

CHAPTER 1

Why Bricks Matter

We had to learn supply chain practices. We then had to unlearn them as technologies evolved, and then relearn them based on new capabilities.

—First-Generation Supply Chain Pioneer

The story is old. When generations come and go, at the end, the bricks remain. They last through the ages. They are a symbol of prosperity, solidity, and strength. Found in many forms, they give a culture countenance. This book is a variation on this old theme. In the end, *bricks matter*.

The foundation of business is built on *bricks*. Manufacturing plants, warehouses, and sales operations centers are built to deliver on a brand promise. Each is run by people. Collectively, their effectiveness can make or break a company's ability to fulfill customer promises. To drive success, these processes need to be synchronized. They need to be carefully architected and adapted to meet strategy. The design has changed over time as business complexity increased.

In business, while there are fads, true value is built through continuous improvement of processes to deliver real products to real people along with market differentiating services to build brands. To make year-over-year progress, companies learn—although, sometimes the

hard way—that the ability to successfully deliver on the brand promise requires proficiency in supply chain management.

I found Rome a city of bricks and left it a city of marble.

—Augustus

The term *supply chain* is not new. It is fundamental to military strategy. It was the difference between winning and losing in the Napoleonic wars and the Battle of the Bulge in World War II. The application of supply chain practices as a fundamental business process is newer. First coined in 1982 to be used as an overarching business concept, it is now 30 years old. Over the last three decades, it has morphed in definition.¹

No two companies today define it the same, nor will they agree on what *good* looks like. The definitions are as varied as ice cream flavors in a local shop.

The goal of this book is to share the insights of what has been learned over the course of these 30 years. In this book, we do not debate the ideal supply chain or the flavor of the month. Instead, we give insights on the evolution of the processes, share the stories of success and failure, and prognosticate on the future of tomorrow's supply chains.

To help the reader not familiar with supply chain vernacular, here we start with a definition. For the purposes of this book, we define the term *supply chain* as “the process of organizational alignment to effectively manage the flows of cash, product, and information from the customer's customer to the supplier's supplier.”

Success depends on both vertical processes (within a function) to drive operational excellence and horizontal processes (across functions) to ensure alignment within the organization. Excellence happens when there is orchestration of the trade-offs to the business strategy.

Supply chains make good companies great; however, ensuring this happens is easier said than done. As shown in Figure 1.1, each company has an effective frontier: a unique set of trade-offs to manage to improve business outcomes.

Over the last 30 years, supply chains have become more complex with implications for cost, working capital, social responsibility, and product quality. These interactions involve thousands of trading partners in interconnected and ever-changing relationships that stretch around the globe. Excellence is defined through trade-offs on the effective frontier.

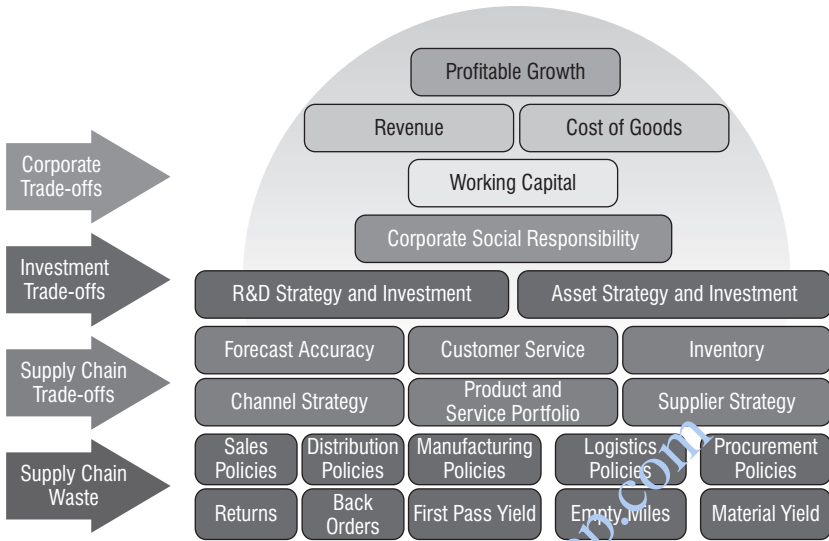


Figure 1.1 The Supply Chain Effective Frontier

The challenges are many. Time and clock speed pressures are high. Cultural differences are a hindrance. Data latency is a problem. The impacts on economic growth are far-reaching. It is a complex system with complex processes with increasing business complexity. This management is intricate. There is not one supply chain. Companies find that they have five to seven unique supply chains to be managed simultaneously. These systems need to be knitted together into business process outcomes.

Although it is easy to understand the increasing business process complexity, the key to supply chain success is a true understanding of the supply chain as a system, and learning how to make the right choices on business complexity to drive true lasting value. Today, there are 3,500 companies greater than \$1 billion in revenue working on improving the supply chain response. There is no company that feels that it has it nailed. There are no best practices. Instead, the processes are evolving.

▶ THE MISSION

Supply chain leaders manage complex systems with complex processes with increasing complexity. Leaders orchestrate the trade-offs vertically and horizontally to deliver the business strategy. Laggards let the supply chain whip them around.

Core to the business strategy is agreement on how to make trade-offs. Strong decision-making capabilities delivered through a horizontal process characterize supply chain leaders. Governance and well-defined decision-making processes are essential. A good supply chain translates to good business.

Once I was asked to shut down a manufacturing facility. I had worked with the people in the factory for many years. As we rolled out the lay-off packages and talked about why we needed to relocate the factory, no one liked it; but everyone understood it. I was okay until we leveled the building, and I sat on the rubble of the bricks that once was a vibrant entity of people making real things day after day. It was then that I cried. I was all alone sitting on the bricks remembering what had been.

—Director of Supply Chain Management,
Chemical Industry

Most companies understand that supply chains have complex processes. They also know all too well that the underlying processes are growing more complex. They live it every day. However, what most companies fail to realize is that supply chains are *complex systems* with *finite trade-offs*. These choices happen up and down the supply chain. Leaders make them consciously while laggards make them by default. They are both horizontal (cross-functional) and vertical (within a function). They are also intra-enterprise (within the company) and inter-enterprise (external to the company within a trading network).

Each supply chain has a unique potential. As shown in Figure 1.1, the business choices are intrinsically linked at multiple levels.

The approach needs to be holistic. Some typical trade-offs include:

- The proliferation of products and services will increase demand error, raise inventory levels, and decrease asset utilization.
- An extreme focus on cost will decrease customer service and increase inventory levels.
- New products will increase forecast error, inventory, and supply chain waste.
- A singular focus on asset utilization will increase inventory and decrease customer service.

- An increase in customer service will increase cost, decrease asset utilization, and increase inventory levels.
- Shortening working capital cycles will increase cost.
- Lengthening the manufacturing and delivery supply chain cycles will increase working capital and decrease customer service.
- Increasing manufacturing quality hold times will increase inventory levels, increase working capital, and decrease customer service.

For each supply chain, the impact is different. There are no hard-and-fast rules. The trade-offs of customer service, forecast accuracy, and inventory are the easiest to understand. Through continuous improvement programs, employee training, investments in technology, and alignment of metrics, the core of the supply chain can be improved.

In setting targets for the supply chain, leaders use advanced modeling tools to understand their specific supply chain potential. Modeling helps organizations see the impacts of business changes through *what-if analysis*. This analysis allows companies to set realistic and holistic metric targets. Leaders use the same metrics but different targets for each supply chain team. The determination of supply chain potential cannot be accomplished through spreadsheets. As a result, companies working on improving supply chain capabilities need to invest in business analytics for supply chain modeling. Without this modeling, the goals are unclear. They cannot be rolled up horizontally across the organization or vertically from region to global.

There is no magic wand or easy button. Companies cannot wish things to happen; instead, leadership happens through hard work. It is about building the organizational muscle to raise this effective frontier. It requires strength, balance, and flexibility. Results happen over many years. Progress is not linear. Supply chain leaders set targets consciously and align metrics systematically with a focus on balance. Supply chain laggards let their supply chain whip them around.

Time is money. If we could take one day of transit time out of the supply chain, we could free up \$1 billion in cash. Unfortunately, we cannot.

—Chief Financial Officer, European Operations,
High-tech and Electronics Manufacturer

IMPLICATIONS

Implications matter. The business impact of the evolution of supply chain practices is far-reaching. To support the evolution, an entire ecosystem of software, consulting, and hardware companies dedicated to improving supply chain processes evolved.

The use of these technologies enabled growth in global markets, accelerated new product introductions, and drove more-informed decision making within the company. As computing power grew and connectivity increased, process and technology innovation accelerated. Although progress has been made, this journey is far from over. Today, there is a plethora of solutions for cloud-based computing, big data supply chains, mobility, and advanced analytics for learning systems. The greatest concentrations of solution providers building technologies for supply chain management are in Germany, India, and the United States.

To improve the processes, and to conquer new opportunities, corporate spending has been significant. Over the past 20 years, manufacturing organizations have spent 1.7 percent of revenue on new forms of information technology (IT) to improve visibility, accelerate decision making, and drive insights. This spending has had a profound economic impact on the gross domestic product (GDP) of nations and on the business results of manufacturing companies.

I remember the early days of supply chain management, when we typed our own letters, mailed them in paper envelopes, and went to our office for a conference call. Today, we communicate globally in real-time anywhere. E-mail has replaced inter-office mail and our handheld devices define where we will have our next conference call. So much has changed.

—First-Generation Supply Chain Pioneer

Not all supply chains are created equally, and not all industries perform at the same level. High-tech, chemical, and consumer products supply chains are the most mature. The industries of automotive, pharmaceutical, and retail lag the rest.

There is an inverse relationship between margin and supply chain excellence. When margins were tight, supply chains got better. The combination of product life cycle changes, commodity margin pressures, and product proliferation put pressure on organizations to improve the processes quickly. Throughout this book, you will see that manufacturers with the tightest margins defined wave after wave of supply chain process excellence.

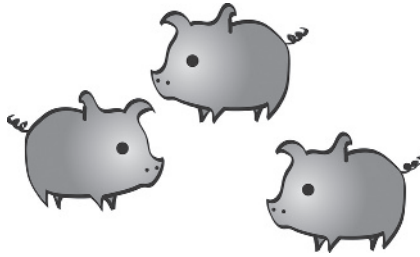
In today's world, *clicks* are sexier than *bricks*. There is a fascination with online presence. Social and e-commerce news grabs headlines while the traditional manufacturing processes are largely taken for granted. Delivery through the supply chain is assumed. Supply chain processes are not sexy. The pioneers did not earn the seven-digit salaries of the Wall Street financial executives. However, the supply chain was and still is the silent enabler behind great companies, world economies, and successful communities. It created viable brands and defined world economies.

The bricks of the supply chain are analogous to the children's story *The Three Little Pigs*. When a supply chain is done right, it makes companies stronger to withstand the storms and volatility of the global economy. When it is done wrong, companies fold against the winds of market changes. The best supply chains are built with a clear understanding that bricks matter.

Supply chains made hastily will fail. They are unequal to the test of demand volatility. They cannot meet the challenges of global risk management or the pressure to produce new products quickly to enter a new market. It is only when the supply chain is made of the right bricks that it can maximize opportunity and weather market-to-market volatility.

BUILDING THE RIGHT BRICKS

The bricks pave the evolution of supply chain processes. In the 30-year evolution, as shown in Figure 1.2, three types of bricks mattered: the right use of assets or *buildings*; expansion into Brazil, Russia, India, and China (BRIC countries) and the *knowledge* to build supply chain processes.



Published in England in 1886 by James Orchard Halliwell-Phillips, the tale of the *Three Little Pigs and the Big Bad Wolf* tells the story of bricks. This well-known story begins with three little pigs being sent out into the world by their mother to “seek their fortune.” The first little pig builds a house of straw, but a wolf blows it down and the pig runs to his brother’s house. The second pig builds a house of sticks and when he sees his brother he lets him in, with the same ultimate result. Each exchange between the wolf and the pig has a chant:

“Little pig, little pig, let me come in.”

