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Supply Chain Dynamics in Asia

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Abstract

Supply chain management in Asia is a relatively novel topic but a key challenge for all Asian based manufacturers and traders when trying to integrate into the “global market”. The purpose of the paper is to describe key supply chain issues faced in Asia. These issues are related to supply chain security that forces Asian firms to comply with numerous requirements as well as the importance of a properly managed supply chain in enhancing firms’ competitiveness. The critical role played by Asian based logistics providers in facilitating supply chain integration is explored. Logistics providers must be able to design effective and efficient supply chains for the clients. A case study is presented to illustrate how supply chain dynamics affects supplier selection.

1. Introduction

The development of logistics services and communication technologies has revolutionised supply chain management, and has created a “global” market. Shippers and consignees require efficient logistics services that can move their goods to the right place, at the right time, in the right condition, and at the right price. It is, therefore, of great importance that linkages among countries in Asia are strengthened to facilitate trade and integrate supply chains for better access to the global market.

The purpose of this manuscript is first to introduce a number of key supply chain issues that impacts the operations of manufacturers, traders in Asia and the rest of the world. The second objective is to illustrate the key role played by Asian based logistics providers in managing the dynamics that occurs within any given supply chain. The last section describes a case study that reflects how supply chain decisions are made and how a particular Asian manufacturer was able to integrate into the global supply chain of a major car manufacturer.

World markets have become increasingly “globalised”. To a large extent, this reflects the fact that the majority, if not all, countries are adjusting to the strong trade liberalisation pressures observable around the world. This pressure stems from international trade agreements including the World Trade Organisation (WTO), the North American Free Trade
Agreement (NAFTA). There is also the development of other trading blocs like the European Union, the Association of South East Asian Nation (ASEAN), the Asia Pacific Economic Co-operation (APEC), the Greater Mekong Sub-region (GMS) and the growth of intra-Asian Trade. These trade policy initiatives have a common objective: to open up new trading opportunities by facilitating international trade.

Global economic integration relies upon efficient global supply chains but integration can only succeed if there is cooperation among trading nations. Certain supply chains, especially in some regions of Asia, are served by relatively fewer logistics service providers; with less favourable operational conditions; and where risks are higher, etc. For these countries, this situation results in failure to develop their international trade potential, in higher price for imports, in lower foreign exchange earnings from exports, in restricted investment and employment and, thus, in limited economic growth. The logistics costs associated with the distribution of any product can account for a high proportion of its sale price. There is therefore, potentially, considerable scope for efficiency gains that will reduce costs, which in turn will be reflected in the price of a given product. This reduction cannot be implemented without complete control over the supply chain.

Supply chain management is an integrative approach for planning and controlling the material flow from suppliers to end-users (Carter & Ferrin, 1995). It is used as a technique to create and maintain a firm's competitive advantage. The management of supply chains is important to ensure that customers' demands are met, as well as preventing excess in stocks that may lead to high holding costs or losses through obsolescence. One of the goals of supply chain management is to meet customer service objectives while simultaneously minimising transport, inventory, and other associated costs.

The integration of supply chains in Asia can provide a foundation for further economic cooperation and development. For some countries in Asia, inadequate transport infrastructure and high logistics service costs have constrained supply chain development and integration. Major infrastructure investments are already being undertaken in many Asian countries and more are planned. Physical connectivity between neighbouring countries will be significantly improved on the completion of these infrastructure investments. The improving infrastructure, coupled with expanded cross-border cooperation among Asian countries, will accelerate the process of integrating Asian supply chain into the rest of the world and the global market.
2. Key Supply chain Issues in Asia

Supply chains are not just confined within national borders or markets. In an international supply chain, many state agencies and in particular customs agencies play a very important role in the efficiency and efficacy of the supply chain. There is also a heavy reliance on specialized logistics service providers, such as freight forwarders or customs brokers that can facilitate the flows of goods across borders or even develop logistics systems for their clients. The biggest difference between domestic and international supply chain is the environment in which the chain operates.

The key role of a supply chain is to assist in the production, consumption and distribution of goods and services. This means that goods must be produced and delivered to the market (or customer) in the right quantity, required quality without defect and at competitive price. Integrated and seamless logistics system can play an important role in facilitating global supply chain processes.

It is therefore important that the movement of goods can be done by combining several modes of transport from one point or port of origin via one or more interface points to a final point or port where one carrier or many carriers organise jointly the whole transport process. Integrated transport is an efficient transport system that provides the physical operation to be carried out within the environment of a simple streamlined documentation, efficient management with effective control, a single liability system and provides a service, which is totally reliable, predictable, and fully meeting the needs of the customer.

However, the efficient operation of transport modes and nodal points are dependent on reduced barriers, institutions and simplified legal regime in order to effectively implement integrated logistics operations. It is viewed that trade is not possible without transport therefore support for integrated transport will facilitate national and international trade by ensuring an uninterrupted and smooth flow of cargo and giving better control over the supply chain.

2.1 Supply chain security
Supply chain security can be perceived as inconsistent with the objective of facilitating international trade (Dubelco & Laporte, 2003). Security is very much part of mainstream supply chain paradigm while security can also become a driver for trade facilitation.

