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Shifting Governance Structures in Global Commodity Chains, With Special Reference to the Internet

GARY GEREFFI

Duke University

There are three main drivers of economic globalization in the latter half of the 20th century: investment by transnational corporations, international trade, and the Internet. Whereas producer-driven and buyer-driven commodity chains characterize the phases of investment-based and trade-based globalization, respectively, the emergence of the Internet in the mid-1990s heralds a new age of digital globalization. The explosion in connectivity that is enabled by the Internet has launched an e-commerce revolution that is beginning to transform the structure of business-to-business (B2B) as well as business-to-consumer (B2C) transactions in global industries. New infomediaries that navigate access to rich information and greater reach by businesses and consumers are prominent in B2C digital networks. The Internet's most significant impact to date, however, has been in B2B markets, where e-commerce is reshaping the competitive dynamics and power alignments in traditional producer-driven and buyer-driven commodity chains such as automobiles and apparel.

Globalization has become a prominent and controversial feature of the contemporary landscape. Although there are myriad processes and definitions associated with the economic, political, social, and cultural dimensions of globalization, this article is concerned primarily with the evolution of the global commodity chains that help to structure industrial change in the international economy. There have been three main drivers of economic globalization in the latter half of the 20th century: investment by transnational corporations (TNCs), international trade, and the Internet. Each has expanded the scope of global integration by altering how people, resources, and places are connected in economic transactions. This can be seen in three broad and to some degree overlapping phases of globalization:

Investment-based globalization (1950-1970). The global reach of vertically integrated TNCs dates from the late 19th century in primary products (oil, mining, agriculture) and from the early decades of the 20th century in manufacturing

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sectors such as automobiles.¹ International production networks were the primary vehicles for this form of globalization. In the 1950s and 1960s, the multinational spread of TNCs accelerated in a growing number of manufacturing and raw material industries, and the ability of global companies to try to manage the world as an integrated unit was seen by some as a threat to national sovereignty (see Barnett & Müller, 1974; Vernon, 1971). The transition from investment-based to trade-based globalization is marked by two related changes in the international economy beginning in the 1970s: (a) the dramatic increase in the supply of finished-goods exports from low-cost, developing-country locations and (b) the vertical disaggregation and globalization of supply chains.

Trade-based globalization (1970-1995). In the 1970s, there was a marked shift to export-oriented industrialization as a preferred development strategy in many parts of the developing world, beginning with East Asia, but spreading in the 1980s to Latin America, Africa, and elsewhere (Gereffi & Wyman, 1990). This shift in national development strategies toward exports was premised on the rapid and diversified industrialization of a wide range of developing nations. In effect, the center of gravity for many manufacturing industries moved from the core to the periphery of the world economy. The emphasis on international production networks controlled by the headquarters of TNCs (producer-driven commodity chains) shifted to international sourcing networks controlled by large retailers and global marketers based in developed countries (buyer-driven commodity chains) (see Dicken, 1998; Gereffi & Korzeniewicz, 1994).

Digital globalization (1995 onward). In the mid-1990s, the information revolution and a growing acceptance of the Internet began to create an explosion in connectivity due to the open and almost cost-free exchange of a widening universe of rich information (Evans & Wurster, 2000). Asymmetrical access to the Internet has given rise to concerns about a digital divide between those countries and firms that were connected to modern information technology and those that were not.² However, the rate of diffusion of the Internet is far faster than the rate of diffusion for previous breakthroughs in information and communication technologies,³ and the Internet still appears to be near the beginning of the technology S-curve, whereby the spread of a technology's market penetration accelerates as it reaches a critical mass of users ("Untangling E-Conomics," 2000, p. 7). The transformation wrought by the Internet on the structures and strategies of international business could eventually be as profound as that set in motion by the transportation revolution based on steamships and railroads in the latter half of the 19th century and the onset of the electric age and the car in the first half of the 20th century (see Fine, 1998; "Untangling E-Conomics," 2000).

Globalization has been defined as "not merely the geographical extension of economic activity across national boundaries but also—and more importantly—the *functional integration* of such internationally dispersed activities"

(Dicken, 1998, p. 5). But what underlies this functional integration of globalization processes? At the most fundamental level, information and the mechanisms for delivering it are the unifying force that holds together the structure of business. In the investment-driven phase of globalization, vertically integrated TNCs relied on proprietary information systems and hierarchical control to extend their global reach. In trade-based globalization, TNC operations were decentralized, and firms in different parts of the world allied with each other to form global value chains that involved horizontal rather than vertical coordination, resembling spider webs more than pyramids (Reich, 1991, chap. 7). These value chains are shaped by the same kind of informational logic found in vertically integrated companies, but in a weaker form. The new digital era of globalization is characterized by a dramatic increase in connectivity that is melting the informational glue that holds corporations and global value chains together.

In this article, we will examine how the commodity chains framework facilitates our understanding of the structure and dynamics of global industries and the development prospects for nations and firms within them. First, we introduce the seminal distinction between producer-driven and buyer-driven commodity chains. Our analysis of the power structure of commodity chains leads to the hypothesis that development requires selective linkage with distinct kinds of lead firms in global industries, which have varying prospects for mobility in the world economy. Second, we identify the main types of lead firms in the automobile and apparel commodity chains, which exemplify producer-driven and buyer-driven chains, respectively. Third, we illustrate how electronic commerce, or trade that takes place over the Internet, is simultaneously threatening traditional intermediaries (bricks-and-mortar wholesalers, retailers, and distributors) and giving rise to a novel set of Internet-based infomediaries. Profiles of several prominent e-commerce firms are provided to highlight the kind of consolidation that could generate a new set of drivers in the Internet's emerging governance structure.

