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Abstract

Companies recognize international sourcing as a business practice useful to reduce product prices, deal with supply shortages and identify new competitive suppliers. Effective international sourcing implies the integration and coordination of materials, processes, information flows and multiple producers at each buying location. Many companies do not have the capabilities or the willingness to develop and manage such sourcing networks; therefore, other entities have assumed these responsibilities. These coordinators are in charge of the integration of many suppliers to develop full-package production, serve as liaisons between suppliers' capabilities and market demands, and provide the technical and financial support to sustain the sourcing network. The review of the industrial clustering and global supply chain literature allowed the identification of such coordinators in Mexico. The emergence and profile of these coordinators is associated with corporate strategies of multinational firms, the efforts of industrial groups, and the governmental policies for the development of dynamic industrial regions. This paper analyzes the characteristics of four coordination models identified in the Mexican context, focusing on their contribution to the participation and upgrading of national suppliers. The profile of the coordinator firm, the type of relations that this firm sustains with producers and the support offered to suppliers is also discussed. A

particular emphasis is given to the fourth model where a third party, a knowledge and service company, assumes the coordinator role. The interest on this model is due to its novelty, the flexibility of the sourcing network, and the potential impact on regional development that could result from the intervention of a neutral third party as coordinator of the activities of multiple local and specialized suppliers.

Key words: Supply chain coordination, industrial clustering, global supply chain, supplier upgrading, advanced logistics services.

Section 1: Introduction

Supply chain management (SCM) continues to be a topic of considerable interest for academics and practitioners. Research in SCM has evolved from its core conception around logistics and operational activities to become a multi-faceted concept that is now studied from different theoretical perspectives such as strategic management, relationship marketing, knowledge management, institutional economics, systems theory, etc. (Giannakis and Croom, 2004). Multiple definitions for SCM have been provided, Mentzer et al. (2001, p. 18) integrate them and distinguish SCM from related concepts, to define SCM as "... the systemic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole."

In the earliest versions of the supply chain concept, firms sought to achieve vertical integration by establishing direct coordination over all the activities of the chain to obtain the desired efficiency and responsiveness (LaLonde and Masters, 1994, p. 39).

But as supply chains become more complex as a result of the dynamics of the business environment, new manufacturing and management philosophies, downsizing and the increased trend in outsourcing; integration via full ownership and restricted to the firm's boundaries is no longer the best alternative. Competition is not longer among individual businesses but between supply chains, therefore vertically integrated companies need to reorient their strategies to accomplish integration across the following dimensions (Lee, 2000):

- a) Information integration, described as the sharing of information and knowledge among the members of the supply chain
- b) Coordination, which refers to the redeployment of decision rights and resources to synchronize complementary and dissimilar activities through effective relationships with multiple tiers of suppliers, customers and third parties, and
- c) Organizational linkages that includes communication, the implementation of supply chain performance metrics and the alignment of objectives among integrants of the chain.

The integration of the supply chain is affected by factors such as the degree of competition and maturity of the industry, the nature of the products (commodities or technology-intensive products), the dominance versus balanced power in the chain, and the strategic orientation of the leader firms (Bagchi and Skjoett-Larsen, 2002; Stonebraker and Liao, 2004). The position and orientation of the leading firms in the supply chain is critical for the development of cooperative relationships and the integration of participants, but it is not clear if current leading firms, including transnational companies (TNCs), are the most suitable entities to support such integration, especially for small and medium suppliers in the lowest tiers of the chain,

given the “hit-run” strategy of reallocating production in emerging low cost labor regions with the consequent de-industrialization (industrial and technology infrastructure loss) and job loss. To address this issue, this work analyzes the characteristics of sourcing networks related to global supply chains (SC) in Mexico, focusing on the contribution of current organizational models in the specific subject of development and upgrading of suppliers, and their potential contribution to industrial development as result of partnerships with local suppliers.

The paper is organized as follows. In the first section we present the critical concepts on coordination of the global supply chain. This section depicts the mini-maestro model as an alternative to vertical reintegration of the supply chain. The second section outlines the methodology followed to identify and profile the four coordination models related to global supply chains in the Mexican context. The third section describes the characteristics of each model, the role of the lead firms coordinating the sourcing network to serve the orders of international buyers, and their potential impact on the development of local suppliers. Particular examples for each model are used to support the discussion; the section ends with a comparative analysis of the models. In the following section a detailed analysis on the fourth coordination model derived from the study of two cases is presented, this model corresponds to a sourcing network coordinated by a third party. The interest on this model is because of its novelty, the profile of the coordinator firm and its role as orchestrator of existing domestic suppliers without a direct participation in production. The final section of the paper gives general conclusions and implications of the models for research, the elaboration of governmental policies intended to support the development of competitive sourcing

networks in Mexico and the emergence of service and knowledge based companies able to coordinate segments of the fragmented supply chain.

Global sourcing and the emergence of coordinators

Globalization has made it possible to source from any region in the world with lower production costs, therefore many firms pursue global sourcing with the objective to improve their profitability margins and increase their base of competitive suppliers. The concept of global sourcing differs from international purchasing, this last term refers to the commercial transaction between a buyer and a producer located in different countries meanwhile global sourcing is defined as the integration and pro-active coordination of materials, components, process, technologies, designs and facilities across the world (Trent and Monczka, 2005). The global sourcing concept has several implications, among the most relevant we identified the following:

- 1) The disintegration of the supply chain, which has become a complex network of entities geographically dispersed (the global supply chain) that require coordinating and linking major business processes, and the management of information and cash flows within and across companies
- 2) The development of full package production (complete production of a particular product line) by linking multiple specialized producers able to manufacture all components and to assembly final products, to create regional sourcing networks attractive to international buyers
- 3) The need to improve logistics infrastructure and services in the sourcing regions in order to efficiently move products from manufacturing to consumption points. Logistics

is critical to assure competitive prices and profitability because low labor costs could not overcome the costs of moving goods produced at remote regions.

4) The need for responsible agents that align integrants' objectives, coordinate activities and transfer knowledge and expertise to improve local supplier's capabilities, especially those small producers (SMEs) that operate at the lowest tiers of the sourcing networks.

The disintegration of the supply chain as a result of global sourcing is considered a temporal state, but the required reintegration does not imply the re-establishment of vertical integration. The new supply chain network is being formed by parallel relationships between different layers, this structure calls for increased coordination, subdivision and redistribution of responsibilities for producing and moving materials, and the rapid integration of new partners (Bitran et al., 2007). Therefore, novel forms of coordination are required, opening the opportunity for the appearance of new entities capable to orchestrate the activities of a large number of suppliers and third parties and sustain partnerships with critical customers. In the case of the automotive sector, multinational automakers have opted for an internal governance structure that assures the fulfillment of corporative rules and procedures. In consequence, automakers have transferred to their one (or "zero") tier suppliers -the large original equipment manufacturers (OEMs) like Bosch, Magna International, Johnson Controls or Dana Corporation- the responsibility of the main decisions about product and information flows, as well as the administration of lower tier suppliers. In the chain's segment or layer where these OEMs figure as the leader firm, they are in charge of the development of sub-systems and modules in collaboration with the automaker, and assume the responsibility for the management of multiple suppliers, perform or outsource the associated logistics activities, and set the objectives for the integrants. Whitford and

Zeitlin (2004) found dysfunctional the OEMs' supplier management model due to the traditional transactional and price-based relations these companies sustain with their suppliers and the limited manufacturing capabilities of the producers' base. These factors are considered barriers for effective coordination, the establishment of partnerships and the development of suppliers, the mediation of external organizations is claimed relevant to overcome these barriers.

The increasing customer demands for quality, flexibility, cost and design, have created the opportunity for the emergence of collaborative partnerships between leading firms in the supply chain and producers located in developing regions (Zeitlin, 2004). These partnerships imply SC leading firms' involvement in the training and upgrading of suppliers' capabilities, promoting suppliers' participation in more value-added activities instead of just absorbing production, increasing the suppliers' opportunity to access the international market and advancing long-term continuous relationships. But leading firms in the global supply chain tends to develop embedded ties only with first-tier suppliers and relegate small firms to mere suppliers of parts and components of low value. This makes SMEs highly dependent on the orders of the primary manufacturers they supply, forcing them to attend the norms and requirements of large buyers which select and evaluate smaller suppliers in terms of efficiency and price, and easily replace them in case of failure (Qualyle, 2003). Many of these SMEs are located in developing regions where they significantly contribute to employment and industrialization; therefore, governments and other organizations have tried to implement programs designed to develop both their productive and export capabilities via the formation of regional industrial clusters.

Research in developing regions (Dolan and Humphrey, 2000; Doner and Hershberg, 1999, and Gereffi, 2001), including Mexico, indicates that local manufacturing processes and products upgrading can occur incrementally when learning occurs in global supply chains and regional industrial clusterings, while the introduction of governmental policies and private initiatives advancing a supply chain's governance structure that advance industrialization (Zeitlin, 2004) is taking place. Hence, the integration of domestic firms in a global supply chain could contribute to regional development through the dissemination of knowledge and experience provided the leading firms have the interest to develop cooperative relations with local suppliers. These leading firms can support supplier's development programs and also play a coordinator role. The firms able to play this role are not necessarily the large manufacturers or brand owners in the global SC, but firms that control the access to major resources, in the form of tangible assets (technologies), capacities (product design) or information (consumer demand) (Gereffi, 2001).

In the context of logistics outsourcing, van Hoek (2001) analyzes the model of UPS Worldwide Logistics as a logistics leader or fourth logistics provider (4PL) that assumes full responsibility of all OEMs' logistics problems by effectively managing all product and information flows. The 4PL is the only point of contact between the customer and multiple 3PLs which are coordinated by the 4PL with the aim of taking advantage of 3PL's expertise to optimize the logistics of the supply chain. As the 4PL advances in its coordinator role, it also receives and manages customer's orders and enlarges its understanding of the customer's replenishment process. By integrating information about customer orders and supply operations, the 4PL could get complete visibility of operations and products flows to be in a position of coordinating not only logistics but

also manufacturing operations while the customer is fully dedicated to design and marketing. Bitran et al. (2007, p. 34) go further in the discussion of the potential contribution of a neutral third party to the reintegration of the supply chain by introducing the concept of “maestro”, an external entity, possibly external to the chain that coordinates the entire network, functions as the unique linkage among the focal firm in the SC, the suppliers, customers and 3PLs, and aligns the incentives for all these players. However the authors argue that leader firms are not likely to give full control of the supplier’s base to the “maestro”, but many will be willing to consider the value-added services of a modified version of this entity, the “mini-maestro”. A mini-maestro controls only a segment of the complete supply chain by integrating multiple specialized suppliers within a region to develop full-package production and efficient logistics; meanwhile the focal company retains control over the rest of the supplier base and maintains close partnerships with strategic suppliers. The “mini-maestro” provides value added services to customers, supports and/or manages the production of multiple suppliers, coordinates their activities, assumes the responsibility for the logistics and the management of collaborative relations in the network, and aligns the participants’ objectives with those of the complete chain. Figure 1 describes graphically this mini-maestro model.