If all firms involved in a particular supply chain optimise their logistical systems independently of other firms in that chain, the management of product flow across the whole chain, or ‘pipeline’, is likely to be sub-optimal. Attempts to overcome this problem have resulted in the creation of ‘supply chain management’. Supply chain management extends the principles of logistics management to customers and suppliers, crossing geographical and organisational boundaries.

Supply chain management leads to stricter requirement on service level related to frequency, reliability, lead-time, information provision, and risks of damage to cargo, security of the cargo, complexity of administrative procedures, and the increasing number of smaller consignments.

The security of the supply chain, like the efficiency of the chain, concerns both the physical flow and the information flow from origin to customers (Banomyong, 2005). In a supply chain there is no benefit if certain links or stakeholders are operating efficiently while others are not. It is the total performance of the supply chain from origin to final consumption that is relevant. Each link in the supply chain is dependent on the previous link in order to achieve continuity, synchronization and enhanced final customer service level. The security issue is directly related to the performance measurement of any supply chain. This means that all security conditions must be met and guaranteed in order for goods to move unhindered within supply chains.

Supply chain in Asia has experienced important changes during the last 25 years and several ports in the region have specialised in the concentration of transhipment activities. The ocean going containers ensure flexibility of shipments and several ports are dedicated to this technology and are, as a consequence, consolidating their status as supply chain hub centres. Economic growth and development have restructured the nature and pattern of supply chains with new demands within the main trading regions in Asia.

Hub centres thus require specialised high capacity transhipment infrastructures. However, infrastructures are not the only dimension in nodal restructuring. Supply chains are structured by an integration of services and transhipment functions to distribution functions
at hub centres. The security of these hub centres as nodal links in the supply chain is of critical importance.

The world has become a system of linkages in which individual nodal links are connected into intricate patterns of dependency in hub/feeder relationships as well as into end to end connections that reflect the increasing trade dependencies among regions. This trade dependency is conducted within a broader competitive regional environment, with the development of supply chain underlining the need for efficiency as well as security; and these conditions have impacted upon, and will continue to have an impact on management strategies of supply chain nodes around the world.

Security is now considered one of the necessary pre-conditions for a high performance supply chain that is able to guarantee high economic performances. The search for global supply chain efficiency is currently leading towards the development of techniques, which allows a wide variety of unforeseen events to be overcome through the use of prevention measures. This is even more evident by the “just-in-time” paradigm and “door-to-door” service that require a high security level coupled with low inventory level and efficient movements between several points of origins and destinations.

However, security has a cost. Supply chain security is leading to an increase in logistics costs and may even exert a negative pressure on economic growth for all Asian countries involved. The short-term effect will be negative but the medium to long-term impact is likely to be beneficial to certified and recognised operators. This will permit the creation of dedicated secure supply chains where supply chain processes are considered more efficient. More security could therefore mean greater facilitation with a possible expansion of trade. It must not be forgotten that the cost of delays and procedures linked to the trade of goods is estimated between 5 and 13% of the value of goods traded (Banomyong, 2009). But, security issues, if not dealt with properly can also become the main cause of delays. The table hereunder describes the main players involved with the security of the global supply chain.

Stakeholders are diverse with often-conflicting objectives but it is of interest to all parties to improve the security of global supply chains. It is important to guarantee the protection of global supply chains and its capacity to serve international markets. If a nodal link is considered secure, it is likely to benefit from increased traffic of goods but in reality only a uniform level of security in all supply chain nodal links will reduce the risk of disruption to
global supply chains. It is not enough just to have a number of selected secure supply chain nodes if other nodes within the supply chain are not assessed by the same criteria.

**Table 1: Players in the security supply chain**

<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The governments</td>
<td>Customs have the duty to protect the national economy and society instead of merely focusing on goods control at the border.</td>
</tr>
<tr>
<td>The traders</td>
<td>Reliable, secure and efficient supply chain will theoretically contribute to global trade expansion.</td>
</tr>
<tr>
<td>The ports</td>
<td>Security will represent a critical variable in terms of competitiveness.</td>
</tr>
<tr>
<td>The service providers</td>
<td>Key player in terms of security as they move goods and information.</td>
</tr>
<tr>
<td>The insurance providers</td>
<td>Increase security less insurance premium.</td>
</tr>
</tbody>
</table>

*Source: Adapted from Dulbecco & Laporte, 2003*

**Box 1: Secure Supply Chain**

The China-Europe Smart and Safe Trade Lanes (SSTL) Pilot Project has been running successfully at the Port of Shenzhen since its launch in November 2007. Cargo exported via the project cumulated to 671 TEU during the first five months, a surge of 163 per cent year on year.

Aiming at facilitating trade and enhancing cargo security by imposing surveillance on sea containers during the shipping process, the scheme has been launched on trading routes between Shenzhen in China, Felixstowe in Britain and Rotterdam in Netherlands.

China and EU customs have selected companies as participants of the project. They share data and risk codes, cooperate on using electronic seal and other intelligent technologies. Participants of the scheme are allowed to enjoy further simplified customs clearance procedures. There
are currently eight companies taking part in the project in China.  
Source: Adapted from Journal of Commerce (2009)

In order to access efficient and effective global supply chains, security related activities incurred must be completely synchronized with the requirement of the said global supply chain management. Security initiatives are now being considered part of the key logistical activities but it is at the same time one of the most problematic activity, especially in an international context. If the security activity fails to perform, this will surely impact on the competitiveness of global supply chains. This is a challenge that Asian countries cannot afford to miss.

