

Is the East Following the West or Its Own Destiny for Industrial Development? A Research Agenda Based on Supply-Chain Integration

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Abstract

We seek to set up a research agenda around the question of whether companies in emerging economies in Asia are following the same industrial development path as those in developed countries. In particular, we compare supply chain integration in these economies through examples of companies known for their supply chain expertise and explore if and how supply-chain integration is different for these companies. These examples indicate that companies in emerging economies in Asia might be focusing on the customer or the front end of the supply chain for integration efforts while those in developed economies might be focusing on the supply or the back end of the supply chain. To explain these or other differences, we provide alternative research hypothesis based on the notion of development cycle and on region-specific development, along with related research questions for further research and their different policy implications. opportunities facing the supply chain of the future and describes the various effects these issues have on supply chain design, management, and integration.

Keywords: *Asia, supply-chain management, supply-chain integration, emerging economies; alternative research hypotheses; research questions*

1. Introduction

As emerging economies in Asia continue to grow at a relentless pace, it is interesting and important to determine the extent to which companies in these economies are following their counterparts in developed countries. Viewpoints on this debate often bias import and export policy, credit policy and industrial development policy, as we have seen first in Japan and then in S. Korea. However, not all Asian countries have taken the path of Japan or S. Korea and the debate on the path for growth continues especially in the light of information technology development and its exploitation, for instance, by Indian companies.

We seek to set up a research agenda around this debate that is informed by the nature of supply chains in these economies. We want to compare how companies in emerging economies in Asia are developing their supply chains through integration in contrast to companies in the developed world, and explore alternative research hypotheses to explain these differences. We take examples of companies known for supply-chain excellence both from developed countries as well as from emerging economies in Asia. We examine their integration efforts to look for patterns. Although examples do not comprise evidence, we suggest that integration efforts in the developed economies focus on

robustness and efficiency of supply at the supply or the back end of the supply chain whereas those in emerging economies focus on the customer or the front end of the supply chain through breadth of products and services and reliability of delivery.¹

This difference, which needs to be confirmed, motivates at least two alternative hypotheses as part of setting up a research agenda. One hypothesis is that the difference is due to the economies being at different stages of development. An alternative hypothesis is that the nature of economic development, and by implication, supply-chain development, is region specific. The significance of these hypotheses lies in their policy implications: the first one suggests that emerging economies should encourage the development of large vertically integrated companies as S. Korea has done, whereas the latter one suggests that economies must take regional factors into account as perhaps India and China have done. Thus our work contributes by setting up a research agenda around supply-chain integration that, when developed through research over time, has the potential of informing development policy for emerging economies.

This paper is organized as follows. We first consider integration efforts in developed countries by taking examples of leading companies in section 2 and then do the same in section 3 for companies in emerging economies in Asia. We present alternative research hypotheses in section 4 to explain differences in supply-chain integration before concluding in section 5.

2. Integration Efforts in the West and in Japan

Economic growth in the US history since the late 1800s can arguably be attributed to or at least tied to vertical integration within the supply chain. One of the earliest success of vertical integration was Carnegie Steel company. Rather than relying on supply chain partners, Andrew Carnegie vertically integrated his company by owning and controlling the entire production process from mining to milling

and the entire distribution process from shipping to wholesaling. Most companies in the oil industry such as ExxonMobil (US) adopt a vertically integrated structure by controlling the entire supply chain operations from locating, drilling, extracting, to transporting crude oil; from refining, to distribution of fuel; and finally retailing.² Even computer companies such as IBM, HP, and Texas Instruments were vertically integrated in the early days.

In the automotive industry, General Motors and Ford did the same to compete with the high-end custom-designed car manufacturers such as Daimler or Rolls Royce in Europe. Henry Ford revolutionized car manufacturing by vertically integrating the entire supply chain operations from design to part fabrication; and from assembly to distribution in 1909. By doing everything in-house, Ford sought tight control of lead time, quality and cost.

Many vertically integrated western companies have become leaders in their respective industry sector. Examples include Intel in the semi-conductor industry (from wafer fabrication to motherboard assembly), Starbucks in the coffee industry (from coffee bean purchasing to coffee retailing in cafes that it owns), and Zara in the fashion industry (from clothing design to retailing in stores that it owns with with a 'catwalk-to-rack' time of 15 days).

