# I

# GETTING STARTED IN INDUSTRIALS

# 1

# INDUSTRIALS BASICS

*Mr. Grant started his Sunday morning with some housework—taking out the trash, mowing the lawn, cleaning the pool, changing light bulbs, installing cabinets, and fixing the air conditioner.*

*It was a productive day until 2:00 PM when his shoulder cushioned a fall off his ladder, requiring a trip to the ER. Making matters worse, Mr. Grant's normal route was getting re-paved, forcing him to take the long way through a $5 toll road to the hospital.*

*The bad news: He needed an MRI and a shoulder specialist—the closest was an hour's plane flight away.*

*Early Monday, he took the train to the airport and boarded a jet. At the hospital, he got his MRI, and the doctor told Mr. Grant his shoulder would be fine in time. Mr. Grant celebrated with a shopping spree through the airline's gift catalogue, fixing Post-it notes on everything he wanted to buy.*

This is more than a simple anecdote with a happy ending—it's an illustration of the importance of Industrials products in our everyday lives. Every event, action, and item in Mr. Grant's travails used products and services, from the Industrials sector. Table 1.1 lists just some of the Industrials products and services Mr. Grant encountered.

**Table 1.1 Industrials Sector Impact on Mr. Grant**

| Action | Industrials Sector Involvement |
|---|---|
| Taking out the trash | Pick-up service provided by a Commercial Services & Supplies company |
| Mowing the lawn | Lawnmower made by a Machinery company |
| Changing light bulbs | Light bulb manufactured by an Electrical Equipment company |
| Installing cabinets | Cabinets manufactured by a Building Products company |
| Fixing the air conditioner | Air conditioner manufactured by an Aerospace & Defense company |
| Road getting re-paved | Road paving equipment manufactured by a Machinery company |
| Paying $5 on the toll road | Toll road operated by a Transportation Infrastructure company |
| Taking the train to the airport | Train manufactured by a Machinery company and operated by a Road & Rail company |
| Taking the plane flight | Plane manufactured by an Aerospace & Defense company and operated by an Airline |
| Getting an MRI | MRI machine manufactured by an Industrial Conglomerate |
| Shopping from an airplane catalogue | Package delivery services provided by a Air Freight & Logistics company |

The Industrials sector, arguably more than any other, is vastly diverse. Because it's not focused on a particular product or service, myriad drivers, end markets, and operating conditions can impact profitability of Industrials firms. And, while diverse, Industrials have played a very important role in global economic development. The sector has progressed globalization and global trade, it has built the world's infrastructure and boosted quality of life, and it has driven significant gains in productivity and manufacturing efficiency.

## INDUSTRIALS BASICS

What does the Industrials sector look like from a high level? Because it has many diverse industries, it's split into three broad categories (as defined by the Global Industry Classification Standard [GICS]

classification system). Firms in these categories primarily serve governments and corporations, but in some cases serve consumers as well:

- Capital Goods
- Transportation
- Commercial Services & Supplies

Capital Goods, the largest sector component, consists primarily of firms involved in production and making machinery and industrial goods including airplanes, tractors, power generators, and defense and transportation equipment. Globally, there are over 4,300 publicly traded Capital Goods firms.[1]

Transportation firms, the second largest weight within the sector, mostly ship goods rather than make them. Most forms of transportation are included in this group, including planes, trucks, ships, and railroads. Globally, there are nearly 900 publicly traded Transportation firms.[2]

Last, Commercial and Professional Services are a mixed bag, including commercial printing, data processing, environmental waste and garbage pickup, janitorial services, and staffing services. While seemingly disparate, these firms are generally service focused. Globally, there are over 1,000 publicly traded firms classified as Commercial and Professional Services.[3]

### Industrials by the Numbers

The 200 largest Industrials companies employ over 11.5 million people globally—greater than the populations of Greece, Sweden, Switzerland, Hong Kong, Israel, or Denmark.