2.2 Supply Chain Competitiveness

Asian countries are recognised for the quality and the cost of their products. The competitiveness of internationally traded products is greatly influenced by various factors, which build up the overall logistics cost within supply chains. These factors need to be taken into account within Asian supply chains in order to sustain competitiveness. The main ones are:

*The cost associated with the physical transfer of the goods* is an essential piece of information in the negotiation of an international trade transaction. To maintain product's competitiveness, the seller must make sure that his cost is as low as possible. However, on any particular supply chain, this cost is made up of a number of costs elements corresponding to the services provided along each specific link. These elements cannot always be clearly quantified beforehand:

- Some cost elements (direct costs) are directly related to the logistics service provided. In general, they are based on published tariffs, which reflect the local market conditions, the quality of the service, and the management capacity of the service provider. These considerations depend on the state of the local infrastructure and equipment, and on the local infrastructure/equipment maintenance policy to provide reasonable transport services.
- Other cost elements (indirect costs) are a consequence of the service provided. They build up as financial costs resulting from poor operations (low speed, unexpected delays, etc.) as additional costs (e.g. increased insurance premiums), or as “consequential costs” (e.g. sales opportunities lost because goods are not readily
available). They reflect the efficiency of the services, the level of risk involved, and the capacity of the service providers to cope with administrative and operational problems.

*Transit time* is an important element as goods in transit cost money [11]. Any reduction in transit time would therefore reduce the overall cost of the delivered goods. Transit times can be improved by increasing transport speed while cargo is moving on any particular transport mode, and/or by reducing idle time while cargo is waiting at some interface point for its next movement. The lack of proper co-ordination of transport operations or the excessive burden of administrative and documentary requirement might neutralise any effort or investment in increasing commercial speed.

To reduce the financial cost of their inventories, producers favour arrangements that supply the required input goods “just in time” (JIT), that is, within a short time span just before the anticipated use in production or sale [12]. Under these conditions, time reliability is very important. An industry under tight schedule operations (JIT supply chains) cannot afford delays on delivery [13].

*Safety of goods* is equally important. Any loss or damage, because of theft, mishandling, poor quantity packaging or physical damage caused by accident will result in the non-availability of the goods at the expected time and place, and in expected conditions. The financial consequences of such non-availability, in addition to the cost of loss or damage, are similar to the time reliability consequence mentioned above.

*Uncertainties* of schedules, breakages, loss, pilferage, rules and regulations, etc., are some of the issues faced by traders and may disadvantage exporters and importers.

*Security measures* are necessary to guarantee the protection of global supply chains against act of terrorism or any possible unexpected threat. Beyond the loss of human life and material destructions, a terrorist attack will disrupt the flow of goods within global supply chain.

The above-mentioned considerations indicate that trading opportunities can benefit from better-organised supply chain services. To take advantage of existing supply chains by increasing their competitiveness, sellers and buyers must adapt their commercial practices, and governments must provide the logistics service providers with an institutional,
regulatory, and operational environment, which can stimulate and guarantee the level of service needed for the efficient movement of goods.

Logistic activities traditionally have been among the largest costs in global supply chains. But in contrast to that, the most significant advances in modern logistics have not been in cost reduction, but in improved processes to move goods and material between nations in a timely and seamless manner. Distance is critical in global supply chains as international marketers require systems designed to handle the challenges of distance in a manner that is timely and transparent to customers.

Distance in global supply chain equates to transportation speed and dependency. As a general rule, the longer the average distance of movement, the greater is the total cost of transportation. This increased transportation cost results from firms seeking to maintain flexibility while reducing or avoiding extensive inventory commitment. Improve flexibility and lower average inventories translate into an increased number of small shipments moving under positively controlled logistical operations. The distances involved and the specialised nature of international requirements have created a dependence by shippers on third-party providers, such as logistics service providers, capable of providing a broad range of value-added services to assure logistical continuity and supply chain integration.

A supply chain approach must encompass not only the economic, commercial and operational aspects of the international movement of goods, but also all issues related to the facilitation of trade and the responsibility for the goods while in transit.

To take into account all interests involved in the development of supply chain, especially in Asia, the relationships between traders, services providers and governments must be clearly identified and proper co-ordination in the implementation of security measures must also be established. The development of supply chains will also demand the need for properly regulated logistics providers. This can result in an increased level of competitiveness for all three key players.

**Traders/Manufacturers** can expect the economic and financial benefits from integrating their supply chains in the forms of the following factors:

- Reduced transit-time; increased time reliability; and increased security of cargo, particularly at interface points.
- Reduced transport costs (resulting from the use of modern transport related technologies: ocean going containers, EDI, etc.).
• Closer commercial relationships with services providers.
• Greater awareness and understanding of supply chain & logistics related issues influencing their trade.

Service providers can expect the following benefits:
• The importance of their profession as international logistics service providers and supply chain system developer. This is particularly important in the development of their relationship and their recognition with governmental agencies.
• Commercial incentives to adopt new technologies such as the Internet, EDI and RFID.
• A need to reconsider their marketing strategies, for example, for logistics service providers to concentrate their activities in “niche” operations to serve specific commodities on specific trade routes.