While vertical integration offers cost efficiency for stable product and technology, its internal organizational structure can become rigid and slow in responding to dynamic changes in the marketplace and technologies; see the discussion on efficient versus responsive supply chains by Fisher (1997). This drawback of vertical integration could have been a reason why many US-based auto and other manufacturers fell behind Japanese competitors in the 1980s.

As Japanese companies such as Toyota and Sony overtook the US giants like the Big Three or RCA in product development lead time, quality, and cost, many researchers attributed the success of many Japanese companies to these companies use of virtual supply chains integration to hook up tightly with their suppliers without acquiring them.³ For

¹ Front-end or back-end integration is not the same as *vertical* or *horizontal* integration. Front-end integration may be achieved through horizontal integration of multiple companies selling to the same customers or by vertically integrating into the customers' operations. Likewise, back-end integration may be achieved by vertical or horizontal integration of suppliers.

² This is true for Petronas, a Malaysia-based company as well.

³ There are many excellent studies on this subject, the reader is referred to Dyer (2000), Dyer and Ouchi (1993), Helper and Sako (1995), Monteverde and Teece (1982), Tang (1999) and Williamson (1981) and the references therein for details.

instance, Toyota's vertical integration is "virtual" in the following sense:

- (1) *Outsourcing*: Toyota sources over 75% of the contents from its suppliers;
- (2) *Tiered structure*: Toyota manages only a few tier-1 suppliers who in turn manage tier-2 suppliers;
- (3) *Long-term collaborative supplier relationship*: Toyota achieves short product development cycle time, high quality and low production cost by coordinating suppliers' efforts in a collaborative manner.

As US and European manufacturers learned of the success recipe of virtual integration from Toyota and other Japanese companies in the 1980s, the advances of computer, information and telecommunication technologies in the 1990s have created a window of opportunity for many US and European manufacturers to develop their virtual supply chains to compete. New computer/electronics giants such as Cisco, Dell and Palm began to emerge in the late 1980s using virtual supply chains.

Some companies have extended their virtual supply chains all the way to design and development of products. Consider Cincinnati-based Procter and Gamble (P&G) that was seeking a growth of 5% per year in a mature market for basic consumer packaged goods such as detergent and potato chips. P&G developed a method termed "connect and develop" to develop innovative products quickly and cheaply (Huston and Sakkab, 2006). Specifically, P&G post their requests on a site called InnoCentive; scientists around the world see the challenge, work on solutions and sell these solutions to P&G. For instance, by working with a professor in Italy, P&G developed printable Pringles potato chips in the US and achieved double-digit growth in the potato chip category. When P&G learned of a household sponge in Japan with a cleaning agent developed by BASF, P&G developed a new sponge called Magic Eraser with BASF.

Achieving virtual supply chain integration was a necessity when US and European firms used offshored outsourcing to take advantage of low labor cost and favorable tax schemes in Asian and Eastern European countries (Ferdows, 1997). While integrating backwards into the supply chain virtually is motivated initially by cost, these long virtual supply chains are vulnerable to various types

of disruptions potentially resulting in losses to the company initiating integration.

Indeed, supplier failure is now becoming the riskiest link of supply chains, according to a 2007 industry survey (Supply Chain Digest, 2007). Examples of significant supply chain disruptions include: Boeing delaying its delivery schedule of 787 in 2007; Mattel recalling over 18 millions of toys in 2007; Dell recalling 4 million laptop computer batteries made by Sony in 2006; Ericsson losing 400 million euros in the quarter following a minor fire at their supplier's semiconductor plant in March 2000; Land Rover having to lay off 1400 workers after a supplier became insolvent in 2001; and Dole suffering a large revenue decline after Hurricane Mitch destroyed banana plantations in South America in 1998. Finally, among the many instances of disruptions after 9/11 attacks in 2001, Ford had to close five plants for several days owing to the suspension of all air traffic.⁴

As such, many companies that relied on virtual supply networks previously are considering actual integration at the supplier end possibly motivated by the success of such vertically integrated companies as Starbucks and Zara (Ghemawat and Nueno, 2003). For example, after various suppliers delayed in delivering certain newly designed sections, the former 787 program manager Mike Bair commented that more "in-sourcing" would be needed in the near future. Other examples are Bridgestone (Japan) acquiring an Indonesian rubber plantation in 2005 and Mittal (India) buying iron ore producers in 2007 to secure supplies. Despite these isolated examples of vertical integration, virtual integration cannot be ruled out because the cost for developing in-house capabilities such as design and manufacturing can be exorbitant. Also, an in-sourcing strategy cannot be aligned to an approach to remain asset-light as in the case of Dell.

