

## **Market Making in the PC Industry**

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# Market Making in the PC Industry<sup>1</sup>

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## I. Introduction

Over the past twenty-five years, personal computer makers have been steadily changing from manufacturers to market makers. Leading PC makers once designed and built their own PCs and sold them through a mix of direct and mostly indirect distribution channels (Dedrick and Kraemer, 1998).<sup>2</sup> PCs were built to forecast, and fluctuating demand led to alternating periods of costly inventory build-up and product shortages. Given the rapid depreciation and obsolescence of PCs and their components, and the common practice of price protection given to retailers, this production and distribution model was very costly to PC manufacturers.

This model was severely disrupted in the 1990s by the rise of direct sales specialists Dell and Gateway (Dedrick and Kraemer, 2005). By selling directly to the customer and only building products to order, these companies were able to reduce inventory and introduce new products without needing months to clear out old inventory in the channel. Dell's rapid growth and superior financial performance in particular put enormous pressure on the rest of the industry, eventually driving some competitors out of the market and forcing others to revamp their distribution channels and supply chains. While different models were applied over the years, PC makers moved to selling direct to the customer or to working closely with retailers to match supply and demand through

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<sup>2</sup> Direct channels include telephone and Internet sales made directly by the manufacturer. Indirect sales involve sales to distributors and/or retailers.

sophisticated marketing, forecasting and supply chain management. A key element has been the use of the Internet as a distribution channel and information technology more generally to streamline processes within the firm and across the supply chain.

The impacts are greatest in the U.S., where direct sales increased from less than a quarter to over one half of the market between 1995-2005. The direct channel is especially important in serving the commercial market,<sup>3</sup> where PC makers offer a variety of services together with hardware to support IT departments in organizations. In the indirect channel, aimed at the consumer market, sales shifted from dealers and specialist stores to larger consumer electronics and office retailers such as Best Buy, Circuit City, and Office Depot, who now work closely with PC makers to shape and efficiently fulfill market demand.

The U.S. pattern contrasts with other markets. Worldwide the indirect channel accounts for two-thirds of sales, and the dealer/reseller segment is larger than retail. Retail exhibits many different local patterns as a result of local consumer preferences, government regulations and differences in historical evolution. This local complexity makes it difficult for branded PC makers to become global market makers. Instead, branded PC makers such as Dell, HP, Acer, Sony and Toshiba are forced to adjust their distribution models to fit local markets. Internet sales in particular are constrained by consumer preferences and by the quality of IT and delivery infrastructure (Kraemer et al., 2006).

In some country markets, domestic competitors maintain extensive dealer networks (e.g. NEC, Toshiba and Fujitsu in Japan, Samsung in Korea and Lenovo in China). Elsewhere, local retailers developed their own store brand PCs, or collaborated with local companies to act as market makers (e.g., Germany, Brazil). In many markets, “white box”<sup>4</sup> PCs make up a large share of

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<sup>3</sup> The commercial market refers to enterprise, SME, governments education and other organizational segments, whereas the consumer market refers to households and individuals.

<sup>4</sup> White box refers to generic PC which carry the brand of the retailer or distributor rather than the manufacturer

the market. In these markets, small local shops build PCs for individual customers or small businesses. However, while there is a great deal of variation, the global trend is also towards more direct sales and towards large electronics retailers taking market share away from specialist dealers and resellers.

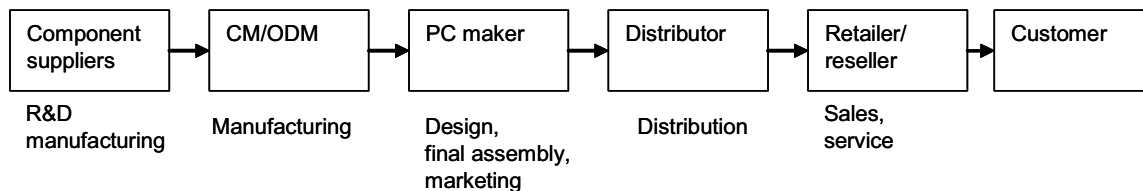
Although PC makers have become market-makers, retailing PCs to commercial customers and consumers, the PC industry offers a different and interesting twist on the “market makers” theme. In other industries, retailers used their relationship with the final customer to gain leverage over brand name manufacturers. They also developed store brands, essentially coordinating the manufacturing process even though they do not own any factories themselves. In the PC industry, major branded manufacturers became market makers in their own right, primarily by selling directly to the final customer, and also in collaboration with major retailers. PC makers perform market-making activities such as targeting markets, defining products, capturing customers, organizing efficient supply chains, and integrating hardware, software, services and content to deliver new user experiences. Meanwhile, some retailers have developed “store” brands, but most have either lacked the ability to compete directly with brand name vendors, or decided it is not profitable to try to do so.

## **II. Evolution of the PC industry**

Historically, computer companies were vertically integrated, handling all aspects of manufacturing and distribution. The introduction of the PC, which was a modular product whose architecture was open, changed the industry into horizontal industry segments, each of which specialized in different aspects from microprocessors to components and peripherals to PC systems to operating systems and applications to distribution (Figure 1). PC companies designed and assembled modular systems from components and software developed by outside suppliers. These systems were distributed through a variety of channels, including wholesalers, corporate resellers, department stores, electronics

superstores, specialty retailers and the vendors' own direct sales force. The connection between the PC maker and the final customer was often weak (via advertising and marketing) or non-existent. This market diversity made it difficult to match supply and demand, leading to build-up of inventory which is costly given the rapid depreciation of the product.

