CHAPTER 5

Once upon a time … How Toyota became number one through customer focus

As we have already seen, focusing too much on resource efficiency has several negative effects. Focusing on flow efficiency is a way of overcoming these negative effects. A company that systematically chose to focus on flow efficiency was Toyota Motor Corporation. This choice laid the foundation for what we now call lean. This chapter will take you through the history of the company and illustrate why Toyota came to focus on flow efficiency and what effect this move had on the evolution of Toyota's production system.

The history of Toyota Motor Corporation

Kiichiro Toyoda founded Toyota Motor Corporation in 1937 with the idea of producing cars for the local Japanese market. After the Second World War, Japan needed to rebuild its industries. Some representatives of Toyota Motor Corporation travelled abroad, for instance to the United States, seeking ideas for how to set up successful car production. Two things in particular puzzled the Toyota representatives. The first was that there was so much stock and the second was that so many products needed to be repaired at the end of the production line. These two factors stood in stark contrast to the Toyota representatives' own views.

Kiichiro's father, Sakichi Toyoda, had developed some basic principles that would later prove very important for Toyota's car production. In 1896, Sakichi had launched an automated loom that would revolutionise the textile industry. The loom had a function that was unique at the time: textile production stopped automatically when a thread broke. This made it immediately possible to identify, analyse, and eliminate the problem that had arisen. The concept was later termed *jidoka*, which means, 'automation with a human touch'. Machines developed 'human intelligence' in the sense that they could identify a problem automatically. Jidoka became the core of Sakichi's philosophy and later became one of the two pillars upon which Toyota built its production system.

When Kiichiro established Toyota Motor Corporation, he took his father's philosophy from the textile industry as a starting point, by 'finding the thread' throughout the entire production process. This led to the development of *just-in-time*, the second pillar upon which Toyota's production system

was based. Just-in-time is about creating flow in production by eliminating all inventory and only producing what the customer wants. Every single product should 'flow' through the production system.

Toyota faces an economy in crisis

To understand why Toyota focused on flow efficiency, it is important to understand the problems that faced Japan immediately after the Second World War. The country's scarce resources at the time had a huge influence on how the company developed. Toyota faced what Professor Takahiro Fujimoto at the University of Tokyo calls 'economies of scarcity'. The following resources were particularly scarce:

- *Land*. Japan is a small nation in which land is a scarce resource.
- *Technology and machines*. Japan's industrial development lagged behind that of the Western world, particularly the United States.
- *Raw materials*. There was a shortage of iron and steel due to high transport costs.
- *Financial resources*. Japan was a country in crisis and remained so for many years after the war. No financial institutions could finance the expansion of the motor industry.

Faced with this lack of resources, Toyota had to develop a new way of thinking about efficiency. The answer was to focus on flow efficiency. The development of Toyota's production system came to be characterised by several important factors.

Focus on doing the right things

The first effect of the resource scarcity was that it increased the importance of 'doing the right things', which meant providing the product that the customer wanted. Because Toyota lacked capital, there was an intent focus on investing in the right technology and the right materials. The company could not risk making a bad investment and had to ensure that its product offering was what customers actually wanted. Accordingly, Toyota used build-to-order production: nothing was produced that had not been ordered.

To produce only what had been ordered, Toyota learned the importance of really knowing customers' needs. Customer needs were broken down into three questions:

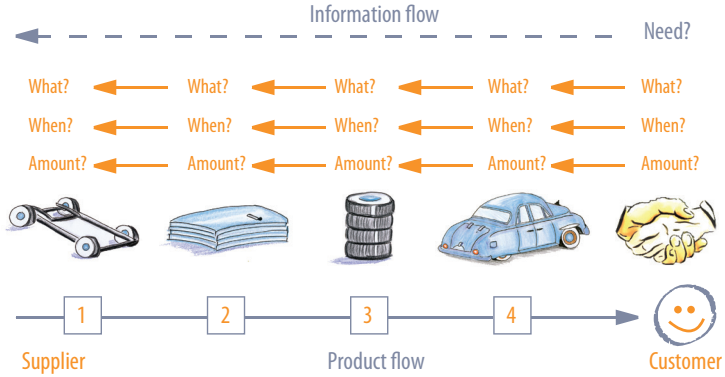
- What (which product) does the customer want?
- When does the customer want the product?
- What amount does the customer want?

The first question dealt with *what* potential car-buyers needed and desired. Establishing close customer contact enabled Toyota to understand fully what customers needed, which meant the company could develop products with the desired design and function. Once the product had been developed, Toyota chose to invest in relatively simple machines with a low level of functionality. The machines focused on producing exactly what Japanese customers wanted.