Retailers can be both "asset-light" and vertically integrated virtually with greater success than manufacturers, partly because they typically purchase from a variety of suppliers and are not vulnerable in the sense some manufacturers are in having only a few suppliers. One retailer well known for its use of information technology to make its supply chain virtually integrated across suppliers

⁴ See, for instance, Chopra and Sodhi (2004), Lee (2004), and Tang (2006, 2008) for details

(and transportation providers) to its retail outlets is Seven-Eleven Japan. Seven-Eleven Japan has frequent deliveries of small batches of products using an innovative program called *joint delivery program*: Seven-Eleven Japan first consolidates the orders of different products from different franchise stores. Then, a single truck from a third-party logistics partner picks up the consolidated orders from different suppliers and then deliver individual orders to the stores multiple times throughout the day. To ensure on-time deliveries, Seven-Eleven Japan urges its logistics partners to diversify their mode of transportation that includes trucks, motorcycles, bicycles, ships, and helicopters. This logistics strategy proved its worth when Seven-Eleven Japan used 125 motorcycles and 7 helicopters to make rush deliveries of 64,000 rice balls to earthquake victims in Kobe shortly after the earthquake that destroyed many roads in the late 80s (c.f., Lee, 2004). For Seven-Eleven Japan, the number of stores has grown from 8,602 in 2000 to 11,735 in 2006, and sales has grown from 2 trillion yen in 2000 to 2.5 trillion yen in 2006 (Okongwu and Santosa, 2008).

In addition to physical products, Seven-Eleven Japan offers services including postal, cell phone cards, utility payment, etc. as well as other online services offered via its electronic kiosk that offers a wide range of products (DVDs, accessories for cars, toys, etc.) and services (travel, concert tickets, etc.). Most of the services offered through the electronic kiosk are provided by a joint venture called 7dream.com, which is a joint venture of seven companies (Seven-Eleven Japan, JTB, Nomura, Sony, NEC, Mitsui, and Kinotrope). By combining content, information, technical resources, infrastructure and know-how, these seven companies have come together to integrate at the front-end of the supply chain so as to provide one-stop online shopping experience to consumers by offering music, travel, merchandise and gifts, car-related services, and photos. Many companies from emerging economies in Asia follow this as a typical model for supply-chain integration as we shall see in the next section.

3. Integration Efforts in Emerging Asian

Consider the following examples in emerging economies in Asia. Operated as a Mumbai-based

co-operative since 1880, Mumbai Tiffin Express in Mumbai has approximately 5,000 persons who collect the lunch boxes, called *dabbawallas*. These individuals collect approximately 200,000 lunch boxes from homes in the morning and deliver them to the respective office workers by noon, and then return these boxes back to their original homes by evening everyday. The process involves sorting, grouping, carrying, and delivery. Without sophisticated IT systems (Balakrishnan and Teo, 2008), the error rate on time delivery in a large city like Mumbai with a stretched transportation system is only one per 6,000,000 deliveries!⁵

Anticipating demography changes, the company now offers other services including express delivery service, meals cooked by a group of designated housewives, distribution of other products such as promotional materials along with the lunch box, and online access via SMS and a new website, www.mydabbawalla.com. According to the New York Times, this 125-year old dabbawalla industry continues to grow at a rate of 5-10% per year (Rai, 2007) Note that the integration is across dabbawallas and that the supply chain does not involve any manufacturing and is rather short from the supplier to the customer.

Founded in 1959, Lijjat Papad is a cooperative in India that allows women to earn a dignified livelihood. By mobilizing a group of over 40,000 women and its 63 branches in India, this coop won many business awards and now exports its products to many countries including US, Singapore, Thailand, UK, etc. Lijjat integrates the "suppliers", i.e., the women making the product that comprise a rather short supply chain, to provide a single-face to the customer.

