



Original paper

Introductory study on Disaster Risk Assessment and Area Business Continuity Planning in industry agglomerated areas in the ASEAN

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Abstract Two large disasters which occurred in 2011, the Great East Japan Earthquake and the Flood of Chao Phraya River in Thailand, reminded us of the risks of business termination and further impacts on national, regional and global economies through their supply chains. Business Continuity Planning (BCP), of some private enterprises, helped them survive these events to some extent. However, due mainly to disruption of essential resources such as energy, water, transportation and communications in the area of disasters, revealed finally that individual BCP was insufficient to continue their business or quickly recover.

In order to minimize economic impacts or losses in the case of large scale disasters that disrupt fundamental infrastructure in certain areas, it is important to do risk assessment at a proper scale and scenario based contingency planning of area damage mitigation. Furthermore, integrated resource management and strategic recovery at a scale of a whole industrial area are crucial since they could support each enterprise's BCP actions in coordination with the public sector's actions.

The Japan International Cooperation Agency (JICA) undertook a study on disaster risk assessment and formulation of "Area BCP", as a new concept of disaster risk management in industrial agglomerated areas based on the lessons of recent disasters. The term of Area BCP is adopted from the "Area Command" under the National Incident Management System (NIMS) of FEMA. NIMS is an organizational structure used to oversee the management of multiple incidents or a very large incident that has multiple Incident Command Systems or management teams to establish critical resource use priorities between various incidents and to make relevant coordinated actions of disaster management. The Area BCP will then describe a framework and direction of actions of stakeholders including individual enterprises, industrial area managers, local authorities and administrator of the infrastructures in order for business continuation of the industrial cluster as a whole.

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This study introduces the concept of Area BCP and the plan of its formulation in three pilot areas, in Indonesia, the Philippines and Vietnam, in the ASEAN. These pilot areas are selected because the areas have been affected constantly by disasters, such as earthquakes, floods, tsunamis, typhoons/cyclones and others, and at the same time those areas have been highly agglomerated by many industries in recent years.

This paper tries to highlight the current understanding of the study group and does not represent JICA's official views.

Key words Disaster risk assessment; Business Continuity Plan; Area BCP; Risk management.

1. BACKGROUND AND NEED FOR THE STUDY

In recent years, risks of natural disasters on economic activities have become more and more tangible. People have realized seriously that natural disasters can cause not only human causality but also impacts on national to regional and world economy.

The Great East Japan Earthquake and Tsunami in 2011 put an incredible strain on the national economy and also had global impacts through the supply chains of industry: as an example, the supply of Japanese-made vehicle parts to automobile assembly plants around the world was severely disrupted (Ando and Kimura 2012).

The 2011 Flood of Chao Phraya River in Thailand again reminded us of the risks of business termination and further impacts on national, regional and global economy through their supply chains (Komori et al. 2012).

Considering the recent increasing economic damages by disasters and recognizing the private sector as actor and partner of disaster management, the Global Platform for Disaster Risk Reduction (2013) under the support of the United Nations summarized the Fourth Session that promotes resilience and fosters new opportunities for public-private partnerships as part of an overall improved risk governance. Furthermore, it also highlighted agendas including private sector's progressively aligning risk reduction efforts and developing business practices.

The most significant contribution by the private sector for disaster risk reduction are denoted by the Business Continuity Plan/Planning (BCP) or Business Continuity Management System (BCMS) of each enterprise that can reduce damages and help quick restoration from business termination. The BCP or BCMS is standardized as ISO22301 (ISO 2012) and disseminated in many business enterprises around the world.

However, for comparatively small business enterprises, particularly in developing countries where although many industry agglomerated areas are located in vulnerable conditions against natural disasters, the BCP or BCMS has not been formulated nor implemented yet in most of the local enterprises.

Moreover, the business enterprises have limited capacity to mitigate damages and maintain operation by their own efforts even if BCPs are prepared, as was the case during recent large scale disasters.