PRODUCER-DRIVEN AND BUYER- DRIVEN GLOBAL COMMODITY CHAINS

Globalization has been promoted by industrial and commercial firms alike, which have established two distinct types of international economic networks that have been called producer-driven and buyer-driven global commodity chains, respectively (see Figure 1) (Gereffi, 1994, 1999). A commodity chain refers to the whole range of activities involved in the design, production, and marketing of a product (see Gereffi & Korzeniewicz, 1994, for an overview of this framework). Producer-driven commodity chains are those in which large, usually transnational manufacturers play the central roles in coordinating production networks (including their backward and forward linkages). This is characteristic of capital- and technology-intensive industries such as automobiles,

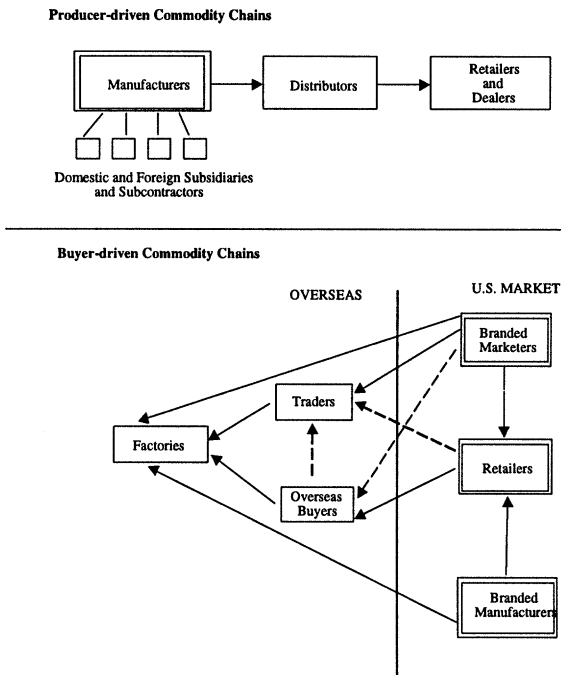


Figure 1: The Organization of Producer-Driven and Buyer-Driven Global Commodity Chains

NOTE: Solid arrows are primary relationships; dashed arrows are secondary relationships. Retailers, branded marketers, and traders require full-package supply from overseas factories. Branded manufacturers generally ship parts for overseas assembly and re-export to the manufacturer's home market.

aircraft, computers, semiconductors, and heavy machinery. The automobile industry offers a classic illustration of a producer-driven chain, with multilayered production systems that involve thousands of firms (including parents, subsidiaries, and subcontractors). In the 1980s, the average Japanese automaker's production system, for example, contained 170 first-tier, 4,700 second-tier, and 31,600 third-tier subcontractors (Hill, 1989, p. 466). Florida and Kenney (1991) found that Japanese automobile manufacturers actually reconstituted many aspects of their home-country supplier networks in North America. Doner (1991) extended this framework to highlight the complex forces that lead Japanese automakers to create regional production schemes for the supply of auto parts in a half-dozen nations in East and Southeast Asia. Borrus (1997), Gereffi (1998), and Henderson (1989) also supported the notion that producer-driven commodity chains have established an East Asian division of labor in their studies of the internationalization of the U.S. and Japanese semiconductor and electronics industries.

Buyer-driven commodity chains refer to those industries in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in the Third World. This pattern of trade-led industrialization has become common in labor-intensive, consumer goods industries such as garments, footwear, toys, housewares, consumer electronics, and a variety of handicrafts. Production is generally carried out by tiered networks of Third World contractors that make finished goods for foreign buyers. The specifications are supplied by the large retailers or marketers that order the goods.

One of the main characteristics of the firms that fit the buyer-driven model, including retailers such as Wal-Mart, Sears Roebuck, and J. C. Penney; athletic footwear companies such as Nike and Reebok; and fashion-oriented apparel companies such as Liz Claiborne, The Gap, and The Limited, is that these companies design and/or market—but do not make—the branded products they order. They are part of a distinct breed of “manufacturers without factories” that separate the physical production of goods from the design and marketing stages of the production process. Profits in buyer-driven chains derive not from scale, volume, and technological advances, as in producer-driven chains, but rather from unique combinations of high-value research, design, sales, marketing, and financial services that allow the retailers, designers, and marketers to act as strategic brokers in linking overseas factories and traders with evolving product niches in their main consumer markets (Gereffi, 1994).

Profitability is greatest in the relatively concentrated segments of global commodity chains characterized by high barriers to the entry of new firms. In producer-driven chains, manufacturers making advanced products like aircraft, automobiles, and computers are the key economic agents in terms not only of their earnings but also of their ability to exert control over backward linkages with raw material and component suppliers and forward linkages into distribution and retailing. The lead firms in producer-driven chains usually belong to global oligopolies. Buyer-driven commodity chains, by contrast, are characterized by highly competitive and globally decentralized factory systems with low barriers to entry in production. The companies that develop and sell brand-name products exert substantial control over how, when, and where manufacturing will take place and how much profit accrues at each stage of the chain. Thus, whereas producer-driven commodity chains are controlled by large manufacturers at the point of production, the main leverage in buyer-driven industries is exercised by marketers and merchandisers at the design and retail ends of the chain.

The leading firms in producer-driven and buyer-driven commodity chains use barriers to entry to generate different kinds of rents (broadly defined as returns from scarce assets) in global industries. These assets may be tangible (machinery), intangible (brands), or intermediate (marketing skills). Adapting and extending the typology of rents in Kaplinsky (1998), producer-driven chains

rely primarily on *technology rents*, which arise from asymmetrical access to key product and process technologies, and *organizational rents*, which refer to a form of intraorganizational process know-how that originated in Japan and is particularly significant in the transition from mass production to mass customization (or flexible production), involving a cluster of modern organizational techniques such as just-in-time production, total quality control, modular production, preventive maintenance, and continuous improvement.

Buyer-driven chains are most closely tied to *relational rents*, which refer to several kinds of interfirm relationships, including the techniques of supply-chain management that link large assemblers with small and medium-size enterprises, the construction of strategic alliances, and small firms clustering together in a particular locality and manifesting elements of collective efficiency associated with original equipment production;⁴ *trade-policy rents*, understood as the scarcity value created by protectionist trade policies such as apparel quotas; and *brand-name rents*, which refer to the returns from the product differentiation techniques used to establish brand-name prominence in major world markets.