Bangkok-based Bumrungrad International Hospital is an internationally accredited, multi-specialty, publicly traded hospital in Bangkok that has over 800 *independent* certified physicians and serves over one million domestic and international patients from 190 countries each year. As a result of integrating with travel partners, health insurance providers in western countries, and a myriad of other large and small companies including independent physicians, Bumrungrad offers one-

⁵ The success of this service has motivated BBC to develop a documentary film demonstrating the power of this virtually integrated supply chain (Vaswani, 2006).

stop service that includes travel arrangements (including private jet and helicopter services), personal services (interpreters, translators, concierge, etc.), hospitality services (luxury rooms/suites, shops, restaurants and fitness facilities for patients and their family/friends), and medical service (state-of-the-art diagnostic, therapeutic and intensive care facilities and over 30 specialty centers). Bumrungrad co-developed an integrated hospital information system with US-based Global Care Solutions, a subsidiary of Blue Cross Blue Shield of South Carolina, that would allow all medical staff to have a common access to patients' medical records, to coordinate medical treatments for patients with multiple illnesses, and to schedule staff and facility for different needs. The information is shared with Blue Cross Blue Shield of South Carolina as well. As with the two examples above, we see that Bumrungrad focuses on integration at the customer end of the supply chain for the customer's convenience, exploiting technology in doing so.

In Indonesia, small electronics shops selling mobile phones, MP3 players and other consumer electronic items do so with shared inventory.⁶ Owing to low profit margin due to fierce competition, uncertain demand of each product and the short product life cycle being very short, these shops are integrated in the sense that they share a common pool of inventory to reduce the risk of overstocking or of failing to meet customer demand (Okongwu and Santosa 2008). Specifically, these small shops act as showrooms by displaying different mock-ups of many types of consumer electronics products. Once the buyer and the seller agree upon a price, the seller will receive the unit from the common pool that is stored in a convenient location. In order to offer multiple products at low cost, inventory sharing appears to be a common practice among small shops in Asia. The authors have observed this among electronics retailers in India as well.

Okongwu and Santosa (2008) also report on two wholesalers who sell imported wines and spirits in Indonesia. To reduce the logistics costs and to achieve group discounts, one of the wholesaler orders a full container-load of branded wines and

then shares some of the shipment with the other wholesaler at a negotiated price. This mechanism enables both wholesalers to reduce the cost of ordering and of transportation.

Some tailors in Asia use the same model of sharing expensive inventory. For example, when one of the authors was buying a custom suit in Singapore, the tailor showed different booklets of fabrics without actually carrying any inventory of fabrics in the store. This is because the inventory of different fabrics is shared among different tailors and stored in a common warehouse. The idea is not just one of emerging economies – many firms in developed economies, e.g., Sears stores inventories at certain "strategic" locations (warehouse, logistics hubs, distribution centers) for use by multiple supply chain partners such as other retailers. Sears keeps certain inventories of cars and appliances at certain locations so that all retailers in the nearby region can share these inventories (Tang, 2006).

Founded in 1906 as a trading company exporting porcelain, fireworks and silk from China, Li and Fung became the largest trading company for durable goods such as textile and toys in Hong Kong. Li and Fung uses a virtually integrated network of 4,000 suppliers throughout Asia to provide a one-stop global sourcing service to multinational firms. Their offerings include product design, product development, supplier qualification, raw material sourcing, manufacturing, custom clearance, distribution logistics management, and inventory management (St. George, 1998; Meredith, 2007). For example, as the Indonesian Rupiah devalued from about 2400 to one US dollar in July 1997 to about 16000 a year later, many Indonesian suppliers were unable to pay for the imported components or materials and hence, unable to produce the finished items for their U.S. customers.⁷ Li and Fung shifted some production to other suppliers in Asia and provided financial assistance such as line of credit, loans, etc. to affected suppliers in Indonesia so as to ensure their U.S. customers will receive their orders as planned. By using a common pool of suppliers in a flexible manner, Li and Fung

⁶ See Er and MacCarthy (2002) for the implications of Indonesian manufacturing companies acting as direct contract manufacturers for various multi-national firms.

⁷ The currency crisis affected Indonesia seriously in 1997. For instance, Indonesia's national car manufacturer, Astra, suspended their production because they were unable to pay for imported components. Also, 60% of Jakarta's public transport system was suspended, because of the soaring price of the spare parts needed to repair the city's buses. Moreover, 40% of the country's 1500 chemical plants have been forced to halt production because of the soaring cost of imported raw materials.

earned its reputation in Asia and continued its growth in sales from 5 billion to 47 billion Hong Kong dollars from 1993 to 2006.