“No, no, not by the hair on my chinny chin chin.”

“Then I’ll huff, and I’ll puff, and I’ll blow your house in.”

The third pig builds a house of bricks and when he sees his brothers he lets them in. The wolf fails to blow down the house of bricks. The wolf then attempts to trick the little pigs out of the house, but the pigs outsmart him at every turn. Finally, the wolf tries to come down the chimney only to find that the pigs have placed a pot of boiling water in the fireplace. The wolf comes down the chimney, lands in the pot of hot water, and is cooked.

Brick 1: Effective Asset Strategies: The Buildings

The effective use of assets starts with supply chain design. In the early days of supply chain management, manufacturing and distribution processes were insourced. Companies owned their bricks and mortar, and products were made and sold within the same region. Today’s supply chain is largely outsourced. Manufacturing and distribution

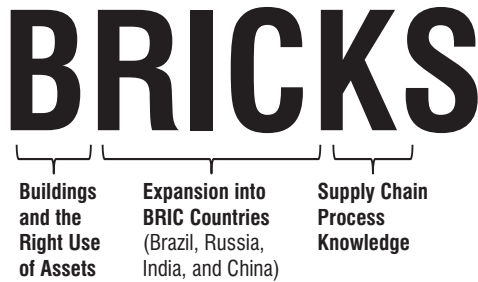


Figure 1.2 Bricks Matter

centers are operated by third parties and the flow of goods and services use many modes of transportation to cross multiple international borders to enter global markets.

Most companies inherited their supply chains. The active design of supply chain networks is relatively new. In the first 20 years, the placement of factories, the design of distribution centers, and the selection of suppliers were not critical. Today, the design is paramount.

As global trade barriers tumbled, the design of the supply chain needed to be more flexible. It needed to flex on many dimensions to take advantage of the lower costs of labor, to build the capability to enter new markets, or to drive the opportunities for tax incentives and rebates. As a result, today's companies focus on more frequent network design and the building of processes to support manufacturing and logistics outsourcing. Planning becomes more important.

Despite the increased outsourcing and growing complexity of production and distribution processes, companies quickly learn that while they may outsource the bricks of their supply chain, they cannot outsource the responsibility. Many companies have learned this lesson the hard way through failure.

As a result, they have stumbled forward. As companies have outsourced the supply chain, they have had to build inter-enterprise processes to ensure that they are able to achieve better levels of quality, customer service, and corporate social responsibility through their network as they did when all functions reported through their organization. As a result, the focus of the supply chain has become outside-in.

Today, it is focused on not just building chains but also on the design of agile networks.

As companies outsource, they quickly learn that relationships matter. The nodes of the network are only as effective as the trading partner relationship. As a result, the sharing of information and the alignment of incentives increase in importance. This is the mortar between the bricks.

To effectively use assets, supply chain leaders have found that they cannot be insular. They have found that they must tear down the bricks between the silos of their own internal organizations to stretch across networks to build lasting supply chain processes. The walls of these functional silos are difficult to break down, but they must be dislodged to build the end-to-end supply chain. For, it is now not just a company's bricks, but the responsibility for all the assets of the extended network that is paramount.

Brick 2: Right Expansion into BRIC Countries

Through the last decade, the largest contribution of the supply chain team was driving growth in emerging economies. These teams powered growth in the emerging countries of Brazil, Russia, India, and China. They fought the corruption of Russia, battled the compliance barriers of Brazil, and embraced the sheer enormity of China and India. These were greenfield start-ups (built from the ground up).

From our supplier's supplier to our customer's customer, our supply chain in Brazil is 200 days long. When we started, we projected capacity for five years. Due to exceptional growth, we found that we exceeded our usable capacity within one year. We were in trouble. To build a new plant in Brazil takes two years. The application process is tough. We have to get approval from three of the 13 ministries within Brazil before we can start the process. As a result, we built capacity in China and ship the product to Brazil to satisfy the burgeoning needs.

—Second-Generation Pioneer, Chemical Industry

The biggest hurdle was human. Within these geographies there was little to no understanding of supply chain processes. Factories had to be built, and teams had to be hired and trained. Companies forged new partnerships and adapted to new forms of logistics infrastructure. Each country had a unique story and set of obstacles. Coca-Cola's failure in India spurred progress on social responsibility while Wrigley's success in China redefined processes with distributors. It is one of the reasons that McDonald's succeeded in India while Kentucky Fried Chicken failed. Success in emerging markets gave InBev the funds to purchase Anheuser-Busch.

Globalization is a process of the past, present, and future. The work is not done. It is still a challenge, and of growing importance for companies to drive growth.

CASE STUDY

EXPANSION INTO BRIC COUNTRIES: MCDONALD'S

McDonald's operates in 119 countries serving 68 million customers on a daily basis. The company stayed true to the brand promise while recognizing the different local preferences for taste. In Norway, McDonald's offers a McLaks (a salmon and dill burger); in Uruguay, the menu features a McHuevo (a burger topped with an egg); whereas in Japan, the company serves Ebi Filet-O (a shrimp burger). In Germany, McDonald's serves beer. In India, the menu is free of beef and pork products. The menu is local. The supporting supply chain was designed to support country-specific taste preferences. Many times this was done in regions where the suppliers and the supporting infrastructure did not exist. In each region, the supply chain pioneers identified and qualified suppliers and built logistics infrastructure to deliver the redefined McDonald's experience.

Contrast this with the story of Kentucky Fried Chicken (KFC). KFC opened in India at the end of the twentieth century only to leave the market. The company made two mistakes: the menu was not localized to recognize regional taste preferences and the supporting supply chain of suppliers was inadequate. The company reentered the Indian market in 2004 with a new menu focused on meat-free rice dishes, wraps, and spices more in line with Indian taste preferences.

Brick 3: Knowledge: Building Effective Supply Chain Processes. Putting Value in Value Networks

The last brick is knowledge. It is building the right supply chain processes. While the definition of supply chain excellence has changed over the last 30 years, leaders have progressed through stages as shown in Figure 1.3. There are five phases: the efficient, the reliable, the resilient, the agile, and the aligned supply chain. For most, the agile and the aligned supply chain are aspirational. (The agile supply chain is often termed *demand driven* and the aligned supply chain is termed *market driven*.)

While companies attempted to implement best practices over the last 30 years, they are now grappling with the fact that many Y2K projects built an efficient supply chain without resiliency. These investments made the supply chain strong, but not agile. Today, most companies have processes that can respond, but cannot adapt. They are too rigid. They cannot sense and adapt to market shifts. This is the basis of the drive to create market-driven value networks.

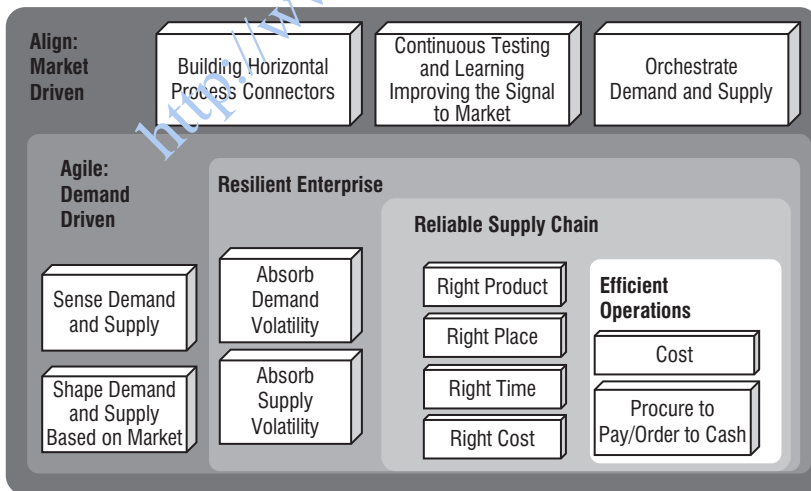


Figure 1.3 The Evolution of Supply Chain Process Excellence

A LOOK AT HISTORY

No two supply chains are alike. They come in many forms and definitions. While companies may argue on the definition of a supply chain, no one in manufacturing and distribution organizations will disagree that it matters. Over the last 30 years, it has become clear that supply chain practices both build and destroy brands. While failure can have a quick and deleterious impact, success can be seen only over many, many years. Although the stories of the losers fill headlines, the untold story is the one of quiet leaders using supply chain processes over the course of many years to improve corporate viability.

This book shares insights from these stories. To write this book, we interviewed 75 supply chain leaders from a variety of industries. These pioneers charted the path. They worked in apparel, automotive, chemical, consumer products, and high-tech and electronics industries. To better understand the evolution of supply chain management, we asked them three questions:

1. In your career, what were the primary tipping points?
2. How do you define supply chain excellence?
3. Who does it best? And why?

During the last six months of 2011, we captured their experiences to understand the evolution. Here, we tell their stories.

SUPPLY CHAIN PIONEERS: THE TIPPING POINTS

In the interviews, when we asked the pioneers about the major tipping points of supply chain management, there was no quick answer. They struggled to answer the question. There were so many changes that happened concurrently that it was hard for them to cite just one. In the discussions, they acknowledged that the changes were fast and furious. The major tipping points happened simultaneously in the forms of technology, globalization, and changes in transportation. In the interviews, it was hard for the pioneers to separate them; but when pressured, collectively they outlined the major tipping points as shown in Figure 1.4.

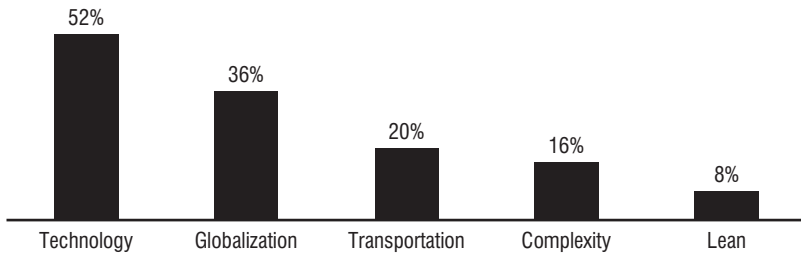


Figure 1.4 Major Tipping Points for Supply Chain Management Processes

When the pioneers recount their stories, they all agree that in the beginning, the emphasis was on manufacturing efficiency. The most efficient supply chain was believed to be the most effective supply chain. Supply chain practices evolved primarily to make manufacturing even more efficient.

When the practices started, there were islands of automation. No pioneer could have imagined the world today where data is anytime and anywhere.

In the early years, the personal computer was a rarity. The early processes were paper-based. The phone was stationary. Intercompany communication was completed by letter or telex. As computing power became a reality, it spawned a series of focused applications for the factory, transforming business-to-business interactions and improving the speed of data.

In this period, process innovation flourished. The major tipping points for the period of 1987 to 1999 are shown in Figure 1.5. The concept of just-in-time (JIT) manufacturing to manage the flow of inbound materials with suppliers reduced waste and improved the speed of receipt. The application of optimization techniques to improve factory scheduling using the theory of constraints (TOC) improved asset utilization and reduced manufacturing changeover times. Both were major steps forward. In this period, the first vestiges of a supply chain organization appeared in the form of a few specialists reporting to the leaders of manufacturing. In these early days, manufacturing centers operated as islands of isolated data.

