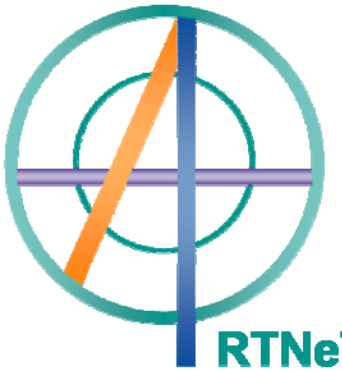

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Thailand's 2011 flooding: Its impact on direct exports and global supply chains

By Aekapol Chongvilaivan

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Thailand's 2011 flooding: Its impact on direct exports and global supply chains

Aekapol Chongvilaivan[*]

Abstract

While developing Asia has used fragmentation and industrial agglomeration as leverage to create impetus for sustaining its competitiveness, the downside risks of just-in-time procurement and production have not been sufficiently emphasized. Based on the experience of Thailand's flooding in 2011, this study examines the extent to which the supply chain disruptions are translated into plunges in production and export performance, and explores how companies can effectively manage the risks and cope with supply chain breakdowns. The analysis reveals implications that corporate culture and management mindsets need to take into consideration the potential sources and impacts of risks and to assess them systematically. Redundancy in principle offers a shock absorber, but investment in untapped inventory and suppliers can be prohibitively costly. Last, enhancing the flexibility of supply chains through information exchange and coordination in vertical relationships is crucial to ensuring resilience against high-impact, low-probability shocks.

Key words: Production networks; just-in-time procurement; supply chain disruptions; Thailand; flooding.

JEL Codes: F14, F23

Introduction

Fragmentation and agglomeration forces, together with the concept of just-in-time production, have made it possible for many countries to establish manufacturing production through vertical specialization and economies of scale even though they do not have a comparative advantage at all levels of manufacturing production. This is true for Thailand today, much as it was previously in Taiwan Province of China and, some decades before that, the Republic of Korea. As Thailand becomes a part of this production sharing and global production networks, it also becomes increasingly evident that supply chain disruptions could be a serious threat. Natural disasters and some types of man-made catastrophes can endanger the just-in-time approach to procurement and production because any disruptions to a single node of production may lead to a breakdown of the entire production chain.

In the last quarter of 2011, Thailand experienced its worst flooding in 70 years during which several key industrial estates were severely affected. However, that was not the first disruption of the global supply chain in the East Asian region. Since the end of the last century, the global supply chain has been brought to a halt on several occasions by natural disasters in East Asia, such as the major earthquake in Taiwan in March 2000, the outbreak of the SARS epidemic in southern China during 2002-2003, the Great Hanshin-Awaji earthquake of 1995, the Chuetsu offshore earthquake of 2007 in Japan and, more recently, the massive earthquakes in March 2011 (Fujita and Hamaguchi, 2011).

The 2011 flooding in Thailand created serious problems for the country's industrial manufacturers. The disaster highlighted the vulnerabilities of production and direct exporting when prevailing just-in-time procurement and management have not fully envisaged the potential damage resulting from supply chain disruptions as well as the pivotal role played by building up resilience in supply chains. The total production and supply chains that have been caused by such disasters has clearly shown that strategic assessment and management of disruptions constitute the root elements of supply chain management; if this lesson is ignored, Thailand will lose its competitive advantage as a hub of global production networks.

In view of this potential threat, this paper is based on existing studies of supply chain management and operations and the experience of Thailand's worst floods in the last quarter of 2011. The paper examines the impacts of supply chain disruptions on direct exports and vertical intra-industry specialization, identifies the sources of vulnerabilities associated with the proliferating production networks, and explores the options and strategies for businesses and the Government of Thailand to nurture the burgeoning production networks in order to ensure their resiliency in future disruptions. The following analysis indicates that among the hardest hit sectors during Thailand's flooding were key industries – e.g. the automotive, and electronics and electrical appliances manufacturing sectors – which experienced sharp declines in production as well as direct exports during the last quarter of 2011. Although the adverse impacts on production and exports appear to have been rather short-lived, as normal operations among most firms have quickly resumed and global demand remains robust, the floods have painted a bleak picture of long-term performance in terms of declines in stock prices, deteriorating competitiveness and trimmed market

shares, among others. The drastic consequences of the supply chain disruptions felt by companies in Thailand offers a key lesson that strengthening the resilience of supply chains not only offers immunity against disruptions, but also serves as a strategic tool that differentiates a company from, and positions it ahead of its competitors.