Governments will theoretically benefit from supply chains since it offers an opportunity to update trade and transport related administrative procedures and regulations. An efficient and effective national supply chain will facilitate commerce with other trading partners.

3. The Role of Logistics Providers in Handling Supply Chain Dynamics

Supply chain objectives are rarely fully met because of the individual behaviour of decision-makers in firms along the supply chain, as their behaviour is neither optimal nor rational (Parnaby, 1979). Due to the dynamic nature of the supply chain, amplifications and fluctuations occur, from suppliers all the way down the chain. What is needed is a robust control system that is flexible enough to counteract any disturbances along the supply chain.

Logistics and supply chain management are seen as the field in which logistics providers, by virtue of their particular expertise, are able to offer the most added-value to transactions in the freight trade (Bugden, 1999). Freight forwarders, as ‘logistics service facilitators’, are playing an important role in supply chain management as an increasing number of firms outsource their logistics function (UNCTAD, 1998). These third party logistics providers are now becoming more involved in the design, management, and control of firms’ supply chains. Asian based regional logistics providers are best equipped to manage supply chains in Asia as they are familiar with the context.
The selection of the right logistics provider is critical to supply chain competitiveness (Hensher & Chow, 1999). Third party logistics plays a pivotal role in designing and providing integrated supply chain that respond to their clients’ needs. In order to help their customers, logistics providers need to behave more like a partner to their clients. Not only does logistics providers have to arrange for the transport of cargo and facilitating its clearance through customs but he will also need to manage his clients’ order process. This means that the logistics provider will actually be involved not only in lowering clients’ costs by reducing waste in ordering operations, but also in integrating his client’s supply chain. The strategy is to make the partnership so tight and seamless that the logistical services provided becomes part of the clients' own business. Figure 1 illustrates how logistics providers control a supply chain.

*Figure 1: Role of Logistics Providers in a Supply Chain*
The task of a logistics provider is to facilitate trade to the extent that the trader needs only produce and sell the goods (or to order the goods in case of imports). Once this has been done the logistics provider can take over and provide every subsequent function from factory gate to the final delivery. As the distance between the manufacturer (i.e. the exporter) and the distributor or retailer is often quite considerable (and vice-versa for imports), there will usually be problems in both the material and information flows.

Manufacturers have to respond as quickly as possible to the various requirements within the specified time frame. If he cannot, the multinational enterprise (MNE) as the focal firm in the supply chain will probably choose another supplier. This creates a number of problems for the manufacturers, as not only do they have to manufacture the goods on time, they also need to deliver them on time (Bruisma et al., 2000). The problem of delivering the goods on time is a very crucial one when many MNEs are using just-in-time (JIT) management techniques.

The logistics providers main role is to organise the supply chain so that the goods will arrive on time but on many occasions, because of limited resources and various operational constraints, logistics providers are not able to deliver and are thus rendering their clients’ less competitive.

3.1 Logistics providers’ role in a regional supply chain: an example

Supply chain routeing alternatives between Thailand and Vietnam are presented and compared. The purpose of this sub-section is to illustrate some of the issues logistics providers have to deal with when managing their clients supply chains in the context of Southeast Asia. A total of 3 supply chain alternatives are described in Table 2 and illustrated in the figure 2 hereunder. The client is not interested in the routeing decision. The client is only interested in having the goods delivered as per the agreed upon service levels. It is the duty of the logistics providers to find the optimal solutions that balances client’s cost and time requirements. A contextual scanning is needed in order to find the most suitable option for clients’ supply chains.
Table 2: Routeing alternatives between Thailand & Vietnam

<table>
<thead>
<tr>
<th>Route</th>
<th>Thailand</th>
<th>Mode</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bangkok/Laem Chabang</td>
<td>Road vs. Sea</td>
<td>Hanoi</td>
</tr>
<tr>
<td>2</td>
<td>Bangkok/Laem Chabang</td>
<td>Road vs. Sea</td>
<td>Danang</td>
</tr>
<tr>
<td>3</td>
<td>Bangkok/Laem Chabang</td>
<td>Road vs. Sea</td>
<td>Ho Chi Minh</td>
</tr>
</tbody>
</table>

Source: Compiled from industry sources

There is currently no direct maritime link between Bangkok and Hanoi. The freight container is therefore transhipped in Ho Chi Minh port. This increases transit time and the cost. Sea transport including transhipment cost represents about 30% of the transport cost but represent more than 70% of transit time. Trucking costs represent around 15% of the total transport cost. It is interesting to note that administrative formalities take up to 36% of total transport cost from Bangkok to Hanoi via the maritime route. It is interesting to note that the total transport cost is higher than the maritime option by 30% but transit time is 80% faster.

Figure 2: Supply chain routeing alternatives between Thailand and Vietnam
In the land route between Bangkok and Hanoi, actual transport has the highest activity ratio with more than 68% of cost and 73% of time for the whole journey. If no trans-loading is conducted at the border, then it would be possible to reduce transport cost by over $300 per TEU\(^1\). Transloading does not need to be done at the Lao-Vietnamese border. It can be done in Sawannakhet after the container has passed the bridge from the Thai side as Vietnamese trucks are now allowed in Lao PDR and (theoretically) in Thailand.