It is instructive to compare Li and Fung to a newer company, Alibaba.com. Li and Fung continues to dominate the market by providing one-stop global sourcing services to such *large* customers such as Levi's, Disney, and The Limited. In contrast, to meet the needs of US and European customers who are small and medium-sized enterprises (SME), Jack Ma established Alibaba with \$25 million of financial support from Goldman Sachs and Softbank in 1999. Alibaba (www.alibaba.com) is one of the world's largest B2B online trading platforms that connects small and medium-sized buyers and suppliers from around the world.⁸ Unlike Li and Fung that relies on relationship and in-depth knowledge, Alibaba uses information technology to provide an online trading service for smaller buyers and suppliers to meet. As the overhead and operating costs are low, Alibaba can offer free membership to its buyers and suppliers. Alibaba generates revenue from online advertising and from the fee for extra service such as personalized web pages and accreditation of suppliers.

Li and Fung have also developed an online "adjacency" to serve SME customers by using high quality suppliers in Asia. This online service makes use of the existing quality suppliers to offer basic designs of certain products and potential SME customers can make minor changes to fit their individual needs. This limited customization process enables Li and Fung to consolidate the orders from these SME buyers so that Li and Fung can continue to offer high quality sourcing services at low cost (McFarlan, 2002).

Meanwhile, Alibaba.com is expanding its service from B2B to the C2C marketplace. Alibaba adopted an adjacency strategy that enables individual sellers and buyers to buy and sell their products via the auction site Taobao.com in 2003. To compete with eBay in China, Taobao (www.taobao.com) is based on the same business model as Alibaba.com: the buying and selling service is free from transaction fees.⁹ As Taobao's business model is simple and is

free and as Alibaba provided proven security for online trading, cost conscious buyers and sellers feel more comfortable to sell and buy online via Taobao.com. Within only two years of inception, Taobao had over 4 million registered users and attracted 41% of online auction sales in China (Doebele, 2005).

Foxconn (Taiwan) is an example of a manufacturer that is seeking to integrate forward into its supply chains to better serve its customers. It offers one-stop manufacturing and other services to Original Equipment Manufacturers (OEMs).¹⁰ Founded in 1974, Foxconn has moved up the value chain first to produce personal computers and subsequently to digital cameras, cell phones and flat panel LCD monitors. To achieve sustainable growth in sales and in profit, Foxconn made a strategic move to reposition itself as an original design manufacturer (ODM) that designs, produces and ships products to be branded by their customers. By providing value added service as an ODM, Foxconn can obtain a higher profit margin, develop additional skills to fend off competition from other contract manufacturers, reduce manufacturing cost of similar products (such as notebook computers) using in-house modular design, and retain the intellectual property of certain products. To protect innovations in electronics and computer product design, Foxconn files three times as many patents per employee in the US, Taiwan and China as IBM (Nowotarski, 2003). With sales of over \$40 billion in 2007 and a global footprint of 450,000 employees, Foxconn is the world's largest manufacturer of electronics and computer components. Foxconn produces iPhone for Apple, cell phones for Motorola, personal and notebook computers for Dell and HP, and electronic games Wii for Nintendo and PS3 for Sony (Dean, 2007). The success of Foxconn has inspired many other large contract manufacturers such as Flextronics to adopt the ODM business model (Huckman and Pisano, 2005).

4. Alternative Research Hypotheses

Although these examples by themselves do not comprise evidence, they suggest that the (actual or

⁸ Alibaba.com listed on the Hong Kong Stock Exchange on November 6, 2007.

⁹ Unlike eBay who charges its sellers to list their goods, selling a product on Taobao is free. However, in addition to online advertising revenue, Taobao generates additional revenue from providing value added services to the sellers including personalized website and accreditation.