In order to minimize economic impacts or losses in case particularly of large scale disasters that disrupt fundamental infrastructure in certain areas, it is important to carry out risk assessment at a proper scale and to make scenario based contingency plans for area damage mitigation. In addition, it is vital to have integrated resource management and strategic recovery plans which could support each enterprise's Business Continuity Management actions in coordination with the public sector's activities.

Some studies suggested that further research on regional level management of business continuity is required. Warren (2010) explained that a significant number of public sector authorities are not preparing integrated disaster management plans nor BCPs. It is noted that further need for research exists into the

impact on assets, the role of the public sector manager of certain area in assessing the risks, the strategy to prepare the coordination framework and to mitigate the effects of natural disasters and severe catastrophic events.

With this background, JICA, in collaboration with the ASEAN Coordination Centre for Humanitarian Assistance on Disaster Management (AHA Centre), has launched a project of study entitled “Natural Disaster Risk Assessment and Area Business Continuity Plan Formulation for Industrial Agglomerated Areas in the ASEAN Region” since February 2013.

The study aims to collect, analyse and store information on natural disaster risks, industrial agglomerated areas, infrastructure for distribution, lifelines and supply chains in the ten ASEAN Member States. It also aims at preparing a database of the above information so that it can be shared in the region. The study team selected three Industrial Agglomerated Areas from Indonesia, the Philippines and Vietnam for pilot areas to apply the new approach. The studies are going to evaluate the natural disaster risks and prepare the plans for Area BCP (definition provided in section 3) for the Industrial Agglomerated Areas. Handbooks will be prepared with an aim to be utilized for other Industrial Agglomerated Areas in the region by describing guidelines on natural disaster risk assessment and Area BCP.

2. DISASTER RISK IN INDUSTRY AGGLOMERATED AREA

Countries in the ASEAN region have been suffering constantly by disasters such as floods, typhoons/cyclones, earthquakes, tsunamis and others. Since East Asia is rapidly urbanizing (Jha *et al.* 2012), cities are becoming disaster hotspots (Dilley *et al.* 2005). It indicates that a great number of people and most areas of economic activity are exposed to natural disasters (Figure 1). Furthermore, climate change is an additional concern with the potential for intensifying hydrological and meteorological disasters.

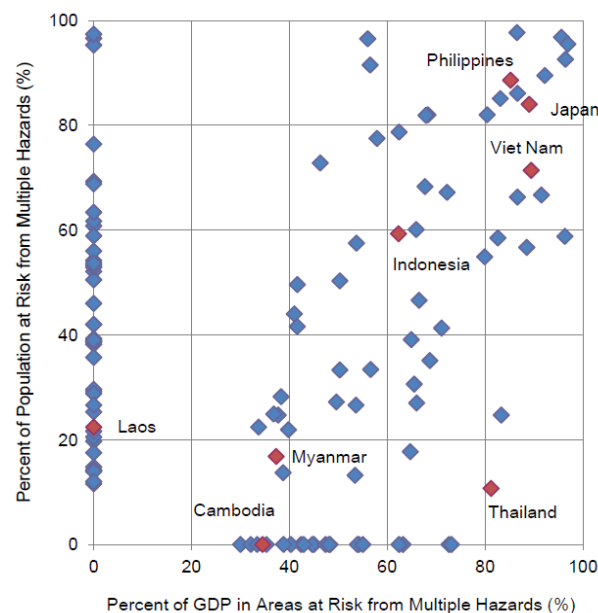


Figure 1. Percentage of Population (vertical axes) and percent of GDP (horizontal axes) at risk from multiple hazards. Red dots indicate ASEAN nations and Japan. The Philippines, Viet Nam and Indonesia, selected as the pilot areas of this study, belong to high risk countries among the ASEAN nations. This chart is prepared by using information from Natural Disaster Hotspots, Global Risk Analysis, The World Bank (Maxx

et al. 2005).