A number of fees are levied by various related authorities in the transit movement of goods between both countries. This creates a problem for the land route as from empirical evidence there is a strong possibility that the land route would be selected by traders who are handling higher value and more time sensitive commodities. These add-on fees are

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\(^1\) Thailand, Lao PDR and Vietnam on June 11, 2009 had a ceremony to officially mark the implementation of a trilateral exchange of traffic rights but the procedures are still being implemented.
defeating the facilitation purpose of physically and institutionally connecting Thailand and Vietnam via Lao PDR.

The actual physical transportation of goods is not a real problem in itself. The difficulty is still with the border crossings even though the Cross Border Transport Agreement has an objective to reduce border crossing time to not more than 30 minutes per border.

Cost is not the sole factor taken into account for the routeing selection and transit time is another key component. The land route is able to link Bangkok to Hanoi in a little bit more than 2 days while the sea route due to transhipment issue takes more than 14 days. Even if there was a direct maritime link between Bangkok and Hanoi, the journey would take at least 5 days to complete.

The current maritime linkage is a reflection of the relatively low volume of direct trade between Thailand and Vietnam’s northern region. If there is more cargo then there would surely be direct links between both areas. The maritime linkage is not at all competitive for the time dimension and is probably suitable for cargo that is non-time sensitive.

3.2 Designing supply chains: the role of logistics providers

In Asia, supply chain control processes including production scheduling, shipment of product and inventory maintenance are frequently de-centralised and remote from each other. They usually operate independently and in serial order. Slow feedback from the market place causes scheduled production to over or under manufacture in relation to the actual demand. Another issue in the region is the relatively high cost of logistics which is a by-product of inadequate physical facilities, cumbersome administrative barriers coupled with a legal framework not adapted to modern international business practices (Banomyong et al, 2008).

Specialised “middle-men” such as logistics service providers perform critical value enhancing functions that benefit all the players along the chain and increase the supply chain competitiveness. This can be done by designing and developing effective supply chains and integrating multiple service suppliers into a seamless distribution system. This is the value added that is provided by logistics providers. Asian based logistics providers can help and support the integration of supply chains for their clients and their network.

Limited resources and operational constraints are not unique to logistics providers’ operations in Asia. In each region or country in the world, various resource limitations and
operational constraints exist. It is the duty of Asian based logistics providers to make the best use of his resources within the physical and non-physical framework of Asia.

The logistics providers see its function in the supply chain as that of a distributor. Their main role is to move the goods from one end of the supply chain to another within the constraints imposed by their clients and the commercial environment. A situation of ‘Customer Panic’ occurs when the client is faced with a difficult situation in his supply chain (mostly stock-outs) and is unable to rectify the situation. When a break in the supply chain occurs or is going to occur, there is a very strong risk that the whole supply chain will be immobilised, generally for a longer period that it took the break to occur (Hong-Minh et al., 2000). The analogy may be drawn with traffic jams along the motorway. Typically it may take three times longer for traffic jams to clear than it takes to build up.

This interest in managing supply chain dynamics in recent years has led to a number of research activities that tried to verify the predicted demand amplification and information distortion. Most of these studies so far have focused on retail networks and distribution chains, neglecting the complexity induced to the system by product conversion in supply chains.

According to Hines et al (2000), the reasons behind supply chain complexity are:

- The lack of interaction of information and material flow, induced for example by short or late deliveries, which force firms to re-schedule their production.
- The interaction of whole value streams, competing for example for capacity at bottleneck points.
- Multiple routeing of parts or products through the supply chain.
- Parts or products in general have their own particular dynamic demand and supply patterns.
- Parts range from 50 to 600 parts on average per first tier company.
- Ordering policies and customer prioritisation distorts demand and supply chain flows.
- Product conversion and value-added within every manufacturing level of the supply chain.
- New product introduction and retirement that creates further instability.

Due to the complexity involved, a new system dynamics framework is necessary to gain a more comprehensive view of supply chain reality. Supply chain management in many Asian countries such as Thailand is still in its infancy stage. This is particularly true for local small and medium enterprises and family-owned businesses. Supply chain management practices
have been widely implemented between multinational firms operating in Asian country but these practices have not yet reached the small and medium sized local suppliers (Wong and Boon-itt, 2008). Supply chain performance for most local firms is weak but with strong potential for improvement, as most business owners do not have a grasp of supply chain issues. During a supply chain assessment exercise of many local firms, it was discovered that existing assessment tools such as the SCOR model or the Enkawa Supply Chain Logistics Scorecard were considered too complicated and too difficult to use, especially when dealing with small and medium enterprises (Banomyong, 2008). This shows that many SMEs in the region are not in control of their supply chain and are subject to the influence of the focal supply chain firm which is usually a MNE.

When members in the supply chain are rendered non-operational, costs increase massively and major penalties are incurred. There is no choice left for all of the players involved, as they must be able to find someone who is able to solve the problem of immobilisation in the supply chain. This is where the logistics providers responsibility; as they must be able to find solutions to the problem no matter the costs involved. This can be done through the logistics providers’ network of overseas agents to monitor manufacturers around Asia, so as to be able to have complete control over their clients’ supply chains. Some logistics providers may even act as a buffer by creating an emergency network, so that goods will arrive on time, as requested. The role of an ‘emergency channel’ is to minimise the effect of interruptions along supply chains (Jennings et al., 2000).