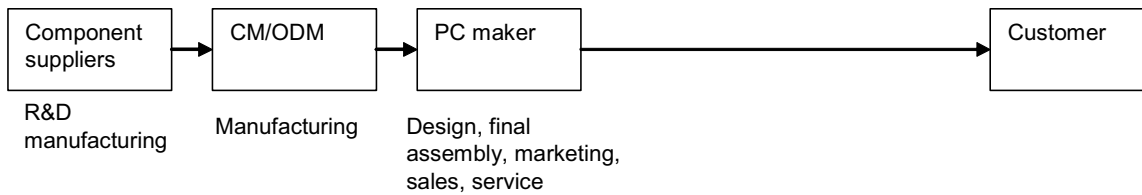
**Figure 1. Indirect distribution**



Note: CM= Contract Manufacturer; ODM= Original Design Manufacturer<sup>5</sup>

In the mid-1990s, a major shift began in the U.S. market toward direct sales of PCs, led by Dell and Gateway. By selling directly to the end customer, the PC maker was able to respond to demand and also to shape the demand to match available supply (e.g., by using telesales staff to promote or offer discounts on products in stock). The direct model also cut out the distributor and retailer, thereby eliminating two layers of inventory, avoiding costly price protection guarantees to retailers, and allowing new products to be brought to market without clearing old inventory out of the channel (Figure 2). The direct model put the PC maker in the role of “market maker,” with control over pricing and branding and the ability to bundle a variety of products and services to the customer.

<sup>5</sup> ODMs are mostly-Taiwanese firms that provide manufacturing and design services. Over 80% of notebook PCs are now manufactured by ODMs. CMs provide manufacturing services to a broad array of electronics firms.

**Figure 2. Direct distribution**

In the U.S. market, the direct model came to dominate the corporate market, as a result of the success of Dell and the shift to greater use of direct sales by Compaq, HP and IBM. The direct model was augmented by e-commerce, as customers could easily compare, configure and buy PCs online from the PC vendor, or place the order by phone. In the consumer market, while many customers began to buy direct, many still preferred shopping in a physical store. However, the retail market for PCs changed. Whereas the indirect channel dominated with 76% of PC shipments in 1995, direct sales accounted for nearly 55% of all PC shipments by 2005 (Table 1).

**Table 1. U.S. PC shipment share by channel (units)**

Channel	1995	2000	2005
<b>Direct*</b>	<b>23.79%</b>	<b>41.70%</b>	<b>54.46%</b>
Direct Inbound	16.02	22.31	17.31
Direct Outbound	7.77	12.67	24.76
Internet Direct	.00	6.72	12.39
<b>Indirect**</b>	<b>76.21</b>	<b>58.30</b>	<b>45.54</b>
Retail	29.76	24.05	21.36
Dealer/VAR/SI	37.32	29.77	19.85
Other	9.13	4.48	4.33

Source: IDC, 2006

\**Direct sales include:* (1) sales by customer-initiated inbound calls, (2) sales by a feet-on-the-street sales force, and sales by vendor-initiated outbound calls, (3) sales made strictly online directly by the end user with no human interaction from the vendor.

\*\**Indirect sales* are those sold through a distributor, aggregator, system integrator, value added reseller, mass merchant, or retailer, including vendor-owned retail stores.

### III. Market-making models in the U.S. PC market

Many variations of market making are used in the direct and indirect models, with different companies choosing different mixes of the two. Four such variations in the U.S. PC market are shown in Table 2 and described next.

1. In the *traditional channel* third party intermediaries supply branded PCs to business and consumer end users. These intermediaries may be distributors, value added resellers (VARs), systems integrators (SI) or large merchandisers (e.g., department stores, large electronic stores, large discount stores). In addition, distributors supply branded PCs to the many specialty retailers, especially smaller ones. Hewlett-Packard is the iconic illustration of this variation, but also involves retail collaboration (as described below). The traditional channel is the dominant variation used by vendors for many other related products (e.g., components, peripherals, supplies) whose manufacturers are too small to deal directly with retailers.

2. *Retail collaboration* was created by eMachines whose CEO was a former Best Buy executive. It is incorporated by Gateway, which bought eMachines and continues to sell both brands. It involves

- close collaboration between the PC maker and a few major retailers, using very sophisticated demand forecasting models to match supply and demand, and
- three month product cycles with sell-out at the end of each cycle to avoid inventory build-up (Ralston et al., 2004).

The market making mechanism is shared by the branded PC maker and the retailer who cooperate in determining target markets, product design and advertising programs. The number one consumer PC vendor, HP, reportedly developed a similar approach in the retail channel for consumer and SME (small and medium enterprise) markets.

