Emerging Trends in Supply Chain Governance

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Abstract

Motivated by the disintegration of supply networks observed in the automotive, textile and electronics industry, we discuss the impact of such phenomena on the network players. We hypothesize that the state of disintegration is not sustainable and will be followed by an eventual reintegration. We present evidence from a field study that was conducted to understand the impact of disintegration on original equipment manufacturers and on small and medium enterprises to support our hypothesis. We introduce the aggregate player, whose role is to provide the required services, assume control and govern a portion of the supply network. We explore the issues that an aggregate player will face and contrast two different models of an aggregate player.

Introduction

The last few decades have witnessed a dramatic shift in the manner in which business is conducted around the world. Firms have shifted away from a hierarchical, one-dimensional supply chain entity to a fragmented network in favor of strategic partnerships with external entities. This global phenomenon causes ripple effects throughout the old supply network. Many businesses, facing challenges that accompany such change, are struggling to compete in this new landscape. On the other hand, the fragmentation creates opportunities for whole new set of supply chain services. We conjecture that such a fragmented state will not be sustainable. There will be a period of disintegration followed by reintegration facilitated by an independent third party, the mini-maestro. In supporting our hypothesis, we present results from a field study conducted to understand the impact of fragmentation on original equipment manufacturers and on small and medium enterprises.

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Historical Perspective

Historically, the process of disintegration followed by reintegration has been observed in the airline and the communications industry. In 1938, Congress introduced regulation for the airline industry to avoid the impact of “excess competition” that plagued the railroad and automobile industries. The regulated airlines were widely acclaimed to be the “world’s finest system of transportation” until the oil shocks and recessions of the 1970s [1]. In 1978, President Carter signed the Airline Deregulation Act. Airlines were free to compete on prices, entry and exit. The fuel crisis of 1979, the air traffic controllers’ strike of 1981, the severe recession in the early 1980s and the intense price competition combined to produce the worst losses in the history of domestic aviation. During the first decade of deregulation, more than 150 carriers collapsed into bankruptcy. In the same period, the industry witnessed more than 50 mergers, acquisition and consolidations. In the late 1980s, eight airlines emerged from the decade of fare wars and consolidations with a combined market share of 92% of United States air traffic. The “Big Three” (American, United and Delta) together with Northwest, Continental, TWA, USAir and Pan Am were known as “mega carriers”. Analysts noted that the mergers had increased their ability to manage operations across hub systems, new geographic territories and marketing areas. In addition, with their monopoly, carriers were able to raise prices. In part due to the Persian Gulf War in the late 1990 and the end of leveraged buyouts in 1989, the industry again experienced a serious downturn.

As the “mega carriers” were being awashed in red ink, simultaneously, the industry was observing the rise of Southwest Airlines. Initially dismissed as a niche player, by the mid-1990s, major airlines were responding to the threat of Southwest with the equivalent of lower fare fighting brands such as Continental Lite in the southeast United States and the United Shuttle on the West Coast. These fighting brands temporarily depressed Southwest’s profitability in 1995. However, because they were spawned by full service airlines, they carried the same baggage – the same cultures, management beliefs, labor policies and route structures[2]. Southwest Airline was not merely a discount airline, it took off at a time when all other major airlines were struggling because it identified, addressed, and fulfilled the needs of the marketplace. It operated with a different culture and employed a point-to-point route system instead of the hub-and-spoke
system. The hub-and-spoke system, in addition to being less convenient to customers who preferred point-to-point flying, caused domino delaying effects, crowding and confusion at the hubs. In recent years, emerging players such as JetBlue have continued to innovate and respond to changes in the industry, causing further damage to the mega carriers who still operate in an archaic way.

The divestiture in the telecommunications industry has been extensively chronicled in the literature. AT&T, since its founding in 1877, has monopolized the United States telecommunications services. After Bell’s telephone patents expired in the 1890s, the US telephone industry entered a period of intense competition. Under the helm of Theodore N. Vail, AT&T began a furious effort to buy out competitors. The acquisition of Western Union in 1909 triggered federal antitrust scrutiny, but Vail was able to convince the government that having a single, dominant telephone company was in the best interests of the nation. This lead to the 1913 Kingsbury Commitment, and the company was informally recognized as a monopoly.