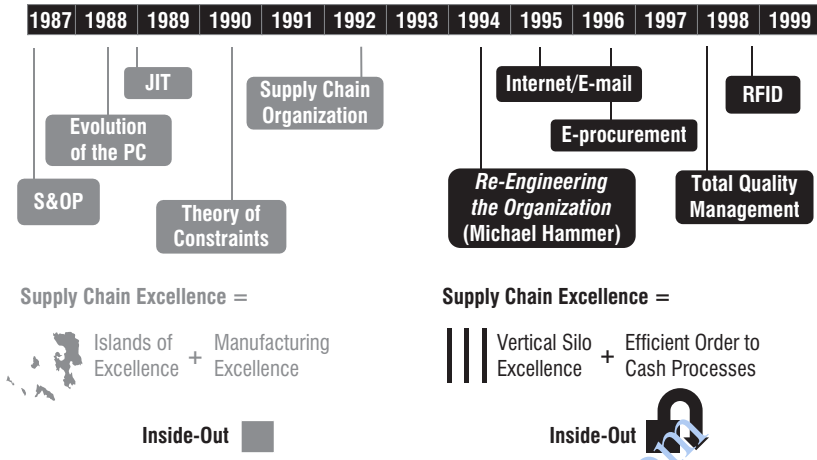


Figure 1.5 Supply Chain Tipping Points 1987–1999

As companies focused on year 2000 process readiness, the rate of technology change accelerated within organizations. What started as a simple initiative—to be sure that the computer systems could handle a time designation change with Y2K—became the focus of large-scale process transformation efforts. This period laid the foundation for the modern supply chain. While the prior period automated the factory, this coordinated effort focused on improving order-to-cash and procure-to-pay processes. Strong processes were built within the functions of source, make, and deliver to support the growing complexity of serving multinational supply chains.

The Internet along with Y2K was the perfect accelerant. The two forces intertwined to reshape and transform both business-to-consumer and business-to-business relationships. The most profound effect was in retail. As shown in Table 1.1, the Internet sparked a new channel that outpaced the growth in traditional store formats. While the uninformed might conclude that the growth of e-commerce made *bricks* obsolete, in reality, the opposite was true. Successful companies transformed their traditional supply chains to meet the new requirements of this growth channel. It required new bricks, new processes, and a business transformation.

Table 1.1 Growth of the E-commerce Retailer as a Business Model

Retail Channel	2000–2004	2005–2009	2010–2012
E-commerce	15.7%	16.0%	26.6%
Drug	14.8%	19.7%	9.5%
Grocery	12.2%	21.5%	19.6%
Mass Merchant	30.6%	9.6%	9.1%
Specialty	14.7%	12.2%	3.0%

Research from financial analyses of retail annual reports for the period 2000–2012

CASE STUDY

THE TALE OF TWO E-COMMERCE START-UPS: AMAZON AND WEBVAN

In 1997, Amazon and Webvan were both e-commerce retail start-ups. Amazon built distribution and fulfillment capabilities as the company grew, while Webvan drove massive capital investments to operate a 336,000-square-foot warehouse in Oakland, California. This distribution center was designed to process volumes equivalent to 18 supermarkets. In 1999, Webvan contracted with Bechtel to build 26 new fulfillment centers. This building project did not materialize because the company closed for business in 2001. Webvan is now owned by Amazon.²

In this period, interest in business-to-business trading exchanges skyrocketed; however, growth in these ventures fell short of expectations. While business-to-consumer business models flourished, business-to-business models were overhyped and often underdelivered.

In many ways, it was a new gold rush. The promise was high, but the underlying technologies were too immature to make it a reality. As a result, none of the industry analyst firms correctly predicted the future. In 2000, Gartner Group predicted that 7,500 to 10,000 trading exchanges would evolve by 2002. Similarly, Jupiter Research forecasted that the technology spending in business-to-business marketplaces would increase from \$2 billion in 2000 to \$81 billion in 2005.

In reality, less than 2 percent of the trading exchanges provided value to the extended supply chain over the course of the next decade. They were not a major factor in the evolution of supply chain processes.

CASE STUDY

THE TALE OF TWO TECHNOLOGY E-COMMERCE BUSINESS-TO-BUSINESS START-UPS: E2OPEN AND TRANSORA

In 2000, trading exchanges were proliferating. Market hype was at an all-time high when E2open and Transora opened their doors for business. Both companies were founded as business-to-business trading exchanges to improve supply chain visibility, drive network collaboration, and improve trading partner relationships. The similarities stopped there. E2open was funded by eight major high-tech companies. The initial funding was \$200 million and the design was for it to be a private company that would go public. Transora was founded by 50 large consumer products manufacturing companies. It raised \$240 million in four months.

We are well financed and strategically positioned to shape our own destiny in a way other business-to-business exchanges cannot. With this venture, old economy companies are becoming new economy leaders.

—Judy Sprieser, Executive Vice President of Sara Lee and Chairwoman of the early Transora steering committee

You will not be able to perform, compete, and survive in our industry if you are not participating in an electronic marketplace. It's that simple. We will not allow Transora to fail.

—Anthony Simon, President of Marketing Foods Division, Unilever³

While Transora struggled to find a successful business niche, E2open completed an initial public offering (IPO) in 2012 after delivering annual revenues of \$55.5 million in 2011. Today, E2open has successfully diversified to multiple industries serving more than 32,000 trading partners. Transora, in contrast, merged with 1SYNC in 2005, and is seldom mentioned today in the industry.

The race for global expansion also spurred supply chain spending. Companies felt since they were forced to spend on Y2K that they might as well get more value for the investment by improving their global processes. Not all companies moved at the same pace, but the impact of the rollout of new technologies coupled with the global expansion was staggering. Armies of people worked on system implementations. Many companies today are still digesting the technology investments from this period of time.

It was a boom-and-bust cycle. In this period, talent shortages in information technology coupled with large IT investments for year 2000 readiness raised the stature of the chief information officer (CIO). Multimillion-dollar investments in IT infrastructure were made based on a handshake, and hundreds of consultants were trained to implement new technologies to improve supply chain management. Good talent was hard to find. As a result, many process compromises were made.

Growth in new markets was the rallying cry. To satisfy the demand following this period, supply chains processes were challenged to transition from regional, multinational organizations to a more global footprint. Focused on global growth serving multiple channels, teams were defined in-country to serve new customers. Employees were relocated to be in-country to build processes, teams, and infrastructure.

Connectivity was a strong enabler. With the growth of the Internet, friction was taken out of the supply chain. New processes evolved to better serve business-to-consumer (B2C) and business-to-business (B2B) relationships. In this period, millions of dollars were spent on B2B connectivity, enterprise resource planning (ERP), and e-commerce initiatives. Most were hastily implemented. These tipping points are shown in Figure 1.6.

While the primary impetus for global supply chains was the penetration of new markets, the second thrust to be global was driven by the lower cost of labor. For laggards, it was a pure labor arbitrage strategy.

To take advantage of the lower cost of labor, companies redesigned their supply chains and transformed the supporting logistics systems. Supply chains became longer. Air shipments, cross-border transport, and improvements in labeling were enablers. As supply chain planning grew in importance, it spurred the development of multiparty supply chain visibility systems.

In the last five years, escalating costs, material scarcity, and global warming concerns have further redefined supply chain practices. Because of the increasing volatility of demand and supply, the focus has been on the development of processes and on the organizations that can adapt to change. The new goal is greater agility to flex with market changes and business directives. This new era has also demonstrated the need to define the socially responsible supply chain.

No real impact can be made in a supply chain in less than three years. It takes time.

—Marty Kisliuk, Director of Global Operations and Business Development, FMC Corporation Agricultural Products Group

As a result, the focus of supply chain processes is shifting from inside-out to outside-in. To connect a network of smaller networks of suppliers, logistics providers, and third-party manufacturers, there is a shift from a vertical focus of building functional excellence in operations to the building of horizontal processes to connect value networks. In this transition, companies learn that they must break

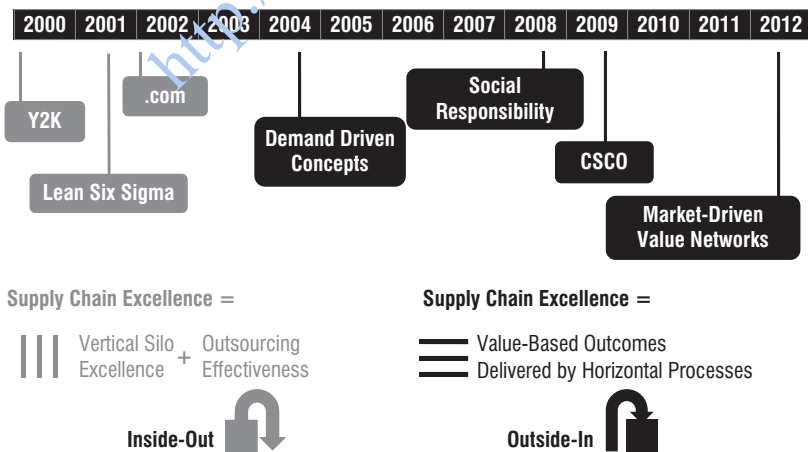


Figure 1.6 Supply Chain Tipping Points 2000–2012

down the bricks between the silos of the organization to build effective networks.

We used to see trade-offs in commodities. One would go up and one would offset it by going down in price. This is not so anymore. In the last two years, all we have seen is up. All commodities are going up at the same time.

—Vice President and CIO,
Fortune 500 Food Manufacturer

The future of a supply chain lies in the definition of these outside-in processes. It will drive new business models. Just as Amazon, Apple, Dell, and Walmart used supply chain management to define new business models of the past, new leaders will seize these shifts to power innovation.

The ability to sense and shape while listening and learning will define the supply chain of the future. Supply chain leaders are currently ushering in the era of big data, predictive analytics, and learning systems. The future will belong to those that understand the basics of what has happened in the past but can see the potential of the future.

MEET THE PIONEERS

Underneath the evolution of process and technology are the stories of people. It is about individuals who never dreamed that they would spend their careers in supply chain management. For these pioneers there were no yellow brick roads, or clear paths. Instead, they stumbled forward. These pioneers learned lessons through doing. Slowly, the processes evolved. And as they evolved, the pioneers transformed supply chain processes brick by brick.

1980–1990: First Generation of Supply Chain Pioneers

These leaders were from engineering backgrounds. Within their companies, they were thrust into the world of supply chain management from either manufacturing or procurement roles. When they started,

there was no supply chain organization or defined process. In this era, manufacturing was king and supply chain processes were designed to support manufacturing efficiency programs. These leaders often led the charge for continuous improvement programs. They became pioneers by default, not by choice.

These pioneers were primarily male. They were seasoned. Their hands were calloused. Most had spent many years wearing hard hats and safety shoes. The culture was no-nonsense. They joked about using slide rules in college and knew what it was like to stand long hours on a factory floor. They focused on the adoption of new practices and technologies to improve time to market, to schedule transportation, to reduce product variation, and to plan manufacturing production.

As processes in manufacturing matured, companies realized that the goal of supply chain excellence could not be met only by working manufacturing processes in isolation. Instead, they envisioned an end-to-end value chain that could stretch from the customer's customer to the supplier's supplier. They hit their heads on the walls that formed around organizational silos.

The technology evolution—personal computers, in-memory processing for advanced analytics, client/server architectures to support networked employees, increased global connectivity, and e-commerce and business-to-business connectivity—was a steady drumbeat for process innovation and redefinition. These pioneers remember when memos were written by hand, letters were mailed through interoffice mail, and the phone was hardwired to the office wall.

They defined the processes and installed the new technologies. Each one, in his or her own way, fought for recognition. They wanted organizations to see the greater whole and create a supply chain organization. Most of these pioneers are now retiring. They are currently worried about where the next generation of supply chain leaders will come from. As they end their careers, three concerns weigh heavy on their minds:

1. These pioneers believe that an understanding of manufacturing processes is critical to being a great supply chain leader. With the outsourcing of manufacturing, they wonder how companies will train the next generation of supply chain leaders.

2. With the growing demand for supply chain skills, they worry how their companies will attract and retain the right talent.
3. As the educational processes shift from an engineering degree to a business background, they worry about the systems understanding of the third and fourth generations of supply chain pioneers.

Someone is sitting in the shade today because someone planted a tree a long time ago.

—Warren Buffett

1990–2000: Second Generation of Supply Chain Pioneers

The second generation of supply chain professionals acted as the boots on the ground for the expansion of supply chain practices into BRIC (the emerging economies of Brazil, Russia, India, and China) countries. They were the implementers of global processes and systems to penetrate new markets. They were the builders of supply chain organizations in new countries.

As they built the infrastructure of the global supply chain, they shuttled their families from country to country. The pace was fast, and the challenges diverse, but they kept their eye on the prize. Their goal was to build market domination to drive growth.

