Distributed Excellence and the Dell Model

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Best known for shipping computers with customized option packages within a few days after order, Dell Computer qualifies both as a manufacturer and as a Dot.com company — and a profitable one. It's the only desktop computer manufacturer now making money. As Dell puts it, they have about 120 percent of the industry profit.

Dell has commanded attention from investors because it operates by a new business model — on-line orders coupled with mass customized manufacturing. Computers are sold and shipped directly to customers, not through distributors. That eliminates field inventory and puts Dell in direct contact with their customers, a modus operandi neatly summarized in Dell's catch phrase, "Be Direct."

Dell illustrates a form of Distributed Excellence: Solve the customers' problems better and faster — anywhere, anytime. Within five years or less, the expectation is that operations elsewhere will migrate toward a form like Dell — or beyond.

Dell does not intentionally give anything away. It's financial numbers make business sense: six days of inventory, going for five, with no finished goods. Fast growth: 30 percent per year and more. Negative working capital, because it collects from customers before suppliers are paid. Losses from obsolete material are less than 0.1 percent of sales in a business where material costs drop by 1-2 percent per month. With no finished goods or distributors, Dell computers don't hang around to depreciate.

**Strategy: Best Direct Customer Experience**

The top item in Figure 1, Dell's strategy, is to give the best direct experience customers can have with computers — obtaining them, using them, and servicing them if necessary. No intermediaries stand between Dell and its customers, so the company learns directly what customers do and don't like. Dealers and distributors filter and delay signals from the end users. Sometimes the filters completely plug up.

Not all customers are ready to buy direct. Some need assistance from value-added providers mixing and mating competitive equipment, or want to see the machine before buying, so Dell is still Number Two in North American PC sales. However, competitors envy Dell's cost position. All recognize that quality customer experience is the key to profit and survival. A computer is a commodity; excellent service is not. Savvy users are more likely to buy through the Dell direct channel if their experience is satisfactory.

Dell keeps a service record of each computer and the software pre-loaded on it. When the computer is built, Dell assembles the service record, including full traceability on all major components. Design, logistics, build, and test are steps crucial in preparation for the main event — the customer's experience.
Design, logistics, build, and test processes are mostly hidden from the customer. By definition, direct experience is every process visible to the customer, which begins with learning about Dell's offerings and continues into post-purchase service.

Dell is working hard to make it easy to specify, obtain, and use a computer. Anyone can order a computer from the main web page. For corporate clients, Dell has created 25,000 web pages worldwide, one for each client company. Employees in these companies can communicate directly with Dell using an approved link. The web pages are customized to make it easy to get a computer that meets the client company's approval and to work through the payment process. Dell has thus set up a rapid communication business interface between itself and each major corporate customer.

**Strategy: Low Cost Provider**

Low cost is a prerequisite to staying in the personal computer business. Since the value of the goods almost shrinks before your eyes, managing obsolescence is vital. By selling directly to customers, Dell has no aging finished goods anywhere in the field. A new model is added or dropped almost daily, and Dell tightly controls the cutoffs of components for model changes and engineering changes, so it doesn't get stuck with obsolete components.

Six to nine months is average model life expectancy. In this business, customers assume that Moore's Law is a given — that innovation itself is a commodity. Cost competition begins with product development. Time pressure is intense. Time is money. Dell drives down cost primarily by tightening the leadtimes of all operations, not just manufacturing throughput time.

Speed is important to customer service, but equally important, it eliminates cost and investment. Not only are inventories low, so is the order backlog. Longer order leadtimes give customers more opportunities to change their mind, and managing order changes takes time and money too. Computers ship within 3.5 days after receipt of the order. The longest leadtimes are from suppliers, some of which extend 10-12 weeks.

Production is build to order, or BTO, the electronics industry's standard acronym for mass customization. Each day Dell builds the mix of computers that arrive in the order queue. The lot size is one. Little attempt is made to balance the load sequence in production. The biggest variance in time to fulfill an order is loading and testing customized software packages. Almost all orders ship in eight hours after they are kitted to start production.

**Strategy: Virtual Integration**

Dell operations depend on synchronized information flow, which is necessary to routinely translate customer orders into a service record for field use in 3.5 days. To go along with the record, a computer is assembled and tested. When information flows are accurate and available at the instant needed, many other problems simplify. Dell managers often refer to "Lovejoy’s Law," which is that timely, useful information substitutes for both inventory and capacity.