**Table 2. Comparison of market-making models in U.S. PC market**

<b>Characteristics</b>	<b>Indirect</b>		<b>Direct</b>	
	<b>Traditional channel</b>	<b>Retail collaboration</b>	<b>PC maker as retailer</b>	<b>Retailer as PC maker</b>
<b>Channel Roles</b>	Channel as intermediary between manufacturer and the market	Re-intermediation: PC maker and retailer collaborate in going to market	PC maker disintermediates the traditional channel and goes direct to the market	Retailer employs ODMs to make own-brand PC and go to market
<b>Channel Members</b>	Channels include large distributors, VARs, SIs and electronics/ discount stores	Channels include large retailers	Channels include vendor sales force, inbound and outbound phone sales, online sales, vendor-owned stores	Retailer is the channel
<b>Examples</b>	HP and Apple: IngramMicro, TechData, Fry's, Costco, Best Buy, CompUSA	Gateway/ eMachines, and HP with Best Buy, Costco, Office Depot	Dell: web, telesales, experimenting with own stores Apple: web, telesales, Apple Stores	Wal-Mart, CompUSA, white box dealers, with ODMs/ component suppliers
<b>Market Strength</b>	Commercial & consumer markets	Consumer market	Commercial market	SME, consumer markets

3. The *PC maker as retailer* is the classic illustration of the pure direct sales model which employs the vendor's own direct sales force in the field, its own and third party telesales, and Internet sales to reach customers. It proved especially attractive to the commercial market, but also caught on with consumers in the U.S.

The direct model is associated mostly with Dell for the commercial market (Kraemer et al., 2000) and originally with Gateway for the consumer market (Dedrick et al., 2001). It is also used by other PC makers such as Apple and



HP. In this case, the PC maker acts as retailer and market maker and disintermediates the channel. Direct sales have been expanded by Dell and Apple to include other electronics products such as big-screen TVs, printers, and portable music players. The most familiar forms of direct sales are telesales and online sales, but both Dell and HP have feet-on-the-street sales forces that deal with large corporate and multinational customers.

The vendor-owned store is a variation of PC maker as retailer. Although abandoned by Gateway (Dedrick et al., 2001), it is highly successful for Apple. Dell is currently experimenting with its own stores. Apple's success is partly due to the design and location of its stores, which are generally in high-end retail malls and districts and do not compete directly with electronics retailers who also sell its products. Also, retailers cannot obtain Macs or iPods elsewhere, unlike the Wintel standard PCs, and so they lack leverage with Apple.

4. *Retailer as PC maker*, the private label brand experimented with by WalMart, CompUSA and other retailers (Tzeng and Shen, 2005). It also is used by small local makers who long held a strong position in the small business market. Although declining, private labels still supply about 20% of the total PC market in the U.S. and more in developing countries. Retailers can easily source PCs from contract manufacturers and original design manufacturers, as well as from distributors who provide final assembly. There is no real barrier to selling private label brands, yet as of 2007, large retailers in the U.S. have not done much to develop their own PC or electronics brands, unlike retailers in clothing, tools, furniture and other products.

### **Evolutionary patterns of PC makers as market makers**

When applied to the branded PC firms in the industry, it is clear that no single firm fits the direct and indirect models perfectly, although Dell and Gateway were closest to the direct model and HP and Compaq were closest to the indirect

model in 2000. Since then, the companies chose different mixes of the two models, with their distinct patterns apparent when comparing changes in channel use from 1995-2005 (Table 3).

**Table 3. U.S. branded PC makers as market makers: percent of shipments by channel (%)**

Vendor	Indirect				Direct			
	Retail		Value-added reseller/System integrator		Vendor-direct sales force & telesales		Pure Internet & 3rd party Internet	
	1995	2005	1995	2005	1995	2005	2000 <sup>1</sup>	2005
Apple	36	39	53	13	11	43	7	4
Dell	0	0	0	6	100	67	15	27
Gateway	0	67	1	3	99	25	8	5
HP	20	51	80	21	0	24	2	5
Compaq <sup>2</sup>	34	-	58	-	8	-	2	-
IBM	30	0	57	51	14	36	6	13

Source: IDC, 2007

<sup>1</sup> Note that this column contains values for 2000 rather than 1995. The 1995 values for each vendor add to 100. Internet sales were 0% in 1995, the year that the Internet was opened for commerce.

<sup>2</sup> Compaq was acquired by HP in 2002. Its 2005 data are included in HP's results.

The table shows that:

- All PC makers listed moved to greater use of direct sales, but indirect sales still dominate for most companies.
- Although all PC makers moved to greater Internet sales by 2005, they comprise only 5% for Apple, Gateway and HP with greater share for IBM (12%) and Dell (27%). Gateway actually went down in its Internet share between 2000 and 2005.
- *Dell*, which was 100% direct in 1995, has remained largely direct with 27% of sales from the Internet. Dell has begun to use value added resellers and system integrators (6%), mainly for the SME market where its own direct sales force is too expensive and retail is not equipped to serve it.

- *Hewlett-Packard*, which was 100% indirect in 1995, has become nearly 30% direct in 2005, partly by acquiring Compaq, which had established a direct sales business. The ratio of retail to VAR/SI shifted from 2:8 to 5:2.
- *Apple* moved the farthest towards engaging in its own market-making activity. Whereas only 11% of shipments were direct in 1995, 48% were direct by 2005. This change was largely through its own retail stores and telesales rather than the Internet.
- *Gateway* migrated from nearly 100% direct to mainly retail collaboration (67%), after its acquisition of eMachines and introduction of Gateway brand products into large retail outlets. In between 1995 and 2005, it opened and then closed over 200 of its own Gateway Country Stores in an unsuccessful market-making strategy.

These individual patterns illustrate that the industry remains dynamic with each firm seeking relative advantage through different combinations of direct and indirect approaches to market making.

#### **IV. Market making activities by PC makers**

Two fundamentally different market making approaches to customer and supplier markets underlie the direct and indirect channels: supply push in the indirect channel and demand-pull in the direct channel (Table 4). Individual firm innovations also resulted in variations of these approaches.