With backgrounds in either engineering or business, this generation was more diverse than the first. There were more women. It was more multicultural. The organizations had greater cultural diversity and the processes spawned the need for academic programs to support the growing need for talent. These pioneers defined cross-functional supply chain processes into finance, procurement, and sales. They built trading relationships and implemented planning systems.

They cut their teeth on Year 2000 programs. Many were hired to help implementation teams test new systems and prepare for possible Y2K failure. Out of this work, they designed and built e-business programs with trading partners and championed new ways to connect and improve procurement processes.

The second generation was mentored by the first. When they started their careers, there also was no supply chain organization.

There was no standard career path. They both witnessed and shaped the evolution. They saw the supply chain organization rise from the functions of procurement and manufacturing to own their own seat at the table with other operations leaders. Today, these pioneers are the new leaders of supply chain organizations in the Fortune 500. There is now a supply chain leader on the board of directors of 6 percent of the Global 1000.

These pioneers built training programs for new employees in emerging economies. Talent development, metrics alignment, and the building of stable relationships in these emerging economies became the secret to success.

2000–2010: Third Generation of Supply Chain Pioneers

The third generation of supply chain leaders is just entering the workforce. Many of these pioneers are new graduates. They have completed a four-year college degree or advanced studies in the field of supply chain management. They are the first generation of college graduates to deliberately choose supply chain management as a career path.

As they enter the workforce, the processes are now clearer, the technologies are more mature, and the career paths well defined. They are entering the profession as the first generation of supply chain pioneers retires. Life looks good for the third generation. There are more jobs than available candidates. Projects are numerous and exciting work abounds.

They are culturally diverse. Their backgrounds are more business than hard-core engineering. The legacy of the second generation's work surrounds them. However, their environment is rife with change management issues. As companies try to define supply chain excellence, the third generation often finds themselves inserted as reluctant peacekeepers to arbitrate between the functions of sales, marketing, manufacturing, distribution, and procurement. They are also often the voice of reason and conscience of the supply chain pushing for a faster pace in the definition of corporate social responsibility programs.

As students during the economic downturn, they have experienced high unemployment firsthand. They are happy to have a job. Most have friends that could not find employment, and they are

excited to be entering a field where there are more job openings than qualified applicants. However, naivety reigns. They struggle to understand why the processes that they learned in school are so different from those in the real world.

Very, very few people could appreciate the bubble. That's the nature of bubbles—they're mass delusions.

—Warren Buffett

They are more aware of social technologies than the first two generations. They are often found on Twitter, Facebook, and Pinterest. They are pushing for companies to open up firewalls to enable access to social networks. This generation are the early adopters of mobile devices. They want access of systems beyond corporate firewalls, and they struggle to understand why the technologies that they work with are not easier to use.

2010–2020: Fourth Generation of Supply Chain Pioneers

The fourth generation of supply chain leaders is currently studying in college. They tend to be good at math, love computer gaming, and are active on social networks. They will bring a new view to supply chain management. They will push for technologies to be more visual, socially aware, and action-oriented. They will strive for improvements in corporate social responsibility.

Expect these employees to question the status quo. They carry two to three mobile devices and are connected at all times. They will take the supply chain from near real-time to real-time. Their focus will be on process reinvention. They will push to reduce data latency and improve the use of data.

They will be less accepting of the current levels of waste in the supply chain. Their focus will be on scarcity of materials and improving human welfare. They will be pushing to redefine commonly accepted processes for returns, scrap, and rework.

This will be the first generation to witness homegrown teams in emerging economies. No longer will the definition of the supply chain

be dependent on expatriates. They will hire talent directly from home-grown educational programs in the evolving economies of Brazil, Russia, India, and China.

When this fourth generation enters the workforce, there will be less of a gap in their academic teaching to real-world practices. The career paths will be established and this book will seem archaic. We write this book to ensure that they understand the stories of the pioneers and can learn from history.

WHY IT MATTERS

The supply chain failures grab headlines. Success in the supply chain happens slowly over many years, but when a leader stumbles the impact on the balance sheet is pervasive. Much of the public understanding of supply chain management comes from reading about the failures. When companies with names like Apple, Boeing, Cisco Systems, Coca-Cola, ConAgra, Hershey, Johnson & Johnson, Ericsson, Mattel, Nestlé, Nike, PepsiCo, Sainsbury's, and Western Digital make headline news due to supply chain failure, it is hard to not pay attention. Each time these premier brands stumbled, failed, and learned new lessons, the bar on supply chain excellence was raised.

Companies stumbled in two areas: process evolution and technology implementations. These failures drove improvements in supply chain excellence. The pace of change from failure was much faster than from success.

Supply Chain Process Failures Leading to Financial Balance Sheet Disclosure (Material Events)

Supply chain failures affect each company differently. Rarely does a company tie balance sheet write-offs explicitly to supply chain failures, but recent annual reports provide a multitude of examples of where supply chain process mistakes were material events on corporate balance sheets.

- **2007.** ConAgra results in fiscal 2007 included a statement that “the impact of approximately \$30 million due to the peanut butter recall, reflected as a reduction of net sales of \$19 million, and an increase of \$11 million in cost of goods sold.”

- **Fiscal 2007.** Mattel stated, “Product recalls reduced gross profit by approximately \$71 million. The costs can be further quantified as increased sales and administrative costs by \$35 million, reduced net sales by approximately \$48.9 million, increasing cost of sales by approximately \$22 million and finally increasing ad and promotion expenses by \$5 million. Regionally, U.S. operating income decreased by \$30 million while International operating income decreased by an even greater \$47 million.”
- **2009.** Boeing stated that “research and development expense included \$2.7 billion of production costs related to the first three flight test 787 aircraft that cannot be sold due to the inordinate amount of rework and unique and extensive modifications that would be made to the aircraft.”
- **2010.** The Kellogg Company Annual Report stated that “Kellogg’s cereal primarily manufactured in the United States was recalled due to an odor from waxy resins found in the package liner. Total charges were \$46 million with a \$.09 impact on earnings per diluted share.”
- **2011.** Toyota’s annual report stated that “Toyota announced four separate recall events. Net revenue in 2010 was down 8.9 percent compared to 2009. Although it is difficult to definitively separate out flagging sales numbers as a result of the economic downturn versus the recall issues, in fiscal 2011, Toyota had an approximately ¥100.0 billion increase in [operating] costs related to recalls and other safety measures conducted to heighten the level of reassurance for customers.”
- **2011.** Western Digital’s quarterly earnings report announced that the company had experienced “\$199 million in charges and expenses relating to flooding in Thailand.”

A negative supply chain event permeates financial returns. When there is a supply chain disruption, the affected company’s share price drops 9 percent on average below their comparative peer group benchmarks. When there is a failure, companies do not recover quickly. Based on multiple studies by the Georgia Institute of Technology in 2005 to 2009, we know that the average stock return of those suffering from a disruption is almost 19 percentage points lower relative to the benchmark group over a two-year period following the disruption.⁴

The incidence of material failures has grown exponentially over the decade. The number of product recalls grew tenfold and the impact of corporate sustainability decisions filled the news. Why the increase? The processes of supply chain management have become more expansive with greater importance to both corporate balance sheets and reputation.

The stories of success make fewer headlines. There is no easy correlation between supply chain excellence and financial balance sheet returns. As a result, success is hard to measure. Instead, it becomes the organizational muscle providing year-over-year work resilience.

It is also a story of process innovation. The transformation happens slowly through the combination of discipline, training, and careful design. We share the stories of success at the end of this chapter.

Failures in IT Project Implementation

Companies also stumbled in the implementation of information technology (IT) systems. One by one, over the course of 10 years, projects failed. No industry went unscathed. The reasons for failure were repeated. The stories are now legend. The list of failures includes great names: Allied Waste, FoxMeyer Drugs, Hershey, Hewlett-Packard, Goodyear, Kmart, Nike, Sainsbury's, Waste Management, and Whirlpool. Here are excerpts from the news:

- **1996.** In 1994, FoxMeyer Drugs, with revenues of \$5 billion, was the fourth largest U.S. pharmaceutical distributor. In 1996, the company was bankrupt. The fall was largely due to an IT project named Delta III that was kicked off in 1993. The original project was scoped to cost \$65 million and deliver \$40 million in annual cost reductions. Problems arose when the actual project costs spiraled to more than \$100 million and resulted in a \$34 million inventory write-off. The company was sold to McKesson Corporation for \$80 million in cash.
- **1999.** The Hershey announcement in September 1999 made headline news. The original \$112 million project was expected to go live in April 1999, but a number of complicating issues pushed the implementation back three months. The company

failed to implement a big bang project (three systems in one implementation) in one of their busiest seasons. As a result, the company was short in inventory to deliver \$100 million of customer orders at Halloween. Hershey's stock price tumbled 8 percent; and in October 1999, the company reported a 12.4 percent drop in quarterly sales.⁵

- **2000.** A \$400 million upgrade to Nike's supply chain systems resulted in \$100 million in lost sales and a 20 percent stock dip. The reason given by Philip Knight, then Nike's chairman and CEO, was "complications arising from the impact of implementing our new demand and supply planning systems and processes."⁶

As software project failures made front-page news, the tit for tat between the software providers and the industry leaders became the new soap opera.

There's no way that software is responsible for Nike's earnings problems.

—Greg Brady, President, i2 Technology
(Nike's supply chain vendor), in 2001

I guess my immediate reaction is: This is what we get for \$400 million?

—Philip Knight, Chairman and
Chief Executive Officer, Nike

- **2004.** In September 2004, CEO Carly Fiorina stated that Hewlett-Packard (HP) had "executed poorly on the implementation of an order-processing and supply chain management system." She partly blamed the problems for a \$400 million third-quarter revenue shortfall within HP's enterprise servers and storage group. The company had completed 34 similar migrations, but the 35th failed. Three senior leaders were fired.⁷
- **2005.** Sainsbury's had exceptional expenses of £145 million in information technology and £119 in supply chain costs following the implementation of a new supply chain system.
- **2007.** After two years of attempted implementation of an ERP project, Allied Waste Industries pulled the plug on a \$130 million

system. Following suit, Waste Management cancelled a \$250 million project after spending \$45 million.

- **2008.** In the second quarter of 2008, Levi Strauss Company's net income dropped by 98 percent because of the failure of an IT project for ERP. Three U.S. distribution centers were forced to close for a full week and the company took a \$192.5 million hit to its bottom line. David Bergen, chief information officer, was forced to resign.⁸
- **2009.** At the end of 2009, Comfort Corporation announced that the company had abandoned its plan to implement an integrated suite of ERP software and recognized asset impairment charges of \$27.6 million. One shareholder's SEC filing deemed that it was "indicative of extremely poor judgment by management."

These examples of failures in IT implementation are now pages of history. However, if we step back and look at the mistakes holistically, there are four lessons:

1. **Approach new technologies with caution.** The supply chain is the lifeblood that supplies goods and services to customers. Without it there is no revenue. Major projects need to be approached with caution. In an attempt to meet return on investment (ROI) pressures, many of these projects were under-scoped and understaffed.
2. **Test software. Take the proven route.** Software sales cycles are long and complex. To shorten them, software sales personnel sell the promise and the hope of the project to top executives, short-circuiting the sales processes. As a result, 60 percent of these projects were sold to executive teams without proper testing by their supporting IT departments. As a result, many of the technology failures were due to project commitments made by unknowing leaders to buy software that was just not ready.
3. **Penny-wise and pound-foolish.** Over the course of time, companies have focused on shortening implementation cycles. However, there is often more risk than benefit in shortening the cycle. In this type of implementation, change management issues abound. While many companies focus on the "technology implementation," the larger risk lies in the management of change associated with technology adoption.

4. **A weak link.** Many of the projects implemented in this period were hastily defined and implemented. Knowledge of software and supply chain systems was scarce and the rate of change was rapid. Today's supply chain leader has inherited many of these poorly designed systems from the prior decade.