Industrial agglomerations in Asia were triggered by direct investment of electricity and/or electronic industry in many cases. The increasing inflow of the foreign capital accompanied by high technologies has driven the administrators and local governments of the industry areas to further attract foreign-affiliated firms by providing special measures such as Export Processing Zone (JMC 2000).

Generally, industrial agglomeration tends to occur along coastal or riverine zones which are convenient for physical distribution. The formation of industry clusters in cities is also linked to the progress of urbanization such as through the concentration of workers as one of the production elements (METI 2010). In ASEAN, the supply chain network of those industrial clusters is also expanding within the region, which further accelerates industrial agglomeration in and around some recently developing cities.

However those locations, mostly developed areas which were not intensively used before, tend to be vulnerable against flood, typhoons, storm surges and other natural hazards. Earthquake, tsunamis and volcanic hazards are also significant in some Asian nations along the Pacific Rim. For instance, the 2011 flooding of the Chao Phraya River in Thailand caused extensive damage, which covered a wide area from the capital city of Bangkok to the North for a long period of time. Flooding caused heavy losses to the industrial sector which was particularly devastating. According to J. P. Morgan (2011), the event set back global industrial production by around 2.5%. The seven industrial estates near Ayutthaya province where a number of Japanese firms are located have been ravaged by the floods since October 2011. The destruction of Ayutthaya Province severely impacted the global supply chains of automotive and electronics industries, etc. Its aftermath is still felt today in some of the companies and products (METI 2012).

Based on the lessons from the recent disasters and impacts including the above flood, the study team started to assess the disaster risks of industrial agglomeration areas and to prepare area wide systems of business continuity management in selected areas in order to improve the investment conditions. The selected industry agglomerated areas in this study are 1) Cavite, Laguna, Metro Manila from the Philippines, 2) Haiphong from Viet Nam, and 3) Bekasi - Karawang industry area from Indonesia. Those areas are highly agglomerated with industries including automobile manufacturers, parts products, electric machinery, food processing and so on.

The study selected some natural hazards which are dominant in those areas as for scoping scenarios of disasters. This selection is to efficiently develop a new concept of business continuity management. The selected natural hazards are geological hazard (including earthquakes, volcanic activity and emissions, and landslides), tsunami and hydro-meteorological hazard (including floods, cyclones (also known as typhoons and hurricanes), and storm surges).

3. BCP AND AREA BCP

3.1 BCP

Once businesses are shut-down or damaged by a natural disaster, they may take certain time to recover and to return to normal production and trading. The recovery process may be hampered by the loss and lack of production factors such as personnel, machinery, electricity, gas and waters; lack of sufficient staff due to injury leading to delays in tracing orders; other time constraints such as completing insurance claims and issuing invoices. Other indirect effects may include increased expenses; lack of demand; the short-term loss of market share, travel difficulties; involvement in recovery operations; loss of production efficiency; loss of supplies; withdrawal of licenses; and loss of quality accreditation or approved standards. For many businesses, these impacts can be catastrophic.

Through some studies, we can acknowledge that preventive investments in risk reduction and

emergency preparedness are extremely cost-effective and are greatly able to reduce the impact of natural hazards (Jha and Stanton-Geddes 2013). In contrast to these studies' results, many business enterprises are not much interested in taking actions of disaster preparedness.

BCP is a documented plan which defines those preparatory actions in normal situation as well as methods and means to continue business in the case of emergency. Through BCP, enterprises are able to minimize the damage to their business assets in an emergency including natural disasters, great fires and terrorist attacks, while continuing or quickly recovering their core business (Ministry of Economy, Trade and Industry, Japan. 2012). In order to continually enhance the ability to respond to unexpected events, it becomes necessary to adopt various measures and to provide guidance/training as part of Business Continuity Management (BCM).

Especially in the field of international business transactions, BCP is sometimes required as a pre-condition of entering into a contract. In this way, adopting BCP is no longer intended just for damage control but rather it is becoming necessary for business standards.