These firms generated over $3.1 trillion in revenues in 2007—larger than the size of the entire economy of every country in the world except the US, Japan, Germany, and China. And they had over $5.1 trillion worth of assets—more than the value of all durable goods (goods meant to last more than three years) owned by US households and nonprofit organizations.

*Source:* Bloomberg Finance L.P.; CIA 2008 World Fact Book; US Federal Reserve; IMF World Economic Outlook Database.

**Table 1.2 World's Largest Industrials Companies as of 12/31/08**

| Name | US Ticker | Country | Industry | Market Value |
|---|---|---|---|---|
| General Electric | GE | US | Industrial Conglomerates | $161,278 |
| Siemens | SI | Germany | Industrial Conglomerates | $67,087 |
| United Technologies | UTX | US | Aerospace & Defense | $50,953 |
| 3M | MMM | US | Industrial Conglomerates | $39,873 |
| United Parcel Services | UPS | US | Air Freight & Logistics | $37,372 |
| ABB | ABB | Switzerland | Electrical Equipment | $34,000 |
| Lockheed Martin | LMT | US | Aerospace & Defense | $33,683 |
| Boeing | BA | US | Aerospace & Defense | $31,270 |
| East Japan Railway | EJPRY | Japan | Road & Rail | $30,403 |
| Emerson Electric | EMR | US | Electrical Equipment | $28,082 |

*Source:* Thomson Datastream.

## Industrials Leaders

Industrials firms can play a vital role in the global economy because of the functions they serve, the markets they affect, and the scope and scale of their operations. But who are these firms? Table 1.2 shows the world's largest Industrials firms (by market cap). GE, one of the world's largest firms, nearly triples the size of the next biggest. Seven of the ten largest are US-domiciled, but they vary greatly by industry. And all operate in multiple markets and industries, producing goods ranging from Post-it notes to power generation equipment.

Over time, these firms have grown via mergers, product extensions, and growth into new markets—the result being significant economies of scale, highly recognizable brand names, and global diversification. These firms are generally considered industry "bellwethers" and are good firms to analyze to understand their industries.

## INDUSTRIALS CHARACTERISTICS

There's no denying Industrials firms can be massive with a broad scale of operations. And while they are a diverse group, they do have a few more unifying characteristics and attributes. Generally, the Industrials sector as a whole:

- Is diverse—both in where the firms are domiciled and in the end markets served,
- Tends to be economically sensitive,
- Is highly correlated to broad markets, and
- Tends to have lower profit margins.

Let's look at each of these characteristics in a bit more detail.

### A Diverse World

The Industrials sector is diverse—including where they're domiciled and the end markets served. These firms manufacture equipment and provide services—factory equipment, machinery, and transportation and supply chain services, to name a few—to a wide range of other sectors and government branches. Most manufacturing industries—from food production to car manufacturing—require production equipment that is often produced by an Industrials firm. These equipment manufacturers fall into a select number of industries (whether in Industrials or another sector), but the number of industries and end markets served is significantly more.

Freight transportation firms are responsible for shipping other industries' products globally, giving these industries exposure to multiple drivers and providing them with significant diversification. For example, railroads generate revenue from myriad markets like food, clothing, coal, lumber, motor vehicles, and metals.

Unlike most sectors, Industrials industries are not always cohesively linked. It's easy to see why oil exploration firms might be classified in the same sector as an oil refiner, but the link isn't as clear among a machinery producer, a staffing firm, and a railroad—all classified as Industrials.

Larger Industrials firms serve regionally diverse end markets as well. In some cases, firms have a greater portion of foreign sales than domestic. Among other factors, improved technology and communication abilities, increased globalization, and the liberalization of trade, investment, and the financial markets have driven significant changes in revenue distribution and the potential to penetrate foreign markets. Table 1.3 highlights a few firms whose revenue distribution has changed significantly in just 15 years. While not every firm's gains are as remarkable as these, greater regional diversification is common for many Industrials. And with this diversification comes a host of new market opportunities and the ability to access new and potentially cheaper labor and suppliers.