¹⁰ Foxconn is the trade name on the Taiwanese firm called Hon Hai Precision Industry Co. (Ltd). It is listed on the Hong Kong Stock Exchange, London Stock Exchange and elsewhere.

virtual) integration effort in supply chains in developed countries is at the back end or the supplier end. In contrast, the supply-chain integration effort in emerging economies in Asia appears to focus on the customer or the front end of the supply chain. The latter efforts involve either aggregating products and services for the customer or integrating forward into the customer's supply chain. Assuming this difference in supply-chain integration is real, we need alternative hypotheses for testing through further research to explain it. In this section, we propose alternative research hypotheses to set up a research agenda. For each hypothesis, we also indicate key factors for research.

4.1 Alternative Hypothesis 1: Development follows a Lifecycle

One hypothesis is that the difference is due to the respective economies being at different stages of development. This hypothesis implies that, in time, firms in the developed and emerging economies will use the same supply-chain integration, broadly speaking. This convergence would occur because underlying factors such as infrastructure, technology, and contract regimes evolve in the same direction. Therefore, supply chains will likewise evolve in the same direction.

There are several factors that can be considered within this hypotheses including (a) position in the value chain, (b) industry sector, and (c) availability of technology.

(A) Position in the Value Chain

In our examples, the integration effort appears to be related with the position of the firm in the supply chain. For instance, our examples in the developed countries (Procter & Gamble, Seven Eleven Japan, Starbucks, Toyota, Zara, etc.) focusing on back-end integration were at the front of the supply chain – they have established brands in the consumer market. When a firm is at the front, it makes sense for them to focus on the back-end integration by managing their suppliers. Several examples in the emerging economies in Asia (Foxconn, Li and Fung, Alibaba) focusing on the front-end integration were further upstream in the supply chain. In this case, should a firm change its integration effort as it move closer to the front of the supply chain? For example, as Lenovo, the China-based computer manufacturer, changes its

position in the supply chain by establishing a brand in the consumer market, would Lenovo start focusing on back-end integration?

(B) Industry Sector

With the exception of Seven Eleven Japan, the examples were manufacturing companies in developed countries. For the Asian examples, the examples are all from the service sector – including Foxconn that is positioned as an original design manufacturer who does not own a brand in the consumer market. As such, our perceived differences in supply chain integration between companies in developed economies and emerging economies may simply be due to differences in industry sector. It could also be that as western economies move from manufacturing to services – the UK, for instance, has seen manufacturing shrink to 14% of GDP in 2006 – there will be greater emphasis on services in emerging economies as well, partly in response to demand from western countries and partly from changes in the local economy. Two interesting research questions are: (1) Do different industry sectors adopt different supply-chain integration strategies in different geographical regions that are at different stages of economic development? (2) Relatively speaking, does service sector focus more on the customer-side or front-end integration than the manufacturing sector?

(C) Technology

Technology can reduce transaction costs and, consequently, aggregation of suppliers or customers is easier with the Internet than without. For example, Li and Fung use information technology to coordinate with their suppliers to ensure on-time delivery to their customers. Tapscott and Williams (2007) present other examples, for instance of motorcycle production in China using an “open-source” model as an example of supply-chain integration. This suggests that the difference in whether integration occurs at the front end or at the back end has more to do with technology rather than with the economy being “emerging” or having become developed. In the context of supply-chain integration, what is the impact of technology on supply chain integration in general and specifically in emerging economies in Asia?

4.2 Alternative Hypothesis 2: Development is Region-Specific

A second hypothesis can be that the nature of economic development, and by implication, supply-chain development, is region specific. This is a “path dependent” view of supply chain innovation based on the argument that that certain economic, social, and business environments give rise to certain types of supply chains. For instance, from this viewpoint, supply chain arise in environments facing certain limitations such as infrastructure and government (over) regulation or over-regulation, while being connected to wider contextual factors such as culture and trust relationships patterns.

Some factors to investigate under this hypothesis are: (a) fragmentation in existing industries, (b) culture, (c) infrastructure, and (d) government policy.

(A) Fragmentation in Existing Industries in Asia

Relative to western countries and Japan, most privately or publicly owned industries such as manufacturing, logistics, and retailing are quite fragmented in Asia. This means that back-end integration is more difficult in Asia than it is in western countries. For example, national and international chain stores such as China-based WuMart, US-based Wal-Mart, and France-based Carrefour account for only 9% of total retail sales in China (Tao, 2007) and the logistics industry is still fragmented in China (Chang, 2007). According to an on-going research project conducted by Iyer et al. (2007), certain industries (iron, steel, telecommunication, petrochemical, etc.) have been reserved for the public sector, and 73% of Indian manufacturing enterprises in garments, shoes, and toys are small and medium enterprises. Even some of the big giants in Asia including Mr. Li Ka Shing's Cheung Kong Holdings in Hong Kong was established initially as a fragmented supply chain that produced plastic flowers in the early 1950s.