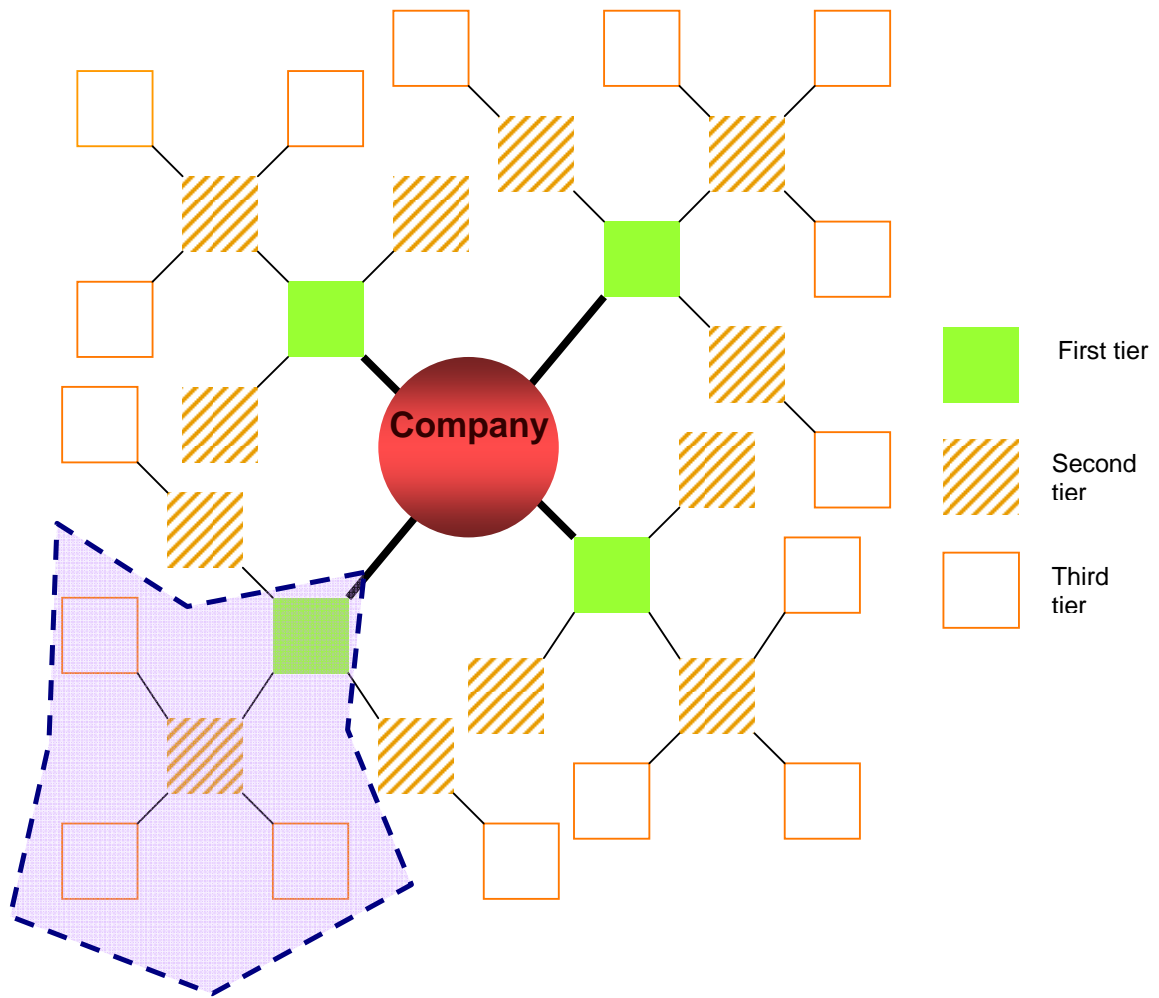


Figure 1. The Mini-maestro Model (Adapted from Bitran et al., p. 34)

Bitran et al. (2007) provide two examples of such emerging system integrators or “mini-maestros”: Flextronics International Ltd. in the electronics sector and Li & Fung Group in the textile and apparel sector. Flextronics is a leader company that provides manufacturing services, its portfolio of services includes the complete design of electronics products and their total manufacturing. Flextronics controls a vertical sourcing network integrated by suppliers that operate in six industrial parks located in low-cost labor regions; each park is a manufacturing center which affords full-production. Flextronics not only controls all manufacturing activities, but also administrates all the SC logistics either by performing the activities or creating strategic

alliances with lead logistics providers. Li & Fung, originally a trader company, also plays the mini-maestro role but with a different business model. Contrary to Flextronics, Li & Fung is mainly a service company that coordinates all the productive activities in the textile and apparel chain by capitalizing on its knowledge about the manufacturing capabilities of Asian suppliers and the relationships developed when working as a trader. The group strategy is based on its coordination capabilities: its ability to expand and manage multi-region sourcing networks and its logistics competences, which are additionally capitalized through IDS group, a specific branch specialized in logistics and marketing. Li & Fung portfolio of services include product design, sourcing of raw materials, control of production, consolidation of orders, exportation of goods, marketing support and the execution of all logistics activities required to deliver multiple orders to international customers (brand owners, retailers and marketers) or to distribute products in eleven Asian countries. Li & Fung receives customer orders, and decomposes them to assign production to many manufacturers located mainly in China and other six countries in Asia, and to others in Oriental Europe and America (Meredith, 2006). Even though both companies, Flextronics and Li & Fung, play the mini-maestro role and serve as intermediaries between regional suppliers and buyers, Bitran et al. (2007) question the flexibility of the vertical model of Flextronics and consider more configurable the Li & Fung supply network which is sustained by social ties that promote trust, the compromise and the collaboration of the participants with the coordinator. Then, different forms of coordination, managed by entities with distinctive characteristics are emerging and could be implemented to reintegrate the supply chain.

The objective of this work is to analyze the characteristics of current organizational models or forms of coordination of sourcing networks identified in the Mexican context,

making particular emphasis on the analysis of a model where a neutral third party functions as “mini-maestro”. The interest in Mexico is due to the country’s vocation toward international sourcing and its geographical proximity to USA (and Canada) market that facilitates product transportation and reduces delivery times. The attractiveness of Mexico as a global sourcing region increased notably after the peso devaluations (1993 and 1994) and NAFTA, especially among some sectors as apparel, automotive and electronics (Gereffi et al., 2002). The two following factors contributed to Mexico’s orientation to global sourcing:

- a) *Governmental policies* like the maquiladora program (assembly or manufacturing firms wholly or partially owned by foreign companies that do not pay taxes on imports but only on the value added to the product in Mexico), the Caribbean Basin Initiative (preferential access to USA markets for Latin American countries) and the promotion of regional industrial poles as a means for economic development.
- b) *Upgrading of Mexico’s productive base and acceptable logistics infrastructure* via regional industrialization and the development of telecommunications, specialized customs services, transportation corridors (NAFTA highway, among others), privatization of railways (Ferromex, TFM, Ferrosur) and foreign investment in inter-modal transportation.

Two of the four models to be presented and discussed in the following section are closely related to governmental initiatives (the “maquiladora” model and regional industrial clusters) and have been extensively studied but from different perspectives (Schmitz, 1995; Chaston and Mangles, 2000; Enright and Roberts, 2001; Gereffi et al. 2001; and Arbonies and Moso, 2002). The other two models, and in particular the

fourth, are structured from new data around the following aspects: a) the profile of the coordinator firm, b) the identification of the activities within the supply chain supervised or performed by the coordinator, c) the pitfalls in the execution of such activities, d) the support offered to suppliers in particular domestic and/or small producers, and e) the coordinator's ability to integrate specialized suppliers to provide a full package of value-added services to international customers.

Methodology

This study is exploratory and conceptual in nature, the identification of the four coordination models was mainly based on empirical material reported in the literature; the analysis of multiple documents provided a broad coverage of information from different sources over an extended time span. The analysis and examples of the first two models was carried out by using the information of cases provided by other authors (Carrillo, 2004; and Competitiveness Project-Vision 2020 for Mexico State) but with different objectives and under other theoretical frameworks; additional information about the structure of the shoe cluster that serves as example of Model 1 was collected by performing structured personal interviews with shoe producers in the town of San Mateo. The description of the last two models was based on empirical primary information, published documents (newspaper and academic articles), web pages and additional documents provided by the selected companies. We conducted semi-structured in depth interviews with the following key informants: the CEO and operation manager of the Mexican-USA joint venture OMJC (Original Mexican Jeans

Co.), the founder and CEO of Aztex Trading, and two owners-CEOs of the so called consolidator firms that operate in the artisan region around the city of Guadalajara.

Initial contact was established with each of the key informants to ask for their participation, all contacted firms accepted to participate in the study. Additional information about the objectives of the research was provided to the informants either as a written document or as a short presentation at the beginning of the interview. All interviews were conducted at the firm's facilities; an interview guide covering the following dimensions was used: services and activities performed by the coordinator with a particular section about logistics activities, relationships with suppliers, relationships with customers and main challenges and contributions associated with their business model. All interviews were personal and lasted at least one hour and a half; interviews were recorded with previous authorization of the interviewee(s) and additional notes were taken by the researcher conducting the interview or an assistant. All companies authorized a visit to their facilities, complementary questions were posed during the visit to clarify or enhance the information previously provided during the interviews.

Given the particular interest on the fourth coordination model, we conducted three small cases: Aztex Trading and two consolidator firms. In addition to the interviews with the owners and/or managers of these three companies and the analysis of published documents and web pages, we interviewed some of the producers participating in these sourcing networks coordinated by third parties. This additional data was used to complement and validate the information provided by the CEO and/or owner of the coordinator firm, to enhance the perspective about the structure of the coordination

model, and to explore the interactions between the coordinator firm and producers in the network. This augmented information enabled us to achieve the required depth in describing the characteristics, benefits and drawbacks of this last model. Information from participant suppliers was collected during a personal interview by using a structured questionnaire. The suppliers, two linked to Aztex's supplier network and other five which work regularly with consolidators, were referred by the firms playing the coordinator role and cannot be considered a representative sample of their suppliers' base.