3.2 Area BCP

During the Great East Japan Earthquake and Tsunami in 2011, many private enterprises were forced to suspend their business and were faced with incredible difficulty in quick recovery from damages (Okada 2011). Whether or not the enterprises had prepared for and activated BCPs, their business continuation efforts were interrupted by disruption of common infrastructure (Special study team, 2011) such as transportation and communication, absence of inevitable essential resources such as electricity, fuels, water supply, sewage and food (Sato and Bessho 2011). Commuter systems for personnel and workers were also down and interrupted the businesses.

In addition, their supply chains of parts and products were also disrupted and resulted in negative impacts on business continuity of partner enterprises; consequently not only in the affected areas but also in surroundings or even far locations (Saito 2012).

On the other hand, the supply chains have been positively impacted, and some businesses were able to quickly find alternative delivery networks of essential parts or resources for production and operation. Ota (2011) studied that supply chain cooperation was effective as they restored business operation. We also found that, in restoration and reconstruction activities, cooperation between the affected community and certain enterprises in the region or assistance from outside the affected areas was an effective practice to generate private sector participation in disaster management. The local government should promote supporting them with a wider scope of BCP in this concern to quicken the cooperation (Kagiya and Isouchi 2009). Even before occurrence of the great disaster in 2011, some researchers had argued the importance of establishing wider scope BCMS, which can oversee the whole scale of an incident. Iwasaki (2009) argued that the coordination between the Chief Information Officer (CIO) of an enterprise who plays an important role of operating each BCP and the Government CIO who takes part in the total resource allocation and the emergency operations for devastated area. The local authority that administers the area of an Industrial Agglomeration and/or the national authority have the responsibility to understand the risks of the area, to plan, to implement and take measures for minimizing the economic impacts.

Yoshida and Doyle (2005) analyzed hazard mitigation initiatives including BCP of small businesses which are vulnerable and ill prepared for recovery. They recommended that the local governments should provide outreach products and programs for hazard mitigation, while the federal or state government can provide the framework to support such efforts. In Japan, some district-wide BCPs are under discussion among local community and business society. Tokyo metropolitan area is one of the examples where the society discusses the business people's survival environment in the district. Kojima (2011) studies the scope of whole industry area BCP as well as surrounding supporting systems. Kourakata (2011) also proposed several key elements of a "regional BCP" to raise regional industry resilience based on a case

study on the Mid Niigata Prefecture Earthquake in 2004.

Considering the above circumstances, the study preliminarily defines the new concept of expanded BCP to the wide area, namely “Area BCP”, as a framework and direction of disaster risk management by stakeholders. These stakeholders include individual enterprises, industrial area managers, local authorities and administrators of the infrastructures in order for business continuation of the industrial agglomerated area as a whole. The study team also defined the external goods and services which are independent of the business management but are essential for business continuity as External Resources.

4. AREA BCP AND COMMAND

Okamoto *et al.* (2011) reported the process of the BCP development aimed at the establishment of the standardized crisis management system and efficient expressway operation by applying a Business Flow Diagram (BFD) and an Incident Command System (ICS) through a case study. ICS is a subcomponent of the National Incident Management System (NIMS), as released by the U.S. Department of Homeland Security in 2004. An ICS is based upon a changeable, scalable response organization providing a common hierarchy within which people can work together effectively. These people may be drawn from multiple agencies that do not routinely work together. ICS is designed to give standard response and operation procedures to reduce the problems and potential for miscommunication on such incidents.

The term of “Area BCP” comes up from the “Area Command” (Figure 2) under the NIMS of FEMA (Waugh 2009), which is an organizational structure used to oversee the management of multiple incidents or a very large incident. “Area Command” requires multiple ICSs or management teams to establish critical resource use priorities between various incidents and to make relevant coordinated actions of disaster management.