Market making through the indirect channel historically followed a supply-push approach to both customer and supplier markets (Table 4, column 2). For customer markets, vendors decided what products to offer to customers, developed sales targets for regions, supplied the products to distribution and provided high margins to retailers and value added resellers to push the product through their own advertising and sales campaigns. The vendor also provided

umbrella advertising for its brand and products, and protected the channel through price protection to retailers who had to discount to move inventory.

**Table 4. Market making activities in PC industry**

<b>Market making activities</b>	<b>Indirect (Supply-push)</b>	<b>Direct (Demand-pull)</b>
Customer markets		
Market & product definition	Hardware and software, e.g., HP/Compaq	Hardware, software and a "relationship," e.g., Dell
Capture customers	Vendor provides the box; retailers and resellers offer "value beyond the box:" touch & feel, additional software, services Vendor develops brand; retailers do advertising	Vendor offers custom box and relationship through vendor direct sales force, inbound & outbound call centers Vendor develops brand, makes sales calls to capture customers Develops customized web site, offers PC services to lock in customers
Incentives & risk	Incentives for channel partners, but vendor takes inventory risk Collaborative variation involves shared risk by retailer and vendor	Vendor & suppliers bear risk; no retail
Demand management	Only what is in inventory. Retailers can push products with advertising and sales	Can match demand and supply; can shape demand
Supplier markets		
Product management	Vendor designs product, procures key components, manages supply chain	Vendor designs product, procures key components, does final assembly, manages logistics and distribution centers
Outsourcing	Development, mfg., assembly, logistics, distribution, support	Development, mfg., support
IT-based supply chain management	Vendor supply-push; IT critical for supply chain mgt.	Customer demand-pull; IT critical for demand signals & supply chain mgt.

For supplier markets, vendors developed quarterly sales forecasts, placed orders for systems/components to suppliers and required them to keep a 45-60 day inventory in the vendor's regional distribution centers to reduce the risk of stock-outs. Both vendor and supplier bore substantial inventory risk if the sales forecasts were high because another 45-60 day inventory was already in the supply chain. In recent years, vendors have made significant improvements in supply chain management, with techniques such as vendor-managed components inventory, supply hubs close to the assembly site, and interorganizational IT systems to coordinate with suppliers. As a result, indirect vendors have seen significant improvements in inventory turnover and other measures of supply chain efficiency. Today, the indirect model continues to be an important way to reach markets, particularly consumer and SME markets, and in developing countries without adequate information and transportation infrastructure to support direct sales.

The collaborative variation on indirect market making emerged as a response to problems with the indirect channel in managing demand and controlling inventory between the PC maker and end customer. By making quarterly commitments to sell predefined quantities, the retailer takes the market risk. In turn, the PC maker is able to incorporate the latest components into new designs each quarter in order to have a fresh supply of new products. The quarterly commitments enable the PC maker to provide accurate forecasts of demand so there is no inventory in the supply chain. These commitments also enable better forecasting of long-term demand by the PC maker, which in turn gives them greater price leverage with the ODMs and suppliers who can see the potential volume of business.

In addition, the PC maker is able to provide umbrella marketing for its retail partners and to mount joint advertising campaigns to promote sell-through of all product with the retailers. For example, eMachine's collaborative model, which focused on market making with large electronics retailers, was also adopted by

Gateway when it acquired the firm. A similar approach has been taken by HP for its HP and Compaq brand PCs, which are the biggest sellers by far in the U.S. retail market. As will be seen in Section VI, the collaborative model was emulated outside the U.S. by the German PC maker Medion who collaborated with the very large supermarket chains and mass retailers in Europe.

In contrast to the supply push approach, the direct model involves a demand-pull approach to market making (Table 4). For customer markets, vendors promote customization (build to order), standardization (download of corporate standard software to all PCs) and low cost, especially to commercial customers (business, government, education) to attract their business. Vendors take orders through their own direct sales force, call centers or the Internet, giving vendors direct understanding of customer demand and the ability to detect new market trends early. The direct relationship also enables the vendor to up-sell customers by offering related products at low cost (computer plus printer, monitor, training and service), sell components that are in inventory by offering discounts, and shape demand by offering newer technologies at the same price as current ones. Vendors develop advertising to build brand image, promote specific products and drive customers to their web sites and call centers. A substantial direct sales force and “executive centers” are also used to promote large commercial contracts. For example, Dell has executive centers located at manufacturing plants whose purpose is to sell customers on the Dell model and Dell’s execution of it through briefings, an in-plant tour and an informal lunch or reception with Dell executives and staff (Dell interview 2000).

Commercial contracts usually involve thousands and frequently tens of thousands of PCs to be delivered over several years, which have major implications for supplier markets. Vendors are able to forecast demand better, plan production, and negotiate prices with suppliers based on known demand. Because PCs are built to the customer's order and delivered direct as a complete package, there is no inventory in the distribution channel. Inventory in the supply

chain also can be reduced through the use of IT to better forecast demand and plan production. And because the vendor controls final assembly and logistics, it can better ensure product quality and timely delivery even when parts of a complete system (e.g., monitors or peripherals) are shipped direct to the customer from suppliers' factories.

The result is a brand image of low cost, customization and advanced technology which helped propel Dell to be the industry leader for commercial markets, and for a while, Gateway to be a leader for direct sales to consumer markets. Dell's success forced other major PC makers to emulate its market making strategy by developing direct capabilities. Although Dell retains the lead on most performance measures, emulation and process innovation by other vendors has resulted in closing the performance gap.