Part 1. Four coordination models in the Mexican context

1. Regional industrial clusters as auto-coordinators for the sourcing network

The liberalization of the Mexican market imposed competitive pressures on local companies especially SMEs, and contributed to the disappearance of some industrial sectors. In an attempt to sustain and encourage industrial development, in the 90's Mexican government agencies tried to develop efficient industrial agglomerations in the form of inter-firm networks, collaborative production-commercialization efforts (*empresas integradoras*) and industrial clusters. The objective was to develop suppliers, perform more value-added activities in certain strategic sectors (e.g. automotive due to its contribution to the manufacturing gross product), and to encourage cooperation and exportation among local SMEs working in traditional production markets (e.g. knitwear and textiles). Credit unions and producer consortia owned by local entrepreneurs were established to provide financial assistance, with the backup of the Mexican development bank, Nacional Financiera (NAFIN) or with the creation of state financial funds. These

federal initiatives, along with regional ones supported by state governments (e.g. the Chamber for the Transformation Industry in Nuevo Leon, Baja California through Competitiveness, and Competitiveness Project-Vision 2020 for Mexico State), are mainly oriented to support firm's associations instead of individual firms, assuming collective development is less costly than individual development, and regional proximity and inter-firm collaboration is enough to integrate a sourcing network. A problem with this perspective is that inter-firm collaboration is difficult to develop due to lack of trust and rivalry among firms, and moreover, local inter-firm collaboration does not necessarily stimulate innovation and knowledge diffusion or can be taken as a universal characteristic of dynamic regional clusters (Malmberg and Power, 2005). The *Shoe cluster in the State of Mexico* provides an example of a first form of coordination of Mexican sourcing networks, the analysis follows.

Mexico has a strong tradition in shoe production, the state of Guanajuato is the main producer and the state of Mexico is the fourth. After the 1994 peso devaluation, shoe producers became interested in exporting their products. They increased their export volume from 3% in 1994 to 12% in 1999. However, since 2000, export volumes have been decreasing due to international competition with products of low price from Asia and Brazil. Almost all Mexican exports go to the USA market (93%) and correspond to products with medium price and quality; almost no exports go to Europe despite of the fact that the EEC is absorbing 20% of the world exports. Five percent of the total Mexican shoe production comes from the state of Mexico, the producers are mainly micro and small workshops and 40% of them are located in the town of San Mateo Atenco (Torres-Noyola, 2006). The production in this cluster is mainly artisan (95%) with only 5.6% of the larger producers using machinery and some industrialization but

still relying on intensive labor, around 20,000 workers are linked to this shoe cluster. Production from workshops is characterized by poor designs and innovation, low technology use and heterogeneous quality, so competition is mainly on price, with retail points organized by the same producers inside the town. The cluster basic contribution is to local employment (family business) but not to region industrialization or social welfare; indeed tanneries in the area generate high soil and water pollution.

This sourcing network is incomplete, the leather -the main raw material accounting for 65% of product cost- is not of good quality in Mexico and its production is limited. As a consequence, the shoe industry relies on imports for leather (around 50%) and also imports basic technology (e.g. sewing machines). Mexican shoe exports are in the hands of the largest and more industrialized firms, that is the case in the San Mateo cluster, the largest shoe manufacturer sells all its production – ladies' dress shoes- to department stores (Sears, Palacio de Hierro). This firm follows trendy international designs (critical for competition in this sector), uses high quality raw materials, and employs technology for production and design. This firm acquires some products from tanneries in the cluster and subcontracts some small producers during its peak production seasons. The firm is not really playing a coordinator role for cluster members, but is the critical cluster's link with large buyers and the mechanism to access fashion trends; the new designs produced by the large firm are usually copied by small producers. Domestic demand has been large enough to sustain this shoe cluster but the increasing imports from China and Brazil (the largest American shoe producer and exporter) question the survival of the San Mateo cluster, unless producers become more competitive in quality and price.

The difficulties that firms in the San Mateo shoe cluster face when they try to coordinate production and commercialize their products in the international market are not particular to the shoe cluster, Vangstrup (2002) and Domínguez-Villalobos and Domínguez-Villalobos (2002) describe a similar situation for the textile and apparel clusters in Villa Hidalgo, a town located in the West of Mexico, and the State of Mexico.

In the case of the consortium of Villa Hidalgo, an association of domestic producers of garments, a Mexican entrepreneur convinced the consortium leaders to begin to export and put them in contact with an important USA broker interested in sourcing from Mexico. The two largest firms and most technically advanced firms in the consortium took the responsibility to prepare most of the samples required by the potential customers while small producers made the simplest ones. These largest companies assumed the coordinator role and subcontracted the small ones for production of basic garments and materials once a contract with the international buyer was signed. Process re-engineering, integration and realization of new production activities (assembly and finishing) required to provide full-package production were carried out by these coordinators. The exporting experience contributed to technology upgrading and productivity improvement but small producers' dissatisfaction with the leadership of larger companies, lack of trust among consortium members, a limited vision about the economic potential of being part of a global supply chain, and financial problems finally ended the collaboration and export effort.

The textile and apparel regional cluster in the state of Mexico is mainly oriented to the domestic market with limited inter-firm interactions and collaborative projects.

Moreover, the firms in the cluster do not consider cooperation and collaboration as effective mechanisms for production upgrading and competitiveness (Domínguez-Villalobos and Domínguez-Villalobos, 2002). Similar to the shoe cluster case, the sourcing network is incomplete, production largely depends on imports of cotton and synthetic fibers, and small producers in the cluster have no access to premium quality fibers since large textile producers prefer to serve the orders of large firms. Design capabilities are limited, and even though communication infrastructure is good, the firms in the cluster have limited logistics capabilities and are unable to aggregate their production to serve large volume orders. Some individual firms have tried to promote associations to modernize their designs and to improve their production processes. But these efforts are isolated and only some firms have improved the quality and design of their products to fulfill international standards, other producers preferred to quit and serve only the less demanding and low cost domestic market.

Given the cluster situation, Domínguez-Villalobos and Domínguez-Villalobos (2002) suggest the need to develop a cluster coordinator able to perform the following basic functions: a) to consolidate production orders and distribute them to final customers, b) facilitate access to the large volume global market to SMEs, and c) support SMEs for product upgrading both in quality and design. No recommendations on how to select or develop this coordinator agent are given, but it is suggested that a neutral third party could assume the cited functions, resulting in a better deployment of the financial resources provided by governmental agencies.

This first organizational model is described graphically in Figure 1, local producers constitute a network with weak ties and rely mainly on governmental agencies for

financial support, acquisition of management knowledge, in the format of non-customized training courses, and indirect information about potential international buyers. The integration of local producers, coordination of the manufacturing and logistics activities, and the development of external links come from inside the cluster, provided strong social relations exist to support these actions. Key problems for the global competitiveness of the regional cluster are poor networking capabilities, deficient managerial leadership inside the cluster, pervasive lack of trust and the financial dependence on governmental agencies. According to the Australian cluster experience in Adelaide (Enright and Roberts, 2001), long-term commitment by regional producers and government agencies is necessary before firms accept collaboration, develop trust and evolve to a sourcing network. When international links are established, benefits include acquiring expertise on serving new markets, technical upgrading, increased cooperation among cluster members, and development of consolidation and logistics capabilities. Lead firms able to assume the coordinator role are the ones with the higher production capabilities but there is the risk other firms perceive this leadership as domination, then cooperation and interaction will decrease and the cluster will not evolve (Harrison, 1994). Trust levels in Latin America are reported low to medium (http://www.competitividadandina.org/view/new_popup.asp?id=21207&ms=4) then it is necessary to develop a governance structure that aligns incentives, promotes trust and motivates inter-firm cooperation and joint decision making. In addition, the lead firms in the cluster cannot offer the required financial support for the sourcing network and are themselves inexperienced in dealing with foreign markets, have limited capacity and logistics shortcomings, so they learn and help at the same time. Finally, the export strategy is pursued only when the domestic market shrinks, giving place to integration-

disintegration episodes for the sourcing network, which are unattractive for international buyers.

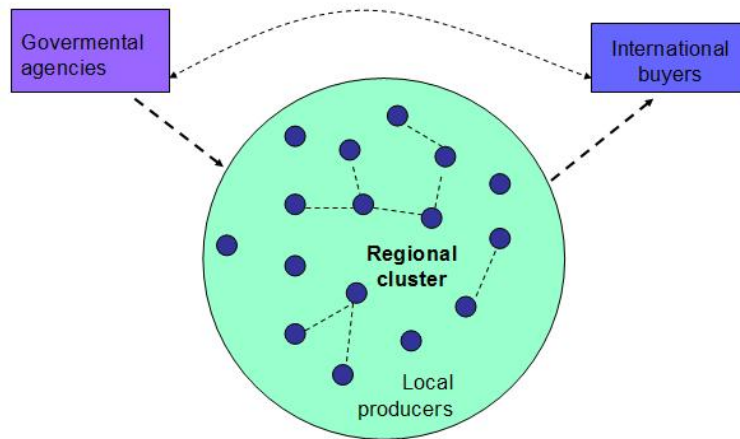


Figure 1. Regional industrial clusters as auto-coordinators for the sourcing network

The pure agglomeration of firms in an area is considered a state of transition in the development of a sourcing network; collective goals, activities coordination and the establishment of links with larger firms outside the region are required to avoid the risk of isolation. Extra-local collaboration is recognized as more important for knowledge creation and diffusion; successful clusters sustain cooperative relations with firms outside the region, their export orientation encourages the development of intra-cluster linkages in an effort to conform to market standards (Malmberg and Power, 2005; Lechner and Dowling, 1999; Vangstrup, 2002). Then, a cluster development program not only needs to offer financial and technical assistance or to promote meetings between local producers and international buyers; it is crucial to provide experience, additional information about cluster competencies, market intelligence services, infrastructure and human capital (Enright and Roberts, 2001). Therefore, the intervention of a neutral party taking responsibility of the cluster governance seems

attractive, provided this entity has the leadership, vision and long-term commitment to develop the sourcing network.

II. Sourcing networks without local links

The example selected to profile this second coordination model is *The Delphi case in Northern Mexico* described by Carrillo (2004) in the context of the evolution of the maquiladora model. This particular example was selected due to the completeness of the discussion provided, but other maquiladora cases exhibit a similar situation (Carrillo et al., 2002).

Since late 1970, GM has located plants in low-priced labor regions, favouring Mexico due to its proximity to USA and the size of the local market. In the 80's, maquiladora facilities were established at the Mexican border, and joint projects were developed with Mexican plants to supply GM-OEMs and auto-part plants. The spin-off of GM, Delphi, following the strategy of the parent company, established its own assembly plants in Mexico looking for low labor cost. The maquiladoras of Delphi Electric Systems and Switching (SEC) are mainly located at the border city of Ciudad Juárez in the state of Chihuahua. These maquiladoras have been through an evolution process that can be divided in three stages.

1) The maquiladoras were established with no connections to local networks, and their production was based on intensive manual labor. The increased use and sophistication of wire harness promoted the development of an industrial agglomeration or cluster around this product, this regional cluster is a vertically integrated network of companies and suppliers belonging to Delphi. The cluster formation was supported by Mexican government institutions via a program aimed to strengthen manufacturing supply chains

and upgrade suppliers' capabilities. However, few Mexican suppliers actually participate in the network, due to their limited competitiveness in quality, cost, delivery times and productive capacity, plus the disinterest of Delphi plants to support their upgrading, therefore their participation is limited to low value-added activities like cardboard packing and machine shop parts.