In the apparel commodity chain, entry barriers are low for most garment factories, although they become progressively higher as one moves upstream to textiles and fibers; brand names and stores are alternative competitive assets that firms can use to generate significant economic rents. The lavish advertising budgets and promotional campaigns required to create and sustain global brands, and the sophisticated and costly information technologies employed by today's mega-retailers to develop quick response programs that increase revenues and lower risks by getting suppliers to manage inventory (Abernathy, Dunlop, Hammond, & Weil, 1999), illustrate recent techniques that have allowed retailers and marketers to displace traditional manufacturers as the leaders in many consumer goods industries.

The main features of producer-driven and buyer-driven commodity chains are highlighted in Table 1. Producer-driven and buyer-driven chains are rooted in distinct industrial sectors, they are led by different types of transnational capital (industrial and commercial, respectively), and they vary in their core competencies (at the firm level) and their entry barriers (at the sectoral level). The finished goods in producer-driven chains tend to be supplied by transnational corporations in core countries, whereas the goods in buyer-driven chains are generally made by locally owned firms in developing countries. Whereas transnational corporations establish investment-based vertical networks, the retailers, designers, and trading companies in buyer-driven chains set up and coordinate trade-based horizontal networks.

Both buyer-driven and producer-driven commodity chains are useful in analyzing and evaluating global industries. As with traditional supply-chain perspectives, the commodity chains framework is based on the flow of goods involved in the production and distribution of apparel products. However, the global commodity chains approach differs in at least four respects from related

TABLE 1: Main Characteristics of Producer-Driven and Buyer-Driven Global Commodity Chains

	<i>Producer-Driven Commodity Chains</i>	<i>Buyer-Driven Commodity Chains</i>
Drivers of global commodity chains	Industrial capital	Commercial capital
Core competencies	Research & development, production	Design, marketing
Barriers to entry	Economies of scale	Economies of scope
Economic sectors	Consumer durables, intermediate goods, capital goods	Consumer nondurables
Typical industries	Automobiles, computers, aircraft	Apparel, footwear, toys
Ownership of manufacturing firms	Transnational firms	Local firms, predominantly in developing countries
Main network links	Investment-based	Trade-based
Predominant network structure	Vertical	Horizontal

concepts, such as business systems (Gereffi, 1996; Whitley, 1996) or value chains (Porter, 1990):

1. It incorporates an explicit *international dimension* into the analysis;
2. it focuses on the *power* exercised by the lead firms in different segments of the commodity chain, and it illustrates how power shifts over time;
3. it views the *coordination* of the entire chain as a key source of competitive advantage that requires using networks as a strategic asset; and
4. it looks at *organizational learning* as one of the critical mechanisms by which firms try to improve or consolidate their positions within the chain.

One of the major hypotheses of the global commodity chains approach is that development requires linking up with the most significant lead firms in an industry. These lead firms are not necessarily the traditional vertically integrated manufacturers, nor do they even need to be involved in making finished products. They can be located upstream or downstream from manufacturing (such as the fashion designers or private-label retailers in apparel), or they can be involved in the supply of critical components (such as microprocessor companies like Intel and software firms like Microsoft in the computer industry). What distinguishes lead firms from their followers or subordinates is that they control access to major resources (such as product design, new technologies, brand names, or consumer demand) that generate the most profitable returns in the industry. What follows is a brief listing of prominent kinds of lead firms in the automotive and apparel commodity chains.

LEAD FIRMS IN THE AUTOMOTIVE COMMODITY CHAIN

The United States is the world's largest consumer market for passenger cars and light trucks. The Big Three U.S. automakers—General Motors, Ford Motor Company, and DaimlerChrysler⁵—accounted for 58% of the passenger cars produced in the United States in 1999, down from 64% in 1996 (Standard & Poor's, 2000b, p. 6). The remaining 42% of U.S.-made cars came from Asian and European transplant firms. Along with these giant assemblers, the automotive commodity chain also includes parts manufacturers. The auto parts industry is fragmented, consisting of thousands of suppliers ranging in size from small shops to large multinationals. The auto parts segment of the chain is divided between original equipment manufacturers (OEMs) and the replacement market. OEMs are companies that produce parts and components that automakers use in the assembly of new vehicles. Participants in the replacement market (also known as the aftermarket) make parts and components to substitute or supplement items that were included in the original assembly of the vehicles. Both OEMs and replacement parts suppliers and distributors may be independent firms or subsidiaries of larger companies.

The basic method of making automobiles changed very little between 1913, when Henry Ford first invented the moving assembly line, and the 1970s, when a radical new system of lean production began to emerge in Japan. Pioneered by the U.S. Big Three, the automobile industry was the mass-production industry par excellence. The Fordist method of production made a limited range of standardized cars for mass-market customers. Auto manufacturing was carried out in massive assembly plants using rigid methods in which each assembly worker performed a highly specialized and narrow task very quickly and with endless repetition. The big U.S. and European automakers developed a particular kind of relationship with their suppliers, based on short-term, cost-minimizing contracts. As the major producers scoured the world for low-cost components, the increased geographical distance between the assemblers and their suppliers made it necessary for assemblers to hold huge inventories of components at their assembly plants. In this just-in-case system, the possibility of the assembly line being disrupted by a temporary shortage of components or by faulty batches was reduced.

Since the early 1980s, the auto industry has been marked by intensifying competition and increased globalization, which has resulted in lower costs and improved product quality. With the advent of lean production by the principal Japanese automakers, led initially by Toyota, just-in-time systems emphasized close assembler-supplier relations and flexible forms of production in which quality control (or total quality management) was viewed as an essential element at all stages of the production process (Dicken, 1998, chaps. 5 and 10; Womack,

Jones, & Roos, 1990). U.S. and foreign motor vehicle assemblers now employ supply chain management to diffuse lean production methods and high-performance work organization practices into the broader automotive industry.

U.S. Big Three (General Motors, Ford Motor, DaimlerChrysler). Supply chain management is central to the efforts of the U.S. automakers to restructure, rationalize, and integrate the automotive supplier industry across Canada, the United States, and Mexico. In particular, the Big Three have initiated three key changes in the 1990s that have redefined their relationship with suppliers (Kumar & Holmes, 1997). First, automakers have shifted more of the responsibility for product design and inventory programs to their suppliers. This has allowed the assemblers to focus their resources on their core capabilities, which include overall system design, drive trains, final assembly, and the marketing of the completed vehicle. Second, the size and complexity of those items of the vehicle that are sourced from suppliers have grown from individual parts and components to entire subassemblies, such as acceleration, braking, steering, handling, and seating systems, or even larger modules such as integral automobile interiors that include carpets, headliners, and dashboards. The outsourcing of complete systems and modules offers important cost savings to the assembler through reductions in the size of the plant and workforce needed to assemble vehicles. Third, automotive assemblers are reducing the number of their direct suppliers and offering them longer contracts, which lower the overhead costs of managing and coordinating the entire system.