SUPPLY CHAIN PROCESS EVOLUTION

Supply chain processes are evolving. The definition of supply chain processes started within the company's processes of manufacturing or distribution. Today, the center is stronger than the ends. The vertical processes are stronger than the horizontal. As shown in Figure 1.5, the steps are progressive with each step building and encompassing the prior.

First Shift in the Supply Chain Process: The Efficient Supply Chain

In the beginning, supply chain excellence was defined as the lowest manufactured cost. The belief was that supply chain excellence could be achieved by sweating the assets. This set of beliefs formed the foundation for the efficient supply chain. Through the evolution of supply chain processes, costs were reduced, inventory levels lowered, and waste eliminated; however, each company reached a point where they could no longer just cut costs without trading off service to customers. They had reached their effective frontier.

Early pioneers fought hard battles with finance teams that did not understand the concepts. IT projects were implemented with overinflated commitments that were not grounded in reality. In the early days, the principles of supply chain trade-offs and the effective frontier were difficult to conceive. The singular focus on costs resulted in failures in customer service. These failures drove organizations to define supply chain excellence as a reliable supply chain to focus on closing multiple gaps:

- **A shift in the goal of continuous improvement programs.** In this period, there was a belief that savings from operations could self-fund growth. At first, it worked. However, as the company reached its effective frontier of trade-offs, these continuous

improvement programs became largely shell games of trade-offs between functions. Net new savings and true impact on the bottom line became more and more difficult to achieve.

- **Recognition of multiple supply chains.** As companies matured, they also realized that they had not one but multiple supply chains. Each supply chain had unique rhythms and cycles requiring design from the outside-in (from the market back).
- **Need to build supply chain talent.** There was a need for a supply chain organization that could span the organization to build a guiding coalition: leaders that could credibly drive the discussion. This led to building of the supply chain organization and the need to hire and train the second generation of supply chain professionals. There is now a supply chain organization in over 83 percent of North American manufacturing and distribution corporations.

As shown in Figure 1.7, there is a new door for the supply chain leadership team. Most of these supply chain organizations



Figure 1.7 The Evolution of the Supply Chain Organization

are complex, operating in matrixed structures. The channel organization fans out to encompass multiple selling groups in a decentralized organization while the procurement organization usually aggregates spend into a central organization.

Second Shift in the Supply Chain Process: The Evolution of the Reliable Supply Chain

The lack of reliability to deliver customer service was the Achilles' heel of the efficient supply chain. This realization gave rise to the concepts of the reliable supply chain. With this shift, the focus changed to balancing costs with reliability in customer service. The goal of this new supply chain direction was the right product at the right place at the right time at the right cost. In this process evolution, companies focused on improving the decision support systems to increase the potential, or the effective frontier, of the supply chain. This included the implementation of deep analytics for inventory optimization and factory scheduling.

In this process, companies had to rethink their processes and close some major gaps:

- **Rethinking the goal.** There was a general belief that the best supply chain is a tightly integrated supply chain. As companies worked on the implementation of processes to become more reliable, they found tight integration was not always beneficial. Planning grew in importance and there was a need to focus on what-if analysis and simulation to test for reliability. Each planner needed his or her own workbench to test the feasibility of solutions and these solutions required a different technology configuration.
- **Redefining forecasting.** While many companies in their quest for efficiency embarked on a one number forecasting program, they quickly found that this was too simplistic. Instead, they found that they needed a common plan (not one number) with role-based views for sales, marketing, and manufacturing based on assumptions and market drivers. The visualization of a common plan by role with agreed assumptions increased supply

chain reliability. They also discovered that each type of forecast within the organization has a distinctively different data model, bias, granularity, and time horizon. (We share more about this evolution in Chapter 3.)

- **Need for a supply chain strategy.** As companies worked on the definition of supply chain excellence, it became clear that there was a needed layer of definition between business strategy and supply chain planning. This spawned work on supply chain strategy documents to drive alignment and clarify cross-functional direction. Without this clarity, functions within the organization aligned on functional goals that were a barrier to building a reliable supply chain system. Today, only 5 percent of companies feel comfortable with their level of supply chain strategy.

Between 2000 and 2010, there were many market shifts, and companies found that without the ability to sense and adapt to market conditions, the reliable supply chain was not sufficient. In 2000, Cisco Systems was caught in the downturn of the e-commerce bubble. As a result of not sensing demand changes, the company was forced to write off \$2.25 billion in inventory in 2001. This loss taught the company an important lesson. The redefinition of supply chain processes to be more resilient enabled the company to sense and withstand the downturn of the Great Recession of 2008.

It is now known as business continuity. In 2011, Intel lost \$1 billion in revenue, and the Japanese auto industry lost ¥450 million in profit due to the Thailand floods.

In contrast, also in 2008, the leaders in the chemical supply chain learned a tough lesson. The magnitude of the economic downturn caught all by surprise. For example, DuPont, a supply chain leader five steps back in the supply chain serving the automotive and construction industries, was forced to shut down one-third of its factories in 2008. As demand was translated across the long supply chain through conventional processes, the dominos started to fall. The business impact was pervasive with an employee restructuring program in both 2008 and 2009. The strength of the DuPont supply chain team was able to drive cash flow improvements and cost savings to stem the losses.

In December 2008, DuPont announced plans to address rapidly deteriorating market conditions and strengthen the company's future competitiveness. Plans are focused on generating cash by better aligning cost, working capital and property, plant and equipment expenditures to the revised demand signals of the fourth quarter. These plans include a restructuring program with associated fourth quarter pre-tax charge of \$535 million, with expected pre-tax savings of about \$130 million for 2009, and about \$250 million annual savings thereafter. The company also outlined 2009 plans to achieve \$1 billion in net working capital reduction and a 10 to 20 percent reduction in capital spending.

—DuPont, 2008 Annual Report

Shuttering factories in 2008 for DuPont was serious business. The company is known for excellence in process reliability. It owns and operates factories in some of the most challenging chemical environments. The company is a supply chain leader. To ensure that this would not happen again, DuPont used the downtime in the factories to train employees on the principles of supply chain management. The focus was on the redesign of the processes to sense and adapt more quickly to market changes. The principles of supply chain agility grew in importance. Today, the company is actively building market-driven value networks.

Throughout the economic downturn, companies one by one gained a deeper understanding that the reliable supply chain was not sufficient. As a result, the demand-driven concepts gained greater adoption in the building of a resilient supply chain.

Third Shift in the Supply Chain Process: Building the Resilient Supply Chain. Absorbing Demand and Supply Volatility

Like the story of the three little pigs, supply chain leaders wanted to build supply chains that could withstand the winds of demand volatility or the pressure of supply disruption. These supply chains were built to sense outside-in and change the supply chain response based on market conditions. Supply chain leaders that built resilient supply

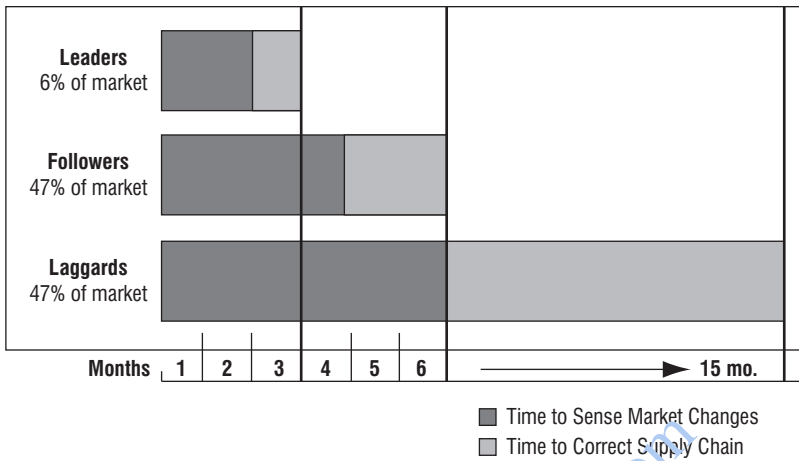


Figure 1.8 Great Recession: Leaders Corrected Five Times Faster

chains decreased the latency—or time to sense—demand and supply changes. Based on a qualitative survey of 60 Fortune 500 companies in the Great Recession, we find that companies that were better at demand sensing were able to sense market changes three times faster and align their total supply chains five times faster (see Figure 1.8) in response to market demand.

In this stage, supply chain leaders defined process excellence by minimizing data latency from both buy- and sell-side markets to drive a near real-time response. In the process, supply chains became networks. In the adaptive, or demand-driven supply chain, companies increased sensing capabilities and infused the processes of source, make, and deliver into the discussions with both buy- and sell-side trading partners. These top-to-top meetings and relationships became more data driven. The metrics changed. Procurement discussions focused on total landed cost rather than just purchase cost, and suppliers were incented to contribute through innovation networks and alignment to corporate social responsibility (CSR) programs. Scorecards and performance management processes evolved. The focus evolved to building win-win partnerships through supplier development programs.

In the process of writing this book in a center seat on a flight, I had a discussion with a physician. I was writing intently, and it piqued his interest. When I explained the premise of the manuscript, he commented, "Isn't corporate social responsibility an oxymoron?" He then laughed and retorted that he was not sure what was the greater obstacle, the "ox" or the "moron." I smiled. Building the responsible supply chain is certainly a paradigm shift.

—Lora Cecere, Coauthor, Bricks Matter

To build supply chain sensing capabilities in the downstream channel, the processes needed to be turned outside-in. Demand planning processes changed from focusing on predicting what to ship from factories to predicting what would be sold in the channel. For many companies, this made the investment that they had made in the integrated supply chain and multiyear ERP programs obsolete. It was no longer sufficient to be tightly integrated to order and shipment processes. Instead, the company needed to define the process of demand translation: the translation of market demands to supply operations with minimal latency. These processes were built on channel data, not corporate history. Demand architectures needed to be built to sense and then translate the meaning of channel or downstream data.

In the process, these leaders realized that sensing without changing the response was insufficient. They needed to be more adaptive. They needed internal processes that could flex and adapt with market changes. As companies experienced high levels of demand and supply volatility, they realized that they needed to embed mechanisms into the processes to ensure profitability. As a result, they invested in the processes of revenue management and demand shaping to deliver the adaptive supply chain. These leaders learned the hard way that it was not sufficient to just sense the change, but they needed to actively shape the outcome.

My supply chain planners used to work for NASA. They are scary smart. They say market sensing in supply chain management is tougher than what they did at NASA.

—Supply Chain Leader,
North American Manufacturing Company

Fourth Shift in the Supply Chain Process: Building the Adaptive Supply Chain. Becoming Demand Driven

In the *adaptive supply chain*, the processes first sense and then shape demand based on revenue management practices. This is sometimes termed a *demand-driven supply chain*. Demand shaping includes the active processes of new product launch, price management, trade promotion management, marketing and advertising, and incenting sales against revenue management processes. They design processes outside-in and evaluate what really matters to customers. Companies that mature in this capability usually are also mature in the processes of analyzing customer profitability through cost-to-serve analysis and looking at product profitability to determine the right product portfolio. They actively manage complexity.

We introduce 15 to 20 mobile phones a year. This can only happen if there is cross-functional alignment.

—Chief Financial Officer,
High-tech Manufacturer in Europe

This stage of development requires tight integration of the research and development (R&D) efforts into the supply chain processes. Since 60 to 80 percent of the costs of a product are defined in a new product launch and many supply chain networks are defined at the time of launch, in the maturation of these processes, companies need to carefully define the coupling of cross-functional, horizontal processes. This includes the integration of the processes of sales and operations planning (S&OP) with R&D stage gate planning and CSR with supplier development programs. This integration is even more critical in heavily regulated industries like pharmaceutical, agro sciences, and aerospace and defense supply chains. If these companies do not get it right at product launch, they have a difficult time amending the process later.

In this stage of supply chain development, one of the toughest change management issues is the role of sales in driving a profitable demand response. Most sales organizations are incented on volume and not profitability. There is a strong resistance to shape demand unless the incentives are aligned to focus on selling a profitable unit. This is a

change management issue worth fighting. As the adaptive supply chain evolves, leaders find that one of the largest impacts is improved customer service and the reduction of the cost of sales as a percentage of revenue. Customer satisfaction improves and the dialogue is now focused more on what the customer values versus internal self-serving metrics.