2) Delphi suppliers, under the tight control of the company, went through a learning process and became competitive by offering quality products (ISO and QS certification), cutting waste, shortening production cycles, and managing promised delivery times. They successfully adopted the Japanese system of production and were able to adjust to demand fluctuations. Even when employment turnover rates were high, effective training programs were implemented and technical skilled labor was attracted as plant size increased.

3) In the third stage, Delphi plants were not only oriented to assembly or manufacturing; they also participated in the integration of design, research and development with manufacturing. Intra-firm networks were created and new plants were located in other regions of the country. Along with the diffusion of lean manufacturing practices, there were also changes in human management practices. High skilled labor (engineers and high-level technicians) was attracted and local universities and technical schools began to offer careers to cover the increasing demand for competent human resources.

Through these stages, auto part maquiladoras linked to Delphi have experienced an upgrading industrial process, they are not just assembly plants but are also able to decide the manufacturing infrastructure and procedures required to go from design to production. Despite these qualifications, they do not participate in high value added activities such as design and marketing which are under total control of the lead firm

Delphi. These auto part maquiladoras have made a substantial contribution to employment (skilled and unskilled labor) in the Chihuahua region, and they are technologically advanced and innovative in process and management practices. However these benefits are limited to the members of the Delphi vertical network, participation of local suppliers in the global network has not been realized. The transnational OEMs have not pursued a more indigenous strategy nor considered local co-development as part of their international sourcing activity. Another problem with this model is the supplier's over-dependence on the lead firm for decision making and production consumption. This situation contributes to the vulnerability of the whole sourcing network, and tends to occur when the OEM is a spin-off of the lead firm in the entire supply chain. The demand decrement for USA automobiles, GM in particular, has an immediate effect on Delphi production which resulted in plants closure or relocation into lower wage regions, and the subsequent deterioration of the region's social welfare.

The presence of a TNC as the promoter and coordinator of a sourcing network does not necessarily imply low participation of local producers. In the case of the Malaysian state of Penang, the semiconductor industry has grown with the participation of local producers. The TNC perceptions about local support structures, the industry rapid technological changes, and the need for short order cycles drove TNC decisions to extensively subcontract machine tooling and intensify local linkages. As a consequence of these actions, local firms improved their production and managerial practices and encouraged their suppliers to introduce statistical process control, scheduling and accounting methods (Doner and Hershberg, 1999). In Penang, the governmental policy not only promoted industrial decentralization and offered incentives to TNC to relocate in the region, but assured the provision of a high quality labor force (technicians and

engineers); and supported the SMEs with training programs and market information (Rasiah, 2002). Therefore, state programs should look not only for exogenous growth by promoting foreign direct investment but for endogenous growth by creating the conditions to strengthen the links between local producers and TNCs.

Figure 2 describes this second type of coordination of the sourcing network; the figure recognizes the problem of a reduced number of foreign buyers absorbing the OEM production. The reintegration of the automotive supply chains by the formation of parallel segments coordinated by OEMs that sustain collaborative as well as competitive interrelationships among them is questionable in terms of the participation and upgrading of lower tier suppliers and the increased portfolio of responsibilities of OEMs (Whitford y Zeitlin 2004; Bitran et al., 2006). These companies still retain the control in their respective value chains and exert significant pressures on their supply base to be efficient and attain cost reductions, and to align their individual objectives with the strategy of the OEMs resulting in inferior revenues for suppliers, low motivation for collaboration and the chance of decentralized production (Helper et al., 2000). Given the increased portfolio of responsibilities faced by OEMs they are transferring the same scheme of coordination to second tier suppliers, which establish hierarchical relations and vertical knowledge interchanges with third and fourth tier suppliers. Participation of domestic suppliers in such networks is restricted to those suppliers able to develop the required capabilities and production standards, then the need for public policies offering affordable managerial, technical and training resources to upgrade domestic suppliers is identified (Whitford y Zeitlin, 2004).

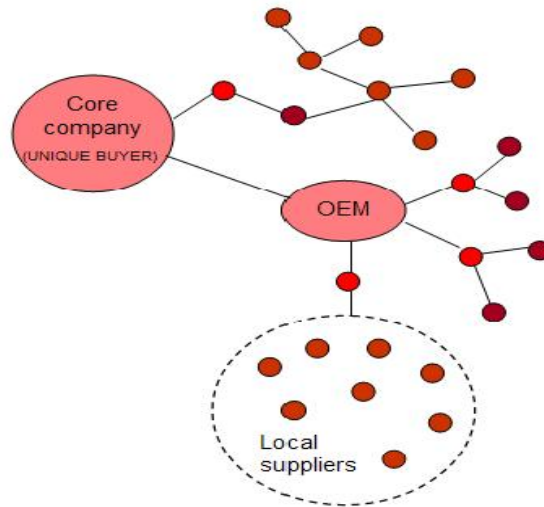


Figure 2. Sourcing networks without local links

III. Industrial clusters linked to global supply chains

The so called Lagunera region is a dynamic industrial cluster with a high concentration of firms in the apparel sector, particularly focused in blue jeans production. The main industrial parks are located around the city of Torreón in the northern state of Coahuila and others in the city of Gómez Palacio in the central-north state of Durango. The Lagunera region has a cotton textile and apparel tradition with a strong export-oriented maquiladora sector and has a good communication infrastructure permitting an easy connection with the USA. Before NAFTA (1993), clusters of local firms were serving the local market or were assembly subcontractors without horizontal ties among them. A few USA manufacturers and brokers were the lead firms in these networks since they dominated the access to the international market and provided the inputs for assembly, so local producers were dependent on the orders placed by these lead firms. NAFTA and the 1994 peso devaluation contributed to the reduction of labor costs and elimination of non-monetary barriers for all production activities in the region. The decrease in production costs promoted the entrance of new lead firms, brand marketers (e.g. Polo, Calvin Klein, Liz Claiborne, Tommy Hilfiger), retailers (e.g. Wal-

Mart, JCPenney, Sears) and international producers (e.g. Sun Apparel) looking for full-package production in the region. The entrance of these large foreign producers, marketers and retailers with high-volume orders and demands for more expensive and high-quality jeans contributed to the growth of the industrial region as well as the upgrading of production capabilities to fulfill quality international standards (Gereffi et al. 2002).

The expansion of the Lagunera region during the 90's was supported by the emergence of full-package producers which represent an evolution from the initial maquiladoras concentrated only in assembly. Full-package production requires performing several productive activities beyond assembly such as translating and adapting design to production, cutting, and finishing process (laundering and pressing in the case of apparel). Besides performing multiple manufacturing activities, full-production also requires the efficient integration and coordination with textile producers and suppliers of accessories and threads to attend the buyer's demands in a particular product line. To develop full-package production, Mexican firms with capital and expertise established successful associations with USA firms. Among these partnerships figure *Original Mexican Jeans Company (OMJC group)* one of the largest producers of jeans in the region, and Parras-Cone an association between a North Carolina mill company with one of the oldest and largest Mexican textile companies. OMJC group is the example we selected to describe this third form of coordination of a sourcing network.

OMJC was formed in 1992 as a joint venture between the USA manufacturer Aalfs and the Mexican Martín-Soberón producers; the objective was to take advantage of NAFTA and the low labor costs. In 1995, direct investment was made to expand facilities to

include laundry, finishing and packing activities; and in 1999 a distribution center with capacity of 150,000 ft² was open with the objective to improve delivery times, reduce costs, improve customer service (98% is the established service level), and facilitate the implementation of Vendor Management Programs (initial VMI was established in 2003 with GAP). Textiles, the most important raw material to OMJC are imported, mainly from USA and Canada, but Mexican fibers are also used (40% is domestic product) and supplied by Parras-Cone. OMJC sustains an alliance with this major textile producer and also a close relation with two local laundries because the increased complexity and duration of finishing activities has resulted in a differential between OMJC capacities for production and finishing. Then the relation with other major local producers specialized in particular activities is relevant to assure the integration of the apparel sourcing network.

At the beginning of 2000 when Asia gained advantage for apparel production at low cost, OMJC and all the firms in the Lagunera region faced a strong contraction of the demand. OMJC responded by augmenting their innovation and design capacities so they could move from producing standardized, large volume and low cost orders to the production of small orders of more value added products in alignment with fashion trends. To support this market re-orientation, OMJC has invested in a design and research center that develops and experiments with new dyes, textures and finishing for textiles. OMJC does not participate in the design and assembly of the jeans -the other critical activity included in the design phase- this activity is performed by the USA counterpart, Aalfs, in conjunction with the customer. The jeans' design is submitted via Internet to OMJC which analyzes its production' viability and prepares the samples to be approved by the customer. Actual customers include JCPenney, GAP, Old Navy,

Tommy Hilfiger, Abercrombie & Fitch, Duck Head (Aalfs own brand) and Harley Davidson.

Joint ventures are not uncommon business arrangements but this example is interesting because of the clear division of activities between the two firms so the association successfully matches the demand and supply sides. OMJC is the organization responsible of all production activities including the acquisition, test and innovation of textiles meanwhile Aalfs is responsible of the logistics and commercialization activities as well as the administration of relations with customers. The synchronization of activities of both firms results in an effective coordination model: Aalfs coordinates the flow of goods and information between the end customers and OMJC with respect to a particular product line, hence, the USA part administrates the knowledge about international requirements and creates/sustains the links with USA buyers; OMJC has the knowledge about local manufacturing capabilities, and it is in a better position to coordinate all the production activities, distribute production loads and consolidate the orders fabricated at its various facilities. OMJC also controls the participation to the sourcing network of textile producers and firms specialized in finishing activities, with preference for a reduced number of close partnerships with well established firms (Parras-Cone and the laundries) specialized in the initial (textile production) and final (laundering and finishing) activities of the productive chain which contribute to the differentiation of the products.

Positive results of the re-orientation of OMJC's strategy include improved wages and conditions for workers to compliance with customer's policies (regular supervision visits and audits are performed by customers), skill upgrading, active participation in

the innovation and design of new textiles, and preservation of critical but few backward linkages. But despite OMJC productive competitiveness, front-end activities such as marketing and customer's relation management are still dominated by the USA firm (Aalfs) which has even developed its own high-prestige brand. Another problem with this model is again the overdependence on a few USA customers, to OMJC the unique customer is Aalfs which absorbs all production and distributes it to customers, so reduction in demand affects the full-package network. At the strategic level, Aalfs still serves the high volume and low cost market by producing in Pakistan and Nicaragua while the Mexican facilities are dedicated to serve customers that require lower volumes but demand flexibility, delivery times, high quality, and products with high value added through innovation and design.