This diversification is not solely a US phenomenon either as many non-US firms share similar changes in revenue distribution. The ability and the need to focus globally to grow—whether through new joint ventures, mergers, investment in distribution channels, or other initiatives—has enhanced the competitive landscape of the Industrials sector. New, smaller regional players have also increased their market presence, driving increased competition as well.

## Economically Sensitive

Another commonality is Industrials are generally considered economically sensitive. Firms tend to buy new equipment or ship more goods when the economy is strong, profitability is rising, and future market

**Table 1.3 Percent of Foreign Revenues for Leading US Industrials Firms (1992–2007)**

| Company | 1992 | 2007 | Difference |
|---|---|---|---|
| Paccar | 21% | 64% | 43% |
| General Electric | 17% | 51% | 34% |
| 3M | 43% | 63% | 20% |
| Emerson Electric | 33% | 52% | 19% |
| United Technologies | 40% | 51% | 11% |

*Source:* SEC, Standard & Poor's Research Insight.

expectations are positive. Industrials are generally driven by broad macro factors—corporate profitability, access to credit, increased spending, and so on—all of which are positive drivers for the economy as a whole. As a result, Industrials tend to move in cycles closely aligned with the broader economy and the end markets served (which are often cyclical industries themselves).

Industrials tend to manufacture and provide services for expensive big-ticket items that can typically run for years. This can increase sales volatility as firms tend to delay making expensive purchases when times are tough. (Note, firms do generate a portion of revenues from selling spare parts and service, which is more stable.) Contrast this with a sector like Consumer Staples where demand can be fairly constant. For example, demand for food isn't as economically sensitive as that for a mining truck.

Industrials' economic sensitivity is exhibited in Figure 1.1, comparing Industrials' annual sales growth as a whole, as well as the Transportation and Capital Goods industry groups (left axis), to

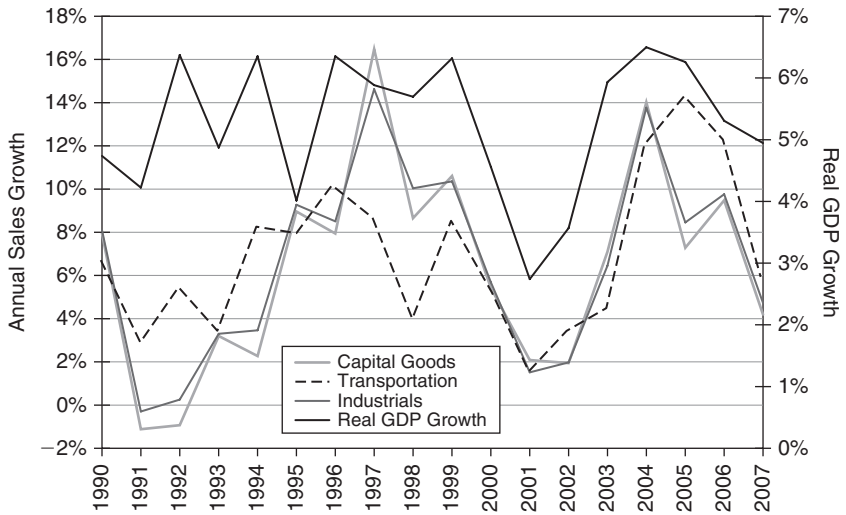



**Figure 1.1 S&P 500 Industrials Sector Sales Growth vs. GDP Growth**

*Source:* Standard & Poor's and Bloomberg Finance L.P.

the annual US GDP growth (right axis) from 1990 through 2007. While the magnitude of growth and the rate of change are greater for Industrials than the overall economy, the overall direction and inflection points are generally similar.

Why does economic sensitivity matter? The sector's leverage to the economy and a diverse set of drivers can allow it to disproportionately benefit when economic conditions are generally good. For example, look at Figure 1.1 again—when GDP growth hit 5.9 percent in 1997, Industrials' sales growth was nearly 15 percent.