Today when it comes to improving sales, a dollar spent on improving the supply chain of our customers is worth three spent in trade promotion management.

—Vice President of Supply Chain, Consumer Products

As the networks within the supply chain coalesce, demand, supply, and innovation networks begin to overlap. Companies learn that a customer is not just a customer; and that a supplier is not just a supplier. A customer may also be a supplier and a supplier may also be a strong contributor of ideas through open innovation networks. A supplier and/or a customer may also be a provider of logistics services.

There is a misconception that these concepts apply to only consumer product value networks. This could not be further from the truth. In discrete industries, the demand signal is from contract to order. Based on the pipeline status in the contract cycle, advanced companies are able to better forecast and share product requirements with their suppliers. In 2012, the aerospace and defense industry is forecasting 50 percent greater demand. If production rates stayed constant, this would represent an eight-year backlog. Slowly the industry will adapt and increase production rates by 50 to 60 percent. In 2011, when PricewaterhouseCoopers (PwC) evaluated the readiness of suppliers in the value network to adapt to this level of change, the study revealed that 21 percent of the suppliers were at risk of failure.⁹ Manufacturers are now more dependent on suppliers. The lack of capacity in today's aerospace and defense supply chain is driven by supplier capacity issues, not manufacturing.¹⁰

The largest benefit of a demand-driven value network is assessing and building the value network to meet upcoming demand. The use of technologies to sense market insights from unstructured data has helped companies to sense potential supplier failures before the

issue percolated into the supply chain. As a result of its work in this area, Intel detected the potential failure of 9 suppliers in the Great Recession and Toyota sensed and prevented the failure of 300 suppliers following the Japanese tsunami in 2011.

Demand and sensing capabilities are important, but for most manufacturers they are still aspirational goals. This level of capability is far from mainstream. Today, only 6 percent of the Fortune 500 has the capability to decrease demand and supply latency.

Supply chain design and the architecture of supply chain strategy increases in importance. This changes from an ad hoc or annual process to be an integral part of the monthly S&OP process. Companies also learn that forecasting is more important than ever, but it needs a new focus. It is no longer about the accuracy and tight integration of numbers; instead, it is sensing market drivers, aligning on assumptions, and planning the network based on the predicted level of demand volatility.

The change in demand forecasting processes is a major change management hurdle for the traditional supply chain. The shift from a focus on history to a focus on market drivers, or to align on demand assumptions versus debating numbers, is a cultural redefinition.

Today, this stage of maturity is largely aspirational for most companies, and not well understood. It includes companies like Dow Chemical, Intel, Kimberly-Clark, LG Electronics, Procter & Gamble, Seagate, and Samsung.

Fifth Shift in the Supply Chain Process: Align the Supply Chain Market to Market. Become Market Driven

The market-driven supply chain is the future state aspiration for the supply chain leader. The concepts are based on building advanced processes to test and learn. These advanced analytics can power learning systems that continually sense, learn, and adapt.

These networks are termed *market-driven value networks*. Market-driven supply chains are adaptive networks that can quickly align organizations market to market focused on delivering a value-based

outcome. They sense and translate market changes (buy- and sell-side markets) bidirectionally with near real-time data latency to align sell, deliver, make, and sourcing operations. The focus is on horizontal process orchestration. With the evolution of market-driven supply chains, companies can focus on delivering value-based outcomes through complex networks.

Traditional supply chains could not sense; instead, they had a fixed response that was often wrong and late. Despite what was happening in the market, the response remained the same. Likewise, supply chains were not built to test and learn. With the evolution of technologies for learning systems, supply chains can now orchestrate demand across the organization market to market while executing test and learn strategies. The response can be adaptive, multiple *ifs* can map to multiple *thens* to allow the supply chain to align, adapt, and learn. This last phase, the market-driven supply chain, is currently being designed by supply chain leaders.

The design of the market-driven supply chains is dependent on the building of value networks, strong horizontal processes, the redesign of forecasting and supply, and a retraining of the organization. (It should not be confused with a marketing-driven supply chain. In the marketing-driven supply chain, the focus is on an internal signal, not a market signal. And, it does not adapt horizontally market to market (buy-side to sell-side markets)). In contrast, the marketing-driven supply chain stretches horizontally across the extended supply chain from market to market.

► DEFINITION

Market-driven supply chains are adaptive networks that quickly align across an organization to sense and shape a market-to-market response. These processes are focused on delivering a value-based outcome. When successfully implemented, these supply chains sense and translate market changes (buy- and sell-side markets) bidirectionally with near real-time data latency to align sell, deliver, make, and sourcing operations to market conditions.

CARGILL BEEF

Cargill Beef is a market-driven leader. The company uses price optimization tools to evaluate the market potential for beef. Before the company decides what to package for the market, it first evaluates the market potential for each cut of beef and then optimizes how to harvest its inbound herds to maximize the opportunity and minimize the risk. There are 197 ways to cut up beef cattle. Because each breed of cow has a different potential or finite mix of products—steaks, ground beef, roast, and so on—Cargill uses the technology in sales and operations planning to drive rancher insights to define which breeds are best for customer demand. This process of being adaptable to trade-offs from market to market based on the use of optimization technologies is termed *demand orchestration*. It is a key capability requirement for market-driven leaders.

Today's Supply Chain Organization

Today, the concepts of market-driven value networks are aspirational. The supply chain organization is still evolving. No two companies have defined them alike. The most mature organizations design the supply chain from the customer's customer to the supplier's supplier. To maximize the potential, mature organizations have changed the organizational design: direct reporting of manufacturing and procurement functions into the same organization as distribution and customer service. When this does not happen, it is more difficult for the supply chain to reach full potential.

WHO DOES SUPPLY CHAIN BEST?

Supply chain excellence is defined by the ability to use the supply chain to deliver the business strategy. The maturity of process allows companies to improve the potential of the supply chain to maximize opportunity and mitigate risks while raising the effective frontier.

As companies mature, they want to know how their supply chain compares to others. They also want to know whether they are getting better or worse and what good looks like. They are hungry to know if they have reached their supply chain potential. While this sounds simple, the answers to these questions are not easy. The ability to get comparison data on supply chain performance is easier said than done.

While there are many services in the market that have evolved to share benchmark data, there are many pitfalls. Companies need to overcome five issues:

1. **Avoid self-reported data.** When companies self-report data, there is usually a bias or overstatement of results. Consequently, the best benchmarking source is either government-regulated financial reporting or the output from software as a service (SaaS)-hosted solution providers where data is a by-product of running the technology for a peer group of companies.
2. **Consistent definitions matter.** When it comes to supply chain benchmarking, the basics matter. Definitions, granularity, and frequency of the process need to align for data to be relevant.
3. **Common data model.** To be useful in benchmark comparisons, the planning systems need to have a similar data model. Very few companies have implemented planning in a similar enough manner to facilitate peer group benchmarking. For most, this is overlooked.
4. **Timeliness.** One of the issues with benchmarking is timeliness. Data gathered in snapshots—once or twice a year—are not very useful.
5. **Peer group.** An essential element to getting useful benchmark data is having a comparable peer group.

After considering the available options in the market, and judging them against these pitfalls, most companies will find that benchmark data available in the industry is expensive and usually not of a great value.

If we look at history, the early leader in a marathon is never the winner that finishes the race. Instead, the winner builds the skill, capability, and resilience to compete. Then based on their strategy, the athlete pushes over the finish line.

—Michael Noblit, Senior Vice President of Operations,
Samsung Electronics America

Companies also find, as they mature, that it is difficult to get the complement of metrics necessary to view the supply chain as a system. There are six metrics in supply chain management that are tightly woven with intrinsic trade-offs. These metrics are asset utilization, days of inventory (or inventory turns), forecast accuracy, customer service (on-time delivery of orders shipped complete), cost of goods, and revenue growth.

In conjunction with this benchmark data to determine supply chain potential, additional insights are gained through the understanding of supply chain cycles. In the supply chain, time is often money. There are 10 primary cycles to map:

1. **Order to delivery.** The time that it takes from order receipt to customer delivery.
2. **Order to cash.** The time from order receipt to payment.
3. **Manufacturing product cycle.** Each manufacturing line has a cycle of product families and the progression that makes the most sense for manufacturing. The manufacturing cycle wheel is the time for a company to progress through this logical grouping of products to minimize changeovers in manufacturing.
4. **Product shelf life cycle.** Not all products have equal shelf life potential. This cycle is the amount of time that a perishable product is viable to be sold.
5. **Product life cycle.** This is the expected time that a product will be available to sell in the market before being outdated with a new product. Margin is usually the highest at the initial launch.
6. **Procure to delivery.** This is the time to source raw materials and receive them at the inbound manufacturing location.

7. **Procure to pay.** It is the amount of time from the purchase of the raw material to the payment of the receipt of the material.
8. **Order latency.** By definition, it is the time from a channel purchase to order translation (visibility of the product's purchase in the channel). For a consumer products company the order latency is 7 to 14 days. For a chemical company, the order latency is often two to four weeks.
9. **Concept to launch.** The critical cycle for time to market is the time required to effectively launch a new product from the ideation and test phase to first-time manufacturing to launch into the market.
10. **Return to receipt.** It is the time to return a product and complete the transactions associated with the return.

To understand supply chain excellence, these 10 cycles need to be viewed together with the measurements from studying the supply chain effective frontier (Figure 1.1) (to determine supply chain trade-offs) for each supply chain. They need to be viewed by a peer group.

So, who does supply chain best? There are many attempts in the market to crown a supply chain leader; and while there are many methodologies attempting to define who does supply chain the best, they are inadequate. One methodology throws all companies into a spreadsheet and compares them on growth, inventory, and asset utilization and asks peers to rate the companies. This methodology has a number of problems. Supply chain excellence cannot be determined this simplistically. Instead, it needs to be evaluated in a stepwise holistic manner based on three criteria:

1. **Strategic alignment.** The supply chain should not be viewed in isolation from the business. This first measurement is perhaps the most important. It is the contribution of the supply chain team to the delivery of the business strategy.
2. **Year-over-year performance.** This is a year-over-year comparison of how a company performed against its peer group on the supply chain financial measurements of growth, revenue/employee, asset utilization, days of inventory, and cost of sales as a percent of revenue. To determine supply chain excellence, companies need to compare year-over-year performance of a similar company to its peer group for at least three to five years.

3. **By peer group.** Benchmarking needs to be against a comparable peer group. While leaders gain insights on innovative practices from other leaders in dissimilar peer groups, benchmarking performance needs to be compared within a peer group based on similar value chain definitions.

Benchmarking analysis is fraught with issues. Companies are not simple. They have multiple supply chains. The markets are dynamic. Companies are bought and sold. Product lines evolve. Channels ebb and flow. As a result, while companies want to benchmark and insights can be gained, definitive answers remain more of an art than a science.

MEET THE SUPPLY CHAIN LEADERS

In interviews, supply chain pioneers were asked, “When you think of supply chain excellence, which company comes to mind?” The first response by the supply chain leaders is that no one company stands above the rest. The collective opinion is that while individual companies do pieces of the supply chain well, there is no one company that does everything well.

In phone interviews, as the leaders think through their answer, they will often cite Apple’s dominance in high-tech innovation, Dell’s leadership in defining new business models, and Toyota’s definition of lean processes. However, when the pioneers are pressed to name a single leader, one name is usually mentioned followed by silence: P&G is seen as the year-over-year leader by the pioneers. Apple is the second most often mentioned and Dell is third. The aggregate response of the supply chain pioneers is shown in Figure 1.9.