To avoid the risk of producing cars that were not sold, it also became important to know *when* and *how many* cars to produce. Toyota developed a so-called 'pull system', which meant that a car was not produced until there was an actual customer order. When a customer ordered a car, the relevant order information was sent upstream in the production flow, through the entire

production system. The information answered the questions of what, when, and how many the customer wanted.

The key to the pull system was that Toyota saw the whole production process as one flow made up of different production steps. Every step had two roles: internal supplier and internal customer (see the figure below).



The figure shows a simplified version of the production process comprising four steps, where the fourth step is closest to the customer. In step four, the customer order is taken and the need is identified: what, when, and how many. The customer's need is then broken down by asking the following questions:

- What (components/materials) do I (step four) need to satisfy the needs of the external customer?
- When do I (step four) need these (components/materials) to be able to produce and deliver the finished product to the external customer at the promised time?
- How many (components/materials) do I (step four) need to be able to produce the product?

According to the breakdown in the figure, step four becomes the internal customer of step three. Step three, in turn, becomes the internal customer of step two, which becomes the internal customer of step one. In this way, the needs of the external customer are broken down and the information concerning the order is spread upstream through the entire production process. Step one will then place an order for the requisite materials with an external supplier. Production can then begin, which is done by each step's delivering its part to the next step in the production process.

In this example, it is not just the external customer's needs that are clearly defined and communicated. All parts of the production process must define and communicate what, when, and how many units they need. In this way, value is constantly added to the product as it flows downstream through the production process. Material is pulled through the production process, from purchasing to delivery of the finished product. This means that no inventory of the product is created. Everyone knows what to do, everyone knows when it has to be done, and everyone knows the correct number of units required.

Focus on doing things right

The second effect of having scarce resources was to 'do things right' by efficiently processing the produced goods to avoid having too much capital tied up in work-in-progress or finished goods inventory. Toyota strived for a quick transformation of the product, from the purchased raw materials to the delivered and paid-for final product.

In order to achieve the pull system, Toyota mapped out the entire production process. The needs of external customers were the trigger in a long chain of value-adding activities.

With this customer-orientated view, Toyota's goal was to maximise flow through the process: a fast information flow in one direction and a fast product flow in the other. Toyota wanted to avoid having work-in-progress between the steps in the production process and strived to eliminate anything that could inhibit the flow through the process. All forms of inefficiency or waste that did not add value to the product were eliminated to improve flow.

Toyota identified seven forms of waste that inhibited the production flow and did not add any value, either to the product or the customer:

- *Waste of overproduction*. Each step in the production process should always produce only what the customer needs.
- *Waste of time on hand (waiting)*. Production should be organised to avoid all unnecessary waiting, both for machines and workers.
- *Waste in transportation*. Avoid transporting material and products, by changing the layout of the factory.
- *Waste of processing itself*. Avoid doing more work on a part or a product than the customer requires; this includes using tools that are more precise, complex, or expensive than necessary.
- *Waste of inventory*. Inventory represents capital that is tied up in the process and hides problems; it should be avoided by means such as reducing machines' set-up times (the time it takes to change a machine from doing one thing to doing another).
- *Waste of movement*. Organise the workplace so that workers do not need to move in order to do things such as gathering material or fetching tools.
- *Waste of making defective products*. Every step in the production process is responsible for producing only fault-free parts.

Toyota's focus on doing things right meant that the company avoided the risk of delivering an incorrect or faulty product to the customer. Quality assurance and control became very important. Every Toyota employee was made responsible for quality to ensure that products were right from the start. Jidoka was adapted to car production by running a cord along the ceiling over the production line, which anyone could pull to stop production when a problem occurred. Problems were seen as opportunities for development and improvement. Problems were something positive that should immediately be identified, analysed, and eliminated, never to reoccur. A mistake should never reach the customer.

The economies of scarcity created a strong focus on seeing the whole

The most important point in the Toyota story is that the lack of resources forced the company to develop a production system that focused on flow efficiency. The resource scarcity forced Toyota to focus on customers' needs. Toyota saw all steps in the production process as internal customers and suppliers, which created an understanding of the big picture. All parts of the production process were links in the same chain.

The company communicated customer orders upstream in the flow through the entire process so that the requested product could be pulled downstream. The goal was to maximise flow efficiency so that value was added to the product one hundred per cent of the throughput time, from order through to delivery and payment. The production process was flow-efficient. It was Toyota's production process that Western observers termed 'lean'.