In 1974 MCI filed an antitrust suit against the company. This final blow, following the opened competition in equipment business and FCC’s approval of MCI gaining entry into the long distance market, resulted in AT&T’s divestiture agreement with the Justice Department. The agreement became effective on Jan 1, 1984 [3, 4]. AT&T divested its 22 Bell Operating Companies to exit local phone business, while remaining a long distance player. As new technologies emerged over time, the US telecommunications industry evolved beyond the wire-based phone system to encompass a range of services which includes wire-line, wireless, cable and Internet[3]. These developments cumulated in the Telecommunications Act of 1996; every segment of the industry was now open to competition. Since then, the industry as a whole saw a wave of mergers and consolidations. Among the region bell operating companies, the strategy allowed them to collectively target the long distance and wireless market. For long distance service providers, the acquisitions and mergers enabled them to foray into new emerging technology domain.
Observation and examples of supply network fragmentation

In recent years, we have observed many instances of supply chain fragmentation across various industries. In the automotive industry, we are able to chronicle the divestment of significant portions of the automotive supply chain, including the cost and labor intensive manufacturing portions, as semi-independent or wholly independent units [5-8]. The case histories of the divestment of Visteon Corp. from Ford, and of Delphi Systems from GM, are examples of this phenomenon in the automotive sector [9-12]. While these are high-profile examples, in our understanding there is also a more fundamental re-organization of the automotive industry at the lower tiers of the supply chain, with outsourcing and off-shoring of the production function being accompanied by changes in system management methodologies and practices (lean manufacturing, just-in-time among others) [6, 7, 13, 14]. These trends are not limited to the North American region, but are also observed and have been documented for the Japanese, and the EU regions, both traditional powerhouses in the automotive sector [7, 15].

Similar examples are to be found in the electronics manufacturing and services sector; many Original Equipment Manufacturers (OEMs) in the consumer electronics market have divested themselves of their expensive and cost-intensive manufacturing and back-end facilities to specialty manufactures and service providers such as Flextronics, Solectron, Sanmina SCI, among others [16-18].

Another industry sector that has witnessed far-reaching changes in supply chain structures is the apparel and textile industry. The global apparel and textile industry spans the entire textile and apparel supply chain, from the processing of raw materials to the production of the finished goods [19]. As shown in Figure 1, the major processes in the supply chain include spinning fibers into yarns, weaving yarns into fabrics, coloration, cutting, and finally sewing into finished garments. However, the structure of the different links in the supply chain may change significantly from upstream production processes to downstream operations. For example, upstream productions are more capital and knowledge intensive, while downstream operations are typically more labor intensive.
(Source: Compiled by the U.S. Trade Commission.)

**Figure 1 A Generic Manufacturing Process in the Apparel Industry**

The increasingly keen competition has forced a shift of significant portions of the manufacturing process from developed to developing countries, resulting in a decline of the textile and apparel sector in developed countries[19-21]. Over the past two decades, the Asian economies have dominated textiles and apparel exports, gaining market share relative to their European Union rivals. The U.S. economy on the other hand, has primarily remained a consumer of textiles and apparel output, and its consumption of Asian imports has increased significantly over the past decade or so. The last observation implies that many of the U.S. firms operating in the textiles and apparels sector are primarily involved in the upstream design, development, and marketing activities, while the bulk of the processing of textiles, and the manufacturing of apparels is outsourced to Asian and European firms.
Figure 2 Disintegration of Supply Network
As seen in Figure 2, the disintegration leads to a much more complicated network configuration. Even though the number of layers in the supply chain (from component to finished product) can remain the same, the level of interaction and coordination increases dramatically with the fragmented supply chain. In addition, the ownership and control of assets and functions in these supply chains have also changed hands, in many cases leading to a significant sub-division, or re-distribution of the responsibilities of handling, material transformation, and of delivering end-product to the customers. This process of disintegration has a huge impact on all the players in the network, but most of the negative effects are felt by the smaller entities in the lower tiers of the supply chain. Their size and distance from the end customer subject them to a great deal of variability, which is further exacerbated by their lack of authority and control. As a result, the smaller players in the network find themselves losing their footing in the middle of the disintegration process.
Reasons of fragmentation

There are many factors leading to the fragmentation of the supply network. One contention is that capital and investments are now being micro-managed to the extent that the validity of non-core assets is being questioned. While cost management and shareholder interests have certainly been prominently cited factors, in our observation and based on our literature review, factors such as end-product quality, product proliferation, information technology, the emergence of retail powerhouses can all be cited as influential drivers.