This vertically integrated sourcing network has emerged and grown thanks to the following conditions: a) the development of full-package production supported by direct investment of the USA and Mexican firms, b) the location of the sourcing network in a region with textile & apparel production tradition, technological and logistics capabilities, capital availability and entrepreneurship activity, and c) the export-oriented strategy of the coordinator firm. These characteristics are in alignment with the Greater Tucson Strategic Plan (Enright and Roberts, 2001 pp. 78) with respect to the characteristics of firms cited as critical for the development of a sourcing network: stable firms with the capacity to be globally competitive, that use significant local labor and suppliers, support export-oriented business and with the best potential for joint international ventures. Figure 3 describes this third type of coordination model where the coordinator combines the expertise of local and foreign manufacturers to create and sustain backward and forward links. A problem with this model is again that upgrading

and knowledge sharing is restricted to the participants owned by the manufacturers which buy from local suppliers without promoting partnerships with or among them.

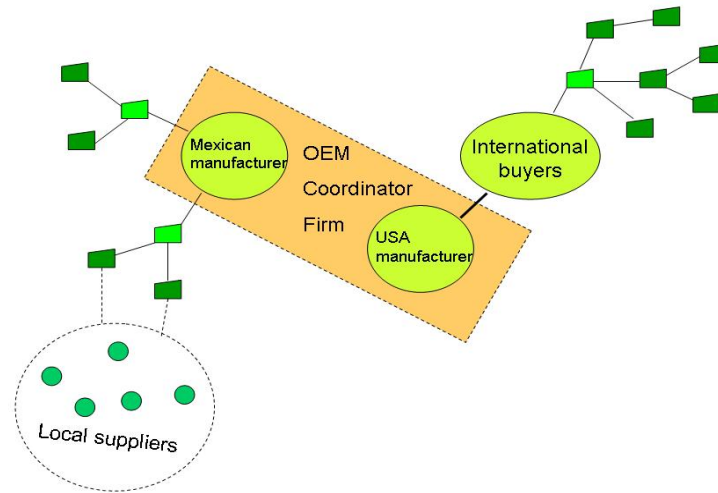


Figure 3. Industrial clusters linked to global supply chains

IV. Sourcing networks coordinated by a trader

Traders are not members of the supply chain but neutral third parties connecting suppliers' clusters with the international market. These firms are not just brokers, they are in charge of the integration (information interchanges and development of communication and collaborative performance systems) and coordination of all the activities (production, order consolidation and logistics) related to the sourcing of a particular product line. These firms do not have manufacturing facilities of their own but have the capacity to facilitate production because of their knowledge about regional production capabilities and their abilities to network multiple suppliers and establish links with international buyers.

These intermediaries are widespread in East Asia (Bair and Gereffi, 2002) but still emerging in Mexico, the most notorious Asian case, already described, is Li & Fung which has evolved from its original trader position to become a SC coordinator or “mini-maestro”. The two cases in this section describe the role of Mexican traders as coordinators of sourcing networks, the identified traders are not as advanced in their services and capabilities as Li & Fung, but resemble the position of this company at the beginning of the 90’s. As previously mentioned, we provide an extended discussion for this last model given the interest in the identification of third parties approaching the role of “mini-maestro” and in order to develop additional knowledge about the profile of service companies able to play this role.

Case a. Tonalá and Tlaquepaque Consolidators

Tonalá and Tlaquepaque are two small towns located near Guadalajara with a strong handcraft tradition. In 1998, there were 925 small-medium handcraft producers in Tlaquepaque and 1875 in Tonalá, these SMEs produce a high variety of customized products (sculptures, pottery, glass, maché paper figures, furniture, ceramics, etc.). The region is actively involved in exports, mainly to USA, Canada and some European countries. Most of the producers do not export directly; exporting activity is dominated by intermediaries like brokers and consolidators (this term is used in the region to denominate traders), which play a critical role in the products commercialization and export by serving as knowledge links between producers and buyers, these consolidators contribute to the handicraft districts development and sustainability (Mercado, 2002, 2006).

Production capacity is usually limited and insufficient to fulfill large orders, also product quality and prices are variable, but SMEs have diversified their production techniques to attain high flexibility and pursue specialization and originality instead of standardization. They have good capabilities to customize products according to trendy designs although they are not identified as design innovators; they tend to replicate saleable designs. These firms sustain kinship ties and constitute a close community expanded through family linkages. The handicraft producers subcontract and acquire raw material (glass, iron, clay and wood) from other family members or former employees located in the same region, resulting in full-package production under a unique family or workshop name. The demand for these hand-made products is constantly changing and there is an intense entrance and exit of buyer firms. SMEs have developed strategies to search and find clients and rely heavily on their participation in local and national trade exhibitions and the creation of commercial districts serving as wholesale points for international buyers. In general, all small producers in the area are willing to participate in these commercial districts because they recognize the importance of external links for the sustainability of their production (Mercado 2002, 2006).

The majority of the consolidators limit their services to the consolidation of the production of multiple suppliers serving a unique customer. The regular services portfolio includes: transport subcontracting and negotiation, preparation of all the export documents (e.g. certificate of origin, bill of lading and shipping manifest), supervision to custom brokers and administration of payments. But some of the consolidators have enhanced their services and play an active role in the upgrading of artisans' capabilities.

This is the case of RRR*, a small service company located in Tonalá which has been in operation for 22 years. The owner of this company actively promotes the abilities of the handicraft producers among international buyers -mainly home designers, architectures, retailers and wholesale distributors of handicrafts of USA origin- and serves customers that look for value added and reliable services over low price. Customers rely completely on RRR for quality control, and also for special packing and labeling (plastic racks instead of wood, no paper bags, bar coding in products, etc.). Transportation is subcontracted, but RRR uses USA containers on Mexican trucks to facilitate the transfer of goods at the border, and maintains close relations with Mexican and USA custom brokers based on its reputation.

The company sustains close, long term and trustworthy relations with around 150 suppliers of different products (glass, wood, furniture, ceramics, etc.) and absorbs between 10-80% of their production. Those suppliers that have been strongly supported by RRR to improve product quality and develop/transfer new designs have become exclusive. RRR helps handicraft producers in multiple ways: supports suppliers in the identification and acquisition of raw materials (e.g. new paints), transfers design and supervises production, always respecting the individuality of artisans. RRR also assists producers to perform the required tests to fulfill international security standards (e.g. lead content in pottery) and helps them to solve technical problems, to elaborate budgets and to regularize their fiscal situation. Submitted orders are carefully revised to guarantee product quality, with basic quality specifications even defined by RRR. If some of the producers do not deliver orders on time or orders are incomplete, the consolidator establishes contact with the producer to inform and correct the situation. In

* The owner of the firm asked for anonymity, therefore firm's name is omitted in the discussion.

the occasional event that a customer does not pay for his order, RRR shares the loss with the involved suppliers. The existing reciprocal ties allow the on-going resolution of problems and the diffusion of best production practices.

Another relevant example of a sourcing network coordinated by a third party is the Mexican designer-consolidator identified as AAA*. AAA is closely related to one of the most traditional consolidators in Tlaquepaque. This consolidator supported AAA to establish links with qualified suppliers and valuable customers, and transferred the knowledge about production capabilities and market preferences and needs. AAA subcontracts the services of this consolidator to deliver the orders to the USA customers. AAA also subcontracts production to around 80 workshops, absorbing around 30-80% of their capacity. AAA grants special credits to the suppliers in its network so they can begin production or acquire new machinery. Regular production is not usually supervised by AAA, the company relies on the outstanding abilities of the producers, and if production is not acceptable, rework and losses are shared or absorbed by AAA in an effort to develop suppliers' loyalty. AAA also supports its suppliers in the acquisition of raw materials, with the introduction of innovative finishing and protection processes, and with new design transference. For some products, AAA performs finishing activities or makes final assembly. Protection of AAA designs is difficult; some of the suppliers become exclusive if they are dedicated to production of original designs.

The owners of these consolidator companies have a profound knowledge of the producer and buyer culture and environment that allows them to take advantage of local

* The owner of the firm asked for anonymity, therefore firm's name is omitted in the discussion.

governmental policies (e.g. tax exemption). These consolidators sustain stable and long-term relationships based on trust and loyalty with the producers, communication is more intense when new designs or samples are required. The accumulated knowledge consolidators have about outstanding artisan capabilities and USA buyers' preferences allow them to function as a "cultural bridge" between the artisan producers and the international buyers. The artisan network is visualized as a repository of experiences, tacit knowledge, social and family ties that have been absorbed (RRR case) or indirectly transferred to the consolidator (AAA case). The intervention of these companies in the buyer-driven chain has contributed to the development of a good reputation for the handicraft abilities and reliability of the local producers and promoted the development of new products and designs attending to international trends. Originality and innovation in design for the handcraft chain is equivalent to research and innovation for product-driven chains, by creating own designs based on popular art (AAA) or by transferring information about fashionable designs (RRR), the consolidators are not only coordinating production but also have an active participation in the high-value activity of design.

Consolidators maintain an open and continuous communication with customers and producers; however interaction with producers is closer, personal and on a regular basis while interaction with customers is intermittent and via telephone or e-mail. Consolidators facilitate the exportation of relatively large volumes of handicrafts; the delivery of small orders to international end-customers is performed by regular carriers (e.g. DHL) under the direct responsibility of the final customer.

Case b) Aztex Trading

Another identified supply chain coordinator, not part of the chain, is Aztex Trading S. A. de C. V. (<http://www.aztex.net>). This firm is defined as a “service and knowledge company” which provides customers a full-service package, from finding the fabrics and adapting or innovating textile’s designs, identifying manufacturing subcontractors, developing products according to specifications, consolidating production and assuring quality and on-time delivery. Aztex is classified by Mexican rules as a consolidator agent, this classification gives the company the privilege to buy products for export from Mexican manufactures without paying the regular purchasing taxes, thanks to this advantage, Aztex can pass savings to its international customers.

The trading company, based in Mexico City, has an experience of 15 years and has been awarded several prizes including the National Prize for Exporting for Commercialization Enterprises in 2000. Aztex has a staff of 40 people working along the 16 offices located around the country (North, Bajío, Central and Southeast). The Aztex personnel include specialists who develop or locate raw materials, and certify and develop new suppliers; textile engineers in charge of production supervision, quality inspectors, and a staff supporting logistics activities. Information technology (IT) is used for communication and information interchanges with the regional offices but intense personal interchanges characterize the relations with the producers.

According to Patricia Medina, founder of the company, and Aztex’ CEO, the company was in the past more a “production supervisor” than a trader, Aztex used to supply orders from international brand owners –Liz Liz Clairborne, Boss, Nautica, Dockers, ESPRIT, Polo Jeans Co. and JNY- looking for the advantages of low cost labor, geographical proximity to the USA and governmental policies favourable to

exportation. But when all these customers decided to source from Asia at the beginning of 2000, Aztex's strategy changed radically and the company redirected its strategy to serve large and prestigious local retailers and brand owners, actual customers include two of the most important Mexican departmental chains - Liverpool and Palacio de Hierro- retailers like Julio and Ivonne and brand owners like Maringo. These new Aztex's customers are looking not just for high volume and low prices, but for top quality, flexibility and reliability, and they recognize the value added services provided by the trader and the convenience of local production to reduce order cycle times.