Chrysler Corporation (now part of DaimlerChrysler) was the car company that initially broke ranks with its U.S. brethren and launched many of these new relationships with its suppliers. In the 1980s, Chrysler was cash poor and struggling to survive. As the smallest of the Big Three automakers, Chrysler typically stood third in line with suppliers, behind the much stronger Ford and General Motors. Instead of dictating to suppliers and trying to pit them against each other, Chrysler borrowed from Japanese companies and established mutually beneficial partnerships with its suppliers whereby they developed entire subsystems in return for long-term supply and cost-sharing agreements. Chrysler went from the brink of bankruptcy to having the lowest cost structure of the Big Three and the highest average profit per vehicle. Furthermore, Chrysler's strategy gave its suppliers the impetus to develop whole automotive subsystems, which has pushed the automotive industry from a predominantly vertical structure to a more horizontal one (Dyer, 1996; Fine, 1998, pp. 61-62).

Foreign transplants. Currency fluctuations have encouraged the production of foreign models of cars in North America and reduced the flow of imports. In particular, the long-term appreciation of the Japanese yen versus the dollar (which seems to have reversed itself since a mid-1995 peak), together with the earlier imposition of U.S. voluntary export restraints against Japanese car imports, made many Japanese automakers step up their North American

transplant manufacturing capacity to maintain competitive prices on their core products. European automakers are also expanding their U.S. and Mexican production operations. Mercedes Benz and BMW joined Honda in assembling cars in Mexico for the first time in 1996, and both German companies are also constructing new U.S. production facilities. The main impact of the foreign automotive transplants is that they offer alternative kinds of supply chains to which North American parts firms can affiliate, and they also are important partners for the growing number of strategic alliances, mergers, and acquisitions among the large U.S. and foreign assemblers.

Tier 1 suppliers (systems integrators). The automotive supply chain has always been organized hierarchically into tiers, but in recent years, the tiered structure has become much more pronounced. There has been a drop in the number of suppliers at all levels of the supply chain, with each assembler relying on a core group of highly competent Tier 1 suppliers. To meet the automakers' ever increasing demands for cost reductions, enhanced productivity, and quicker delivery times, automotive parts suppliers have continued to consolidate. This has resulted in the emergence of a relatively small number of systems integrators among the ranks of Tier 1 suppliers that are capable of designing, manufacturing, and delivering complete modules to motor vehicle assembly plants (Kumar & Holmes, 1997; Sturgeon & Florida, 1999). Sophisticated parts firms like Delphi, Bosch, Denso, Johnson Controls, Lear, Federal-Mogul, and Dana Corporation are consolidating across subsystems, which is leading to a significant degree of vertical integration in what had been a relatively fragmented parts supply industry. Systems integrators are beginning to assume prime responsibility for selecting lower tier suppliers and for coordinating key segments of the automotive supply chain at a global level. Thus, these Tier 1 suppliers are challenging the assemblers for control over the key high-value activities in automotive production.

LEAD FIRMS IN THE APPAREL COMMODITY CHAIN

Because of the intensive use of low-skilled labor in apparel production, transnational companies have limited potential for deriving firm-specific advantages from direct foreign investment in overseas locations. Instead, they have turned to other forms of transnational activity, such as the importing of finished garments, brand name and trademark licensing, and the international subcontracting of assembly operations. These various activities have led to multiple lead firms in buyer-driven commodity chains.

There are three types of lead firms in the apparel commodity chain: retailers, marketers, and branded manufacturers (Gereffi, 1999). As apparel production has become globally dispersed and the competition between these types of firms

intensified, each has developed extensive global sourcing capabilities. While de-verticalizing out of production, they are fortifying their activities in the high value-added design and marketing segments of the apparel chain, leading to a blurring of the boundaries between these firms and a realignment of economic roles within the chain.

Here is a quick look at where each type of lead firm stands in apparel sourcing.

Retailers. In the past, retailers were the apparel manufacturers' main customers, but now, they are increasingly becoming their competitors. As consumers demand better value, retailers have increasingly turned to imports. In 1975, only 12% of the apparel sold by U.S. retailers was imported; by 1984, retail stores had doubled their use of imported garments (American Apparel Manufacturers Association, 1984). In 1993, retailers accounted for 48% of the total value of imports of the top 100 U.S. apparel importers (who collectively represented about one quarter of all apparel imports). U.S. apparel marketers, which perform the design and marketing functions but contract out the actual production of apparel to foreign or domestic sources, represented 22% of the value of these imports in 1993, and domestic producers made up an additional 20% of the total⁶ (Jones, 1995, pp. 25-26). The picture in Europe is strikingly similar. European retailers account for fully one half of all apparel imports, and marketers or designers add roughly another 20% (Scheffer, 1994, pp. 11-12). Private-label lines (or store brands), which refer to merchandise made for specific retailers and sold exclusively in their stores, constituted about 25% of the total U.S. apparel market in 1993 (Dickerson, 1995, p. 460).

Marketers. These manufacturers without factories include companies such as Liz Claiborne, Donna Karan, Ralph Lauren, Tommy Hilfiger, Nautica, and Nike, which literally were born global because most of their sourcing has always been done overseas. To deal with the influx of new competition, marketers have adopted several strategic responses that are altering the content and scope of their global sourcing networks: They are shrinking their supply chains, using fewer but more capable contractors; they are instructing contractors where to obtain needed components, thus reducing their own purchase and redistribution activities; they are discontinuing certain support functions (such as pattern grading, marker making, and sample making) and reassigning them to contractors; they are adopting more stringent vendor certification systems to improve performance; and they are shifting the geography of their sourcing networks from Asia to the Western Hemisphere.