The only prerequisite for the logistics provider to be able to activate this ‘emergency channel’ is for the provider, or a member of his network, to have the goods physically in their possession (see Figure 3).

If the goods are not in the within the control of the logistics provider’s or his agent’s possession, then it is almost impossible to find a solution. When the goods are “in their hands”, a solution is feasible and can be worked out at the most reasonable cost to the client. The logistics provider role is not only to organise the supply chain but also to service it. A logistics provider can be described as an ‘engineer’ or ‘architect’ of the supply chain. This leads to a mixture of proactive and reactive measures. Proactive in the sense that a logistics providers must try to forecast what types of services the client will want for the future and reactive because the provider is always faced with the unexpected.
Figure 3: Logistics providers' emergency channel

Legend:
The logistics provider cannot be successful on his own; he has to rely not only on his agency network and sub-contractors but also on his clients. A close partnership has to be formed between the service provider and the client. This in turn will facilitate the creation of more realistic supply chain designs and operational processes. It is the duty of the logistics provider to be aware of all the options available and to design supply chains flexible enough to cope with unforeseen events.

Today, logistics providers are faced with the daunting prospects of balancing cost minimisation with clients’ almost infinitely variable requirements. The outsourcing of logistics functions, and Just-in-Time (JIT) management techniques, have forced logistics providers to design more dynamic and efficient supply chains within various operational constraints. However, it is the physical aspect of the supply chain that will ultimately shape supply chain dynamics.

The successful development of basic infrastructure and the adaptation of local commercial practices to international standards with the removal of all unnecessary trade barriers are a precondition to the development of freight forwarding and multimodal transport in these countries.

The challenge for logistics providers in Asia is to identify essential transport infrastructure and networks, as well as appraise all logistics options that will allow logistics providers to achieve and maintain an active and competitive role in providing logistics services by integrating global supply chains.

Logistics providers located in the developed economies of Asia provide extensive logistical and supply chain management services. These services go beyond transport and distribution and cater to the needs of exporters and importers in managing all the transport requirements from the point of origin of the raw material, through the manufacturing process and the delivery to the final consumer.
This is because customers require that services offered by logistics provider offer value-added to their goods and make the customers themselves more competitive. In contrast logistics providers in developing countries of Asia are faced with many physical and non-physical barriers, such as inadequate banking practices, documentation and insurance, in order to be able to provide full door to door transport and other logistical services.

Logistics and supply chain management, as a discipline, is not fully developed in many parts of Asia. Nonetheless, the main functions of logistics are available in the region such as purchasing, production, distribution, warehousing, inventory and information but the emphasis is generally on transportation or distribution issues. This is why the role of Asian based logistics provider is critical to the integration of supply chains in the region and the rest of the world.

4. Asian SMEs involvement in global and regional supply chain: A Case Study

Supply chain management integrates suppliers, manufacturers and distribution centres to get the right products to the right place at the right time and in the right condition (Christopher and Towill, 2001). As the management of supply chains improve, the promise of integrated global supply chains begins to be realised, where raw materials are harvested at their sources, manufacturing is performed in the locations providing highest processing value-added, and products are sold in the markets offering highest prices—regardless of the geographical locations of the various members in the supply chain.

A number of theories have been investigated to determine how management could devise efficient and effective global supply chain strategies (Naylor et al, 1999). Despite these developments, many supply chains fail to meet their performance objectives (Fisher 1997). Moreover, as illustrated in the following case study, some firms have been able to successfully compete by selecting opposite strategies to that proposed by lean or agile supply chain theorists.

In this case study, part of the global supply chain of a US automotive seat supplier is examined. This global supply chain sourced raw materials from approved vendors in the US, transported them over a 28-day transit time to a cut-and-sew operation in the North East of Thailand, returned completed leather seat covers to the US over another 28-day period, and delivered them to a seat assembly plant, which ultimately fed into a just-in-time (JIT)
auto assembly plant in Detroit, USA. Despite substantially increasing the supply chain cycle time to over twelve weeks (including a two-week holding of safety stock in both the US and Thailand), this supply chain had a competitive advantage over similar operations in maquiladoras firms located on the US-Mexico border which had only a three-day transit time to the seat assembly plant.

Maquiladoras were originally formed in 1964 when the US cancelled a program that admitted Mexican workers into the US to provide labour in agriculture. Mexico initiated the Border Industrialization Program (BIP) in order to replace the lost economic value of the exported labour, providing incentives for US factories located across the US border to move to the Mexican border to take advantage of lower labour costs. Mexico gained directly from the close proximity of its rich neighbour, and the large US consumer market (Fullerton and Barrza de Anda, 2003).

Maquiladoras import 90% or more of the raw materials or components that they process. These companies assemble components into finished or semi-finished goods, and then re-export them back to the US, mostly to the industrial Midwest states (Fullerton and Barrza de Anda, 2003). The formation of (North American Free Trade Agreement) NAFTA was expected to spur additional growth in maquiladoras, and indeed the number has increased rapidly since 1994, when the agreement went into effect. However, while NAFTA was blamed relocating US jobs to Mexico, the strongest economic force for the rapid growth of maquiladoras was the devaluation of the local Mexican currency at the end of 1994, effectively cutting labour costs in dollar terms by more than 40% (Grubin 2001). Maquiladoras have been incorporated into the “lean” paradigms of automobile suppliers to provide labour cost savings, while maintaining proximity to auto assembly plants based in the US Mid-West.

