

A Profile of Toyota's Production System

Early History

Kiichiro Toyoda founded the Toyota Motor Company in 1937.¹ The company, headquartered in Toyota City, Japan, grew to a market capitalization of \$138 billion by early 2010,² number 10 on the Fortune Global 500. It was the largest car company in the world,³ having produced 8.9 million vehicles worldwide in 2008.⁴

Before founding the company, Toyoda was denied the opportunity to head his family's mechanical loom business. Looking for alternatives, he set his sights on building cars. He attracted his cousin, Eiji Toyoda, to be his understudy and partner.⁵ They were both impressed by the industrial might of US companies during the war and wanted to see them in operation. In the early 1950s, Eiji Toyoda traveled to America in order to study Ford's immense River Rouge plant just outside Detroit, Mich. He was impressed by the size of the plant but noted many inefficiencies,⁶ including large amounts of both inventory and rework to fix production mistakes.⁷ Some good did come from this trip, but it was from a visit to a Piggly Wiggly supermarket. "[T]he delegation was inspired by how the supermarket only reordered and restocked goods once they had been bought by customers."⁸ This would become the *kanban* system, part of the inventory restocking policy that would become world-renowned.

The TPS

While growing the company in Japan between 1949 and 1975, Toyota management—primarily Taiichi Ohno, Shigeo Shingo, and Eiji Toyoda⁹—worked on improving the company's logistics and production processes, especially as they related to minimizing inventory, involving employees in the process of managing their jobs, and defining the manufacturing process so that it could handle multiple products easily.¹⁰ The result of their work became known around the world as the Toyota Production System (TPS).

TPS is "an integrated socio-technical system...that comprises [Toyota's] management philosophy and practices. The TPS organizes manufacturing and logistics for the automobile manufacturer, including interaction with suppliers and customers."¹¹ It has two foundational concepts:

Published by WDI Publishing, a division of the William Davidson Institute (WDI) at the University of Michigan.

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1. "One of these is the 'just-in-time production,' an especially important factor in an assembly industry such as automotive manufacturing. In this type of production, 'only the necessary products, at the necessary time, in the necessary quantity' are manufactured, and in addition, the stock on hand is held to a minimum.
2. "Second...is the 'respect-for-human' system where the workers are allowed to display in full their capabilities through active participation in running and improving their own workshops."¹²

The Toyota Production System

1. Reduced setup times for equipment and people.
2. Small-lot production: Usually allows for smaller inventories, smaller machines, smaller lead times, and less cost.
3. Employee involvement and empowerment.
4. Quality at the source: Correct errors as soon as possible. Any worker can stop the entire line if necessary.
5. Equipment maintenance: Machine operators are trained to also do basic maintenance since they can see the problem before anyone else.
6. Pull production: The amount of product produced is specified by the amount needed immediately in the next stage. Kanbans are usually used here.
7. Supplier involvement: Suppliers are partners, and are integral parts of the overall production process.

TPS, or "lean manufacturing" as it has become known more generally, has seven features (as shown above).¹³ Two distinctive practices, *kaizen* and *kanban*, are closely associated with TPS. *Kaizen* (Japanese for "good change") "refers to activities that continually improve all functions of a business, from manufacturing to management and from the CEO to the assembly line workers."¹⁴ This is pervasive in any TPS organization. "Everyone is encouraged to come up with small improvement suggestions on a regular basis. This is not a once a month or once a year activity. It is continuous. [In] Japanese companies, such as Toyota and Canon, a total of 60 to 70 suggestions per employee per year are written down, shared, and implemented."¹⁵

Kanban (Japanese for "visual card") is a simple and inexpensive means to coordinate manufacturing and control inventory. The following illustrates how a kanban-based system works:

"A simple example of the kanban system implementation might be a 'three-bin system' for the supplied parts (where there is no in-house manufacturing)—one bin on the factory floor (demand point), one bin in the factory store, and one bin at the suppliers' store. The bins usually have a removable card that contains the product details and other relevant information—the kanban card. When the bin on the factory floor becomes empty, i.e, there is demand for parts, the empty bin and kanban cards are returned to the factory store. The factory store then replaces the bin on the factory floor with a full bin, which also contains a kanban card. The factory store then contacts the supplier's store and returns the now empty bin with its kanban card. The supplier's inbound product bin with its kanban card is then delivered into the factory store, completing the final step to the system."¹⁶

