Asia-Pacific Research
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# The impacts of natural disasters on global supply chains

*By Linghe Ye and Masato Abe*

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# Acronyms

| | |
|---|---|
| APEC | Asia-Pacific Economic Cooperation |
| ASEAN | Association of Southeast Asian Nations |
| FDI | Foreign Direct Investment |
| GDP | Gross Domestic Product |
| HDD | Hard Disk Drive |
| ICT | Information and Communication Technology |
| JCCB | Japan Chamber of Commerce Bangkok |
| JETRO | Japan External Trade Organization |
| M&A | Mergers and Acquisitions |
| MNC | Multinational Corporation |
| ODI | Overseas Development Institute |
| OECD | Organisation for Economic Co-operation and Development |
| R & D | Research and Development |
| SMEs | Small and Medium-sized Enterprises |
| THB | Thai Baht |
| TISN | Trusted Information Sharing Network |
| TNC | Transnational Corporation |
| UNESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| USD | United States Dollars |

## 1. Introduction

Globalization has transformed business environments worldwide, including in the Asia-Pacific region. The fast expansion of global supply chains (typically comprised of firms, suppliers, distribution links and labour), which are cross-border business and production networks, allows firms to allocate scarce resources more efficiently than ever before. The advancement of information and communication technology (ICT), the development of international logistics systems and the reduction of trade barriers have all facilitated the integration of economies through the web of global supply chains. Recent disasters in Japan and Thailand demonstrate, however, that the development of global supply chains have also changed the risk profile of business and could potentially increase economic vulnerability in Asia and the Pacific through higher direct and indirect disaster risks.

This paper explores how global supply chains expand the risks of natural disasters and how natural disasters affect supply chain operations in the Asia-Pacific context. The paper will first discuss the emergence and development of global supply chains in the Asia-Pacific region and will then examine how these new developments globalize disaster risks and bring extra vulnerability to businesses, particularly to their production networks. Following this, the paper will describe the impact of natural disasters on the global supply chains, on the basis of two natural disasters that occurred in 2011 in the region: the Great East Japan earthquake and the South-East Asian floods (focusing on the flood of Thailand). Finally, policy options are proposed to enhance disaster resilience for business in the context of globalization.

## 2. Development of global supply chains

Driven by trade and investment liberalization and continued cost reduction pressures from customers, businesses have been extending worldwide to make the most of each location’s comparative advantage. Many industries have adopted highly integrated global supply chains in which products are supplied, manufactured and distributed across national boundaries through offshore activities and outsourcing strategies. At the same time, economies of scale have driven the consolidation and agglomeration of firms in the supply chains, which have also promoted logistic consolidation. As a result, supply chains are becoming more complex with wider geographical coverage, which has increased the invisibility of the supply chains.

Offshore activities refer to activities that utilize facilities located in a country other than where the enterprise is based (incorporated) and can include production, service and sourcing (Vitasek, 2006). The motivation for offshore activities has primarily been cost, including lower labour, setup and ongoing costs, higher cost efficiency with larger production scale, and possibly lower financial costs such as borrowing costs and tax rates. An example of offshore activities is the overseas production network of Toyota. As shown in Figure 1, Toyota conducts its business in 26 countries and regions, with 50 overseas manufacturing operations. As of 2011, Toyota's vehicles from these production bases were supplied to more than 170 countries and regions (Toyota, 2012).

**Figure 1. Overseas production network of Toyota**


Source: Toyota, 2012

Outsourcing represents one of the greatest changes to global business practices. Today, firms do not just procure materials and parts from overseas suppliers, but also outsource various functions such as product design and logistics services (e.g. turnkey products[1] and third-party warehousing) that were conventionally provided in-house. The logic behind this trend is that outsourcing can enable firms to focus on their core value added activities, where they have a distinct advantage. Overall efficiency increases because each firm in the supply chain can maximise its competitive advantage through strategically focused resource allocation (Christopher, 2011). Consequently, the supply chain becomes a web involving multi-tier suppliers and service providers. Focal firms[2] are at the centre of an international production network (global supply chain), linked with several interrelated but independent entities.

As a result of outsourcing, to take advantage of the lower costs in each location as well as to penetrate untouched foreign markets, supply chains have been extended from one side of the globe to the other (Christopher, 2011). As described in fragmentation theory, a whole production process is now split into separate nodes in different locations (Jones and Kierzkowski, 1990). These production nodes are connected by distribution links, which refer to activities coordinating the operation between these nodes such as administration, transportation, warehousing and financing among participating firms (Jones and Kierzkowski, 1990). The final products are produced across the borders and then sold beyond the borders to consumers worldwide. Unlike a local (national) supply chain, a global supply chain involves transporting large amounts of supplies across long distances, which increases the frequency of using multi-modal distribution facilities. Figure 2 illustrates national and cross-border supply chains.