Aztex services include the sourcing of threads, textiles and accessories, advising customers and producers about trendy textile and garment designs, preparation of samples, production planning, order tracking, quality assurance, order consolidation and final delivery at the warehouse of the customer. The coordinator services of this trader does not only cover production activities, but also all the logistics required to move raw materials and trimmings to multiple production facilities, the administration and movement of inventory in process, the consolidation of orders at Aztex's warehouse in Mexico city and the final delivery to the customer. Logistics planning is performed at the executive level, and execution is completed with the assistance of a third party that provides the transportation service. No information technologies are used to track orders or to interchange information with customer about order status, but there are clear pathways and dates to be satisfied that are regularly revised to assure customer service.

Aztex's executives confirm that garment assembly has been the long-established and exclusive activity for many Mexican firms, but recognize this is an insufficient production capability to satisfy international buyers. The textile & garment chain

involves the suppliers of raw materials (threads, textiles and multiple trimmings), the firms that launder and finish the textiles (laundries), and the ones that design the patterns and cut the fabric. At the end of the chain, there are the assemblers or confectioners (maquileros) and other firms that do the dyeing and stitching. The activities of all these integrants of the garment chain are required to have full-package production; Aztex coordinates and synchronizes all these activities to effectively fill the “holes” in the textile & garment supply chain. These “holes” in the chain include not only production but also logistics activities such as the transportation at a competitive price, of small and frequent volumes of semi-finished and finished products among the different regions where the specialized suppliers are located.

Another important achievement of Aztex as system integrator is the reduction of the order cycle by decreasing the length of the design transference phase. Aztex is able to produce and deliver a particular garment in eight weeks on average, versus the six months required to produce in Asia where delivery time is around half of the phase duration. Aztex’s executives indicated that this time reduction also decreases the uncertainty about product’s acceptability and the need for markdowns at the end of season. When garments are produced six months in advance, the risk of low acceptability (poor sales) is estimated in 50% but when garments are produced two months before the season when more information about market trends and preferences is available, the risk of poor sales is reduced to 20%.

Aztex supports suppliers in translating design to production, promotes their raw material and designs (textiles in particular), assists them in the development of a proposal for the customer, provides information about recent fashion trends in the international market, conducts qualitative market research studies to market test new

textile's designs and gives feedback about the acceptance of the garments fabricated under its management. Aztex's original supplier network was formed after the development of a supplier directory; suppliers with export experience located at different regions in Mexico were selected (Hernández, 2002) but the directory is continuously updated according to market needs and the evolvement of the supplier's base. Aztex's executives consider critical to sustain close and personal relations with suppliers, and to understand their cultural and work preferences, these interactions are judged critical to develop trust and collaboration and to assure their compromise and loyalty. The coordination of a supply network that is geographically dispersed around the country calls not only for synchronization of activities but also for the development and management of horizontal linkages between members specialized in the different activities that constitute the apparel supply chain.

Aztex's interaction with customers is intense only during the design phase, but once customers have selected the season's catalog, they trust Aztex to perform all the activities required to fulfill the order and to deliver it on the promised time. Actual customers do not ask for an order tracking system, regular reports or continuous communication, they rely completely on Aztex's services and just expect for their orders to be delivered as expected. Aztex's executives state that customers are not interested in supervising production or logistics activities, "that's why they contract us, it's our job". New Aztex's customers are focused on end clients that value design originality, quality and clothes' fitness (well shaped and adjusted to local taste and physical complexion). Aztex's customers do not want to acquire high volumes of garments with designs similar to the ones carried by competitors, and try to avoid

frequent markdowns. Therefore, they prefer to buy small volumes of products with exclusive designs and made with high quality/original fabrics. By buying small lots of garments, the department stores and retailing chains renovate frequently their stock, so they can offer a “fresh” and distinctive image to end customers and sell most of the seasonal products at regular price. To support its customers’ strategy, Aztex gathers information about international fashion trends (top executives travel regularly to fashion centers in Europe) to advise customers about new designs and to enhance the initial catalog proposed by each customer at the beginning of the season. Then actual Aztex’s benchmarks are not the low-cost Asian textile-garment chains but the ones linked to European customers like those developing in Turkey; these chains do not compete on low price and high volume but on mass customization and flexibility.

Figure 4 describes this last type of coordination model identified in Mexico. The trader (represented by the specific cases of consolidators and Aztex) is identified in the figure as the SC coordinator which constitutes the basic link between production and demand sides. The SC coordinator tenders to the buyer a valuable and integral package of services, including design, production and logistics, and to the supplier side the link with the international market without the need to perform other activities besides specialized production. The cases show Mexican SC coordinators have strong backward linkages and have developed knowledge about the production capabilities, organizational culture and business negotiation styles prevailing in their sourcing networks. This knowledge is not enough to orchestrate the network, companies with intra-cluster links have this expertise but have not been successful (Model 1) because their neutrality and leadership was not recognized by suppliers. Independent traders have a better opportunity to evolve to SC coordinators or mini-maestros because they

do not belong to the sourcing network and therefore suppliers do not feel dominated or in competition with them. Suppliers remain independent since they are not owned or work exclusively with the SC coordinator, and therefore can allocate their remaining production with other buyers if they find it convenient. Another advantage of traders or consolidators as SC coordinators is that they serve multiple customers; this assures stability in order volumes so suppliers and trader are not too dependent on a single buyer.

Traders are also in a better position to open forward linkages with respect to local manufacturing firms with an export orientation. This advantage is because they are service oriented companies, and therefore have developed different competencies and a stronger customer-orientation than manufacturers. Large manufacturing firms acting as coordinators could compete with the focal company in the entire supply chain, for example some of the large full-package producers located in the Lagunera region could turn into Original Brand Manufacturers (OBMs) once they have acquired the links and absorbed their former partner' knowledge about the international market (e.g. Lajat Group purchased its USA counterpart Kentucky and the Mexican manufacturer Siete Leguas ended its partnership with Sun Apparel once it acquired enough export expertise). But traders like Aztex do not represent direct competition because they are service companies fully devoted to coordinate their customer's sourcing network.

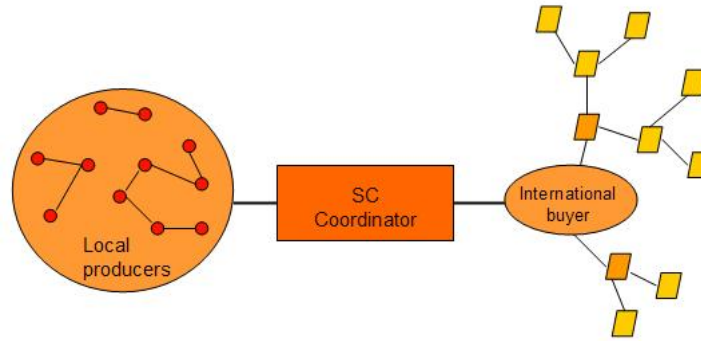


Figure 4. Sourcing networks coordinated by a trader

The following table summarizes our description and contrasts the four models with respect to several dimensions identified as critical.

Table 1. Comparison among four organizational models for SC coordination

<i>Dimension</i>	<i>Regional industrial clusters as auto-coordinators for the sourcing network</i>	<i>Sourcing networks without local links</i>	<i>Industrial clusters linked to a global supply chain</i>	<i>Sourcing networks coordinated by traders</i>
Profile of the SC coordinator	The largest and more entrepreneurial manufacturing firms in the cluster	OEMs serving as first tier suppliers of TNCs, or dominant firms belonging to the SC	Joint ventures or partnerships between large local and international manufacturers, both integrants of SC	Local or international service and knowledge firms: traders, brokers, neutral third parties
Production and logistics activities	Performed by producers in the cluster, assistance from governmental agencies and industrial groups	Performed by the SC coordinator, logistics possibly performed by 3PLs	Performed by the SC coordinator, logistics possibly performed by 3PLs	Production supervised by the trader, logistics could be performed by the coordinator or by 3PLs
Participation of domestic producers	Intense and direct	Indirect and limited	Direct but limited	Intense and direct
Suppliers' control	No control, voluntary participation to constitute the sourcing network	Tight control, suppliers owned by SC coordinator	Tight control, suppliers owned by SC coordinator	No control, voluntary participation to constitute the sourcing network
Suppliers upgrading	Ineffective and with high differentials, mainly related to conformance to	In product and process, but no participation in high-value added activities	In product and process, but no participation in high-value added activities	In product and process

	international quality standards			
Contribution at regional level	Employment and industrialization, increased export activity	Employment, human resource upgrading, industrialization and export	Employment, human resource upgrading, industrialization and export	Sustainability and competitiveness of existing SMEs, more export activity
Type of network	Horizontal integration supported by social networks	Vertical integration, mainly arm-length ties	Vertical integration, mainly arm-length ties	Horizontal integration, partnership ties
Coordinator effectiveness	Ineffective, limited capabilities, (financial, logistics, establishment of forward linkages)	Effective, high production expertise, with financial resources and forward linkages.	Effective, high production expertise, with financial resources and both backward and forward linkages	Effective, high networking capabilities, profound knowledge about local producer capabilities, customer and service oriented

Part 2: Sourcing Networks Coordinated by Emerging Mini-maestros

The description of the cases of Mexican traders identified as emerging coordinators is extended in this section by presenting a detailed identification of all activities in the supply chain performed or administrated by the trader, a diagram depicting the role of the trader in the supply chain, and the recognition of those activities usually poorly executed or in need to be improved if the trader is going to be acknowledged as mini-maestro.

The map of the logistics supply chain which was used to analyze our findings, shows how the trader manages the product, information and cash flows to structure a flexible supply chain according to the customer's needs, as well as the interactions between the trader and other SC participants. The logistics supply chain maps were constructed by using the UPS Supply Chain Process Flow template. The additional information collected from suppliers was used to complete the analysis.

Production in the chain is the responsibility of competent suppliers selected and supervised by the SC coordinator then production is not usually problematic. Deficient activities are mainly related to logistics, the options for the trader to improve them are: a) the development of additional capabilities to cover the deficiencies and even capitalize on them like Li & Fung does through the IDS group, or b) the selection and administration of competent and reliable logistics providers (3PLs). This second alternative opens the opportunity for the participation of other third parties in the network that will be coordinated by the trader in a similar way that it coordinates multiple producers and carriers. The establishment of collaborative partnerships with such external agents can be an effective means to overcome the weak logistics abilities of the trader.

Case a. Tonalá and Tlaquepaque Consolidators

Five micro to small producers linked to consolidators were interviewed. All of them are family businesses; three are specialized in a particular line of products (glass, pottery and furniture made from iron) and the others manufacture or commercialize a broad variety of products. They sell directly in the area, but export part of their production (25-90%) mainly via the consolidators. All suppliers agree consolidators facilitate the exportation process and supports producers to assure appropriate delivery times, allowing them to concentrate on production. However the artisan's perceptions about the extent of benefits derived from the relation with the consolidators differs. The pottery producer perceives low value added by the consolidators' services, meanwhile the other two specialized producers consider the relation with the consolidators as an opportunity to acquire information about trendy designs, fulfill international standards,

and acquire new customers. Two of the five artisans also consider their relations with the consolidators have helped them to introduce new designs and materials and to maintain or even increase their sales volume. Column 1 in Table 2 describes in detail the activities executed or administrated by the consolidators and the second column shows those activities particularly related to the development of the artisan producers.