Industrials can benefit from many facets of economic growth—increased manufacturing, increased construction, increased corporate, consumer, and government spending, etc. For this reason, many of the larger Industrials firms—FedEx, UPS, General Electric, United Technologies, and Union Pacific, to name a few—are generally considered good barometers for the US economy.

But volatile product demand can lead to operational challenges, market uncertainty, and increased business risks, like the following:

- **Forecasting challenges**. Volatile demand can make capital budgeting decisions, project profitability expectations, and growth estimates a challenge.
- **Ill-conceived production changes**. Expanding production can prove problematic and be a poor use of capital. Conversely, not producing enough leaves profits on the table and may lead to competitors taking market share.
- **Excess inventory issues**. No firm wants to be left with excess inventories when economic growth and product demand fade. There is money tied up in inventory, and product price reductions may become necessary.

From an investor's standpoint, the challenge is forecasting sales and earnings in consideration of ever-changing market conditions and how effective management will be in countering such operational challenges. What might be true today may not be true in a year. This is one reason Industrials tends to have lower valuations than other sectors.

## High Correlation to Broad Markets

Economic sensitivity is one reason Industrials tend to be strongly correlated to broader markets. Industrials historically have the highest correlation of any sector to the S&P 500 and very near the highest correlation to the MSCI World (a global stock market index). Table 1.4 shows the monthly correlation between the S&P 500 and the MSCI World for standard investing sectors from 1995 through 2008. During this period, Industrials had a 0.9 correlation to both the US and the world stock markets.

Note that two of the most economically sensitive sectors—Industrials and Consumer Discretionary—have among the highest correlations, while sectors considered less economically sensitive—Health Care and Consumer Staples—rank among the lowest.

Industrials are also more closely correlated to the stock market overall than any individual sector. Table 1.5 shows the correlation of the S&P 500 Industrials and MSCI World Industrials sectors to the remaining nine sectors and each aggregate index. For example, both the S&P 500 Industrials and the MSCI World Industrials have a 0.9

**Table 1.4 Sector Correlations to the S&P 500 and the MSCI World (1995–2008)**

| Sector | Correlation to the S&P 500 | Correlation to the MSCI World |
|---|---|---|
| Industrials | 0.9 | 0.9 |
| Consumer Discretionary | 0.9 | 0.9 |
| Technology | 0.8 | 0.8 |
| Financials | 0.8 | 0.9 |
| Materials | 0.7 | 0.8 |
| Telecom Services | 0.7 | 0.7 |
| Health Care | 0.6 | 0.6 |
| Energy | 0.5 | 0.6 |
| Consumer Staples | 0.5 | 0.6 |
| Utilities | 0.4 | 0.7 |

*Source:* Thomson Datastream.

**Table 1.5 Industrials Sector Correlations to the S&P 500 and the MSCI World Sectors (1995–2008)**

| Sector | Correlation to the S&P 500 Industrials | Correlation to the MSCI World Industrials |
|---|---|---|
| Index (S&P 500/MSCI World) | 0.9 | 0.9 |
| Consumer Discretionary | 0.8 | 0.9 |
| Materials | 0.8 | 0.9 |
| Financials | 0.8 | 0.8 |
| Technology | 0.7 | 0.7 |
| Consumer Staples | 0.5 | 0.6 |
| Energy | 0.5 | 0.6 |
| Telecom Services | 0.5 | 0.6 |
| Health Care | 0.5 | 0.5 |
| Utilities | 0.4 | 0.6 |

*Source:* Thomson DataStream.

correlation to the S&P 500 and MSCI World, respectively. This is much greater than the 0.5 correlation the Industrials sector has to the Health Care sector, both domestically and globally.

## Lower Profit Margins

Another unifying factor among Industrials firms is their lower profit margins. This is partly due to the sector's sensitivity to raw materials used in production (copper, steel, aluminum, etc., for Capital Goods and oil for Transportation). For example, AMR Corp, the owner of American Airlines, spent over $9 billion in fuel in 2008, equal to roughly 35 percent of operating expenses (the firm's largest operating expense).[4] This sensitivity can significantly impact profits.