### **Market making by others**

A special feature of the PC industry is that technical standards are set by key component and software suppliers, who engage in market making activities to promote their own brand and products, and who both cooperate and compete with the PC makers.

Intel develops reference designs for PCs based on each new processor and chip set that it introduces. These standard designs reduce the ability of branded firms to differentiate based on technical architecture, while also making it easier for non-brand firms (white box makers) to compete with the branded firms by simply following the standard. Intel also provides technical assistance (engineering, training, testing services) to the white box makers which are mostly small and medium-sized firms without engineering staffs (Tzeng and Lang, 2003; Chan, 2005; Yeo, 2006). Intel cooperates with the branded PC firms by providing funds for its "Intel Inside" co-branded labeling, marketing and advertising, but also has its own marketing and advertising programs to promote the Intel brand. These

activities are designed to increase Intel's market power and to keep the branded PC makers in line, while cooperating with them in joint marketing efforts.

Intel is not alone. Microsoft also funds co-branded marketing and advertising for PC makers as well as manufacturers of non-PC devices that run on its operating systems (e.g., phones and PDAs). Its own advertising for Windows products promotes retail sales of its operating systems, but also helps drive sales of new PCs to take advantage of the capabilities of its software.

These activities are a double edged sword from a market-making perspective. The Wintel standard helped to make the PC market through standardization of hardware and software interfaces and greater interoperability of PCs, which is increasingly important in a globally interconnected world. Branding and advertising programs also increased the overall demand for computing through greater public awareness and stimulation of demand. However, these programs also reinforced the monopoly power of Intel and Microsoft, enabling them to keep prices high and to punish PC makers who stray from the standard (e.g., use AMD chips or promote open source software) by supporting their competitors (retailers, white box makers). We would argue that Intel and Microsoft could have a greater effect on demand simply by cutting their prices, enabling vendors to reach more customers, particularly in big emerging markets such as China, India, Brazil and Mexico.<sup>6</sup>

## **V. Impacts of market making on customers and suppliers**

The impacts of market making by PC makers and others have been largely positive for customers while quite mixed for suppliers.

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<sup>6</sup> Although admittedly, many customers in those countries already pay close to zero for Windows, and for application software, given high piracy rates.



## **Customers**

Consumers are offered a richer variety of purchasing options thanks to the innovation in market making by the PC industry. They can shop and buy online, or window shop online and buy in a vendor's retail store, or choose from a number of physical retail outlets. The ability of PC makers and retailers to eliminate excess inventory also means lower prices and fresher products with the most recent technologies. Consumers also benefit from more product information and the ability to compare prices online, even if they shop in person. However, consumers now have fewer choices of retail PC brands, as a result of mergers (HP-Compaq, Gateway-eMachines, Lenovo-IBM), and the exit of brands from the U.S. market, such as AST, Packard Bell and Acer (which is just returning to the U.S. market). HP (including its Compaq brand) controls over half of the in-store retail PC market, with only Gateway, Sony and Toshiba as major competitors in the U.S. Yet given the rapid introduction of new products and ever lower prices, it is hard to argue that consumers are suffering from this consolidation.

Commercial customers reap all these consumer advantages and more. With build to order procurement and systems that download corporate approved software and system images and the ability to migrate to newer technologies that come along for the platform, large firms can more easily manage PC resources from procurement to disposition. Furthermore, they achieve greater standardization of platforms. Small and midsize businesses (SMBs) can acquire installation and maintenance services through channel partners (VARs and SIs) or through white box makers as well as from their vendors.

## **Suppliers**

The PC makers' market-making activities that led to industry consolidation also increased their market power over their ODM/CM contractors and the entire

supply chain. It impacted the industry structure, the way firms must do business, the roles they perform, and their prices and profits.

*Industry structure.* The branded PC makers reduced the number of suppliers they do business with, resulting in a two-tier supplier structure of very large and midsize-to-small firms. Although they use fewer contractors and engage in long term relationships with them, the PC makers still shift contracts for specific products among suppliers based on cost, quality, or unique capabilities (Dedrick and Kraemer, 2006).

*Doing business.* PC makers have adopted just-in-time supply hubs and vendor-owned inventory to reduce inventory costs. Contract manufacturers are pushed to provide direct shipment services. In some cases, the PC maker never takes physical possession of the product, which is built by outside suppliers and shipped directly to the end customer or retailer. The exception is build-to-order assembly, which Dell and others keep inside their own factories (Kraemer et al., 2000). However, IBM/Lenovo outsourced build-to-order production in the U.S. and Europe, and Apple did the same in the U.S. so there appears to be no real barrier to complete outsourcing of manufacturing.

*Supplier Roles.* As PC makers shifted their focus from manufacturing to retailing/market making, their suppliers have taken on new roles. Original Design Manufacturers, mostly Taiwanese companies who design and manufacture PCs for all of the major PC vendors, now:

- Do new product development, especially for notebook PCs.
- Provide warranty and repair services in some cases.

As these suppliers gained capabilities, the PC makers were able to concentrate on marketing, branding, product management, and supply chain coordination.

The production model pioneered by the PC industry has been adopted to varying degrees in other parts of the electronics industry as well. Contract manufacturers

and ODMs have taken over more manufacturing and parts of the design process, especially for lower end and more mature products. Typically, contract manufacturers have specialized in efficient production, logistics and related services for a wide range of products such as printers, network equipment, iPods, and video games. But for some products, such as cell phones, joint development with ODMs is becoming more common. However, the outsourced manufacturing and development approach is little used by Japanese and Korean firms who are still much more vertically integrated than US firms.