The cost competitive advantage in this automotive supply chain was achieved through a supplier in Thailand that produced leather seat covers at a higher quality level (with a direct economic benefit of higher yields), and a lower labour cost, compared to maquiladoras operations in Mexico. These benefits helped offset the additional costs of safety stock, freight between the US and Asia, and the potential obsolete inventory due to a longer supply chain.

As supply chain strategies continue to be developed and refined, characteristics of the product itself (size vs. cost) as well as the value of the labour input (quality and efficiency vs.
cost) need to be incorporated into global supply chain design and management decision-making framework in order to permit optimum performance.

One of the main motivations for a firm to look at suppliers outside of its home country is to secure competitive advantage through lower costs and/or higher quality products. This might be in the form of unit price reductions from items produced in low-wage markets (Trent & Monczka, 2003) or to source products that are not available locally (Mansfield 2003). As an example, a significant industry relying on procurement from international sources is the US clothing industry, where apparel and footwear are produced in low-wage areas of the world including Asia, and/or South and Central America. The global aspects of these supply chains include only the final link: the product may be entirely produced in the low-cost region, and shipped to distribution centres or directly to retailers in the markets of North America or Europe. (Cho & Kang, 2001).

A strategy that attempts to leverage advantages of global suppliers is “agile” supply chains. Industries that rely on agile supply chains require the flexibility to meet rapidly changing customer expectations, or to stay ahead of changing technologies, which may quickly become obsolete. Examples of products in these industries include the semi-conductors or computers industry, where innovation drives customer demand, and where service response is the primary driver (Christopher & Towill, 2001). Supply chains systems for semi-conductors and computers may link manufacturers and subcontractors in multiple locations in Asia or Europe, to customers in the US. (Brown & Petrakian, 2000; Bhatnagar & Viswanathan, 2000)

Under a different paradigm, “lean” supply chains tries to stabilise the supply of raw materials and manufacturers’ components, while eliminating waste in the supply chain. In “lean” supply chains, the primary driver for the system is cost, and every effort is made to shorten transit times and eliminate in-process inventory or safety stock (Womack & Jones, 1990). The automobile industry, initially in Japan, then followed by the US, has focused on developing “lean” systems, categorizing suppliers based on strategic importance, and requiring key firms to make regular deliveries as often as every two hours (Levy 1997). Suppliers seeking lower labour costs might locate to the Mexican side of the US-Mexican border, in so-called maquiladoras operations, within 2-3 days shipping time to the major assembly plants in the US Midwest, but a more distant global source would not be considered if management’s goal is to create a lean supply chain (Levy, 1997).
It has also been observed that the advantages of lean and agile strategies are not mutually exclusive. Hybrid or “leagile” strategies include using lean methods for high volume lines, while maintaining agility for more specialized products; implanting lean concepts through part of the supply chain, up to a de-coupling point (Naylor et al., 1999), after which agile processes are applied; or using lean methods in situations where demand is demonstrably stable, and agile principles for more unpredictable aspects operations (Christopher and Towill, 2001).

Another approach to determining the appropriate supply chain strategies is based not on the customers requirements (responsiveness vs. low-cost), but on the type of product. Using this method, responsive supply chains would be applied for innovative products with unpredictable demand, while functional products, which are maturing in their life-cycle, would benefit more from an efficient supply chain, which minimise waste (Fisher, 1997).

The case study presented here illustrates a deliberate supply chain competitive strategy that involved selecting an eight-week transit time over a one-week transit time, with increased safety stock of four weeks, in order to utilise a more geographically distant supplier (i.e. in Thailand instead of Mexico for the American firm) offering better quality at lower cost. These actions seem contradictory with the prevailing body of knowledge pertaining to lean and agile supply chains that dominate the literature today. As such, this case study can be considered an appropriate part of the iterative process in understanding the theory of globally integrated supply chain management (Eisenhardt 1989).

4.1 The Case Study

In most modern automobile assembly operations, the process is limited to forming body panels and welding vehicles frames, while all other components, including engines, seats, instrument panels, and the various other electrical, mechanical, and decorative items are supplied from external sources, and are bolted on the vehicle as it moves down the production line.

One of the most expensive and complicated subassemblies supplied to the automobile is the seat (Torrance, 1998). Seats are supplied in a wide variety of colours, materials, and options (such as heaters, air bags, or memories) for any given vehicle model. To be able to respond to the range of permutations that are required by automakers, seat manufacturers have set up seat assembly operations that mirror the automobile assembly plant that they feed. The operations are usually located within a transport time of 30 minutes or less, and
are tied to the auto plant via electronic data interchange (EDI). The same job order that triggers the production of the automobile also triggers the assembly of the seat. During the approximately 2 hours that the vehicle travels from the welding shop to final assembly, the seat must be built and sent in proper sequence directly to the location at the auto assembly plant to be installed in the correct automobile, matched by colour and options (Shufelt, 1999).