Cost and Quality related factors

It has been well-reported that in the past several decades, many large vertically integrated firms, for example the prominent OEMs in the US industry, have seen incentives to outsource or to off-shore the labor-intensive portions of their supply chain [7, 10, 13, 16]. In the consumer goods industry, for example, the emergence of more powerful retail channels, such as Wal-Mart, have led to the greater pressures on the profit margins of many of the consumer good manufacturing and marketing firms. As a consequence, cost reduction in the supply chain has become a primary goal for many supply chain managers in these supply chains[22]. With the availability of cheap manufacturing labor in China and in the rest of Asia accentuating the labor cost differentials between the developed and the developing regions, the incentives have therefore never been greater for many of the consumer goods firms to either outsource or to move their manufacturing functions off-shore.

However in our assessment, cost differentials between the developed and emerging manufacturing and industrial regions in the world are by themselves not adequate factors to explain the outsourcing and off-shoring trend to Asian supply bases. Partnerships between the supply bases with US giants coupled with surging local and international demand lead to the ability to invest in better processes and technologies, which in turn leads to higher quality products and the ability to manufacture at lower cost and higher margins. This positive feedback
cycle results in the strengthening of the supply bases and partially explains the outsourcing and/or off-shoring phenomena that we are observing.

_Emergence and proliferation of Information Technology_

Information technology, even taken as an independent environmental factor, and its adoption in professionally run businesses and firms has led to fundamental changes in supply chain behavior and further to the changes in governance structures[23-25]. Virtually all sectors of industry in the developed and in the developing regions have witnessed the following major trends over the past two decades:

(i) Data storage costs have gone down in the past few years, while the volume of data gathered for business analysis purposes has increased dramatically.

(ii) The cost per business transaction as well as the networking and communication costs within supply chains has been greatly reduced. Simultaneously, the capabilities and the content involved in the communications and the number and relevance of IT enabled business transactions have also increased.

(iii) With greater analytical capabilities and design technologies, new product introductions have increased, in part as a response to the need for greater product variety. As a consequence, product life-cycles have been shrinking, as documented for many industry sectors. The role of IT in the handling and communication of product design information is also well chronicled[23, 24].

These changes in IT (in particular business communication technologies) have played a critical role in enabling firms and supply chains to operate on a global scale[26]. Without IT being the enabler, the disintegrated supply network cannot be managed effectively.

The reasons above help explain the fragmentation of the supply network. If a firm’s decision to outsource is based primarily on cost factors, and if there are well identified leaders in the fragmented supply chains to assume responsibility for the strategy, planning and control of the operations, the disintegration model might serve well. In practice, there exist companies who
choose to fragment parts of their supply chain for the wrong reasons. Companies who fall in this trap usually perceive outsourcing, which leads to fragmentation, as the solution to their existing problems of incompetence and inefficiencies. Used in the wrong way, this “solution” will lead to a total disintegration of the company. Since a state of total disintegration is not at equilibrium, there needs to be an eventual reintegration stage during which new entities are formed. In this respect, the primary hypothesis of this report is that while a globally dispersed model of fulfillment may be cost efficient, this unstable state of disintegration cannot be sustained. An aggregate player will eventually emerge to conduct a subset of the disintegrated value network.

We conjecture the following:

1. There is a need for responsible agents (or roles) within supply chains that enable the coordination and governance of various supply chain segments in keeping with the objectives of the larger supply chain.

2. There is a need as well as the opportunity for a new set of supply chain services that
   i) Enable or sustain the heterogeneous models of collaboration between the decentralized supply chain agents
   ii) Allow rapid integration of new partners into existing supply chains
   iii) Allow the different parties to communicate and coordinate their activities in support of the end-customer fulfillment objectives

3. There will have to be agents within the supply chain that develop and sustain the small and medium enterprises which operate on the periphery of networks dominated by the larger agents. 
Field Study: Impact of disintegration on Original Equipment Manufacturers and Small and Medium Enterprises

To gauge the impact of disintegration, we performed a field study with business managers, academics, research analysts, software providers and logistics competitors representing both Original Equipment Manufacturers (OEM) and Small and Medium Enterprises (SME). Examples of these companies include BOSE, GM, Boston Fuel Cells, MIT Center for Transportation and Logistics and Gartner. In both cases, we found the need for a neutral party to play the role of a manager of the supply network.