Since the term and concept of the “Area Command” have already permeated many countries including the U.S., and following the spatial scope of the emergency management which “Area” indicates, the study uses the same term to designate a framework and direction of disaster management as defined before (3. 2)). Similarly to the Area Command in terms of managing scale, the Area BCP coordinates multiple BCPs by different enterprises in the affected area. As a point of comparison, management of the External Resources and relevant coordinated actions of disaster management should be conducted under the Area BCP (Figure 2).

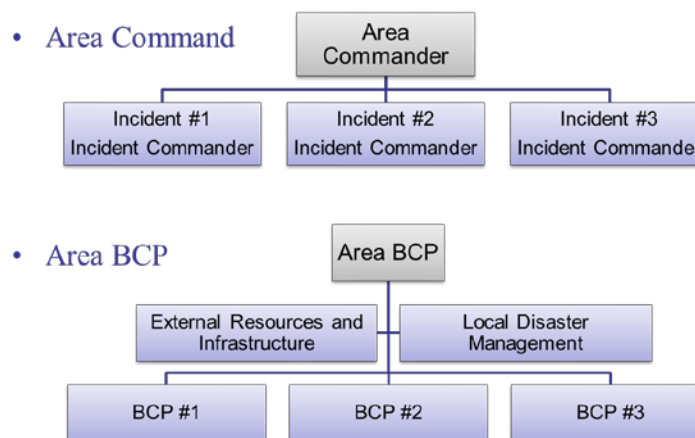


Figure 2. Area BCP and Area Command

5. CONCEPT OF AREA BCP

In some cases, protection measures such as emergency electric generators can be used as an alternative for an External Resource, but the absence of society's infrastructure usually becomes the bottleneck of a company's BCP. Since measures that can be adopted by one company are limited due to disruption of External Resources or to financial and other reasons, it becomes important, especially in industrial agglomerated areas, to cooperate with other players within the region to secure alternative measures. This coordinated cooperation is necessary to jointly request the authorities to improve the society's infrastructure or to amend the administrative procedures and or systems under emergency situations.

Currently, there is no official definition of the term "Area BCP". However, to give an example, it can be considered as a method to prevent high priority functions in places such as an Industrial Agglomerated Area, from being disrupted during emergencies such as earthquakes and floods. It also can be understood as a plan to protect the area by recovering its function within a "Recovery Time Objective". Furthermore, BCP is a management plan for sole business, examining Area BCP will also contribute to clarifying the measures and roles of each company, national or regional governments and infrastructure providers in solving the issues revealed through the examination process. Therefore, it is expected that, by promoting the implementation of Area BCP while taking into consideration its benefits under normal conditions, each entity will be able to facilitate a more resilient business environment.

BCP is designed to protect the company from direct and indirect damages by preventing the company's "Core Business" (high priority business operations) from being suspended in emergency circumstances. In contrast, the Area BCP is designed to secure the critical External Resources, which are essential in supporting the business operation in and around the industrial agglomerated area (Fig.3).

Item	BCP	Area BCP	Disaster Management Plan
Objectives	To protect enterprise from losing customers, market share and corporate value by disruption of core business. BCP is a strategic issue at the management level.	To minimize economic effects or losses of an Industrial Agglomerated Area as a whole.	To reduce disaster risks or damages through systematic efforts for effective measures, and awareness and action of individual residents for natural or technological disasters.
Plan	Documented procedures that guide organizations to respond, recover, resume, and restore to a pre-defined level of operation following disruption. (ISO/FDIS 22301:2012)	A document that describes a framework and direction of actions of individual stakeholders of the industrial agglomerated area as well as of cooperation and coordination among them for business continuation of the industrial cluster as a whole.	A document prepared by an authority, sector, organization or enterprise that sets out goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives. (2009 UNISDR Terminology on Disaster Risk Reduction, UNISDR)
Command	Private enterprise (National and local authorities, emergency responders, operator of infrastructure and lifeline, and others)	Local authority where the industrial agglomerated area is located. National authority responsible for disaster management or economy / industry. Management organization of an industrial cluster.	National and local authorities, sector, organization or enterprise, operator of infrastructure and lifeline, community, and others