This paper presents several options and strategies for companies to strengthen resilience of just-in-time production chains to the risk of high-impact, low-probability events. Fundamentally, assessment and identification of risk sources need to be carried out systematically. The key problem is that while corporate culture and mindsets have a major influence on efforts to improve production efficiency, they downplay the downside risks of lean operations. Redundancy, in terms of extra inventory stockpiles and multiple-sourcing schemes, essentially serves as a shock absorber in case delivery of parts from any production node goes wrong. However, this paper highlights the fact that redundancy incurs exponential costs in terms of arising inefficiencies and management outlays, and is thus constrained by the cost-benefit trade-offs. Finally, as industries continue to flourish by using just-in-time procurement and since a shift towards just-in-case procurement can only be made with limitations, information exchange and coordination between companies and their suppliers need to be enhanced by strengthening the flexibility of the three supply chain building blocks – procurement, conversion and distribution.

Section 1 explores two strands of literature that are relevant to this study, namely East Asia's proliferation of production networks and management of supply chain disruptions. Section 2 provides a primer of production networks in Thailand, while Section 3 examines the impacts of Thailand's floods on production and direct exports. Section 4 proposes options and strategies for enhancing just-in-time production such that the risks of the disruptions can be effectively managed, and the damages of the disruptions, if present, can be mitigated. In conclusion, section 5 discusses the implications on building resilient production networks.

1. Literature review

The proliferation of production networks is central to the debate on globalization and the rapidly changing international trade patterns in East Asia, whereby firms across regions and countries are linked through vertical intra-industry specialization. Most typically, capital-intensive intermediate parts and components are produced in advanced economies such as Japan and the Republic of Korea, while labour-intensive assembly and provision are carried out in developing countries such as China, Malaysia, Thailand and Viet Nam (Chongvilaivan and Thangavelu, 2012). Several recent studies have highlighted the growing significance of production networks as a driving factor of closer trade ties among the East Asian countries. Athukorala and Yamashita (2006), for example, estimated that the share of East Asia in total world exports of parts and components increased from 29.3% in 1992 to 39.2% in 2003. Ando and Kimura (2005) and Ando (2006) further found that intra-industry trade in East Asia had been dominated by trade in machinery parts and components, suggesting the prevalence of production fragmentation and vertical specialization in the region.

Given the increasingly important roles of production networks, the existing literature has been largely devoted to deliberations on cost-saving, efficiency-

enhancing incentives through location advantages and economies of scale, which, in turn, essentially catalyse the rapidly growing production networks in East Asia. Jones and Kierzkowski (1990) introduced a conceptual framework of production fragmentation, where the physical dispersion of production nodes necessitated costly service links such as transportation, telecommunications and other coordination tasks. Jones and Kierzkowski argued that technological advancement and lowering trade barriers led to a significant decline in service link costs and allowed the production process to be fragmented across different locations to leverage on economies of scale. Deardorff (2001) incorporated production fragmentation into the standard models of international trade, and showed that fragmentation could be a driving force of factor price equalization. Several subsequent studies have substantiated these theoretical expositions by examining the interacting combination of intra-firm/arm's-length fragmentation and agglomeration of multi-firms in East Asia. Fujita et al. (1999) and Fujita and Thisse (2002) underlined the trade-off between economies of scale at the firm level and transportation costs as a driver of industrial agglomeration. Kimura and Ando (2005) posited that location advantages – such as low wage levels, factor/resource availability and well-developed infrastructure – reduced costs of service links, both in terms of distance and of uncontrollability, and enabled industrial clustering to keep efficient procurement and networks of parts and components in a just-in-time manner.

Apart from the spatial economics and agglomeration theory, global production networks can also be explained from the perspectives of supply chains and operations management in which manufacturers are induced to rely on a reduced supplier base, as opposed to the conventional approach to an abundant collection of suppliers. The key idea is that buyer-supplier relationships allow firms to demonstrate similar potential and performances without the necessity of ownership and strenuous barriers to exit. By reducing their supplier bases, firms gain a wide array of benefits including trimmed switching costs, limited shipping errors, higher quality, and quantity- and relationship-based discounts, through sharing information, technology and planning efforts (see, for example, Wilson et al, 1990; Treleven, 1987; and Bartholomew, 1984). Scott and Westbrook (1991) underlined several other gains provided by a small supplier base, such as improved communications, more efficient conflict resolution, less probability of opportunism and declined risks from externalities. Brown and Inman (1993) noted that downsizing supplier bases and single sourcing were the primary business strategies pursued by Asian manufacturers as well as the primary catalysts of the Pacific Rim supply chain processes.