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<th>Needs</th>
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<td>• Small and medium OEMs</td>
<td>CM</td>
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<td>- Enforce on-time delivery</td>
<td>Distributor</td>
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<tr>
<td>• Large consumer electronic OEMs</td>
<td>CM</td>
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<td>- Better distribution channel management to facilitate push of new products</td>
<td>Distributor</td>
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CM: Contract Manufacturers
OEM: Original Equipment Manufacturer

Figure 3 OEM Needs

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1 Further examples of institutions consulted are Color Kinetic, GE, SAP, Nortel Networks, Gillette, PCI, Sun Country Sunscreen, Qualcomm, Hardy Machine and Design Inc, Agilent Technologies, Channel Partner, Pratt and Whitney Dependable Machines, Nokia, Cap Gemini Ernest and Young, UCCnet, SAP, UPS, Exiros, DHL and MIT Sloan.
Impact on OEMs

As illustrated in Figure 3, smaller OEMs are concerned about their inbound flow. Due to their size, orders that these companies place with the contract manufacturer (CM) are not significant enough. These smaller OEMs may also deal with suppliers that are even smaller and much less capable. As a result, there is a need to have a neutral third party to enforce discipline among the CMs to meet the OEMs’ delivery schedules. In addition, there is a need for a consolidator whose role is to aggregate suppliers from various locations around the world on behalf of the OEMs.

Larger OEMs typically have much power and influence over their suppliers. As a result, they are more concerned about the outbound flow rather than the inbound flow. These large OEMs would like assistance in diversifying the distribution channels. As such, there is a need for a neutral third party to assist with new ideas for product distribution and for efficient ways to fulfill customer orders. An example of a solution for efficient order fulfillment can be found in the relationship between third party logistics companies and the electronics industry. In order to expedite shipping to the end customers UPS and FedEx provide airport stocking points for storing end products. When an order is received, the products are shipped directly from the airport. In some cases, simple repair facilities are also located in the vicinity.
Impact on SMEs

Figure 4 SME Needs

Traditionally, the interaction between customers, suppliers, and logistic providers takes the form of serial communication. The customer initiates with an order, the supplier works to fulfill the order and the logistic provider concludes the transaction with a delivery of the order. This simple form of communication was not sufficient for the SMEs to remain competitive in the midst of stronger competitors. As illustrated in Figure 4, interviews with SMEs revealed their need for assistance from an independent third party to smooth out capacity fluctuations by selling excess capacity. In addition, SMEs required sales force assistance to reach customers whom they do not have access to due to their size. SMEs also require assistance in the form of financial support for work in progress. Lastly, they need assistance from a third party who will be able to increase their sourcing scope.
This set of required assistance from the SMEs is rather mind boggling. The disintegrated supply network has resulted in a disproportionate amount of uncertainty being pushed to the edge of the network. Smaller companies, located at the fringes, are forced to absorb this bullwhip effect. These companies, being less sophisticated than their larger counterparts, end up living through feast and famine cycles. When viewed in this context, one begins to understand the reasons which cause the SMEs to be willing to impart intimate knowledge about their own capacity, inventory positions and capabilities and allow a third party to assist with the coordination, sourcing and selling process. However, due to the sensitive nature of the shared information, the third party involved needs to be neutral and unbiased.
An example of how such a candidate, the third party logistic provider (LP), can fulfill the needs of SMEs is shown in Figure 5. With the current serialized form of interactions, buyers, suppliers and logistic providers have obstructed views and limited visibility into the activities within the supply chain. To achieve full visibility, an adaptive supply chain which reflects customer demand fluctuations and supply chain variations needs to be put in place. By shifting to a parallel network, the logistic company can integrate demand, inventory transportation and visibility, thus enabling full visibility in the chain.

![Figure 5 Linear Interactions to Supply Chain Visibility](image)

In this new network, the logistic provider now takes on a different role. As illustrated in Figure 6, instead of merely receiving the sales order and transporting the goods, the LP will be involved in the order fulfillment process right from order initiation. When an order is placed, the LP will have knowledge of the event. The LP will then work with the supplier in determining where and how the sourcing should be done. Subsequently, the LP will be part of the production planning process and also line up resources for delivering the end product.
Figure 6 Listen-Check-Delivery
A typical representation of today’s supply network is depicted in Figure 7. Due to the fragmentation of the network, a company needs to deal with many different entities in order to pull products together. In our understanding, it appears that with the increasing product proliferation, retail driven competition, and inter-twining of several supply chains observed in many industries, the complexity costs of coordination have made it more challenging for the companies to exert the same level of control and influence on their supply chains[27]. In
addition, managing internal business functions and managing relationships with external entities call for a different approach. It is here that the role of a maestro would come in – a neutral third party who coordinates the network and aligns the incentives. This conceptually sound role is somewhat idealistic and hard to implement in reality. Established and reputable corporations will not see much incentive to buy into the coordination made by such a maestro. As a result, we are observing the emergence of mini-maestros – a neutral third party who takes charge of part of the network, but not in its entirety. This manifestation of the concept of an independent third party is easier for established corporations to accept and digest. Established companies are more inclined to surrender portions of their supply network to a third party (the mini-maestro) while retaining control of other parts of the supply network. At the same time, the mini-maestros are able to cater to the SME needs by providing services that they require.