The fragmented nature of supply chains in Asia may be because of geopolitical instability; economic instability; government policies; limited access to capital; inadequate physical and IT infrastructure; and limited human capital among other possibilities.¹¹

¹¹ Fragmented supply chains occur in the public sector as well. Consider the rescue and relief efforts that the International Federation of Red Cross and Red Crescent Societies (IFRC) put in place each time after a natural disaster. Be it the tsunami that hit Sumatra or hurricane Katrina that hit New Orleans, IFRC

For example, antiquated physical infrastructure (roads, railway network, and ports), inadequate power supply, and inflexible labor laws in India create major difficulties for firms to coordinate and integrate different supply chain operations.

However, things are changing as regards fragmentation. Consider the example of S. Korea (Son 2004). The Korean food-retail industry used to be dominated by small and medium-sized retailers where such initiatives or partnerships would not be meaningful. However, since the mid-1980s, the industry has gone through major changes partly due to relaxation in regulations. These major changes include: (1) the advent of large discount stores; (2) opening up of the market to major international retailers like Tesco and Wal-Mart; (3) the introduction of Internet and other “alternative” distribution channels; and (4) the growth of consumerism (Ministry of Industry, Commerce and Energy in Korea, 2001; 2002). As a result, large discount stores such as E-Mart and Samsung-Tesco rapidly increased annual turnover (Ministry of Industry, Commerce and Energy, 2002). Also, the resources and the collaboration expertise of the major international retailers have been instrumental in the implementation of numerous supply-chain partnerships. Thus, the traditional retail structure with small- and medium-sized supermarkets and department stores in Korea has been transformed into more of a US-style food/consumer-packed goods retail dominated by large discount stores.

Some research questions are: (1) What is the impact of market fragmentation on supply chain integration? (2) Do firms focus more on front-end integration when operating in a fragmented market?

(B) Culture

In western countries and Japan, consumers are aware of their rights and the government enforces consumer protection laws. Also, as information regarding product and price is transparent in these countries, consumers feel comfortable to make purchases online or in stores with no worries. However, in many Asian countries such as China, many customers are concerned about in-store or on-

needs to “assemble” a supply chain consisting of volunteers and medical professionals who provide water, food and medical services to the victims. With limited resources, coordinating the activities of this fragmented supply chain using volunteers who may not even know each other before hand can be a big challenge (Van Wassenhove, 2006). When human life is at stake, Van Wassenhove suggested various ways to facilitate coordination and collaboration in a fragmented supply chain.

line purchasing.¹² Besides the “no returns” or “all sales are final” policies in many Asian countries, many consumers have concerns regarding genuine products, fair pricing, and reliable after sales service especially when retailing is quite fragmented in Asia. To overcome consumers’ concerns about counterfeit products and pricing, a group buying business model called “tuangou” is booming in China. Successful examples include Taobao (a subsidiary of Alibaba), Liba.com, and Teambuy.com. These group-buying service providers work closely with the seller to ensure genuine products with fair pricing and then organize events for interested members to conduct face-to-face “collective” negotiations with the sellers (c.f., Tang (2008)). Possibly, Chinese cultural habits such as leisure shopping, group behavior, bargaining, etc., play an important role in the success of this kind of front-end integrated services.

Some research questions include: (a) To what extent does culture contribute to the success of the tuangou business model? (b) Will the success of tuangou business model sustainable in China as retailing become less fragmented? (c) Is the tuangou business model transferrable to other Asian or even western countries?¹³

(C) Infrastructure

Companies in developed countries enjoy good infrastructure that enables them to integrate vertically and exploit long vertical supply chains, virtual or otherwise, for efficiency. In contrast, emerging economies typically have a creaking infrastructure that makes companies focus at the front end for integration. Supply chains in these economies are short, at least those targeted for integration.

