

where demand is volatile or time-sensitive. The most efficient mass production technique is the “progressive bundle system” (PBS), which was developed during World War II when product variety was severely limited (Disher, 1947, p. 5). It is based on such extreme specialization and division of labor that any single task takes only seconds to perform and the total labor content of a garment is measured in minutes. However, so many tasks are needed to assemble parts into complete garments and it is so difficult to balance workflow along the assembly line, that production is slow and inflexible. A pair of pants requiring 40 operations can take 40 days to move through the assembly line, even though the average direct labor time is only about 24 minutes (Dunlop and Weil, 1996, pp. 337-338), and typical lead times for manufacturing and shipping range from 2 to 2½ months (Abernathy et al., 1999).

Such slow and inflexible mass production requires retailers to select styles and place orders far in advance of the start of each season, long before consumer demand can be predicted with much accuracy, and it precludes mid-season orders. This means that initial orders have to be large enough to meet an entire season’s demand and that retailers have to carry large inventories and absorb demand uncertainty through mid-season markdowns (Disher, 1947, pp. 3-4).

Conversely, efficiency in small production runs requires far less specialized labor. Each job involves a wider range of skills, takes longer to perform, and workers may also work in teams, but the entire process is faster and more flexible. In the extreme case, a single skilled worker assembles an entire garment.

The Rise and Fall of the American Supply Chain Model

Prior to World War II, U.S. apparel supply chains resembled those of Europe. Fashion products were quickly and flexibly produced by craft shops and by relatively small manufacturers and contractors, following a seasonal product cycle. Less fashionable women’s and men’s wear lent themselves to slow and inflexible mass production in larger manufacturing units with less use of contractors.

The introduction of the PBS system during World War II and the growth of mass retailing, however, shifted production towards large manufacturers in the early post-war period by virtue of their control over branded product designs and their ability to supply large quantities of product at relatively low prices. Large domestic manufacturers subsequently lost market control to large retailers who established their own product design and innovation capabilities to

products because just-in-time supply methods were incompatible with their slow mass production practices while small-scale suppliers lacked the production and coordination capacity to meet the demand for just-in-time products.

In the face of this market “failure”, large retailers began to “drive” a new type of just-in-time domestic supply chain based on flexible manufacturing, new logistics practices, and coordination through proprietary information technologies. Price incentives were used to reward quick and accurate fulfillment of orders and there were cost penalties for failure to meet supply targets. These economic incentives were reinforced through business “partnerships” that large retailers established with preferred suppliers to improve manufacturing flexibility and facilitate the adoption of new information technologies and (Abernathy, et al. 1995, 1999). Just-in-time supply practices diffused rapidly among the most progressive suppliers, such as VF, Sarah Lee, as evidenced by the more than seven-fold growth in EDI linkages between clothing retailers and domestic manufacturers between 1988 and 1992 and by the increased rates of daily and weekly deliveries by domestic suppliers to replenish retail inventories, which rose from 8.7% to 25% of sales in the same period (Abernathy, et al., 1995, 1999, pp. 78, 176).

Developing quicker and more flexible manufacturing practices, along with proximity to markets, initially gave large U.S. apparel suppliers a new source of comparative advantage based on economies of speed and proximity to markets. It appeared that speed advantages would protect new just-in-time markets against competition from imports because long lead times for production and delivery would limit low-cost countries to specializing in “slow” mass production for products delivered at the start of the season (Abernathy, et al., 1995, 1999; New York Times, January 13, 1998). By the mid-1990s, the most technologically and organizationally advanced just-in-time suppliers reported substantially higher operating profits than traditional suppliers and they experienced faster growth in sales (Abernathy et al., 1995).