Prices and Profits. The biggest impact of market making on suppliers, for both the direct and indirect model, is the constant pressure from PC makers to cut costs to meet industry competition. Dell's efficient direct model enabled it to lower prices. Other vendors had to match prices by greater use of outsourcing and continual pressure on suppliers to cut costs. Vendors force the ODMs to compete with one another for business and expect quarterly cost reductions of 5-7%.<sup>7</sup> Suppliers go along with these practices in the hopes that lower prices would grow the market and enable them to gain economies of scale. Low profits, on the order of 1-2%, led some ODMs to integrate forward and to develop their own brand products, while others moved upstream to produce components and subassemblies. The result for the PC industry is a continual increase in the number of units sold, but only a modest increase in sales revenue, and a continual decline in profits for both PC makers and suppliers. The exceptions are Microsoft and Intel, who continue to enjoy rich margins, leading PC makers and suppliers to complain that they're killing themselves to make money for Microsoft and Intel.

## **VI. The global picture**

Outside the U.S., the market-making picture is quite different. The direct sales model for PCs has only been successful in some markets. For example, Dell's

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<sup>7</sup> Numbers based on field interviews with ODMs and suppliers by the authors.

market share is 35% in the U.S., but only 18% worldwide (IDC, 2006). Comparison of the U.S. and worldwide trends shows growing use of the direct model generally, but that the indirect model still dominates outside the U.S. (Table 5).<sup>8</sup> Moreover, the rest of the world tends to use dealers, VARs or system integrators more than retailers regardless of region (Appendix A).

**Table 5. Worldwide PC shipment share by channel (units)**

Channel	1995	2000	2005
<b>Direct*</b>	<b>21.70%</b>	<b>27.90%</b>	<b>33.70%</b>
Direct Inbound	9.58	11.65	9.50
Direct Outbound	12.12	12.80	18.86
Internet Direct	.00	3.45	5.34
<b>Indirect</b>	<b>78.30</b>	<b>72.10</b>	<b>66.30</b>
Retail	24.11	29.80	28.60
Dealer/VAR/SI	49.22	39.68	35.39
Other	4.97	2.62	2.31

Source: IDC, 2006

\**Direct sales include:* (1) sales by customer-initiated inbound calls, (2) sales by a feet-on-the-street sales force, and sales by vendor-initiated outbound calls, (3) sales made strictly online directly by the end user with no human interaction from the vendor.

\*\**Indirect sales* are those sold through a distributor, aggregator, system integrator, value added reseller, mass merchant, or retailer, including vendor-owned retail stores.

This broad pattern for the leading non-U.S. PC makers is also illustrated in the evolution of individual firms from 1995-2005 (Table 6). Four of the five leading Asian brands (Acer, Fujitsu, Lenovo and Toshiba) use VAR/SI over retail. Sony uses retail, including its own Sony Style stores, over VAR/SI and shows increasing use of the Internet. As with U.S. firms, the leading non-U.S. vendors use different mixes of direct and indirect strategies for their markets, though still mainly indirect.

<sup>8</sup> Indirect sales worldwide are over 66% of total sales; excluding the U.S., the figure would be much higher.

**Table 6. Non-U.S. PC makers as retailers: percent of shipments by model (%)**

Vendor	Indirect model				Direct model			
	Retail		Value-added reseller/System integrator		Vendor-direct sales force & telesales		Pure Internet & 3rd party Internet	
	1995	2005	1995	2005	1995	2005	2000	2005
Lenovo	-	1	-	56	-	37	-	6
Acer	31	3	67	96	3	0	10	0
Fujitsu	-	10	-	64		23	5	3
Sony	-	49	-	33	-	5	10	13
Toshiba	56	-	44	-	0	-	2	-

Source: IDC, 2007

The VAR/system integrator channel dominates outside the U.S. because most countries do not have the large nationwide retailers as in the U.S. (as illustrated in earlier chapters), or national distribution networks. Moreover, neither commercial customers nor consumers are accustomed to buying by phone or over the Internet (Kraemer et al., 2006). As a result, local retail models differ among countries. We label this difference generally--“retailer as PC maker.” Some countries, such as Japan, use traditional two-tier channels, with local retailers dominating as illustrated by the “electronics district” in major Japanese cities (e.g., Akihabara in Tokyo). Others with strong domestic PC brands (such as NEC and Fujitsu in Japan, Samsung in Korea and Lenovo in China), are marked by vendor-dominated nationwide networks of dealers who only carry those brands. In Brazil, local brands are sold in supermarkets and other non-traditional retail outlets. In Europe, the German company Medion decided to leverage the already established but unexploited mass-market retailer chains, such as food retailers, supermarkets and discounters (e.g., ALDI, Carrefour, and Metro) to sell PCs to consumers—a model similar to eMachines (Ordanini et al., 2006). In many developing countries, small “white box” makers have up to half

the market. They buy assembled notebooks from the ODMs, assemble desktops themselves, and install PCs for consumers and small businesses.

These differences suggest multiple models in different places rather than an emerging global model for PC or consumer electronics retailing. Market making for PCs is almost always local and must be done through local distribution networks. The need for localization is also a reason why many vendors or their contract manufacturers must keep some local final assembly capabilities, and/or very sophisticated supply chain and logistics systems. Because other markets are much less PC-centric than the U.S. and more focused on wireless technologies and games (Japan, Korea, China), the power of mobile service providers and interactive game services is greater. In their case, the focus is on the service rather than the sale of the hardware per se.