Table 1.6 shows historic average operating margins for S&P 500 firms by sector. As you can see, the Industrials sector is well below average.

While Industrials firms tend to hedge their commodity needs (AMR Corp saved $380 million due to its hedges in 2008[5]), they can still be negatively exposed to input cost fluctuations and price increases by suppliers—more than the aggregate market.

**Table 1.6 Average Operating Margin of S&P 500 Companies (2000–2007)**

| Sector | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Average |
|---|---|---|---|---|---|---|---|---|---|
| Consumer Discretionary | 9.6 | 8.6 | 10.1 | 11.1 | 12.0 | 12.0 | 11.7 | 10.6 | 10.7 |
| Consumer Staples | 12.6 | 12.9 | 13.5 | 13.6 | 13.4 | 13.2 | 13.3 | 13.4 | 13.2 |
| Energy | 17.7 | 21.1 | 12.9 | 15.9 | 18.4 | 22.7 | 27.4 | 26.3 | 20.3 |
| Financials | 25.2 | 23.5 | 25.3 | 28.1 | 29.1 | 28.6 | 29.2 | 33 | 27.8 |
| Health Care | 15.1 | 14.8 | 17.9 | 16.7 | 18.0 | 19.0 | 17.9 | 17.8 | 17.1 |
| Industrials | 12.5 | 10.9 | 11.1 | 10.4 | 11.2 | 12.1 | 12.8 | 12.8 | 11.7 |
| Tech | −7.8 | −20.7 | −0.4 | 9.3 | 14.9 | 16.8 | 16.2 | 15.0 | 5.4 |
| Materials | 11.9 | 9.8 | 9.9 | 10 | 12.0 | 14.0 | 15.1 | 13.7 | 12.1 |
| Telecom | 9.9 | 6.6 | 14 | 14.9 | 19.6 | 20.2 | 20.6 | 21.8 | 16.0 |
| Utilities | 16.9 | 19.1 | 17.8 | 14.7 | 15.5 | 13.5 | 15.9 | 16 | 16.2 |
| **Total** | **12.3** | **10.0** | **13.3** | **15.3** | **17.0** | **17.7** | **18.2** | **18.4** | **15.3** |

*Source:* Bloomberg Finance L.P.

## THE MODERN PRODUCTION PROCESS

Because the largest Industrials industries (by market capitalization) are manufacturing related, no understanding of the overall sector would be complete without an overview of the modern production process. Operationally, the supply chain and the production process are crucial because they dictate quality and quantity of goods produced, drive profitability and margin improvements, and can drive competitive advantages over peers. Therefore, these firms dedicate much capital to, and focus on, improving production abilities.

Two of the most important developments in the modern production process have been the revolution toward *lean manufacturing* and broad adaptation of *Six Sigma*—two fairly widely used business strategies. These strategies were born out of discontent with the ineffectiveness of mass production in today's fast-changing and quality-driven world.

But this does not diminish the importance of mass production in the early twentieth century and how it revolutionized manufacturing and drove substantial productivity gains. The system, made popular by auto maker Henry Ford, capitalized on production economies of scale by using simple-to-attach, interchangeable parts for assembly line production.

In 1908, the average task cycle—the amount of time it took a laborer to perform a task on a new car—was 514 minutes. By 1913, after the introduction of a moving assembly line, the cycle had decreased to 1.19 minutes. Ford's cars were cheaper to produce, quicker to manufacture, and easier to fix than competitors. Rivals and other manufacturing industries took note and, by the mid-twentieth century, mass production was standard in the US and Europe.[6]

While mass production proved successful, by the 1950s, flaws in the system began emerging. Sleek new European car designs began stealing market share from American producers, and competition from Japan began accentuating mass production flaws—including the incentive to let defective cars reach final assembly, and the cost and waste of excess inventories.