Besides communicating the stream of materials information, new product development must be closely integrated with suppliers. Dell designs, assembles, and tests computers and installs software packages. It fabricates no parts and writes no major software so that it doesn't compete with suppliers. Dell R&D collaborates with suppliers to deliver the best available technology for each new model and its options. To preclude obsolescent parts, the Dell engineering and material systems must orchestrate the suppliers, trying to avoid sour notes. (Yes, once in a while they hit one.)

Dell's strategy is to link with suppliers as well as customers using Internet. The supplier web pages are still building. Only about 50 have been launched; more are planned. In time, the strategy is to stop sequential communication among members of the Dell value chain, as shown in Figure 2.
Instead Dell wants suppliers to see much of the information that Dell sees and take action on their own — avoid extensive second guessing of forecasts. Deep into the bill of material, it's impossible to forecast with an accuracy better than plus/minus 50 percent 90 days out — the suppliers' working leadtime. At a minimum, Dell would like to take the information delay out of supplier leadtimes.

Supplier communication is more difficult to develop than customer communication. Different companies' systems don't match, so getting a handle on the interface points between complex organizations is no small task. However, the goal is to make value chain operations function with efficiency and the distributed autonomy possible in a plant with extensive visual controls.

As a current example of Dell shortening information delay, when a component is reported defective by a customer, Dell immediately sends a replacement part and has the customer send back the defective one. The defect is immediately transhipped to the supplier. This procedure still consumes ten days or so between finding the defect and the supplier actually seeing it, but it beats having the things squirreled away for months by dealers or distributors.

Quality Is In the Customers' Experience

A happy end user is the test of performance. Dell's primary performance metrics relate to customer experience. One is to ship on time — or when the customer wants. A second is Initial Field Incident Rate, whether both the computer and the experience has been satisfactory 30 days after delivery (currently about 1300 dpm on this measure). A third comes into play when customers find defects. It's called first-time, on-time fix. Dell wants customer problems resolved sooner, not later.

Two-Knob Control

Because Dell sells direct, it can control two knobs — supply and demand — to satisfy customers. For example, if Dell is short of 15" monitors, sales personnel will adjust both phone dialog and web page offerings something as follows: "Just for you, today we will give you a 17" monitor instead of a 15" for only $25 extra." Thus demand is shifted away from parts shortages and toward parts availability.

Most manufacturers can't do this. Only by selling directly can a company influence demand directly and immediately. Revised offer decisions can be made within minutes after discovering a supply problem. Of course, Dell also scrambles for material to satisfy customer requests. Dell calls this two-knob control. Compared with selling through distributors, the second knob of demand influence is a substantial advantage when operating lean.

The Dell Model

Shown in Figure 3, the Dell Model is the best-known brief explanation of how Dell operates. Dell occupies the OEM space between customers and suppliers. It aims to match customer demand with supplier capabilities using the four stratagems in the bottom four boxes. Each "box" is considered equally important to Dell's business, and within Dell the model is followed as if it were a religion.

A person's view of the Dell Model often depends on his/her background. Manufacturing personnel are fascinated by the mass customization. However, from a marketing view, relations with customers, assistance with finance, and immediate knowledge of how users actually employ Dell machines is equally important. Application specs range from simple to capacity-hogging games, and almost everyone wants to use computers to be connected. Dell would like nothing more than to be each customer's advisor on specifying a computer to meet their needs.

Co-operative R&D

Dell engineers cannot keep up with everything in computing. Such massive R&D would cost too much. Dell is dependent on supplier technology because it avoids "doing" circuit boards, integrated circuits, or anything else that requires great capital. Those are separate businesses.

Dell patrols changing technologies available from suppliers, ready to pounce on any hot trend — flexible innovation, it's called. Today's innovation is tomorrow's junk. Missing an important trend in this business is the kiss of death. For example, wireless web connections could become the rage very quickly. Being caught incompatible could make Dell's huge market cap pucker to nothing in two years. (It's also why Bill Gates seems to want in on every trend.) Of course, Dell tracks what customers are asking for, but that is inadequate to keep up. Dell must
rely on suppliers for market research on features that seem possible, imminent, and desired by customers.

Consequently, computer design at Dell is a team-based enterprise with suppliers, too fast paced to muddle with functional silo issues. The objective is to integrate supplier technologies into easy-to-use, attractive packages.