Still, infrastructure is improving in these economies and may encourage back-end integration. For instance, the Indian government is increasing its

budget from US\$21 billion (3.5% of GDP) in 2003 to US\$47 billion (4.7% of GDP) in 2009. Moreover, private-sector companies in India are now investing in various infrastructure improvement projects. For example, Reliance Anil Dhirubhai Ambani Group, is initiating a 7,480 megawatt electricity plant in the northern state of Uttar Pradesh; while Reliance Industries Limited, is partnering with the city of Mumbai to build a \$4 billion suburban railway system.

Some research questions include: (1) What is the impact of physical infrastructure on supply chain integration? (2) In an environment with poor infrastructure, do firms focus more on front-end integration? (3) As infrastructure continues to improve in Asia, will firms move toward back-end integration just like their counterparts in the West?

(D) Government Policy

Not all Asian countries have had the same policies towards consolidation in industry. Indeed, easy credit policies and other government support have helped companies to integrate vertically, as observed in S. Korea. However, not all Asian countries provide easy access to financial support. While few companies in Asia can afford to integrate vertically or horizontally, financial hardship has forced many Asian companies to learn how to compete and cooperate at the same time as evident from our examples. To survive, these companies need to learn and adapt quickly and they integrate at the front end.

Development of common markets may also encourage integration of companies in emerging economies. Many government and business leaders in Asia commented in the 2006 World Economic Forum that, to form a regional integrated market with a common currency such as European Union, centralized administrative and legislative institutions are needed; however, this development is unlikely to occur in the near future (World Economic Forum, 2006). In the context of supply chain integration, what can we learn from integrated markets such as European Union and regional free trade agreements such as NAFTA?

5. Conclusion

We started with the observation that the how companies in emerging economies develop their supply chains through integration can shed light on

¹² Despite the fact that the number of internet users increased from 123 million as of June 2006 to 162 million as of June 2007, only 26% of these internet users (approximately 40 million people) had engaged in online shopping as of June 2007 (reported by the China Internet Network Information Center). In addition to poor online shopping security, the fact that counterfeit products are still rampant in China contributes to this unpopularity of shopping on the web. According to a report issued by the China State Council in July 2004, it was estimated that the market value of counterfeit goods was approximately \$19-24 billion annually. Due to serious concerns over counterfeited products, many elite customers make their purchases of luxury goods in Hong Kong or in European countries such as France and Italy (c.f., Li and Fung (2007)).

¹³ A tuangou service (tuangou.es) has been established in Spain recently, and similar business models are beginning to establish in the United States. Some beta sites include eSwarm.com and Nethaggler.com. (c.f., Tang (2008)).

whether these companies follow the same development path as their counterparts from developed countries. We used examples of companies from the west and those from emerging economies in the east, known for supply-chain excellence, to shed some light on how companies in emerging economies in Asia are developing their supply chains through integration in contrast to companies in the developed world.

These examples indicated that integration efforts in the west may focus on robustness and efficiency of supply at the back-end of the supply chain whereas those in emerging economies may focus on the customer-end of the supply chain through breadth of products and reliability of delivery.

Assuming for now that companies from emerging economies differ from their counterparts from Japan or from western developed countries, we set up a research agenda by proposing two alternative research hypotheses. One hypothesis was that the difference is due to the economies being at different stages of development. The alternative hypothesis was that the nature of economic development, and by implication, supply-chain development, is region specific. We provided two alternatives but there could be others.

Depending on the hypothesis that is borne out through future research, policy makers would need to choose differently from among policy alternatives for growth. If there is more evidence behind the research hypothesis that development anywhere is based on a cycle, governments of emerging economies may choose to accelerate consolidation, for instance, by issuing licenses to large Western or local retailers (as in S. Korea). They may encourage the use of technology by subsidizing it or providing technology infrastructure for free, as with broadband services for the Internet. However, if the evidence is mostly behind the alternative hypothesis that development is region-specific, governments may focus on infrastructure, for instance through public-private partnerships (as in India) and/or ease government restrictions.

How would we test these hypotheses? First, we are really comparing supply chains, albeit with a clearly defined lead player or brand, so the "unit of analysis" is a supply chain. Next, we will need data about these supply chains (or leading companies in

these supply chains) and the nature of their integration. Finally, we will need to test for the individual factors including those that we listed under each hypothesis. There is much research work ahead but the reward of being able to inform government policy through supply-chain research is worth it.

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