Because changing production lines was expensive, US manufacturers were ill-prepared to deal with evolving consumer demand, the

### When Good Technology Goes Bad

By the 1980s, the US began investing in new technologies to improve productivity and increase efficiency. Unfortunately for some, the learning curve was steep and mastering the technology proved challenging. Automotive analyst and author Maryann Keller saw these challenges firsthand in 1985 when she visited a new Cadillac manufacturing plant in Michigan. She discovered out-of-control robots spray painting each other, destroying windshields, and smashing into themselves and other cars.

Thankfully, US manufacturers got better using robots as time progressed and by 2009 there were over an estimated 186,000 robots used in the US (second only to Japan) and over one million used globally.

*Source:* John Teresko, "It Came From Japan!" *IndustryWeek* (February 1, 2005); Robotics Industries Association.

increasing importance of reliability, and auto-industry fragmentation. And while these attributes were detrimental for US manufacturers, they highlighted the strengths of the new Japanese system—more malleable, flexible, and cooperative production. The result was the birth of lean manufacturing, the Toyota Production System, and Japanese car manufacturers' rise to prominence.

## Lean manufacturing

At its core, lean manufacturing aims to improve overall profitability by eliminating waste through reduction of production inputs and limiting excess production. Done right, this reduces costs and working capital, improves quality, shortens manufacturing time, and creates production flexibility.

Lean manufacturing has resulted in a number of benefits over mass production, including the following productivity gains:

- **Reduced Time.** Engineering, product development, and design take half the time.
- **Reduced Human Effort.** The same production output requires half the human effort.
- **Reduced Space.** Floor space required reduced by half.

- **Reduced WIP.** Work-in-process inventory (WIP) reduced by nine-tenths.
- **Reduced Processing Time.** Processing time reduced by nine-tenths.[7]

**Elimination of Waste** One of the most important ways lean manufacturing is able to accomplish these gains is by eliminating excess waste and unnecessary inventory and supplies. Waste elimination—whether inputs or outputs—can significantly reduce costs and improve profit margins. Not only is inventory expensive, it takes up room, is a distraction to workers and production, and can be rendered useless with product design changes.

The risk of product defects with large inventories increases as well. Under mass production, large batches of inventory were produced at the same time. If something went awry during production, it increased the likelihood all the components had the same issue. And if there was excess inventory, the problem might not have been discovered and rectified until much later—all while faulty products continued making their way to market.

To counter these risks, manufacturers have changed their relationships with suppliers—shifting to more frequent, smaller deliveries rather than large shipments. Thanks to improvements in transportation and the realignment of production, firms can increasingly deliver necessary components with shorter lead times, creating a more constant flow of production and inventory.

Lean manufacturing can also improve manufacturing flow. Today, factories can have more consistent flow, minimizing extra parts and inventories to eliminate waste, including unnecessary removal time. Production bottlenecks and issues can be greatly eliminated once they're recognized and manufacturing activity is constantly flowing.

Rather than produce goods *expected* to be in demand, lean manufacturers strive to produce only what is *needed* to meet current demand. This can reduce a major waste—overcapacity—and in the process, free up capital, limit unnecessary component purchases, and lessen the chance of having to reduce product prices. It also gives a

manufacturer the flexibility of shifting production levels without creating excess inventories.

The result has been a marked improvement in total inventory held relative to total sales and overall production efficiency. Figure 1.2 shows the inventories to sales ratio for US manufacturers from 1967 through 2007. Outside of spikes in the early 1980s, the ratio has trended down over the period. Reduced inventory has mitigated some of the harm of falling demand while freeing up capital, space, and time.

**Six Sigma** The increased importance on product reliability and quality has also led US manufacturers to try a host of other manufacturing techniques ranging from Total Quality Management (TQM), Just-in-Time Manufacturing (JIT), Statistical Process Control (SPC), and other international manufacturing techniques. But of these systems, Motorola's Six Sigma has arguably become the most popular.