Branded manufacturers. The decision of many larger manufacturers in developed countries is no longer whether to engage in foreign production but how to organize and manage it. These firms supply intermediate inputs (cut fabric, thread, buttons, and other trim) to extensive networks of offshore suppliers,

typically located in neighboring countries with reciprocal trade agreements that allow goods assembled offshore to be reimported, with a tariff charged only on the value added by foreign labor. This kind of international subcontracting system exists in every region of the world. It is called the 807/9802 program or production sharing in the United States (U.S. International Trade Commission, 1997), where the sourcing networks of U.S. manufacturers are predominantly located in Mexico, Central America, and the Caribbean; in Europe, this is known as outward processing trade (OPT), and the principal suppliers are found in North Africa and Eastern Europe (*L'Observatoire Européen du Textile et de l'Habillement*, 1995); and in Asia, manufacturers from relatively high-wage economies such as Hong Kong's have outward processing arrangements (OPA) with China and other low-wage nations (Birnbaum, 1993).

A significant countertrend is emerging among established apparel manufacturers, however, who are de-emphasizing their production activities in favor of building up the marketing side of their operations by capitalizing on both brand names and retail outlets. Sara Lee Corporation, one of the largest apparel producers in the United States—whose stable of famous brand names includes L'eggs hosiery, Hanes, Playtex, Wonderbras, Bali, and Coach leather products, to name a few—announced its plans to de-verticalize its consumer products divisions, a fundamental reshaping that would move it out of making the brand-name goods it sells (Miller, 1997). Other well-known apparel manufacturers such as Phillips-Van Heusen and Levi Strauss & Co. are also emphasizing the need to build global brands, frequently through acquisitions of related consumer products lines, while many of their production facilities are being closed or sold to offshore contractors.

THE INTERNET'S IMPACT ON GLOBAL COMMODITY CHAINS

The economic transformation at the turn of the 21st century, driven by the often spectacular development and diffusion of modern electronics-based information technology, has been described by a variety of names, including an innovation economy, a knowledge economy, a network economy, a digital economy, and an E-Conomy (Cohen, DeLong, & Zysman, 2000). Electronic commerce is not simply about technology; it is also about changes in business organization, market structures, government regulations, and human experience. The Internet is challenging organizational dynamics and changing the way business is run. The contrast between producer-driven and buyer-driven commodity chains helps to illustrate how the shift to an information economy has affected global commodity chains in organizational and institutional terms. We now turn to the role of the Internet in creating new kinds of markets in global commodity chains.

The two most important types of e-commerce are business-to-consumer (B2C) and business-to-business (B2B) markets.⁷ The B2C market refers to the

transfer of goods and/or services to individual consumers (a retail model), whereas B2B refers to procurement, logistics, and administrative processes occurring between firms (a supply-chain model). Electronic commerce is growing so rapidly that estimates of the magnitude of these two markets vary widely. For example, the Boston Consulting Group estimates total online retail sales of \$34.2 billion in 1999, whereas Forrester Research calculates online sales of \$20 billion in the B2C market in 1999 but expects that figure to grow to \$184 billion by 2004 ("Shopping Around," 2000, pp. 9-10; U.S. Department of Commerce, 2000, p. 42-3). Online retail sales are dwarfed, however, by B2B transactions, which account for as much as 80% of all e-commerce. According to the Gartner Group, a Connecticut-based market research firm, the B2B market will grow from \$145 billion worldwide in 1999 to \$401 billion in 2000 and to \$7.3 trillion by 2004 (i.e., 7% of the forecast \$105 trillion in worldwide sales transactions) (Standard & Poor's, 2001, p. 2).

The Internet is able to deconstruct both producer-driven and buyer-driven global commodity chains because of two fundamental factors: (a) its ability to create markets on a scale and with a level of efficiency not previously possible⁸ and (b) a radical "pull" business strategy that substitutes information for inventory and ships products only when there is real demand from end customers.⁹ One of the early changes attributed to the Internet is the emergence of a new form of infomediary-driven commodity chain that turns direct access to customers, and especially detailed information about their purchasing habits, into a highly valued asset. Although most infomediaries in B2C transactions currently represent the interests of consumers trying to get the most out of the Web, Internet navigators are also affiliated with producers, sellers, and traditional commodity-chain intermediaries. This infomediary-driven model is not one of consumer sovereignty nor of perfect competition enabled by the Internet. It remains a model of imperfect competition in which dominant infomediaries like America Online (AOL) or Yahoo! control portals¹⁰ and other strategic entry points to the Internet (see Hargittai, 2000, for a similar argument). These infomediaries are further leveraging their power by becoming more integrated across the Internet organizational chain through mergers, acquisitions, and strategic alliances.¹¹

Although the Internet has diminished many of the information asymmetries (and hence power asymmetries) between sellers and buyers through the simultaneous explosion of reach and rich information, intermediation remains vital in the digital economy. The Internet navigators are currently waging a battle over who in the e-commerce value chain will eventually "own" the customers. There is a vigorous effort by large Internet firms with dominant positions in the market to lock in current business models through legal impediments to other competitors.¹² In this context, bargaining power has shifted notably from makers in producer-driven chains to marketers and merchandisers in buyer-driven chains to the Internet navigators in infomediary-driven chains. Now that the venture

capital frenzy for innumerable dot.com start-ups shows signs of abating,¹³ a more realistic and sobering picture of business consolidation along the Internet chain is emerging.

Figure 2 shows the Internet's organizational chain, which is composed of the main firms that make Internet transactions possible. The Internet is a global network of smaller interconnected networks that link millions of computers through thousands of servers. It is built on a complex hardware infrastructure of Internet equipment providers, computer makers, and component suppliers, integrated by software and services. Companies such as Cisco Systems, Nortel Networks, and Lucent Technologies dominate the market for Internet equipment, such as routers and remote-access concentrators, whereas Sun Microsystems and Unix are leading manufacturers of servers. Computer makers are an integral part of the Internet chain because most businesses and individuals hook up to the Internet with personal computers. Corporate clients are looking for single solutions to meet their increasingly complex computing needs, and thus, the major computer companies have shifted their focus to three main areas of growth: servers, storage, and services. The demand for global technology services, by far the largest of these three areas, is expected to nearly double in size from \$359 billion in 1999 to more than \$700 billion by 2004 (Standard & Poor's, 2000e, pp. 3-6). Firms such as Oracle, Ariba, Commerce One, and i2 Technologies, which develop software for online transactions, are becoming key players in the rapidly emerging B2B marketplace. Other important links in the Internet organizational chain are: browsers (browser software permits online navigation by allowing users to view the text and graphics located on Internet Web sites); internet service providers (ISPs offer basic, flat-rate Internet access to customers); and Internet content providers (ICPs use mostly original material to create Internet destinations where people go for information, entertainment, or commerce). The main customers for the Internet are businesses (B2B markets) and individual consumers (B2C markets), with the former currently being far larger than the latter.