Similar to the auto plant, the seat operation performs little manufacturing, except the forming of seat frames. All other components, such as moulded foam, electromechanical parts, and seat covers are delivered in batches and used on an as-needed basis. As a second-tier supplier (supplying the first-tier seat plant) the operation in Thailand was of a type referred to in the automobile industry as a “cut and sew” or “trim” operation (Stampfle, 2001). In this process, cloth, foam, leather, vinyl and other soft materials were cut and sewn together to form one component of an automobile seat, which was the seat cover.

Raw materials had to be produced by approved suppliers, who were primarily located in the greater Detroit area, or states adjoining Michigan. The one exception was the leather supplier, which produced and shipped from Omaha, Nebraska, a centre of beef production and source for raw hides. All materials were shipped in full containers, packed at the respective suppliers’ location, with the exception of a small number of items, such as thread and fasteners. Overland transportation in the US averaged 3-5 days from the Midwest to a west coast port, and sea shipments to Thailand took approximately 24 days, with the entire transit time averaging four weeks in one direction. The supply chain system was set up so that deliveries were made every week (see Figure 4). At any one time, therefore, there was always a shipment that was about to arrive in Thailand, two in transit between Asia and North America, and one just leaving suppliers in the US. Finished seat covers flowed back to the seat assembly plant in the Detroit area in a similar pipeline, also within a four-week timeframe.
Figure 4: Pipeline of weekly shipments between Thailand and the US

Source: Adapted from Rubesch & Banomyong (2005)
Safety stock was maintained in both Thailand (in the form of raw materials) and the US (in the form of completed seat covers awaiting assembly) as a contingency against a delayed shipment, and was strictly controlled to two weeks’ supply. This stock level was determined based on the strategic assumption that a problem in transit could occur which might delay any one shipment, but not two consecutive shipments. Therefore, two weeks supply of inventory would be enough to maintain production, until the next shipment arrived the following week.

The key competitive advantage for the Thailand operation was the processing of leather. Leather is a natural product varying in grain and appearance, and contains many imperfections that cannot be used in the seat covers. Each hide had to be inspected for imperfections before patterns for the various pieces would be sewn together into the complete seat cover, thus avoiding the imperfections. The leather cutting process is time consuming, and requires considerable judgment and skill by the leather cutters. The leather cutters in the Thailand operation had many years’ experience and were heavily relied upon for their expertise.

The Thailand plant achieved an average yield of 70%, or about 5% better than the best suppliers from Mexico, giving the Thailand plant a US$14 cost advantage per seat cover over its competitors from better utilisation of leather. At the same time, lower wages gave the Thailand plant an additional US$73 cost advantage, contributing to an overall advantage of US$87 per seat cover. Meanwhile, additional freight, inventory, an obsolescence allowance, and more durable packaging, offset the cost advantage by US$39, for a net positive contribution of around US$48 per seat cover (see table 1 for a complete breakdown of the logistics costs involved).

<table>
<thead>
<tr>
<th>Cost per seat cover, complete set (US$)</th>
<th>Mexico</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td>88</td>
<td>15</td>
</tr>
<tr>
<td>Leather</td>
<td>199</td>
<td>185</td>
</tr>
<tr>
<td>Other materials</td>
<td>67</td>
<td>67</td>
</tr>
<tr>
<td>Packaging</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Outbound logistics</td>
<td>4</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 3: Comparison of cost components for one leather seat cover (Mexico vs. Thailand)
### Inbound logistics

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of inventory</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Obsolescence allowance</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td><strong>362</strong></td>
<td><strong>314</strong></td>
</tr>
</tbody>
</table>

*Source: Adapted from Rubesch & Banomyong (2005)*

The difference in production cost seems to be the main driver for the selection of the Thai supplier however cost cannot be considered as the only selection factor as other variables need to be included in the decision making process of selecting suppliers. It is a combination of various factors that will contribute to supplier selection but it is perceive that cost is usually the first factor considered in any decision.

#### 4.2 Case Study Summary

The supply chain literature focuses on how customer requirements and market demand determine supply chain strategies that are responsive (agile) or efficient (lean), or a combination of both ("leagile"). However, the case study presented here suggests that market-driven factors alone may not be sufficient to determine the optimum supply chain strategy.

Product characteristics have considerable influence over transportation options, and therefore supply chain strategies. For example, the size of the product with respect to its value influences whether air freight or sea freight is the most viable option, which in turn affects supply chain strategy.

The expertise, efficiency and cost of labour as a resource in the supply chain must be considered when supply chain strategies are being determined. A labour advantage in one location relative to another, better skills or lower wages, may offset additional transportation costs, so that a supply chain that uses a more distant labour source could offer advantages over one closer to the customer market as illustrated in the case study hereover.

#### 5. Conclusions

The purpose of this manuscript was to describe number of key supply chain issues and the key role played by logistics providers within an Asian context. A case study was provided to illustrate actual supply chain dynamics and how an Asian firm may integrate into global
supply chains. It was shown that supply chain management in Asia remains a challenge for all those involved in its operations as supply chain management seeks to find a way to integrate strategies to provide greatest value. Supply chain management must consider the deployment of all resources that affect customer value.
6. References


Dulbecco, P. and Laporte, B., (2003), *How can the security of the international supply chain be financed?* Centre d'Etudes et de Recherche sur le Development International (CERDI), Clermont Ferrand, France.