**Mass Customization**

Dell builds to order. Assembly time for a desktop computer is at most 30 minutes of the 3.5-day order leadtime. Assembly touch time is only 3-5 minutes; the balance of time in assembly cells is initial testing.

Desktops are a two-person build; servers a one-person build. By limiting the number of hands touching each computer, responsibility for each one is easy to trace. Computers are kitted and sent to the next open build station — a single-line, multi-server queuing system. The variance from one unit to the next in build, software load, and test times are too great to balance a line. Direct labor is less than five percent of cost, so sequencing computers to improve efficiency is saving a penny while spending a dollar in increased backlog.

Flexibility is paramount. The plants run two shifts, five days a week. Overtime and a couple of Saturday's a month can handle ordinary order surges; temporary workers plug the gaps when a big bubble hits.

Dell experiences “hockey stick” order cycles common to production, most of it from cyclical purchasing of customers. Internal causes of surges are dampened. For example, sales personnel have periodic targets. However, the sales reporting periods are staggered so that all sales personnel are not closing major orders at once.

Last year, materials cost $19 billion; production $0.7 billion. Inbound logistics was $0.3 billion; outbound $0.6 billion. Materials costs dwarf the operating expenses. The value chain is getting a great deal of attention.

Dell also assembles close to the market. Three-day delivery of BTO orders beats production in a foreign location with lengthy and expensive logistics.

Mechanical components are fabricated by local suppliers and delivered to the kitting area by a JIT process. Electronic components have longer leadtimes. Nearly all of those are metered out to the plants from a warehouse called the revolver. Dell owns very little inventory in the revolver. The intent is to stimulate suppliers to reduce their pipeline stock. Suppliers are paid when stock enters kitting.

Each of the kitting lines feed up to ten assembly cells using a method called “pick to light.” When the bar code on the order is scanned, the bins to be picked light up. Scanning the major components at pick compiles each order record for future traceability. Loaded totes exit kitting on a conveyor that automatically directs them to the assembly station with the shortest queue.

From assembly, the computers go to software load and test. Most loading and testing are also automated — about 2.5 hours for the average desktop. A few complex specials, called Dell Plus, require personal attention and up to ten additional hours. Assembly is a small part of the total effort to assure that each computer is ready for an appropriate customer experience.

**“Dellocity”**

Dell crunches leadtimes to decrease feedback times. The work pace is not extraordinary, but a sense of urgency permeates operations. Nothing sits very long. Not inventory, not information, and not people.

Inside Dell the term for short leadtimes is “Dellocity.” Speed is the key to staying on top of the technology, serving the customer, and maintaining a superior cash-to-cash cycle. All are necessary to make money in the hyper-competitive computer business. Dell monitors not just time-to-market or time-to-cash, but time-to-volume.

To get a sense of the timing and the opportunities, note that the physical processing of order fulfillment takes only 15 percent of order leadtime. Preparing the order, including credit checking, takes the other 85 percent. And hands-on assembly is less than one percent of this time. By contrast, the longest supplier leadtimes are about 15x customer order leadtime.

**Supplier Relations**

While Dell manages suppliers better than most companies, the long supplier leadtimes are a major concern. Fabricating components differs from assembling them. As noted in the integrated circuit business, “We have to ferment the wine; all the assembler has to do is fill the bottle.” But the wine business also has opportunities.

Dell picks suppliers that they think will be winners — best-in-class technology with the operations competence to deliver it. With plants in Ireland and Asia, Dell is global, so they need suppliers capable of giving them global support. Dell refers to suppliers as their value chain rather than supply chain. Dell’s business is to blend the best technology and service from suppliers into a leading-edge mix for customers.

Quality is a given. Dell supplier quality engineers sometimes visit supplier facilities. However, it has been
found more effective if the suppliers’ quality engineers spend time on site at Dell. The reasons and importance of performance requirements are easier to see.

Dell periodically has Quality Summits with suppliers to review performance, but component quality is seldom an issue. Instead, Dell concentrates on cost leadership, service, time-to-volume, and continuity of supply. In addition, quarterly business reviews cover a gap analysis, performance versus best-in-class, and agreed future targets. If necessary, critical issues will be singled out for escalation.

Each supplier also has a scorecard, reviewed every six months, with scores categorized as green, yellow, or red. Criteria cover quality, technology, delivery, flexibility, and cost.