In each segment of the Internet organizational chain, the leading companies have dominant market shares. Cisco controls more than three quarters of the global market for Internet routers and switches; the top four personal computer vendors (Compaq, Dell, IBM, and Hewlett-Packard) account for nearly 40% of unit shipments worldwide; Microsoft controls about 90% of personal computer operating systems and two thirds of the Web browser market; AOL had 43% of the ISP market in 1999 and more subscribers than the next 20 ISPs combined; and AOL, Yahoo!, and Microsoft sit atop the Internet content-provider market as well. (See Figure 2 for references.)

To give more insight into the extent of e-commerce consolidations, brief profiles will be provided of AOL, Amazon.com, Dell Computer Corporation, and the giant online B2B marketplace being created for parts suppliers in the automotive industry. Each of these e-commerce ventures has shaken up the structure of traditional producer-driven and buyer-driven commodity chains.¹⁴

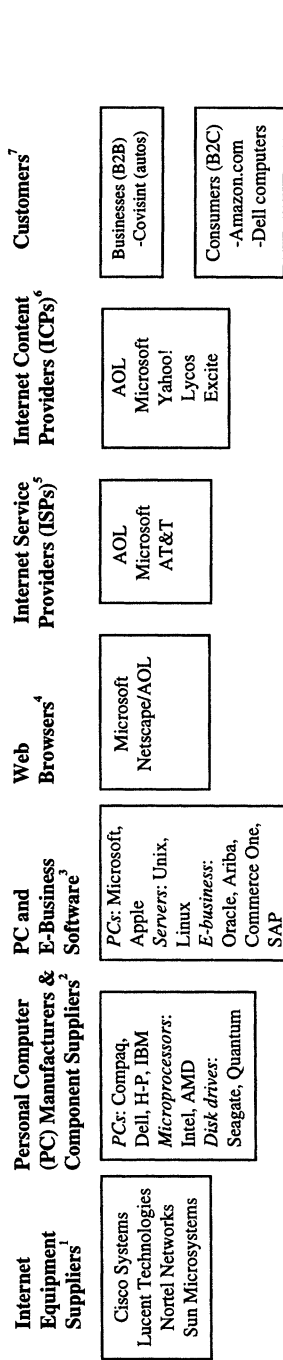


Figure 2: The Internet's Organizational Chain

SOURCE: Market share information comes primarily from the most recent Hoover's (2000) *Company Profiles* and from Standard & Poor's *Industry Surveys*.

1. Cisco Systems controls more than 75% of the global market for Internet routers and switches (Hoover's, 2000).
2. Compaq had 13% of first-quarter 2000 worldwide PC shipments, followed by Dell (11%), Hewlett-Packard (8%), and IBM (6%). In the U.S. market, however, Dell (17%) has pulled ahead of Compaq (16%) as the leading PC vendor in first-quarter 2000 sales (Standard & Poor's, 2000c).
3. Microsoft controls more than 90% of the operating systems used by PC manufacturers.
4. In 1999, Microsoft's Internet Explorer had about 65% of the Web browser market and Netscape less than 30%. America Online (AOL) subsequently purchased Netscape.
5. AOL had 43% of the Internet service provider market in 1999, followed by MSN (6%) and AT&T Worldnet (5%). This was prior to the merger of AOL with the cable giant, Time Warner, Inc., in January 2000 (Standard & Poor's, 2000c).
6. The most visited Web properties in December 1999 (i.e., the percentage of Web-active individuals who visited a site at least once during the month) were the AOL Net-work—proprietary and World Wide Web (78%); Yahoo sites (61%); Microsoft sites (58%); Lycos (44%); and Excite@Home (40%) (Standard & Poor's, 2000c).

AOL is the world's largest ISP with about 20 million subscribers. It went public in 1992 and grew dramatically in sales from \$1.7 billion in 1997 to \$2.6 billion in 1998 and \$4.8 billion in 1999. AOL was originally a closed system that offered no Internet access and unreliable e-mail delivery to non-AOL addresses. Early subscribers were satisfied with proprietary content and internal chat rooms. However, AOL soon realized that if it wanted to keep subscribers, it had to offer better services and full Internet access. In 1996, facing growing competition, AOL shifted from an hourly to a flat-rate pricing plan, vastly increasing the amount of time its members spent online. AOL's 1999 acquisition of Netscape Communications for about \$10 billion significantly expanded the company's Internet presence, and AOL's profile was further enhanced by subsequent alliances with companies such as Sun Microsystems, Hughes Electronics, Gateway, Dell Computer, Sears, and Wal-Mart. In January 2000, AOL rocked the business world when it agreed to acquire entertainment and media giant Time Warner for \$183 billion. As the largest ISP and the one most frequently accessed by slow telephone lines, it was crucial for AOL to offer its subscribers the direct high-speed access over a broadband connection that Time Warner's cable network will bring. This acquisition illustrates two key aspects of the Internet. First, a few years ago, it would have been impossible for AOL to purchase such an immense and well-known media conglomerate as Time Warner. But the high market values placed on Internet companies such as AOL put this kind of a deal within easy reach. Second, AOL seems to be joining Microsoft in playing the vertical integration game. As Figure 2 shows, both firms have sought to acquire or build from scratch capabilities that integrate multiple segments of the Internet organizational chain.