The concept of a mini-maestro is well exemplified by Li & Fung, a Hong Kong based company that serves private label apparel firms in Europe and North America [21, 28, 29]. Li & Fung is known to operate as a “smokeless” factory. It maintains a network of 7500 suppliers in 26 countries; even though it does not own any of the factories that are part of its vast supply and trading network [28]. The inner workings of Li & Fung are best understood through looking at a typical order flow. Upon receipt of the order within a division, Li & Fung dissects the manufacturing process for the order and attempts to optimally allocate the work at each step to its global supply partners. As a typical result, the manufacturing process is divided into two subprocesses: the front-end (sales and design) coupled with the back-end (logistics and banking), and the labor intensive middle portion. The front and back-end are typically performed in Hong Kong where the requisite advanced skills are often available; whereas the middle portion is further decomposed into various segments, and Li & Fung finds the best factory to serve each segment. The entire process is tied together in the end with IT and logistics. To illustrate this order splitting and combining process, when Li & Fung receives an order to produce 10,000 garments, it may decide to source zippers from Japan, purchase and weave yarn in Korea, dye in Taiwan, and produce the garment in Thailand. It will then reach into the supply chain by reserving un-dyed yarn from the supplier, reserving a fixed mill capacity for milling and dying,
and reserving factory time for producing $x$ numbers of garments in $y$ weeks. Li & Fung then coordinates and manages the logistics and transportation involved in the supply chain, such that in about five weeks from when the order is received, 10,000 garments may arrive on the shelves of the customer. Thus, by using its buying power and trust developed with its supply base, Li & Fung is able to considerably shrink the delivery cycle of time sensitive products. This allows its customers to buy closer to market, resulting in substantial savings both by reducing expensive inventory markdowns at the end of selling seasons, and through reacting quickly to changes in demand.

Another illustrative example is Flextronics International (Flextronics), headquartered in Singapore. Flextronics, with revenues of $14.5$ billion in fiscal year 2004, is a leading Electronics Manufacturing Services (EMS) firm operating in 32 countries and 5 continents. The company provides complete design, engineering and manufacturing services that are vertically integrated with component capabilities to optimize its OEM customers’ operations and time to market. As part of its global manufacturing strategy, Flextronics operates in six industrial parks in low-cost regions around the world. Each park incorporates the manufacture of components needed for the final system assembly, thus functioning as complete manufacturing centers. The parks also integrate strategic suppliers onsite to reduce material procurement costs and to accelerate new product introductions [18]. In addition, Flextronics has two “Super Sites” in Asia with access to established local resources and suppliers; it also maintains “High Competency Centers” in North America and Europe that specialize in high-tech services.

The emergence of these mini-maestros alludes to a coordinated supply network. In this new state of the supply network, a pure push system is not likely to be optimal. In a pure push system, due to the limited visibility of the supply network and customer demand, production is initiated without much coordination within the parties in the supply network. The mini-maestros acting as coordinators will make possible the use of pull mechanisms in the new network, but establishing a pure pull network is questionable. The effects of the mini-maestros thus result in a network in which both push and pull mechanisms co-exist. In managing the network, one will gradually
move away from the push and pull mentality towards optimal resource allocation amongst nodes in the network.

In the following sections we elaborate on some of the issues involved with such a model.

Sharing of Costs and Benefits

In the vertically integrated model, the firm itself was responsible, and had a strong profit incentive to take a greater stake in the coordination of the fulfillment value chain, and to ensure proper alignment of the incentives of the supply chain agents (operating within the organizational boundaries) to support the strategic objectives of the supply chain. However, with the vertical disintegration of the supply chains, there is now a larger question of who, or which of the independent or semi-independent agents within the supply chain, is now responsible for the coordination activities and for setting the appropriate incentives for the supply chain agents[30-32]. Given the fragmented and competitive nature of these supply chains, it is challenging for the diverse interest groups within the network to align themselves with the global objectives of the supply chain and the end-customer. Thus the question of supply chain governance and that of leadership is increasingly becoming a critical one for many supply chains[27].