Under these circumstances, the branded PC and consumer electronics makers or retailers in the U.S. face significant hurdles if they are to become truly global market makers. Moreover, it is in the interest of the core technology standard setters such as Intel to limit the market power of any would-be global market maker. Standards issues become even thornier on a global level. Governments and local actors become involved and often different standards prevail in different countries. While the Wintel standard became a de facto global standard, there are, and will be, multiple standards for 3G cell phones, DVDs, wireless networking and many other technologies. As we move into the next phase of the PC and consumer electronics industries, we may see more fragmentation of market making rather than more standardization, with the fragmentation aided by governments and technology alliances among competing groups of companies.

## **VII. Future trends in market making**

*Systems Integration.* The trend which is likely to most significantly redefine the PC and Consumer Electronics industries, and the nature of market making in

those industries, is the proliferation of technologies with the potential to be interconnected in the “digital home.” Consumers no longer buy PCs, TVs, cameras or audio systems as separate items with separate functions. Instead they store digital photos on PCs, download music from PCs to iPods, save TV shows on PCs, and play movies on portable DVD players. And now they are listening to music and playing games on cell phones. The challenge is getting these technologies to work together, which has proved to be a big hurdle for consumers, retailers, and technology companies.

*Convergence.* Partly because of the systems integration hurdle and also because of competing visions, the PC-centric orientation of the PC industry is being challenged by network-centric and PC-independent visions. The network-centric idea is that user applications and content will be stored on the Internet and accessible from anywhere with a variety of devices such as an MP3 player, PDA, phone, or PC—but the PC will no longer be central. The PC-independent vision is that the functionality of a PC will be built into some consumer electronic devices such as TVs, set-top boxes and DVRs (e.g., Tivo) and therefore no longer require a media center PC. It is unclear which of these visions (or some other) will hold sway in the future, but it is likely that the PC will play a significant role in convergence.

Apple’s music service illustrates such convergence. What is being sold is an entertainment ecosystem rather than just an MP3 product. Apple integrated an independent device (the iPod) with the PC (Mac or Wintel). The iTunes software provides the capability to download songs stored on the network (the Internet-based iTunes Music Store), to manage a music library, to play songs and to transfer them to the iPod. Apple needed to keep tight control over the hardware, software, and electronic commerce components in order to make a market for digital music. HP tried to do the same with digital photos, but it had to be more open in allowing interconnection with competing camera, PC and printer brands.

Apple is trying to extend the iPod success with the iPhone, which adds communication capabilities and phone carriers to the ecosystem.

*Technology integration and new services.* For retailers, the issue is providing customers with the help they need to get the technologies to work together. The integration challenge creates new opportunities in market making. Firms that can make the disparate technologies work for consumers will have a new role as market makers. Attempts to do so include Best Buy's Geek Squads (Krazit, 2006) or Circuit City's Firedog service (Reuters, 2006), which make house calls to get balky systems to work, and Apple's in-store experts who will show customers how to use the products they sell. Given that the digital home incorporates products from multiple computer and electronics companies, retailers are in a good position to be market makers if they can develop the needed expertise. Sensing this situation as an opportunity, the distributor Ingram Micro is developing a new business based on providing support to these emerging digital home integrators.

*Standards.* At the technology end, the big issue is standards. Here the problem is that companies need to establish standards for products to work together, but some hope to capture monopoly profits by having their own standards adopted. Also, no one wants to cede power and profits to a future Microsoft or Intel. The result is often years of delay in introducing technologies, or a profusion of standards that don't work together in the home. In the PC industry, Microsoft and Intel set the standards and everyone else (except Apple) went along. In the digital home era, everyone from Microsoft and Intel to Sony, Toshiba, Nokia, Cisco and even Yahoo! and Google are all trying to set standards. PC makers who don't create technologies are left in the position of lining up on one standard or another, or supporting multiple standards, and hoping to be right. Retailers are in the same position, as no retailer has the market power to determine standards by its own choice of what to carry.



*The choice of vision.* It is likely therefore that future market making will include PC-centric, network-centric and PC-independent visions, perhaps with a mix of these visions for individual firms. While market making in the PC industry historically was focused on the commercial market, which led the consumer market in adopting new technologies, now it is the consumer market that leads. This dramatically changes the nature of market making, as individual consumers can have much different motivations than corporate IT departments. Consumers care about style, ease of use, convenience and service and do not get enjoyment or job security from getting technologies to work together. Thus, the future of market making will be driven more by those who understand the customer and less by those who create the technology.

## **References**

Chan, Rodney, 2005. Intel in new push for the clone notebook market, DigiTimes.com. 12/9/2005.

Circuit City, 2006. Circuit City Unleashes firedog(SM); New Brand Offers Increased Level of Services for Personal Computers, Home Theater Installations and More. Richmond, VA: September.

<http://newsroom.circuitcity.com/releasedetail.cfm?ReleaseID=209835>

Dedrick, Jason and Kenneth L. Kraemer, 1998. *Asia's Computer Challenge: Threat or Opportunity for the United States and the World?* New York: Oxford University Press.

Dedrick, Jason and Kenneth L. Kraemer, 2005. The impacts of IT on firm and industry structure: the personal computer industry, *California Management Review*, 47(3) Spring: 122-142.