Amazon.com is the Internet's largest retailer, with a huge base of 23 million customers. It is the number one online seller of books, videos, and music, and it boasts the "earth's biggest selection" of products. Amazon.com is touted by *The Economist* as "the most visible e-commerce website in America, and one of the top two or three in Britain, France, Germany, and Japan" ("Shopping Around," 2000, p. 24). Like most Internet start-ups, Amazon.com is relatively young, and it has grown amazingly fast. Jeff Bezos founded Amazon in 1994, and it went public in 1997. Sales have skyrocketed, more than tripling each year from 1997 (\$614 million) to 1998 (\$2.1 billion) and 1999 (\$7.6 billion). Amazon's patented "one-click" technology makes online shopping simple, and it has the best reputation in the business for order fulfillment and delivery. Although Amazon.com defines the spend-to-grow style of Internet companies, it also seems to suffer from the greatest weakness of many red ink-drenched dot.com firms: a congenital lack of profitability. Amazon carried more than \$2 billion in debt in 2000, and it has seen the value of its investments with a series of e-tailing partners sink (Taylor, 2000; Wingfield, 2000). Like AOL, however, Amazon is one of the few Internet brands recognized the world over, and this may be its most valuable long-term asset with investors in the volatile world of e-commerce.

Dell Computer is a company, like Amazon.com, that invented its own business model. For that reason, Michael Dell has become an icon of the Internet age. Dell pioneered a consumer-centered information revolution that radically substitutes pull for push as the production paradigm. In what Dell terms *virtual integration*, the company exchanges information with both suppliers and customers electronically, thus harnessing the benefits of two very different organizational structures: the tightly coordinated commodity chains typically associated with vertical integration and the focus and specialization of virtual corporations (Magretta, 1998). Bypassing the small computer dealerships and discount or specialist retailers, Dell Computer Corporation sells personal computers directly to consumers. Dell, which went public in 1988, has been extremely successful with its direct-sales business model (Dell, 1999). Dell's computer sales more than doubled from 1996 (\$5.3 billion) to 1998 (\$12.3 billion) and then doubled again by 2000 (\$25.3 billion). Perhaps the biggest advantage of the Dell built-to-order model is that it saves inventory costs due to the rapid product obsolescence of in-store inventories of personal computers, whose retail prices can drop by an average of up to 7% per month (Evans & Wurster, 2000, p. 82). Recently, Dell started selling its computers over the Internet, rather than from its catalog, and Internet sales account for up to half of the company's transactions (Standard & Poor's, 2000d, p. 11), bringing Dell fully into the world of e-commerce commodity chains.¹⁵

Although the B2C market may contain the most familiar e-commerce names for the general public, the B2B market is by far the most significant in terms of the volume of business and the number of firms affected. Global B2B e-commerce is predicted to reach \$4 trillion by 2003, a market 10 times bigger than the \$400 billion forecast for B2C online sales to consumers in the same year ("Untangling E-Conomics," 2000, p. 11). The automotive industry is the leader in B2B e-commerce, and it contains the world's largest online marketplace to date. *Covisint* is a newly formed joint venture that combines the purchasing activities of General Motors, Ford, DaimlerChrysler, Renault, Nissan, and their suppliers. Initially announced in February 2000 as a joint electronic-supply agreement among General Motors, Ford, and DaimlerChrysler, Covisint subsequently added Renault/Nissan and in October 2000, following U.S. Federal Trade Commission clearance, the first online auctions took place (Standard & Poor's, 2000b, p. 5). The scope of the venture is staggering. It is estimated that annual transactions on the exchange will exceed \$240 billion, and the venture is expected to shave billions of dollars off procurement costs.¹⁶ Commerce One and Oracle have been brought in as technology partners to help develop online software for the auto parts exchange.

Covisint promises lower prices, faster transaction turnarounds, and other efficiencies, but many suppliers fear they could be losers in this deal because lower prices for buyers will mean lower margins for sellers. As Covisint strives for an unprecedented degree of collaboration among the world's leading automakers, equally significant changes are a loosening of the tight vertical

structures that used to bind the majority of parts suppliers to particular car manufacturers and the strengthening of large, technologically sophisticated global suppliers (such as Bosch, Denso, Johnson Controls, Lear Corporation, TRW, and Magna), who become preferred partners in all the major automakers' supply chains (Sturgeon & Florida, 1999). These developments, together with the mega-dealers that are emerging in automotive retailing,¹⁷ could lead to substantial realignments in the relative power and profitability of major segments in the automotive commodity chain.

CONCLUSION

The Internet is still in the early stages of its development, but its impact on global commodity chains is already evident. Although it may be premature to try to identify lasting changes in producer-driven and buyer-driven chains, several possible scenarios are emerging, and they are not mutually exclusive. The first scenario is that the Internet will lead to the formation of infomediary-driven commodity chains, which implies a different set of organizational drivers and a new governance structure in contemporary industries. Although there have been some spectacularly successful e-commerce ventures in the late 1990s, the B2C market has already been rocked by a major shake-out as profits have failed to materialize, stock prices have plummeted, and many dot.com firms have gone out of business. The B2C business models pioneered by companies like Amazon.com, Dell, and AOL may indeed prove their worth in the long run, but the B2C market is still too small and volatile to establish a radically distinct and durable infomediary-driven governance structure.

A second scenario is that the Internet is really just extending the logic of buyer-driven commodity chains, as both information and power continue to shift inexorably from producers and retailers to consumers. Rather than being an alternative to buyer-driven chains, the Internet intensifies a shift that is making all industries more buyer driven in the sense that new consumer-oriented competitors are undermining the power of those manufacturers, retailers, and marketers that do not take advantage of the Internet's ability to facilitate mass customization. Dell's built-to-order business model introduces a buyer-driven competitive dynamic in the personal computer industry, just as infomediaries such as Amazon.com and AOL challenge traditional retail, news, and entertainment giants to get real-time information on the purchasing habits and preferences of their ultimate consumers. Thus, a similar consumer-driven governance structure may be emerging in a wide range of sectors.