Figure 3. Comparison of BCP, Area BCP and Disaster Management Plan

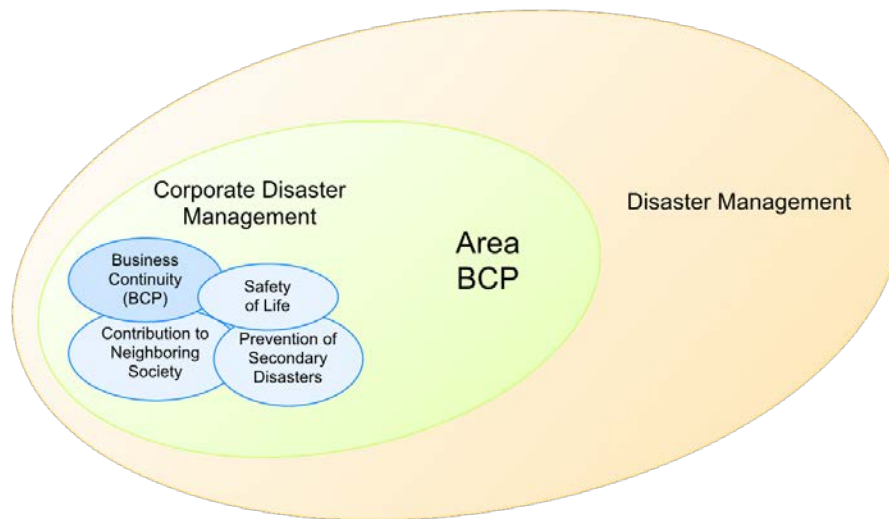


Figure 4. Area BCP in between the individual and total disaster management

Preparedness for extraordinary natural disasters (Fujita 2011) is more important than ever before. However to cope with a changing and uncertain disaster occurrence, the size of the “Area” cannot be predetermined. Similarly to the Area Command, it should be flexible, depending on the magnitude of disaster, size of affected areas and level of calls for service. The command structure of Area BCP should be organized in such a way as to expand as needed by the damage prospect, critical resources and changing hazard conditions. Command should be established with the most important and authoritative positions of local and national governments as well as the management organization of an industrial cluster. In this command structure, multi-stakeholder risk governance normally may involve serious conflicts of interests among stakeholders. Therefore preparation of a conflict management policy is also considered crucial.

The maximum size of the command of an Area BCP should not exceed the total disaster management which needs to oversee not only the business continuity but also the whole society affected (Figure 4). In this concept, it could be said that the Area BCP must be structured under the Area Command.

The concept of Area BCP has two aspects; cooperation of regional disaster prevention and preparedness activities by redundant measures (backup system); and critical resources management by multi agencies and private sector coordination. The Area BCP should have multiple ways (plans) of redundant support (Figure 5) as follows:

- cooperation among multiple BCPs in the industry agglomerated area;
- inter-regional cooperation with other areas of industry;
- supply chain cooperation to backup in emergency;
- industrial community cooperation;
- coordination with agencies or jurisdictional authorities for securing infrastructure; and
- sharing critical resources by unified emergency management