Table 2. Consolidators in the artisan Guadalajara area: services and activities to support the suppliers' development

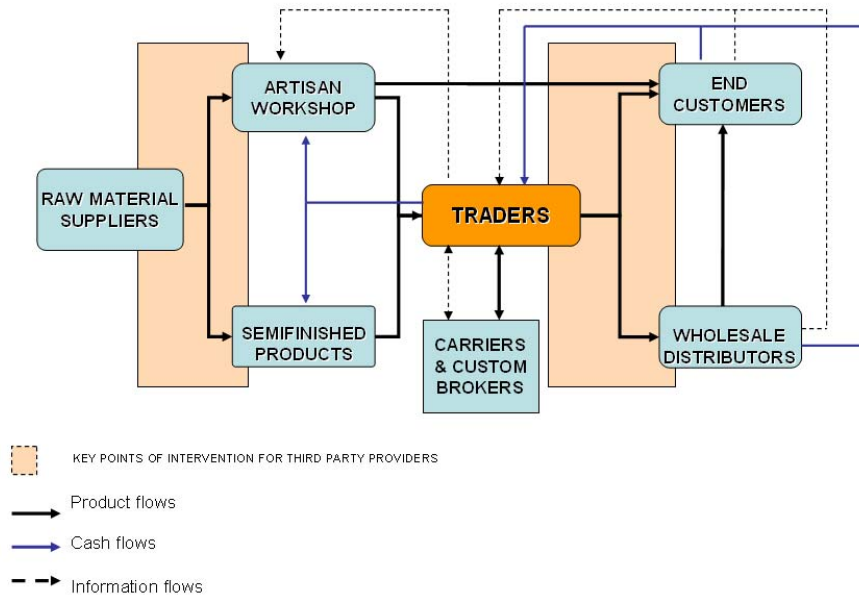
Case	Portfolio of services	Supporting activities to suppliers
RRR	<p><i>Logistics activities</i> Consolidation of the orders of a unique customer Order verification (completeness, quality, composition) Supervision of custom brokers (USA and Mexico) Transportation management. Carriers are selected to take advantage of NAFTA</p> <p><i>Design</i> Adaptation of customer's design production capabilities of local producers Supervision of design's transference to production</p> <p><i>Production</i> Quality control of final goods Tests to final products to guarantee safety according to international standards Finishing, packing and labeling</p> <p><i>Finance and accounting</i> Administration of payments to suppliers Consolidation of supplier's invoices to prepare a unique invoice and an official document for exportation</p>	<ul style="list-style-type: none"> - Promotion of designs and protection of their originality - Assistance during the transference of design to production - Assures to (exclusive) suppliers in network a stable volume of sales - Acquisition of raw materials - Technical advice during production and transference from design to production - Consultancy about accounting and costing issues - Price and payment negotiation - Payment claim and recovery - Share risks with suppliers
AAA	<p><i>Logistics activities</i> Consolidation of orders of a unique customer Subcontracts transportation and exporting to consolidator A</p> <p><i>Design</i> Creates original designs according to international preferences</p> <p><i>Production</i> Subcontracts manufacturing to multiple suppliers Quality control of final goods Finishing, packing and labeling</p> <p><i>Finance and accounting</i> Administration of payments to suppliers</p>	<ul style="list-style-type: none"> - Assistance during the transference of design to production - Credit to closest suppliers for raw material acquisition - Acquisition of raw materials - Assures to (exclusive) suppliers in network a stable volume of sales and continuous renovation of designs - Share risks with suppliers

Figure 5 depicts graphically the map of the logistics supply chain for these two consolidators, those activities or links that represent areas of opportunity are identified and marked in the diagram as opportunities for the participation of logistics providers; these specific activities are additionally explained after the diagram.

Figure 5. Consolidators in the artisan Guadalajara area:

Supply chain process flow and identification of challenging activities

Logistics Network: *Handicraft Consolidators*



Supply Chain Activities	Challenges / Critical points
1) Sourcing of raw materials	a) Identification of materials with acceptable quality (e.g. wood, paint) b) Local shortages and high costs of raw materials (e.g. iron)
2) Verification of order	a) Quality assurance of final goods (major defects) b) Order composition (quantity discrepancies)
3) Order delivery	a) Suppliers do not satisfy delivery times (late delivery) b) Unreliable and cost competitive transportation services c) Transportation acceptable only for FTL, reduction of

	transportation costs for LTL and small packages
4) Payment management	Direct payment to producers to avoid payments' delays and deception to artisans
5) Order documentation	Consolidation of multiple invoices
6) Custom brokering	a) Delays when crossing the border due to queues and revision b) Product damage because of improper material handling during inspection
7) Market diversification	a) Competitive prices, Chinese products are cheapest but some are not hand-made or materials are of inferior quality b) Reinforcement of handicraft image (originality, creativity, quality)

Case b) AztexTrading

Aztex's executives consider the company maintains symbiotic relations with suppliers in its network; however the interviews we conducted with the sales manager of two important suppliers linked to the Aztex's network, Mission Blues and Garment Washer (MB & GW from now on) both located in the Lagunera region, and with the general director of a textile company (referred to in this paper as FFF*) located in the state of Mexico, which is a minor supplier of Aztex, indicate that relations and benefits vary depending on the capacities and market position of the supplier. MB & GW were integrated to Aztex's supplier directory due to the high quality and competitive cost of their production. MB is dedicated to manufacturing while GW is specialized in finishing; both suppliers have developed strong design and customization capabilities that along with their production abilities allow them to offer services of assembly, half-package and full-package production. MB & GW combine their abilities to provide full-package production, under this scheme MB/GW also participates in the development of new designs – of both textiles and garments- according to customer's preferences and/or submitted samples. During the design phase, MB/GW works in conjunction with Archetype, once the client has selected and approved products, Archetype receives the

* The general director asked for anonymity, therefore the company's name is omitted in the discussion.

order and submits it to MB/GW for its production, once the order is completed, it is sent to a distribution center located in the city of Laredo at the USA-Mexican border.

MB & GW usually provide only assembly or half-package services to Aztex, the trader supplies the entire designs and all or part of the textiles and trimmings required to fabricate the products. Then Aztex is viewed by MB/GW as another customer that demands trendy and high quality garments with a “perfect” fit. As other competitive producers in the Lagunera region (see the example of OM/JC in previous section), the pair MB/GW is a large and experienced producer which has re-oriented its capabilities to serve customers that value fashion and superior quality over price. However, MB/GW recognizes that its relation with Aztex, as well as with other customers like JCPenny’s and Mass Industries (the Limited and Express) have contributed to the upgrading of production capabilities and working conditions, the reduction of delivery times, wastes, rework and inventory, and the simplification of the company’s structure which is now more flexible and agile. Since MB/GW is able to provide a broad range of services that goes from assembly to full-package production, its relation with Aztex has limited benefits; but for those firms that can only execute particular activities (textile production, laundry or finishing) the partnership with the trader could be more beneficial because Aztex virtually creates full-package production when acting as system integrator or mini-maestro. According to the general director of FFF, to this lace manufacturer it is very important to maintain relations with firms that offer full-package production services because they absorb most of FFF’s production and connect the company with international brand owners such as Victoria’s Secrets, Avon and Fuller. FFF decided not to become a full-package producer because this decision would imply

to compete with its current major customers and expand their traditional productive capabilities, instead FFF decided to remain as a specialized manufacturer but made additional investment to develop new trendy designs (patterns, colors and textures) that increase its attractiveness as supplier to full-package producers. Then particular textile producers are particularly benefit from their relations with Aztex, the trader maintains a textile directory (denominated “teleteca”) with the support of the Mexican Ministry of Economy with the objective to promote domestic textile production and to keep an actualized record of all new textiles and materials that are being developed by Mexican producers. At its main office in Mexico City, Aztex maintains samples and a limited inventory of those textiles fabricated by qualified producers linked to its network. Table 3 summarizes the activities performed by Aztex on behalf of its customers and to support the suppliers.

Table 3. Traders in the textile and garment sector: Aztex’s services and activities to support suppliers’ development

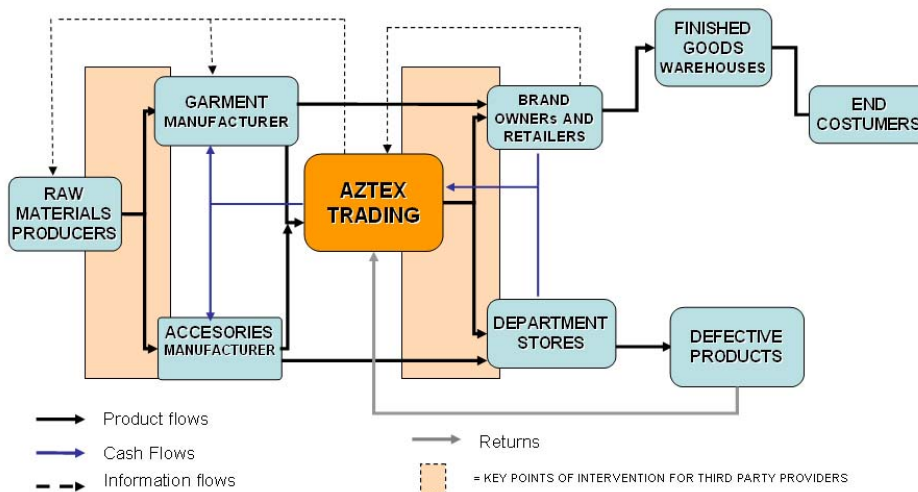
Case	Portfolio of services	Supporting activities to suppliers
Aztex	<p><i>Marketing</i> Continuous (informal and mainly qualitative) marketing research to identify fashion trends and customer’s reactions to new products</p> <p><i>Design</i> Active participation in the design of products Maintenance of a “teleteca” (fabrics directory) and investigation about new fabrics Identification of specialized firms that could do the finishing to fabrics Preparation of samples and a complete catalog of potential designs for the customer to chose</p> <p><i>Production planning</i> Simultaneous production planning for several seasons according to qualitative forecasts In advance acquisition of fabrics Reservation of assembly “space” according to demand forecasts Selection of suppliers and assignment of production loads</p> <p><i>Production</i> Supervision of production Quality control, definition of “soft”</p>	<p>Continuous information provided to producers of fabrics and garments so they can anticipate demand requirements according to fashion trends</p> <p>Marketing tests for new fabrics</p> <p>Assistance during the transference of design to production: finishing of textiles and appropriate fit of garments</p> <p>Acquisition of raw and complementary materials such as garnish, accessories and trimmings (e.g. marketer logo)</p> <p>Recommendation of new technologies and production techniques to keep pace with new styles for fabrics and garments</p> <p>Feedback to producers of fabrics and garments about the acceptability and movement of goods (e.g. “mystery shopper”)</p>

<p>specifications and required “fitness” of the product</p> <p><i>Order management</i></p> <p>Verification of final order completeness, quality and composition</p> <p>Order assembly by consolidation of the production of multiple suppliers</p> <p>Order delivery to customer</p> <p>Preparation of all documents required for exportation when necessary</p> <p><i>Additional logistics activities</i></p> <p>Selection and management of transportation</p> <p>Routing and scheduling</p> <p>Return of unsold products upon customer’s request</p>	<p>Continuous mentoring to suppliers</p> <p>Payments to suppliers once the orders are picked even when Aztex has not yet received the customer’s payments</p>
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Figure 6 shows the map of Aztex’s logistics supply chain along with those critical activities requiring improvement or revision to make Aztex a competent mini-maestro.