A third scenario is that the impact of the Internet in both B2B and B2C transactions will be captured and integrated into the business practices of the dominant manufacturers, retailers, and marketers that already exist in diverse industries. Pitting the so-called new economy against the old economy completely misses the point because the Internet's major impact will be to improve the

productivity of all parts of the economy, especially the old-economy firms. Established leaders in both producer-driven and buyer-driven chains are proving surprisingly adept at incorporating e-commerce in their business strategies (i.e., in popular jargon, these companies are moving from “bricks and mortar” to “clicks and mortar”). This is evident in Barnes & Noble’s increased reliance on online sales of books as a direct result of its competition with Amazon.com, just as the major automakers are using Covisint to reconfigure their traditional relationships with suppliers. In this scenario, e-commerce is being successfully adopted by a number of lead firms in producer-driven and buyer-driven commodity chains. Although significant restructuring of these chains may result, the biggest and most powerful companies co-opt and internalize the Internet, and they force their rivals and suppliers alike to bear the costs of adapting to new technologies in the information age.

Although there is evidence to support all three scenarios, the third model currently seems to be dominant. Nonetheless, lead firms in major industries are adopting quite different strategies with regard to key supply-chain issues such as vertical integration, outsourcing, and globalization, and the impact of the Internet on these business structures remains an open question.

NOTES

1. By 1928, Ford and General Motors were assembling cars in 24 countries, including Japan, India, Malaysia, and Brazil. Ten years later, both companies were operating large-scale integrated transplant factories in Europe (Sturgeon & Florida, 1999, p. 5).

2. In 2000, only 6% of the world’s population was online; for developed countries, the figure is 35%. About a third of U.S. manufacturing firms are currently using the Internet for procurement or sales (“Untangling E-Conomics,” 2000, pp. 6-7).

3. Radio reached a global audience of 50 million people after 37 years and television after 15 years; the Internet had connected 50 million people after just 3 years. One forecast claims that the number of people worldwide with access to the Internet will climb from 140 million in 1999 to a billion people by 2005 (Evans & Wurster, 2000, pp. 13-14).

4. Although organizational and relational rents are closely related, they differ in that the former is intraorganizational, and the latter is interplant, interfirm, and interinstitutional (e.g., research institutes or training programs with public-private sector support). The rent element arises from the fact that all these organizational features are tacit, cumulative, and systemic. Adoption is a matter of degree. Some economies and firms are better at using these techniques than others, giving rise to uneven diffusion and consequently to scarcity and rent (Kaplinsky, 1998).

5. In 1998, Chrysler Corporation merged with Daimler-Benz A.G.

6. These figures do not include the production-sharing activities of U.S. apparel firms in Mexico and in the Caribbean Basin, which also have been expanding very rapidly (U.S. International Trade Commission, 1997).

7. If we were to complete the e-commerce matrix, the consumer-to-business (C2B) market would be represented by Priceline.com, the most popular of several reverse-auction sites, whereas the consumer-to-consumer (C2C) segment includes consumers’ auctions, epitomized by the auction site eBay.com. See *The Economist* (“Shopping Around,” 2000) for a fuller analysis of the e-commerce matrix.

8. A couple of familiar companies provide good illustrations of the extensive reach provided by the Internet. Amazon.com, one of the first electronic retailers on the Web, has no physical stores but offers an electronic list of 3 million books, 20 times larger than the holdings of Barnes & Noble, the largest chain bookstore. Dell's Internet site offers more than 10 million computer configurations (Evans & Wurster, 2000, pp. 61-62, 111).

9. The shift from manufacturer push to consumer pull appears to be a long-term trend in many industries today. It places a premium on a build-to-order business model and reflects a focus on consumer satisfaction and convenience. The pull strategy in supply chain management is embodied in popular business school concepts such as mass customization (Pine, 1992), lean production (Womack, J. P., Jones, D. T., & Ross, D. 1990), and lean retailing (Abernathy, F. H., Dunlop, J. T., Hammond, J. H., & Weil, D. 1999).

10. Portals are Web sites designed to be an Internet user's initial entry point for exploring the Web. Portals typically generate revenues by renting out advertising space.

11. In March 2000, for example, IBM formed a broad alliance (including a minority equity stake) with Ariba and i2 Technologies, two leaders in the business-to-business (B2B) software market, which provide end-to-end solutions for e-commerce clients. In June 2000, SAP A.G., Germany's leading e-business firm, invested in and teamed up with B2B software developer Commerce One to create one-stop e-business marketplaces as a competitive response to the IBM/i2/Ariba alliance (Standard & Poor's, 2001, p. 2).

12. Intellectual property suits are pending against search engines and Web linkers, and various kinds of technological protection systems are used to restrict access to many Web sites. There is a growing trend for some Internet companies to seek patents on business models as well as technologies. For example, Priceline.com (reverse auction) and Amazon.com (one-click shopping) received patent and copyright protection for their business models, which, if permitted, could stifle future Internet innovation (see comments by Mark Lemley, in Johnson, 2000).

13. Following a 36% growth in U.S. Internet employment in 1999 to a total of 2.5 million workers, more than 150 online companies laid off 14,000 people and 30 Internet companies closed down from January to September 2000. Forrester Research expects that by 2001, a large majority of online retailers will be forced to cease operations (Standard & Poor's, 2000d, pp. 1-2).

14. Thus far, e-commerce has not made major inroads in the apparel industry. Online apparel sales reached \$1.1 billion in 1999, which accounts for only 0.6% of total apparel sales (Standard & Poor's, 2000a, p. 8).

15. IBM seems to have followed Dell's lead by discontinuing its sales of personal computers in retail stores and by establishing an online strategy directed at its more profitable corporate customers. In 2000, IBM derived about one fourth of its personal computer revenues via the Internet and telemarketing (Bulkeley, 2001).

16. In 1999, General Motors' total automotive purchases were about \$87 billion, Ford's were \$85 billion, and DaimlerChrysler's were \$80 billion. Each of these automakers does business with about 30,000 suppliers. The online exchange is expected to yield a savings of \$2,000 to \$3,000 on a \$19,000 vehicle (Covisint, 2001). Cisco has the world's largest e-commerce site, with 87% of its orders transacted over the Internet, about \$45 million in Internet sales per day (Standard & Poor's, 2000d, p. 11).

17. AutoNation is the largest car dealer in the United States, and it had car sales of about \$1 billion (about 46,000 vehicles) via the Internet in 1999 (Standard & Poor's, 2000b, p. 5).

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