Such a question is of utmost importance for a mini-maestro. The success of a mini-maestro hinges on the support that it can garner from the network players. As such, the mini-maestro must institutionalize ground level mechanisms for sharing the net costs and benefits of partnering. Typically, as the mini-maestro starts to focus on system optimization, business processes undergo reconfiguration – as a result some players stand to gain or lose more than the others. An example is a distribution center located downstream in the value network which witnesses its inventory rise as a result of a decision to postpone the assembly process further downstream. In such a case, for the distribution center to remain committed, the mini-maestro must institute ways for compensating it for its increased inventory. This is a difficult task and requires immense maturity, patience and deep knowledge of network operations. Similarly, network players that contribute to the overall network performance through innovation need to be rewarded appropriately for individual excellence [33].
Such a cost and benefit sharing system can be observed in Li & Fung’s operations. The company shares cost by assisting with production planning and by advancing letters of credit to the suppliers [34]. Financial support is also offered to factories to facilitate bidding for more quotas. A deeper level of cost and benefit sharing is illustrated through Li & Fung’s benchmarking system. The company maintains a very comprehensive performance benchmarking system that allows it to track performance levels of each player. Although very time-consuming and expensive, benchmarking has provided Li & Fung with a deep knowledge of the supply side, which in turn allows them to allocate work optimally. A player who consistently performs better than its peers will be rewarded with compelling financial incentives in the form of steady and substantial business [35]. For suppliers who under perform, Li & Fung assists by providing in-depth feedback which allows them to achieve stronger performance.

**Mutual Dependence and Trust**

An important factor contributing to the success of value networks relates to the degree of interdependence among the players. The mini-maestro must ensure that the players are mutually dependent for their success and failures. Mutual and well-balanced dependence helps build enduring relationships, while asymmetry in mutual dependence increases the possibility of mistrust and conflict within the network. The cultivation of mutual dependence will also, with time, establish a high level of trust within players in the network.

For each of the 7500 suppliers in the vast network that Li& Fung maintains, Li & Fung targets to consume 30-70% of its production capabilities and capacity. This particular range allows Li & Fung to obtain priority attention from the factories for its end-customer (or retailer) orders, while at the same time avoiding complete dependence of the factories on Li & Fung orders. In addition, Li & Fung cultivates trust by paying several visits to the suppliers during the production process [36]. The first visit is scheduled prior to production for raw material inspection and acquisition, when needed. A subsequent visit occurs after the first batch of garments is produced to stem quality problems prior to full production. The third visit follows for packing supervision and
final quality assurance. In the event that the garments do not pass inspection, the supplier is allowed to replace defectives. In some cases, if the end customer accepts under-quality products, the supplier is asked to lower the final price. These factory visits are coupled with continuous training for suppliers to develop the knowledge and skills required to convene the company requirements.

These monetary incentives, performance feedback, guidance and training serve to strengthen the notion that there is a high level of mutual dependency and trust between Li & Fung and the players in the network. The players trust that Li & Fung will provide them with jobs to fill their capacity, while knowing that Li & Fung will assist when they under perform. Furthermore, the players are also aware of Li & Fung’s dependence on their ability to fulfill orders in a timely manner.

*Systems, Standards and IT*

One of the dangers of pulling together a final product while sourcing from different players within the network is non-uniformity. The fact that two shirts of different colors on display in a store are from different origins (factories) should be transparent to the end customer. To guarantee this level of transparency, the interfaces in the supply network where parts of these products flow through need to have uniform standards to ensure all players can conform to the same set of requirements. The network itself also needs to be extremely malleable; the players should be “hot-swappable” - weaker players should be easily swapped out with the stronger ones replacing it without disrupting the network. This constant reconfiguration results in optimal productivity and responsiveness [35]. Designing and managing such a set of measure to be put in place is non-trivial, while implementing the system and trigger points requires a mature IT infrastructure. Viewed in this light, IT is not a determinant of the network’s success; rather, it is an enabler.