A company can implement a kanban-based system in many different ways, depending on the process used to make the product. Companies can use something as simple as golf balls sent down a system of tubes as the basis for a kanban system.¹⁷

Toyota is remarkably open with information about the TPS and its management practices. Hundreds, if not thousands, of companies now use TPS,¹⁸ including General Motors Corporation,¹⁹ Virginia Mason Medical Center,²⁰ Porsche AG, Steelcraft, Boeing Co., Honda Motor Car Co., and Mitsubishi Heavy Industries. However, it is often the case that other companies have been less successful than Toyota at implementing this system. It can be hard to copy because it's not only a complete system of management, manufacturing, and inventory control, it's also a system of work. This system of work is not formally documented within the company. Four tacit rules underlie how Toyota employees work:

1. "All work shall be highly specified as to content, sequence, timing, and outcome.
2. "Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.
3. "The pathway for every product and service must be simple and direct.
4. "Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organization."²¹

If these rules are not implemented at a company trying to implement the TPS, then the TPS implementation can fail even if the TPS implementation is handled well.

Recent Events

In April 2002, Fujio Cho, then president of Toyota, declared that he wanted Toyota to have 15% of the global market by 2010.²² **Figure 1**²³ reflects (1) Toyota's growing market share through 2008, and (2) both VW Group and Hyundai Kia gaining significant share. Toyota did not commit to several emerging markets, such as China and Brazil, as its rivals did. This meant that, as demand for autos expanded in these markets, Toyota lagged behind its more aggressive rivals.²⁴ Even so, Toyota increased production over ten years by about 80%.²⁵ Regardless of the issues, Toyota appeared well on its way to reaching the 15% goal until the recent economic problems.

Unfortunately for Toyota, it was not only the economy that hurt the company's push for market share. The quality of its cars had noticeably fallen. In January 2010 Toyota recalled 2.3 million vehicles in North America because of mechanical failures; this was after recalling 4.2 million vehicles in November 2009 for another such failure.²⁶ No one problem seemed to have caused these quality issues; however, "[p]eople within the company believe these quality problems were caused by the strain put on the Toyota Production System by the headlong pursuit of growth."²⁷ On the other hand, it was not as if Toyota had fallen to the back of the pack in terms of quality. In the 2009 J.D. Power Initial Quality Survey²⁸ and three-year Vehicle Dependability Study,²⁹ Toyota led more segments than any other automaker.

In addition to quality, Toyota also had issues related to the design of its cars. They were generally panned as boring. *AutoWeek*, as quoted by *U.S. News*, had this to say in a review of the 2010 Toyota Camry: "This is a perfectly functional, perfectly capable, perfectly reasonable, perfectly boring automobile. ... Again, all pleasant enough and functional enough, but it's duller than an empty office cubicle."³⁰ A survey of car-buyers concluded that Toyota's quality advantage was not that significant to customers any more and that other carmakers had "products that inspired greater 'love'."³¹

All of these issues affected Toyota's bottom line. **Figure 3**³² shows Toyota's sales and net income since 2000. The loss in 2009 was Toyota's first annual loss in 59 years.³³

Figure 1
Global Light-Vehicle Market Share

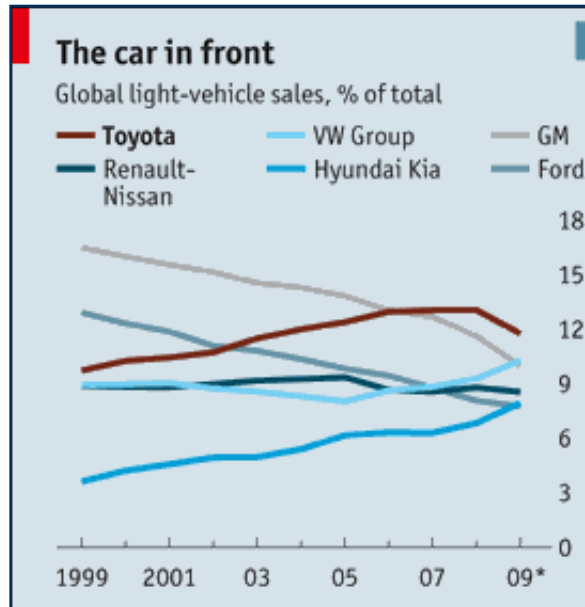


Figure 2
Toyota Production Amounts (millions)