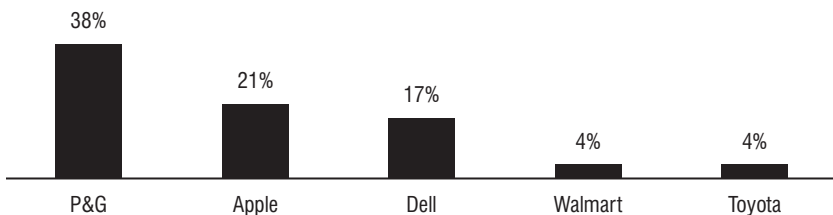


Figure 1.9 Who Does Supply Chain Best?

It is significant to note that each of these three companies pioneered both product and process innovation over the course of the history of supply chain management. They spawned new business models. For Apple to be successful, it required the definition of iTunes. Dell defined a make-to-order online business model. P&G's work on customer-driven supply chains drove market share.

Apple is a relative newcomer with few peer comparatives. P&G and Dell on the other hand have been focused on supply chain for many years with strong performance against their peer groups. We discuss P&G and Dell in the next section, and we share some insights on Apple in subsequent chapters.

PROCTER & GAMBLE: THE QUIET LEADER

Based on the evaluation by peers, over the course of the last 30 years, P&G is seen as the supply chain leader. With a dogged focus on the consumer, P&G has been on a mission to deliver a better response for shoppers in the store. The supply chain played a critical role in delivering on this brand promise.

Founded in 1837, the company closed fiscal 2011 with annual sales of \$82.6 billion. Today, the company supports 300 brands in more than 80 countries. Twenty-two of the brands contribute more than \$1 billion of annualized sales to the P&G topline.

The company has championed process innovation. In 2003, P&G introduced the term *customer-driven supply chain* to the market. It also pioneered top-to-top meetings with retailers, championed barcode product adoption, and automated store checkout in the late 1980s. In 2002, it built one of the first demand signal repositories to use channel data to sense demand.

Over (the past) nine quarters, we've organically added \$7 billion to company sales. This is roughly equivalent to growing one Energizer and one Church & Dwight in a little over two years.

—Jon Moeller, Chief Financial Officer, Procter & Gamble,
Opening Statement at an Investor Conference, 2011

P&G is known for its brands and for delivery on the brand promise. The company's business strategy is enhanced by its supply chain efforts. As stated on P&G's website, the focus of its business strategy is:

- **More consumers.** We are improving more consumers' lives by innovating and expanding our product portfolio vertically, up and down value tiers. We continue to successfully develop and launch premium innovations focused on improving consumer value through enhanced performance. We are also serving consumers who are more price conscious through lower-priced offerings with superior performance versus other mid-tier and value-tier alternatives.
- **In more parts of the world.** We are improving lives in more parts of the world by innovating and expanding our existing product portfolio geographically into new markets. We are increasing our presence in developing markets and increasing the amount of sales from these markets by focusing on affordability, accessibility, and awareness of our brands.
- **More completely.** We are improving lives more completely by innovating to improve existing products and creating or entering adjacent categories. We are driving regimen use that broadens the occasions for which our brands can serve the needs of each consumer. By attracting new consumers into our existing brand franchises and broadening the products used by our current consumers, we are able to build scale, reduce costs, and profitably grow market share.

P&G was an early adopter of supply chain principles. The company was an early leader in the design of the supply chain organization. In 1985, the company moved source, make, and deliver teams to a single reporting relationship through one common organization globally. At the time, this organizational definition was unique and 10 years ahead of the market. Today, the organization operates in a matrix organization with four elements:

1. **Global business units** (GBUs) focus solely on consumers, brands, and competitors around the world. They are responsible for the innovation pipeline, profitability, and shareholder returns from their businesses.

2. **Market development organizations** (MDOs) are charged with knowing consumers and retailers in each market where P&G competes and integrating the innovations flowing from the GBUs into business plans that work in each country.
3. **Global business services** (GBSs) utilizes P&G talent and expert partners to provide best-in-class business support services at the lowest possible costs to leverage P&G's scale for a winning advantage.
4. **Lean corporate functions** ensure ongoing functional innovation and capability improvement.

This organizational structure enabled better alignment horizontally (across P&G's trading network) and vertically (within the company). It enabled the building of outside-in processes in global economies to sense demand and adapt the response. Consumer products companies are complex organizations. As each company in consumer products scrambled to enter the emerging economies of Brazil, Russia, India, and China, each company defined its supply chain organization differently:

- **Definition of global.** In this period, companies within the consumer products industry defined the term *global* differently. Most often it was not conscious. The definition evolved. The race was on. The definition was driven by a strong leader's vision.

For P&G, it was by design. They moved quickly to build a global organization with a strong vision of global planning for local execution. They defined a matrix organization where global teams set standards, defined processes, and were trained to a common set of standards. While other companies had a global product footprint, and put strong energies into opening global channels, the organizational design for the supply chain team was different. For companies like Colgate, Johnson & Johnson, Kraft, and Unilever, the organization had strong regional autonomy. Companies like Campbell Soup, General Mills, Kellogg, and Kimberly-Clark were slow to create a global organization, and when they did it was primarily regional (North America and Europe).

- **Supply chain organization definition.** P&G was also an early mover to consolidate make, source, and deliver into a common organization. This holistic view enabled them to have a better discussion on trade-offs than their peers. In all of the other consumer products companies, as shown in Figure 1.10, there was stronger functional and regional autonomy. This made it more difficult to see and mobilize to take action on trade-offs. During the period 1985 to 2005, P&G was the only organization on the chart to have these supply functions reporting to one common global leader.
- **Technology selection.** Each of the companies also selected and adopted technology differently. While Colgate consolidated on a single vendor strategy, Unilever allowed the regions to select their own technologies. Unilever had lots of small projects with each region doing its own thing. In this period, P&G was consistently an early adopter of technology. It funded corporate development efforts and often worked with small vendors to drive innovation.

The company's progress in supply chain excellence is multidimensional. It is a business process innovator. As the reader will see in subsequent chapters, the company pioneered techniques in open innovation, global talent development, demand-driven manufacturing, and corporate social responsibility.

As technology matured, the possible span of control of a manager increased. . . . Technology enabled the effective management of larger teams.

—Keith Harrison, *Global Product Supply Leader,*
Procter & Gamble, 2001–2011

In preparation for this book, we looked at industry peer groups in automotive, apparel, high-tech and electronics, chemical, consumer products, and retail industries. In this data, we do not see another company that outpaced its peer group as fast as P&G did revenue/employee and EBIT (earnings before interest and taxes)/employee over the last 20 years. We also do not see another leader within a peer group that demonstrated the capability to drive growth while

maintaining inventory levels and reducing the cost of sales. These trends for consumer products companies are outlined in Figures 1.10 through 1.14.

P&G's supply chain leaders were among the early supply chain pioneers. They were primarily engineers. In conversations, they clearly understood that the supply chain was a system that had innate

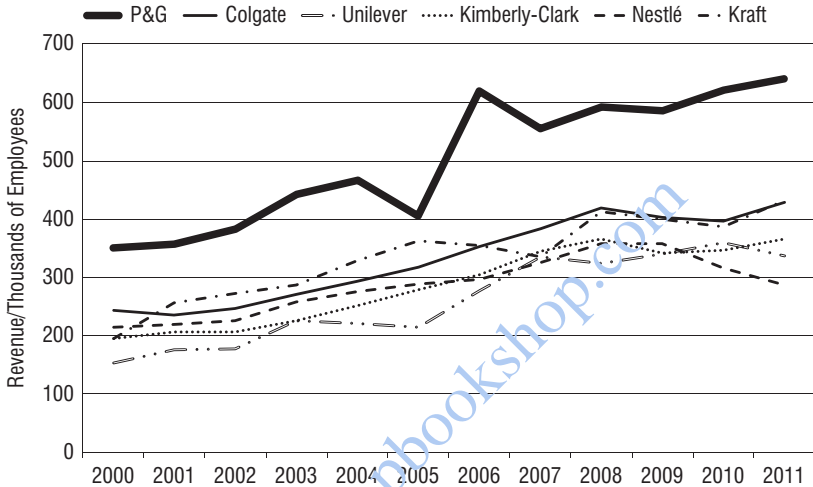


Figure 1.10 Comparison of Revenue/Employee for the Period 2000–2011

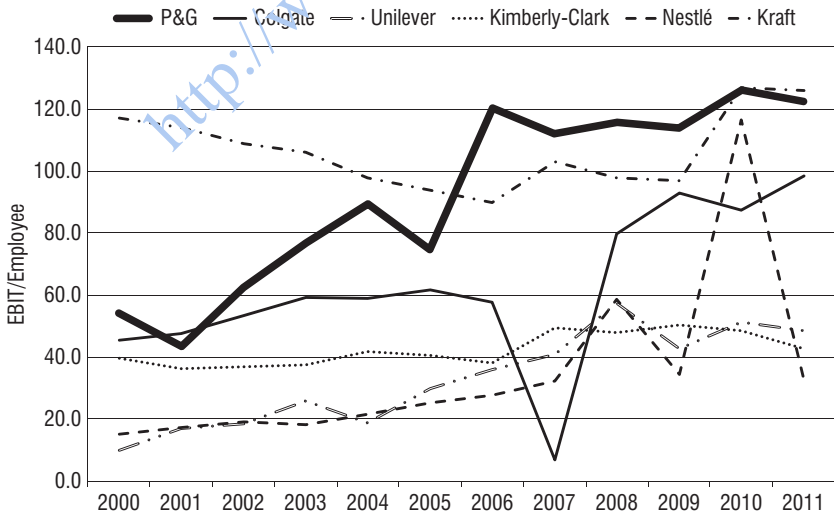


Figure 1.11 Comparison of EBIT/Employee for the Period 2000–2011

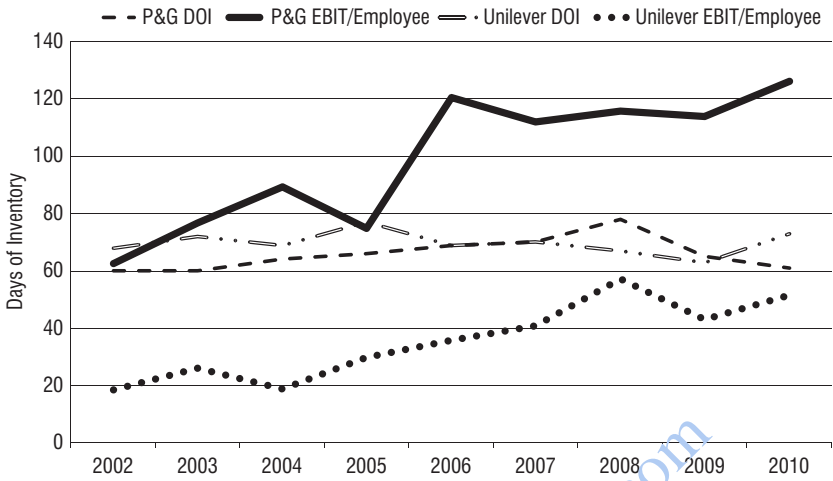


Figure 1.12 Comparison of EBIT/Employee Plotted against Days of Inventory for P&G/Unilever for the Period 2002–2010

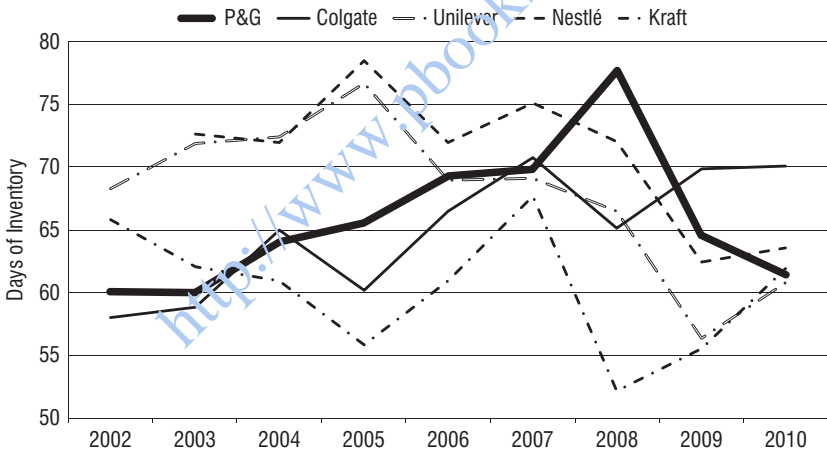


Figure 1.13 Consumer Products: Comparison of Days of Inventory for the Period 2002–2010

trade-offs between customer service, cost, asset utilization, and inventory. They attempted to redefine the potential of the supply chain by improving the effective frontier of their supply chain on many fronts: direct shipments to customers to reduce logistics costs, daily schedule changes at their factories to align to demand, co-located suppliers