However, the promise of comparative advantage based on quick and flexible production has not been sustained. The increased speed of just-in-time supply chains developed through partnerships with relatively large firms was limited to what could be achieved through improved information technologies and “flexible mass production” methods involving greater use of multi-skilled production teams. These methods were gradually imitated by low cost suppliers located in Mexico and various Caribbean Basin countries with relatively short transportation times to U.S. markets. Production continued to grow in these countries during the 1990s (American

center of specialization in women's wear. In 1981, half of New York City's apparel manufacturing workers were involved in the production of women's wear and that percentage has steadily risen to 65% in 1991 and to 71% in 2001. Even more important, New York City's share of domestic women's wear production has been increasing in the late 1990s (Table 5). Partly this reflects the specialization in design, fabric acquisition, and pre-production activities by large manufacturers and retailers of women's wear that are primarily sourcing garments offshore. However, there are also small manufacturers and contractors that are serving market niches that are too small or too time sensitive to be outsourced.

The best of these niches are in high quality, high-end markets for fashion products, custom-made clothing, small orders of fashion products for regional chains and independent shops, and products using exotic technical fabrics that require considerable care and skill in manufacturing. The common element among these niche markets is that the need to respond quickly to the rapid pace of style change necessitates a high degree of quality and the direct collaboration among, designers, producers and retailers that is only possible where there is a concentration of small and medium sized producers in close proximity to fashion markets.

A second set of niches are found in various middle to low end specialized markets -- surgical garments, large and tall sizes, uniforms, low volume mail-order products, emergency orders for fashion-basic products where offshore production has been delayed, repair work on damaged shipments, and rework of products that are not selling. With the exception of uniforms, this set of niche markets share in common the need for supply speeds that cannot be achieved by offshore flexible mass production, or even by large and flexible domestic suppliers. For example, the order fulfillment time for just-in-time inventory replenishment by large domestic suppliers is about 2-3 weeks (Abernathy et. al, 1995) and our field research suggests comparable supply speeds are currently available from Mexico and the Caribbean basin. However, small New York City contractors can routinely fulfill small orders within a week or less.

While large firms and global supply chains cannot match the speed, flexibility, and capacity for quality among the small suppliers that survive in New York City, our surveys show that many of small contractors are not capturing the full advantages of these qualities. Our survey data documents both considerable excess production capacity and an industry that is capable of producing products of higher fashion, quality, and value than is currently demanded (Figure 2).

New York is a center for training new designers, many of whom hope to establish themselves as independent designers. Our surveys of these young designers suggest that a major barrier to the development independent designer boutiques is access to suppliers that are willing and able to manufacture small orders at a competitive cost.

Partly this is a problem of information about supplier availability, quality, and price, but there are more fundamental economic obstacles as well. Young designers often lack operating capital to meet minimum order sizes for clothing. Market uncertainty and risk are high for small collections and untested products, and small orders are inefficient to produce even by small contractors. However, these problems are not insurmountable. The building blocks are present in New York City for constructing efficient supply chains for young designers, particularly if risks can be pooled and if young designers are willing to make commitments to their contractors for repeat orders of successful products.

“Fast Fashion” Supply Chains

A fourth option is to develop markets for new “fast fashion” products, which are known in Europe as “quick” fashion” or “street fashion”. Fast fashion is a concept developed in Europe to serve markets for teenage and young adult women who want trendy, short-cycle, and relatively inexpensive clothing, and who are willing to buy from small retail shops and boutiques.

The key ingredient of fast fashion is the ability to track consumer preferences quickly and to identify potentially popular new designs through daily proximity to fashion markets, fashion images, and fashion makers. Street fashion is not designed in the traditional manner of *haute couture*, but rather is adapted from existing designs and produced in different types of materials, colors, and silhouettes.

This design capability is married to supply chains that can quickly obtain fabrics, manufacture samples, and start shipping products with far shorter lead times than those of the traditional production calendar. In the *Sentier* garment district in Paris, for example, the time from concept to delivery for street fashions can be as little as two weeks by using fabrics that are available locally.

The life of a typical fast fashion product is a month or less. Samples can be produced in a day, small orders for market testing are produced in less than a week, and major specialty chains in France, such as 123 and Camaieu, test market products for a week in a single store. Those that attract consumer demand are reordered on a larger scale and again are quickly