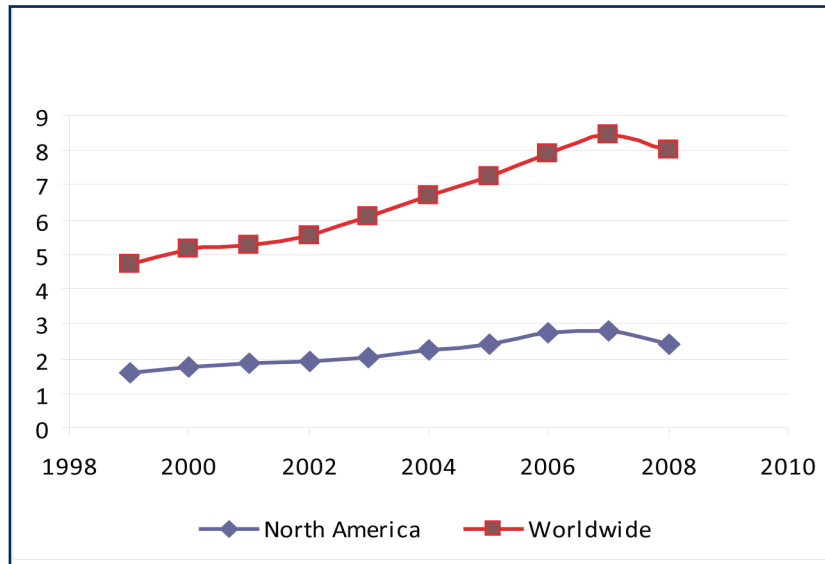
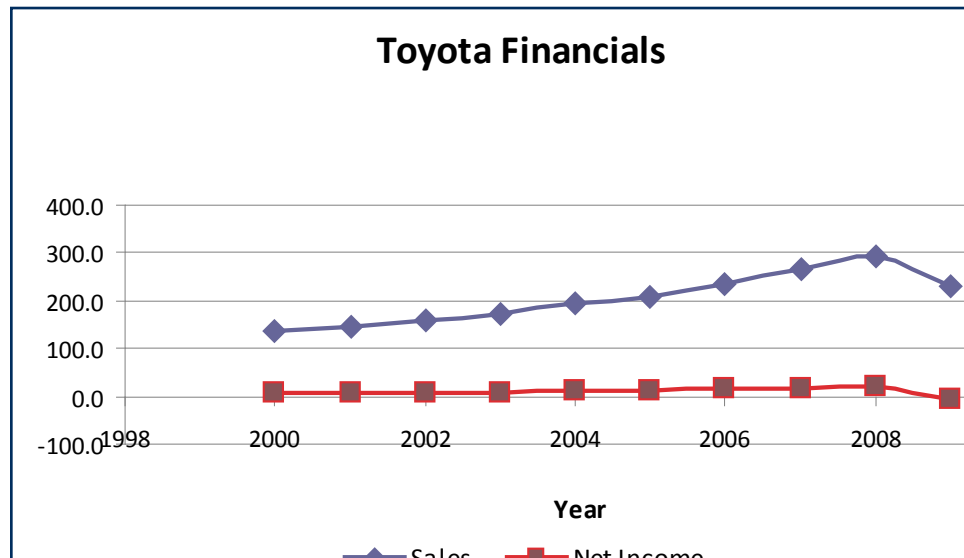


Figure 3
Toyota's Financial Result



In response to these problems, Toyota took a few significant steps. About 40% of Toyota's production was outside Japan in FY 2008,³⁴ and the company realized that it no longer had its homogeneous workforce to rely on when communicating with its employees. To address this, the company opened the Toyota Institute in Toyota City as a forum for teaching employees about the Toyota Way. Toyota planned other such institutes in Kentucky and Thailand.³⁵

In June 2009 Toyota named Akio Toyoda, grandson of the founder, as the company president. Soon after taking the helm, he said that Toyota would continue to work on "efforts to cut costs, boost regional autonomy, and develop affordable, high-quality vehicles that stir emotions. '[We] will work hard to develop cars that people fall in love with,' he said."³⁶

Endnotes

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