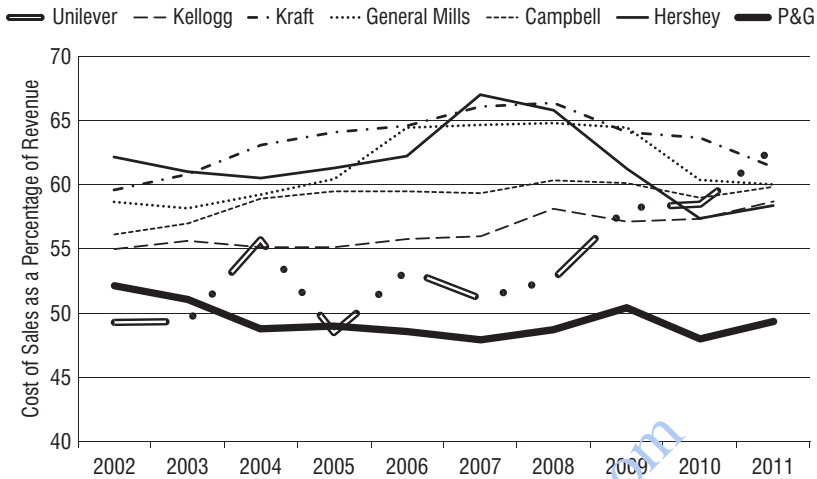


Figure 1.14 Consumer Products: Cost of Sales as a Percentage of Revenue for the Period 2002–2011

to improve the supply response, late-stage postponement to improve responsiveness, and a laser focus on continuous improvement.

APPLE AND DELL: INVENTING NEW MODELS

When asked, “Who does supply chain best?” the supply chain pioneers rated Apple and Dell as second and third in delivering supply chain excellence. In the design of their supply chains, there are many commonalities:

- Process innovation.** Both Apple and Dell defined the supply chain to play a key role in delivering their brand promise. For Apple, one of the primary elements of delivering its brand promise was the design of iTunes. This innovative network to handle content and redefine the role of the supplier within this network helped to define the mobile experience. For Dell, it was the design of a make-to-order business model for online computer ordering that allowed customers to design their personal computer and track its progress through the value chain that drove market share.
- Daily data used daily.** In each company, data matters. Dell and Apple run their supply chain on daily data used daily from

the channel with a view from the outside-in. The leadership at both companies has valued data-driven decision making. They have each invested in systems to minimize data latency.

- **Integration with product innovation.** Each company values product innovation and has focused on building strong horizontal processes for the intersection of S&OP and new product launch.
- **Learning from failures.** Unlike P&G, both companies have stumbled in the last five years. Apple's supplier development issue bubbled up as a corporate social responsibility press issue with Foxconn in 2012. Likewise, Dell's challenge with channel redefinition that started in 2009 is ongoing.

When financial balance sheets are compared year over year, both companies have outperformed their peer groups. In Figures 1.15 through 1.17, Apple's and Dell's results are compared to 'their peer groups'.

When you contrast Apple and Dell to Motorola, it is easy to see why supply chain matters. The differences are many. Apple and Dell had a focused supply chain vision at the corporate level and it was embedded in the company strategy. Motorola did not. Motorola made

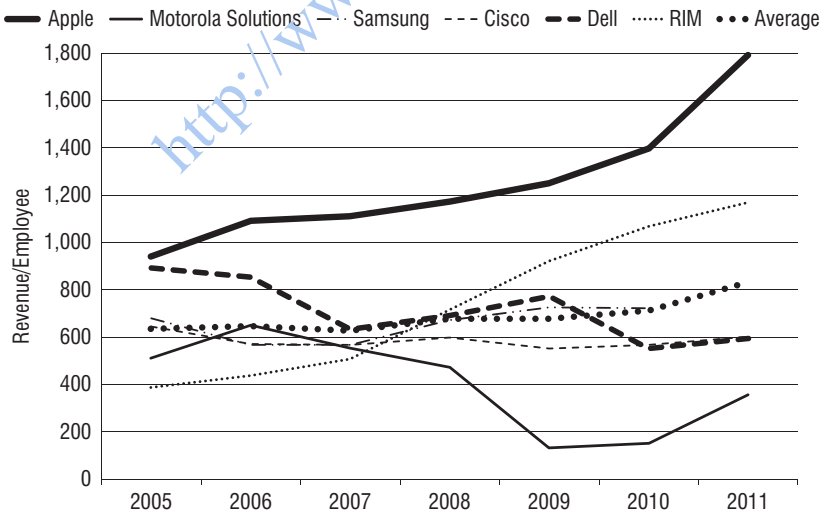


Figure 1.15 Comparison of High-Tech and Electronics Revenue/Employee for the period 2005–2011

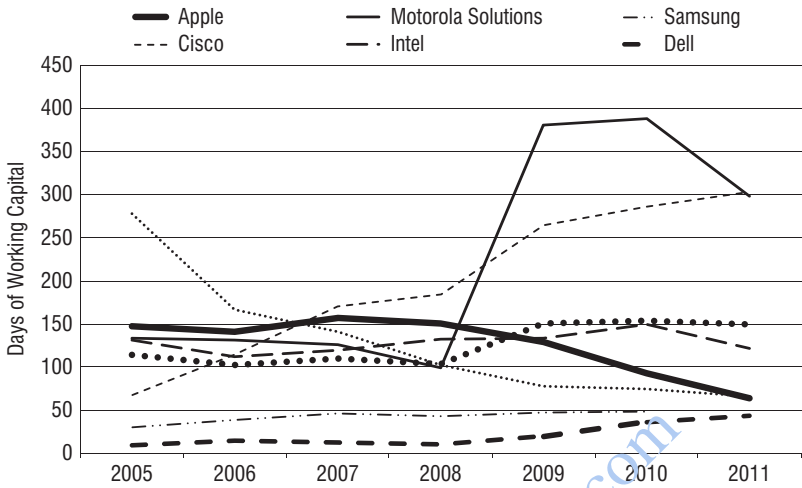


Figure 1.16 Comparison of Days of Working Capital in High-Tech and Electronics for the Period 2005–2011

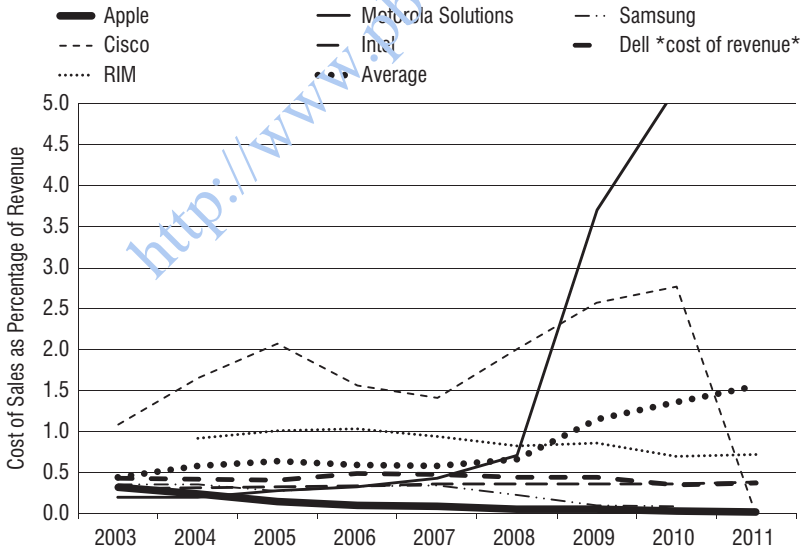


Figure 1.17 Comparison of High-Tech and Electronics Companies' Cost of Sales as a Percentage of Revenue for the Period 2003–2011

a choice to proliferate products without common platforms, and it did not define a supply chain for user-based content. As a result, the company lost its edge on innovation. The lack of downstream data sensing and advanced predictive analytics coupled with declining sales of new products caused Motorola to be hit hard by the recession. They were not able to weather the storm.

When we asked Dell founder, chairman, and CEO Michael Dell for his opinion, he replied, “Our supply chain has always enabled our business strategy—that is true of the early days of just-in-time manufacturing (the backbone of our direct model) to today’s segmented and tightly integrated value chain that delivers a much broader portfolio of Dell solutions.”

He continued, “It has been foundational for our success. For most of our company’s history our direct business model—and the agile supply chain that drove it—were key differentiators for Dell. Constant feedback from our customers, partners, and suppliers gave us the insight that we needed to fine-tune our operations and deliver *only* the products and services that our customers wanted.”

The big lesson for us was that the role of supply chain management goes beyond operational excellence and cost efficiencies. When done right, it enables new business models, creates competitive advantages in the marketplace and enhances brand equity for long-term customer value.

—Michael Dell, Founder,
Chairman, and CEO, Dell

In the balance sheet trends against peer groups, Dell and Apple both built a competitive advantage through process innovation. Today, supply chain excellence is no longer about operational excellence and costs; instead, when done right, it defines new business models and drives new forms of value.

The role of the supply chain is growing in importance. As product life cycles change, demand cycles get shorter, and supply chain cycles get longer, the supply chain needs constant alignment. For example,

today, for a mobile phone or a personal computer, the time to manufacture and ship the product is one-third of the total life cycle. As a result, every step in the process is more important than before. It matters now more than ever.

TO DRIVE CHANGE

- Evaluate how the organization has defined supply chain excellence.
- Identify how many supply chains you have. Detail what is rewarded in each.
- Evaluate how the supply chain organization aligns with what you would like to reward.

SUMMARY

Today, with 30 years of supply chain history behind us, companies no longer have to stumble forward. Instead, they can harvest the insights from the pioneers and build value networks to drive lasting value.

In subsequent chapters, we share insights on five areas to start the journey. In Chapter 2, we discuss the growing importance of value networks. In Chapters 3 and 4, we share insights on demand and supply processes while in Chapter 5, we discuss how to make the right changes to define horizontal processes.

As many companies attempt to digest the multitude of technologies bequeathed to them from the prior generation of pioneers, it is a great time to reflect, to challenge traditional paradigms, and to make a fresh start. Historically, we have:

- **Tried to get precise on imprecise data.** Supply chains of the future will be based on ranges, they will dance agilely with error and adapt to changing supplier demands. The future is not the integrated supply chain; instead, it is about new forms of predictive analytics to deal with uncertainty.
- **Built efficient chains, but not effective networks.** As companies mature, they will realize that the future of their supply chains lies in the strength of the relationships at each end of the

value network. Today's supply chain has a strong center and weak ends. The ability to manage this holistically will define success and failure.

- **Focused inside-out, not outside-in.** As companies build sensing mechanisms, they will quickly learn that there is no place to put either demand or supply sensing data in traditional IT architectures. As a result, most will have to reimplement the technologies that they worked so hard to implement the first time.
- **Rewarded the urgent, not the important.** The natural inclination of the first-generation pioneers was to act. As technologies evolved to enable better planning, the tendency to reward the urgent over the important delayed the adoption of planning systems. As a result, companies rewarded reacting, firefighting, and jumping through hoops. The supply chains of the future will reward planning and the use of decision support tools.
- **Implemented projects without a holistic plan.** For most companies, the implementation of projects has been without a holistic plan. As companies now attempt to digest their many projects and technologies from the last 30 years, it will be hard for them to connect the dots and string them together. For many this will force reimplementation. Supply chain strategy matters more now than ever.

In the next chapters, we challenge these assumptions and share insights to help navigate the future.

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