- Dedrick, Jason and Kenneth L. Kraemer, 2006. Globalization of innovation: the personal computing industry. Working paper prepared for the National Academy of Sciences STEP Project. Irvine, CA: PCIC.
- Dedrick, Jason, Kenneth L. Kraemer and Brian MacQuarrie, 2001. Gateway Computer: Using e-commerce to move beyond the box and to move more boxes. Irvine, CA: Personal Computing Industry Center, The Paul Merage School of Business. Working Paper.
- IDC, 2006. Data compiled on request from *IDC Worldwide Quarterly PC Tracker*. Framingham, MA: IDC, January.
- IDC, 2007. IDC Worldwide Quarterly PC Tracker. Data compiled on request by Hardware Channels and Alliances, IDC January 25, 2007.
- Kraemer, Kenneth L., Jason Dedrick, Nigel Melville and Kevin Zhu, 2006. *Global E-Commerce: Impacts of National Environment and Policy*, Cambridge, U.K., Cambridge University Press.
- Kraemer, Kenneth L., Jason Dedrick and Sandra Yamashiro, 2000. Dell Computer: Refining and extending the business model with IT, *The Information Society*, 16:5-21.
- Krazit, Tom, 2006. Need your PC fixed? Get ready to pay up, CNET News.com, 3/1/06.  
[http://articles.techrepublic.com.com/2100-10877\\_11-6044445.html](http://articles.techrepublic.com.com/2100-10877_11-6044445.html)
- Ordanini, Andrea and Kenneth L. Kraemer, 2006. Medion: the retail “orchestrator” in the computer industry. Irvine, CA: Personal Computing Industry Center, The Paul Merage School of Business, UC Irvine, November. Working paper.

Ralston, Bill, Kenneth L. Kraemer and Jason Dedrick, 2004. The retail model in the computer industry: eMachines. Irvine, CA: Personal Computing Industry Center, The Paul Merage School of Business, June. Working paper.

Reuters, 2006. Circuit City chases service with new Firedog brand, CNET News.com 11/1/06. Also, <http://en.wikipedia.org/wiki/Firedog>.

Tzeng, David and Wen-Yu Lang, 2003. Intel aggressively exploring the clone notebook market, DigiTimes.com. 7/9/2003.  
<http://www.digitimes.com/NewsShow/Article.asp?view=Article&DATEPUBLISHED=2003/07/09&PAGES=01&SEQ=1>

Tzeng, David and Steve Shen, 2005. Wal-Mart adds FIC and Uniwill to its value notebook lineup, DigiTimes.com. 1/18/2005.

Yeo, Vivian, 2006. Intel pushes for conformity in notebooks, CNET News.com, 4/12/2006.  
[http://news.com.com/Intel+pushes+for+conformity+in+notebooks/2100-1005\\_3-6060277.html?tag=nefd.top](http://news.com.com/Intel+pushes+for+conformity+in+notebooks/2100-1005_3-6060277.html?tag=nefd.top)

## Appendix A—Channel shares of PC shipments by world regions

**Table A-1. Asia Pacific PC shipment share by channel (units)**

<b>Channel</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>
Direct	25.77%	16.40%	16.60%
Direct Inbound	.56	1.32	2.33
Direct Outbound	25.21	13.19	12.89
Internet Direct	.00	1.89	1.38
Indirect	74.23	83.60	83.40
Retail	13.64	30.18	32.61
Dealer/VAR/SI	60.16	52.43	49.97
Other	.43	.99	.82

Source: IDC, 2006

**Table A-2. Latin America PC shipment share by channel (units)**

<b>Channel</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>
Direct	20.85%	28.32%	40.43%
Direct Inbound	3.39	4.57	5.95
Direct Outbound	17.46	22.21	32.93
Internet Direct	.00	1.54	1.55
Indirect	79.15	71.68	59.57
Retail	8.01	23.59	18.95
Dealer/VAR/SI	65.60	45.11	38.64
Other	5.54	2.98	1.98

Source: IDC, 2006

**Table A-3. Western Europe PC shipment share by channel (units)**

<b>Channel</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>
Direct	17.12%	16.74%	22.48%
Direct Inbound	10.27	9.00	10.03
Direct Outbound	6.85	6.66	10.36
Internet Direct	.00	1.08	2.09
Indirect	82.88	83.26	77.52
Retail	22.80	32.60	34.47
Dealer/VAR/SI	58.39	48.45	40.38
Other	1.69	2.21	2.67

Source: IDC, 2006

**Table A-4. Central/Eastern Europe PC shipment share by channel (units)**

<b>Channel</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>
Direct	20.61%	23.60%	21.21%
Direct Inbound	.37	.41	.40
Direct Outbound	20.24	22.99	19.64
Internet Direct	.00	.20	1.17
Indirect	79.39	76.40	78.79
Retail	12.29	31.25	33.69
Dealer/VAR/SI	67.05	45.08	45.07
Other	.05	.07	.03

Source: IDC, 2006

**Table A-5. Middle East/Africa PC shipment share by channel (units)**

<b>Channel</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>
Direct	26.23%	25.61%	29.05%
Direct Inbound	1.04	1.69	.42
Direct Outbound	25.19	23.06	28.16
Internet Direct	.00	.86	.47
Indirect	73.77	74.39	70.95
Retail	6.27	8.50	21.01
Dealer/VAR/SI	67.50	63.41	49.82
Other	.00	2.48	.12

Source: IDC, 2006

Source for all tables: IDC, 2006. Data compiled on request by Hardware Channels and Alliances, IDC January 23, 2006.