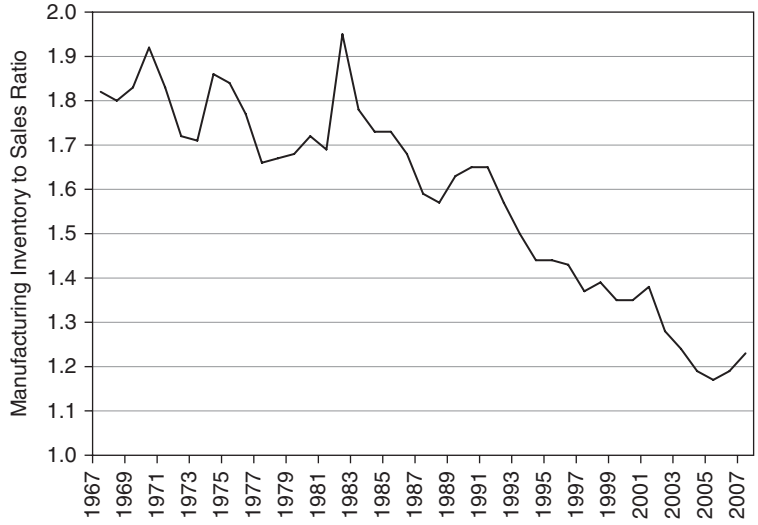



**Figure 1.2 Manufacturing Inventories to Sales Ratio**

*Source:* US Census Bureau.

### Lean Manufacturing at Work

The Defense industry learned firsthand the benefits of lean manufacturing and modern production techniques. In an effort to cut costs and boost competitiveness against growing rivals, US defense contractor Boeing began implementing modern manufacturing techniques in the late 1990s and within years had doubled production of its C-17 military plane, helping the Pentagon save hundreds of millions of dollars.

*Source:* Andrew Pollack, "Aerospace Gets Japan's Message; Without Military Largess, Industry Takes the Lean Path," *The New York Times* (March 9, 1999).

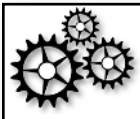
Six Sigma aims to improve product quality and enhance customer value by eliminating production defects. By defining production issues and goals, and establishing data to analyze improvements, a firm can better determine the magnitude of a problem, anticipate the effectiveness of a proposed solution, and control future process performance. A major goal for a Six Sigma firm is removing variation. The smaller the spread between expected and actual production, the greater the flexibility a firm has in producing a good. An efficient firm whose manufacturing time only varies by a day has greater flexibility in determining when to start production over a firm whose production time varies by a week. The reduction of variation allows more predictable business processes and increases the chance of accomplishing the most important goal—pleasing the customer.

Specifically, under the Six Sigma production strategy, the ultimate goal is to reduce defects (anything not meeting customer requirements) to no more than 3.4 per million opportunities (an opportunity is any chance a defect could arise). While ambitious, the program's savings has justified the effort. Between 1987 and 2005, 53 percent of Fortune 500 companies used Six Sigma and claimed an estimated $427 billion savings using the system.[8]

Six Sigma has been an important part of the success of many Industrials firms such as Honeywell, General Electric, Raytheon, Caterpillar, FedEx, 3M, Northrop Grumman, Ingersoll Rand, and Tyco International. The gains for many have been substantial. Honeywell (previously Allied Signal) initiated Six Sigma in 1992

and by 1999 was saving more than $600 million a year in costs.[9] For General Electric, the benefit reached over $2 billion by 1999.[10]

The impact of these programs goes beyond simple cost savings. Customers will often pay more money for higher quality machines with higher productivity and fewer breakdowns and maintenance requirements. For many, the marginal cost increase of a relatively pricier capital good is less than the potential opportunity costs associated with machinery breakdowns. As a result, Six Sigma firms with higher product quality may also find they can charge higher prices and have greater brand loyalty.



## Chapter Recap

This chapter introduced fundamental characteristics distinguishing the Industrials sector and how it operates. Later chapters will build on these concepts, including:

- The sector is composed of three main segments—Capital Goods, Transportation, and Commercial Services & Supplies.
- Industrials firms are typically highly diverse, economically sensitive, highly correlated to the market, and have lower-than-average profit margins.
- Mass production has given way to new production techniques, like lean manufacturing and Six Sigma, which have improved quality, efficiency, and production costs