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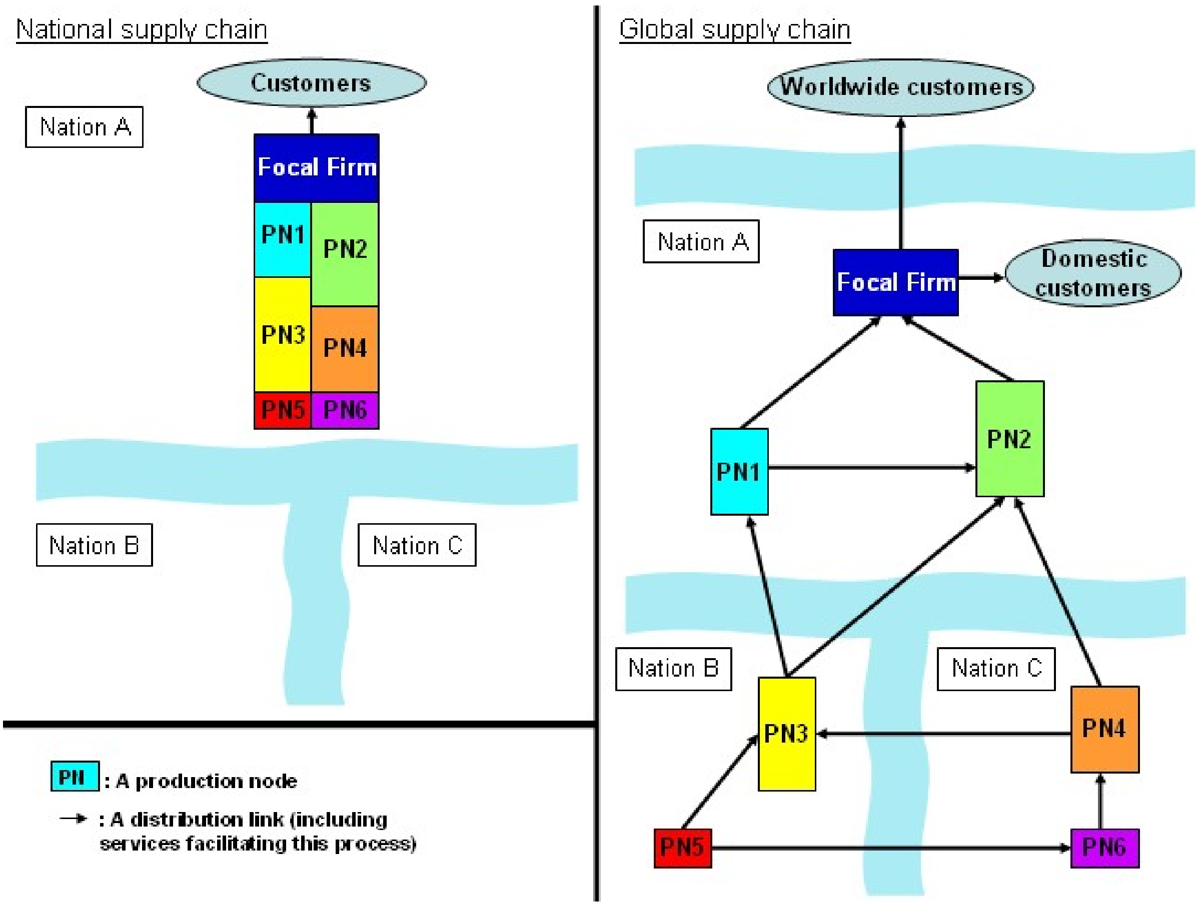
[1] A turnkey product or service is one that is installed fully complete and ready for a user to operate. The term implies that the user just has to turn a key and start using the product or service (TechTarget, 2002).
[2] A focal firm is the initiator of an international business transaction, which conceives designs and produces goods or services (Cavusgil, Knight and Riesenberger, 2008).

**Figure 2. Comparison of national and global supply chains**




Another prevailing trend is supplier consolidation, which refers to the reduction by firms of their total number of suppliers while increasing business with individual suppliers (EIU, 2005). In some cases this corporate strategy has been extended to “single sourcing” whereby one supplier would supply one business input (e.g. a part, component or module). With this strategy, focal firms aim to build strong partnerships with their suppliers and achieve price advantages from the economies of scale and bargaining power while utilizing suppliers’ expertise in research and development (R&D), design, production and distribution. It also lowers transaction costs, with fewer orders to be