Dell’s intent is to manage the suppliers to keep their customer order queue short. Short leadtimes and variable demand compose a rugged materials environment, and naturally, the suppliers would like a better forecast than can be constructed. Dell wants suppliers to shorten leadtimes and increase flexibility so that forecast accuracy is less important.

Dell forecasts high on the newest components that will hold value longer. It “puts a meter” on aging components to phase out obsolete material to the last planned unit. A model is discontinued using a close-out sales plan: After X number have been sold, a model is withdrawn from the web page offerings and discontinued. Customers who still want it are guided to an alternative, newer model. That’s two-knob control.

The big imbalance between Dell’s order leadtimes and the suppliers’ leadtimes necessitates bigger buffer stocks than anyone wants in the revolver warehouse or elsewhere. (About 60 percent of inventory still goes through the revolver.) Dell knows that they must pay for inventory indirectly even if the supplier owns it. The obsolescence risk is higher than inventory holding costs, and Dell is reluctant to assume much of that risk with suppliers. Rather, they press suppliers to drive down leadtimes, lot sizes, and inventories to eliminate risk and expose problems quickly — to get as close to build-to-order as they can. Needless to say, not all personnel in all supplier companies clearly understand the intent, but some do.

Dell and the suppliers enter a more obvious win/win situation in product development. Product life cycles average 15 months from concept to end of life. Suppliers easily see the need to collaborate to cream the newest technology, hit their time-to-volume, and get out before a coach turns into a pumpkin. With both Dell and suppliers, product development is driven by technology and allowable lifetime cost targets.

**Distributed Excellence**

Dell is in a fast clockspeed industry. Not everyone is, but for most, clockspeed is increasing. Customers want more variety in less time, and although production is just one of the elements in providing customer service, it is crucial. To solve customer problems before they know they have them, we must take the waste out of all operations, not just hardware production. The technology do it is here or coming fast. It is a matter of devising the strategy and techniques for using it.

Distributed excellence points toward doing everything possible in near real time. It’s a different business model. While wine doesn’t age in a day, much can be done to improve the speed of communications and take the waste out of even wine making.

The use of web pages for rapid horizontal communication is another “tool” of manufacturing excellence, or perhaps it should just be called management excellence. In almost every company, “communication” is a persistent, but vague set of issues. They are not much improved by trying to do the same old things a little bit better — like the Holy Grail quests for better forecasts. Poor communication generally means that we cannot clearly see what to do. Well-used web pages, or some future equivalent, will extend the scope of processes that can be directly coordinated.

E-commerce enthusiasts who have looked at Dell have thought that the “magic” is in the configurator software. Competitors can design rival configurators, and they have. Knowledgeable customers could also order components and assemble computers themselves. That’s basically how Michael Dell started. Among Dell’s advantages is the relationship with leading suppliers that makes it a center of excellence for computing hardware. Except for those customers who spend most of their energy keeping up with computing technology, it takes less time and money to have Dell expertly perform this task. Any customer — or competitor — must beat Dell’s expertise integrating technology, fulfillment systems, and logistics. The customer experience with Dell depends on all the blocks in the Dell Model, not just one.

Dell would start to come unglued if it messed up relationships with suppliers or missed a turn in technolo-
gy. That’s why Dell is trying to find better, faster ways to communicate — to help suppliers solve real problems, not to hope for a better forecast. And to give customers what they really need. Success is a Dot.com making money because it creates real value.

A shake out among “me too Dot.coms” can be expected before long, separating digital value from digital humdrum. Enterprises that win will create real value for customers by doing more than using web pages for old business practices.

Dell knows that there is little value in just making things and selling them. Value is created by service that includes the “something” that is made.

Dell and like-minded companies have to be ahead of the curve, not just in technology, but in assisting customers to accomplish their goals, or to be successful, or to have a good experience. Long term, it has to be an experience impossible to have without Dell.

Few customers are ready to go beyond “Here’s my spec, please deliver it.” The next step is “Here’s what I want or need to do, give me the means to accomplish it.” That is, “solve my problems.”

This desire is now buried in a welter of concern about privacy, and so on. However, if it were done, a computing package would be ordered from a usage-driven menu rather than a hardware/software list of options. That will happen as customers learn to trust centers of excellence.

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See p. 31 for AME’s new video, Dellocity — Velocity in the Dell Supply Chain.