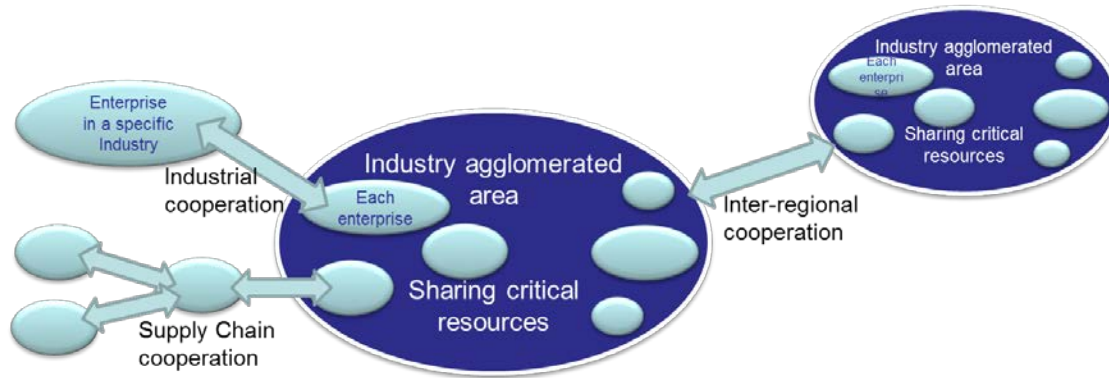


Figure 5. Different means of cooperation, unified management to share critical resources

6. METHODOLOGY

To strengthen the regional resilience of industrial agglomerated areas through establishing Area BCP, we need to formulate the planning framework with the participation of relevant representatives from both private and government sectors. Since the concept of Area BCP is quite new and the participants in this study are not familiar with even BCP, the study first explained to stakeholders about the risks, impact and damages based on probabilistic analysis of disasters. Then, conceptualizations of the Area BCPs in the three pilot areas have started among stakeholders.

Common methodology of formulating Area BCP, in the three pilots, is summarized as follows.

- 1) Assessment of Hazard, Vulnerability and Risk and Preparation of Scenario
 - Identification of the predominant hazards for industrial agglomerated area,
 - Simulation of the hazards in the industrial agglomerated area, including severe probabilities of occurrence
 - Study of Vulnerability and resilience of the elements related to the business continuity of the industrial agglomerated area, by assessing infrastructure and External Resources such as road network, airport and sea port, communication, water supply, electricity, energy supply, etc.,
 - Preparation of the risk scenario for the industrial agglomerated area
- 2) Study of the current situations of supply chain
- 3) Superposition of hazards and vulnerabilities in business operation, and assessment of broad impacts
- 4) Formulation of the Area BCPs, which are based on the risk assessment, for the pilot areas
 - Analysis of Existing measures and private sector's BCPs for natural disasters
 - Establishment of strategy for Area BCP
 - Formulation of plan of cooperation based on the redundant support concept (Figure 5)
 - + to promptly recover critical infrastructures such as road communication, port, etc.
 - + to secure external resources such as electricity, energy, water, etc.
 - + to keep or backup their supply chains and continue business operations
 - Formulation of plan of infrastructure development for more resilience
 - Formulation of disaster response plan
 - Monitoring and feedback framework

- 5) Filing of processes of risk assessment and the Area BCP adopted in the Study, and preparation of guidelines which can be applied to the other areas in the ASEAN region

Through this process, JICA and AHA Centre try to analyze the effectiveness, efficiency of the methodology and impact of the Area BCP.

7. CONCLUSION

The first step for disaster risk management of industrial areas is to promote the interest and will of stakeholders concerning disaster risks and BCP. However in many organizations, the job of a Business Continuity Manager to prepare a BCP is not taken as seriously as it should be. The general management in those organizations only wants the BCP managers to write something, or anything to make the auditors go away.” (Wallace 2010)

In order to promote the Business Continuity Manager’s interest it is important to show the realistic risk assessment results and truthful damage estimation in case of multiple scenarios. Those scenarios should include the potential large scale disasters that may disrupt External Resources essential for each enterprise’s business continuity.

The next important step will be to formulate and activate the coordination system of Area BCP shared between public organizations and private enterprises.

The Area BCP should not be a target solely to the documentation. It is expected to become a guide to implement their management. It also needs continuous feedback, planning and revision.

The above methodology, which is under testimony in this study and the process of Area BCP, would be evaluated during and after the formulation and application in pilot areas. Since this study project continues until August 2014 under support by JICA and AHA Centre, further lessons and analysis will be reported following this introductory study.

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