Figure 6. Aztex Trading in the textile and garment sector
Supply chain process flow and identification of challenging activities

Logistics Network: Aztex Trading S. A. de C. V.



Supply Chain Activities	Challenges / Critical points
1) Design	<ul style="list-style-type: none"> a) Continuous marketing research using more objective and systematic techniques (at present this function mainly relies on top management experience) b) Additional time reduction of the design and transference phases to attain more flexibility. These two phases are the longest.
2) Sourcing of raw materials	<ul style="list-style-type: none"> a) Efficient collection of fabrics and garnish produced at different locations to pass them to assemblers b) Development of additional directories (textile directory is already implemented) of producers of different garment's accessories c) Identification and development of finishers and launders
4) Order assembly	<ul style="list-style-type: none"> a) Efficient collection of clothing pieces produced at different locations for laundering and finishing b) Efficient collection of finished garments to assembly final order
5) Order delivery	<ul style="list-style-type: none"> a) Development of efficient logistics decisions (e.g. routing and scheduling) b) Cost reduction for transportation of small volumes within a medium size region
6) Marketing	<ul style="list-style-type: none"> a) Acquisition of new international customers looking for flexibility and a high value services b) Diversification to other products; at present denim is the main product line

Despite the popularity of Asia for apparel sourcing, Mexico's specific advantages (location and commercial policies) have the potential to attract new international buyers without production facilities or a developed sourcing network -Inditex and Hugo Boss have recently asked for Aztex's services and OMJC managers mentioned Liz Clairborne is exploring the possibility to bring back production to the Lagunera region-, these international buyers could benefit from the services of trading firms able to offer reliable coordination and knowledge services. According to the case studies (Aztex and OMJC), apparel sourcing networks in Mexico will resurge as customer-oriented, flexible and prime quality networks capable of textile design and logistics as additional value-added activities. Mini-maestros could play a relevant role in the development and expansion of such networks.

Conclusions and implications

The supply chain is an effective means for suppliers' learning and upgrading, but this depends on the compromise and attitude of the lead firms in the chain. When lead firms pursue international outsourcing, the segment of the supply chain corresponding to the full-package sourcing of a product line is coordinated by several agents in Mexico: larger firms or associations in regional clusters, local and international OEMs or well established manufacturers and traders. The current coordination models, specifically the first three, exhibit problems of over-dependence and control of the lead firms, restricted participation of subsidiaries or domestic producers in the supply network and in other activities besides production.

Regional industrialization and economic development depend on the links of domestic firms with other firms, in particular those in the international market. Backward linkages, i.e. relationships among producers in a cluster, are insufficient for international competitiveness, then coordination from inside the cluster (Model 1) is ineffective because participants do not have the financial, expertise and knowledge resources required to establish forward linkages and to support the upgrading of the sourcing network. SC coordinators emerging from a regional cluster also face the problem of leadership recognition and credibility.

A successful SC coordinator should integrate knowledge about the supply and demand side, be able to assure the financial sustainability of the sourcing network, help suppliers to attain product quality and security standards, guarantee on-time delivery and reliability to the customer, and promote the participation and development of domestic

suppliers. But when these coordinators are OEMs without local links, for example traditional and even new generations of maquiladoras, only suppliers in the vertical network improve their human, technical and administration capabilities. Despite the technical and production improvement attained by participant suppliers, they do not participate in other high-value added activities such as marketing and design; the SC coordinator appropriates most of the value of the sourcing network. The third model for SC coordination identified in the Mexican context -Mexican-USA joint ventures located in the Lagunera region- is an efficient coordination alternative but results again in a vertical network where only proprietary plants and a few key suppliers have access to benefits.

The last type of SC coordination model we identified corresponds to the cases of consolidators and Aztex Trading. These third parties support suppliers indirectly by monitoring and assisting them during design and production so they can fulfill customer's expectations. They also advice suppliers about new raw materials, technologies and production processes; thanks to their intervention, domestic producers can innovate in design and offer products that are aligned with market preferences and trends. Instead of constructing new facilities, these SC coordinators take advantage of the prevailing production capabilities of a region to define product designs and structure the sourcing network. They try to develop the production potential of micro to medium sized producers or take advantage of the expertise of larger suppliers to fabricate customized products, connecting and synchronizing multiple specialized suppliers to provide "full package" production. The participation of these agents allows producers to concentrate and specialize in manufacturing while the SC coordinator supervises and

consolidates the production to fulfill large orders and takes charge of the logistics activities required to deliver them.

Suppliers participating in sourcing networks coordinated by third parties, either a consolidator or a trader, usually work independently; these SC coordinators do not absorb the complete production, except in some particular cases, for example when artisans fabricate original designs provided by the coordinator (case of consolidator AAA). However, the SC coordinators promote in some way the production capabilities of the suppliers in their network. In the case of consolidators, they recommend specific suppliers to new customers, meanwhile Aztex maintains a textile directory (Teleteca) and selects suppliers according to their abilities to fulfill a specific order (Aztex's customers are not interested in direct relations with suppliers).

The services portfolio of the consolidators and trader includes their participation in the design, production, logistics and marketing activities of the sourcing network. The abilities and portfolio of services of these coordinators are not as advanced as Li and Fung, the mini-maestro benchmark. In particular, the identified Mexican system coordinators have not developed outstanding logistics capabilities, logistics is visualized as a supporting and secondary function. Consolidators and Aztex Trading rely on third parties, especially conventional carriers, to deliver orders to final customers and move work in progress across multiple production locations, assuming complete responsibility of all transportation management activities, namely identification of carriers, selection, contract negotiation, supervision, and direct payment to carriers.

Consolidators and Aztex Trading have oriented their services to a customer segment that look for reliable and high value added services over low cost. In consequence, they have increased their participation in the design phase, carry out some marketing intelligence activities like the identification of new raw materials and finishing techniques, and transfer information about best production and commercialization practices among the suppliers. All these activities contribute to provide customers with original and high quality products, releasing them from the responsibility of the establishment of relations with foreign suppliers, the supervision of production and the execution of logistics activities, therefore customers can concentrate on their core activities (marketing, brand promotion, etc.). Since new lead firms in global supply chains (marketers, retailers, and brand manufacturers) may have insufficient information about the production capabilities of potential partners, neutral agents with profound knowledge about the production characteristics of a sector, and a proper social orientation that contributes to trust development and knowledge transference can serve as links between buyers and multiple domestic suppliers. The participation of SC coordinators in additional high value activities like marketing and design enhances the importance of their position in the sourcing network.

According to experiences on other sites of the world - the biotechnology region Munich/Martinsried (Lechner and Dowling, 1999) - several groups contribute to the regional network structure, the first one is the knowledge broker and coordinator of the sourcing activities. Then there are the firms comprising the network, on the supply side the SME start-ups and on the demand side the large corporations (TNCs) doing activities in the region. The fourth and fifth groups are supporting organizations, like

academic institutions providing knowledge, research and human resources and financial agencies providing venture capital and economic resources. Bitran et al. (2007) propose that entities, called mini-maestros, could perform for a subset of the supply chain, all the required functions (coordination, knowledge transference, financial support and networking) by synchronizing the activities and efforts of all the participants in their subnetwork and sustaining proper network governance. Works in other areas of the world support the emergence of the mini-maestro concept. In East Asia, Li & Fung IDS group has been identified as a company fulfilling the basic characteristics related to the concept: management of knowledge, vocabulary, procedures, rules and technologies through which an economic activity is conducted, plus networking and logistics capabilities (Kooi, 2006). In Germany, the Bio-MAG (Lechner and Dowling, 1999), a public company related to a biotechnology cluster has goals compatible with the mini-maestro role: promotion of partnering and cooperation of firms, technology licensing, consulting services, marketing, brokerage of investors, networking with political institutions, and trade fair participation. According to our research, Aztex Trading is in Mexico one of the closest entities to the mini-maestro concept.

We focused our analysis of the Mexican coordination models on the profile of the SC coordinators, their contribution to supplier upgrading and the integration of domestic suppliers to global supply chains; additional research is required to precise the impact of each form of coordination on the exporting activity and socioeconomic development of a region. Another interesting research issue is to analyze the role of public policies in supply chain restructuring and governance. Some governmental initiatives supported by important OEMs located in Mexico have been launched with the objective to promote the integration of national suppliers to automotive chains, among them the Sonora

Model -the state of Sonora is located in the Northwest of Mexico- and the State of Mexico Automotive Cluster. These initiatives promote endogenous over exogenous growth and recognize regional suppliers have limited capabilities, capacity and financial stability, deficiencies that could be overcome only with the assistance of lead firms in global chains. Participant OEMs evaluate potential regional suppliers and provide them with the required technical assistance to become competitive in terms of quality, cost and on-time delivery, while state governments provide partial funding to participant suppliers and encourage inter-firm collaboration. The impact of such initiatives on the establishment of cooperative partnerships between OEMs and local suppliers, the upgrading of lower tier suppliers (third and fourth), the participation of local producers on traditionally vertically integrated supply chains and the resulting forms of coordination for the supply chain are important topics to investigate.

Results of this study also suggest the need for the emergence of new service and knowledge firms that could help other organizations to deal with problems of global sourcing and supply chain coordination, allowing international customers and regional producers to focus on their core competencies. These firms will provide basic information about the production capabilities of a region, advice about how to deal with local regulations and cultural issues, and a full package of services covering production and logistics. Neutral third parties operating as logistics providers or traders seem to have the essential capabilities and knowledge required to execute the mini-maestro role, but they need to promote themselves by partnering with critical international customers and develop additional coordination capabilities (e.g. traders require to attain logistics operational excellence and logistics providers to network with regional producers). The emergence of such SC coordinators could be beneficial not only to companies interested

in global sourcing and to producers with limited capacity or specialized in a particular manufacturing activity, these coordinators could also contribute to the creation, sustainability and expansion of sourcing networks with the consequent socioeconomic development.

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