For Li & Fung, the orchestrator, it first defines the requirements that the partner companies must meet in order to become a service provider (thus become part of the network). The orchestrator will then structure communication architectures for seamless information transfer and exchange
within the network. Li & Fung will also specify which service provider will participate in what jobs (work-orders) and define what their roles will be. In order to constantly improve the network performance, feedback mechanisms are also created and the results are shared within the network. As a result, service providers will tend to focus on a small but core set of activities – those in which they have developed truly distinctive capabilities.

Furthermore, Li & Fung manages the network at a macro level, and is not involved in managing the day to day operations of the network players. With this loosely coupled network, the service providers can focus on their tasks and capabilities without costly intervention from the orchestrator. The service providers typically need two types of information from Li & Fung. First, they need detailed information on product specifications to perform the tasks; second, they need the schedule of raw material arrivals and end product delivery dates together with the quantity of end products. On its part, Li & Fung needs timely information about the service providers’ progress towards delivering on their commitments. To accomplish this, Li & Fung has a standardized order executing and tracking system that is used by all divisions in the company.

In order to be able to renew the network efficiently, Li & Fung maintains an exhaustive benchmarking system. Performance of each player is constantly monitored and compared to its peers. This information is shared with every player in the network, giving them a detailed understanding of their performance gaps, ideas for addressing them, and strong incentives for taking action. By doing so, Li & Fung is not dictating how the players should do their work, it merely points out who has the best approaches. The poorly performing participants can be swapped out with two implications. First, these poor performing participants are better at other jobs. For example, some suppliers may do well with coarser forms of wool but lack the expertise to maintain high quality and throughput for the more delicate forms of wool products. Second, being out of the network allows them to improve their quality of work based on the information received from Li & Fung [35].

*Social Contract*
A mini-maestro managing a portion of the disintegrated supply network needs to operate with a different social contract. The traditional model of a top-down management approach will not result in an efficient value network. The new social contract should be one that strips away the importance of a hierarchy to allow and encourage individual players to reach their potential. Within a corporate setting, the impact of such a social contract will manifest itself in two ways. First, there will be a sense of equality within different ranks and second, there will be a rooted commitment to allow people to take initiatives and maximize their potential.

At Li & Fung, customer-focused divisions are the building blocks of their organization. Each of them is kept small and entrepreneurial and is run by a lead entrepreneur. Li & Fung provides them the financial resources and the administrative support of a big organization, but each division is given a great deal of autonomy. All the merchandising decisions that go into coordinating a production program for the customer are made at the division head level. Li & Fung maintains a larger number of divisions (around 60) and they view divisions as a portfolio they can create and collapse, almost at will [28]. Towards their suppliers, Li & Fung adopts a similar approach. Each supplier is part of a network which is highly malleable and each of them are encouraged and given autonomy to materialize their potential in the world economy.

The sections above attempted to highlight some of the important issues associated with the mini-maestro model. In short, a mini-maestro needs to architect a governing system to ensure supply chain incentives are properly distributed. Such a system should also be conducive in building mutual dependence and trust amongst the different players. In order to ensure that the network will function efficiently and optimally, there needs to be clearly established standards and benchmarking systems. Information technology then comes into play as an enabler and adhesive agent. Finally, the mini-maestro needs to function within the new social contract such that each player is allowed sufficient autonomy and freedom to materialize it’s potential.
Types of Aggregate Players – Li & Fung vs. Flextronics

In this section we investigate the differences between Flextronics and Li & Fung. Even though both companies control a portion of the supply network, the relationship dynamics between the companies, the suppliers and their end customers are very different. In Li & Fung’s case, the company’s strategy of dispersed manufacturing can be cast in the framework of achieving leveraged growth through operating an efficient process network[35]. In employing a leveraged growth strategy, the company does not own factories, but have highly privileged access to the capacity and schedules of its factory partners. The company’s asset base is its knowledge of the apparel market and a deep understanding of the supply side issues. Li & Fung maintains a detailed, up-to-date view of supplier performance in a wide variety of contexts. For example, some suppliers may do well with coarser forms of wool but lack the expertise to maintain high quality and throughput for the more delicate forms of wool products. Such real-time operational information and knowledge helps the company in allocating work orders and in providing feedback to its suppliers.

In addition to having a distinctive and strong asset base, Li & Fung’s successful leveraged growth strategy is attributed to its efficient process network. A process network is comprised of one orchestrator and many other service providers. The orchestrator, as a coordinator, will organize and manage the work flow. Furthermore, the orchestrator will manage the network at a macro level, and is not involved in managing the day to day operations of the service providers.

