the region, which leads to a greater bargaining power.
- It allows especially SMEs that have limitation in financial and human resources for improving resilience in an effective and efficient manner.

【Community】

- It secures the local residents' life with peace of mind at the time of a disaster if facilities (factories, warehouses, etc.) of enterprises in the region are made available to them as an evacuation center, etc., through collaborations with local enterprises.

5.3 Inter-regional collaboration among stakeholders

The Sendai Chamber of Commerce and Industry, which is located in an area affected by the Great East Japan Earthquake, took various measures to support the business continuity and reconstruction of enterprises affected by the earthquake and tsunami, through collaboration with the chambers of commerce and industry in other parts of Japan.

This initiative was made possible owing to the assistance from private enterprises throughout Japan, utilizing the nation-wide networks of the chamber of commerce and industry, after listening to the voices (needs) of the affected members.

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Case 5-4: Linking Together 514 Chambers of Commerce and Industry—Unused Machinery Matching Project

When the staff of the Sendai Chamber of Commerce and Industry and the Nagoya Chamber of Commerce and Industry visited an iron factory in the area affected by the Great East Japan Earthquake, a factory representative told them of his earnest desire to obtain operable machinery in order to resume the business immediately and work on tasks aimed at early recovery. In response, the members of the Nagoya Chamber of Commerce and Industry delivered well-maintained machinery to the factory with the passion of the members in supporting the disaster recoveries. This led to the launch of the “Linking Together 514 Chambers of Commerce and Industry: Unused Machinery Matching Project.” Information on the machinery and equipment needed in the disaster-affected areas where the relevant chambers of commerce and industry are located was collected and databased. It was shared among the chambers of commerce and industry throughout Japan, which enabled them to find needed machinery or equipment that can be given away free of charge. In order to curtail the large amount of costs to transport the machinery and equipment, which had been a drawback of this project, the machinery and equipment was shipped from/to the relevant chambers of commerce and industry instead of from an enterprise to another enterprise, so that such costs could be defrayed using monetary donations collected at chambers throughout Japan. There also was a tax-law in place based on the past disaster experience, so that the enterprise that donated the unused machine free of charge was allowed to record the book value of the asset donated as an expense, so that it becomes tax-deductible.

Since the launch of the project in June 2011, 3,000 matches have been made, serving towards recoveries of the affected businesses.

(Source: Japan Chamber of Commerce and Industry, Small and Medium Enterprise Development Division “Linking Together 514 - Chambers of Commerce and Industry”)

Strengthening both intra-regional and inter-regional collaboration in peacetime provides for the useful tools in order to improve the resilience towards natural disaster. Above case will help understand the workings of the inter-regional collaboration.

*Chapter 6: Conclusion***Chapter 6: Conclusion**

This Guidebook introduced as many varieties of illustrative efforts undertaken in the APEC region, to enhance GVC resilience against natural disasters. Closer look at each case will assist in vividly understanding how the stakeholders, such as private enterprises, economic organizations and government institutions in the APEC region, coped against the threats of GVC disruptions individually and sometimes collaboratively, and succeeded in strengthening the GVC resilience.

This Guidebook also revealed the issues and limitations these stakeholders have faced. In particular, the policy makers in governments may draw special attentions to the issues and limitations faced by the private enterprises, and consider the roles that the governments and international organizations should undertake in order to cope with them.

Enhancing GVC resilience against natural disasters is an imminent policy issue for the government officials in the APEC region facing the risks toward natural disasters. Policy issues raised here include the following: developments of transport infrastructures such as roads and railroads are critical in diversifying manufacturing and logistics; supports are needed for SMEs that are limited in funding and human resources; improving business environments such as clarification of regulations in emergency situations in order to promote inter-corporate coordination during emergencies are needed; availabilities of disaster insurance needs to improve through supports from public sectors in order to assist private enterprises that have funding restrictions.

In the current globalized economy, the impacts from natural disasters such as Great East Japan Earthquake and 2011 Floods in Thailand immediately spread across the world through the GVC, and the impacts are thought to be more significant in the Asia Pacific region. To cope with this new and complex policy issue, initiatives by one economy or organization are not sufficient, and cross-border/cross-organizational collaborations as one united APEC region are necessary.

Government trade policy official will also need to realize that, in the current world where connections through GVCs have been strengthened, vulnerability/resilience against natural disasters will have much influence on the volumes of trade and investment. Government disaster management policy official will need to realize that measures towards disaster preventions and mitigation will not only have the social impact such as reductions in casualties but also positive impacts on the trade and investments through the avoidances and reductions of risks of GVC disruptions, and formulate policies accordingly.

Chapter 6: Conclusion

Lastly, it is strongly hoped that Asia Pacific region will become free, open and resilient region through formulation of trade and investment policy, and disaster management policy, referencing the good illustrative cases as well as policy issues covered in this Guidebook.