In many functional aspects, Flextronics operates similar to Li & Fung, but there are distinct differences stemming from the nature of the two industries. Similar to Li & Fung, Flextronics organizes its teams around customer accounts. For quality control and seamless integration of the supply network and manufacturing processes, it centralizes information technology and business process applications and standardizes manufacturing processes across its various units. Global manufacturing is adopted as an important component of the strategy to sell their services in
different regional markets, but there is a demarcation line along the skill sets that are deployed at the regional facilities; for example the higher technology services are based in the higher cost and higher skill regions (US and Europe) and the back end manufacturing is based in lower cost regions. However, this trend is also changing, with R&D centers recently opened in Asia that provide services requiring higher skill levels, at lower costs to their customers.

Part of the differences between the two organizations stem from the nature of the two industry sectors and their respective asset ownership strategy; Flextronics, unlike Li & Fung, owns all its factories and facilities. Flextronics also maintains a much more intricate relationship with its customers; the roles that the customer and Flextronics play are not as decoupled as in Li & Fung’s case, especially during the design and prototyping phases. During this phase, Flextronics representatives are housed in their customers’ sites and these two teams collaborate on a daily basis on detailed issues. As such, from a supplier coordination standpoint, Flextronics is not as much an “orchestrator” of the supply chain as it is a reliable purchaser and assembler.

The more intriguing difference stems from the origins of the companies and the relationships they cultivate with their suppliers and clients. The success of Flextronics is partly due to the abuse of outsourcing, which lead many companies to shed their inefficient processes in order remain competitive at all levels. As a result, Flextronics is transforming from the role of a contract manufacturer to a final product designer and eventually, to a formidable threat to its clients. In the local economies where Flextronics operates, one could hypothesize that they are there for cost arbitrage reasons and that they have little interest in the development of the local economies and the social economic impact. Flextronics also do not cultivate rewarding relationships with their suppliers since they own the production facilities. In other words, Flextronics is in a position where it poses a threat to its clients and at the same time, does not garner a lot of trust from the region where it operates in.

Li & Fung originated as a trading business founded in 1906. Though the years, it evolved from a buying agent into a regional sourcing agent to a manager and deliverer of manufacturing
programs and finally to a dispersed manufacturer [28]. By the time Li & Fung became noticeable successful, outsourcing in the textile and apparel industry in the US was common place. Most retailers at that time ceased to manufacturer their own products due to cost inefficiencies; the problem they faced was to effectively, both in terms of cost and time, source products from lower cost regions. Presently, the mass apparel industry has evolved into one which focuses more on marketing and on themes for the upcoming seasons. The core of the design and manufacturing work is outsourced. The nature and state of the industry lends itself well to Li & Fung, for there is no competitive friction between the company and its clients. On the other hand, the electronics industry, being younger than the textile/apparel industry, is still heavily involved in the design, fabrication, testing and selling processes. The emergence of Flextronics and its subsequent growth in skill set is thus perceived as an encroachment and not as a partner.

In terms of supplier relationships, in addition to providing a steady source of business, Li & Fung also provides them with assistance and guidance in order for small suppliers to meet the standards and expectation of global trade. One can hypothesize that Li & Fung’s presence in the local economy has a more positive impact than of Flextronic’s presence; its nature is also less colonial.

**Conclusion**

As the process of disintegration and reintegration continues, it is becoming clear that the emerging aggregate players will become companies of the future. These mini-maestros bring innovation and efficiency to the network by orchestrating the flow of goods, information and funds between multiple entities and by dynamically reconfiguration the network. Much of the competition in the business world will center on gaining and maintaining the orchestration role for a value chain or industry. Clearly, becoming part of the network is essential; yet becoming the conductor of the network will be even more critical. Looking forward, it is important to understand the impact these aggregators have on the local economies where they operate. Such an insight is instrumental in comprehending the development of trust, quality of service and sustainability in networks made up of small businesses in developing markets. With this research,
we are able to identify two broad classifications of mini-maestros in terms of their impact on local economies; one being value creation while the other being colonial. In order to avoid overgeneralization, future research could focus on a comprehensive classification of mini-maestros from the viewpoint of the impact on local economies. To accomplish this, there needs to be a thorough understanding of the nature, strength and evolution of the local companies that grew out of relationships with the aggregator, the expectation and perception of both, evidence and measures of economic contribution to firms and local communities, and finally, the rules of engagement and disengagement set forth.

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References


