

Toyota Production System

and what it means for business





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The Toyota Way

The Toyota Production System is an expression of The Toyota Way.

The five core values of The Toyota Way are shared and practised by Toyota employees at every level in their daily work and relations with others. This is how Toyota is able to deliver sustainable customer satisfaction.

Continuous Improvement

Respect for People



CHALLENGE

"To maintain a long-term vision and meet all challenges with the courage and creativity needed to realise that vision."



RESPECT

"Toyota respects others, makes every effort to understand others, accepts responsibility and does its best to build mutual trust."



KAIZEN

"Continuous improvement. As no process can ever be declared perfect, there is always room for improvement."



TEAMWORK

"Toyota stimulates personal and professional growth, shares opportunities for development and maximises individual and team performance."

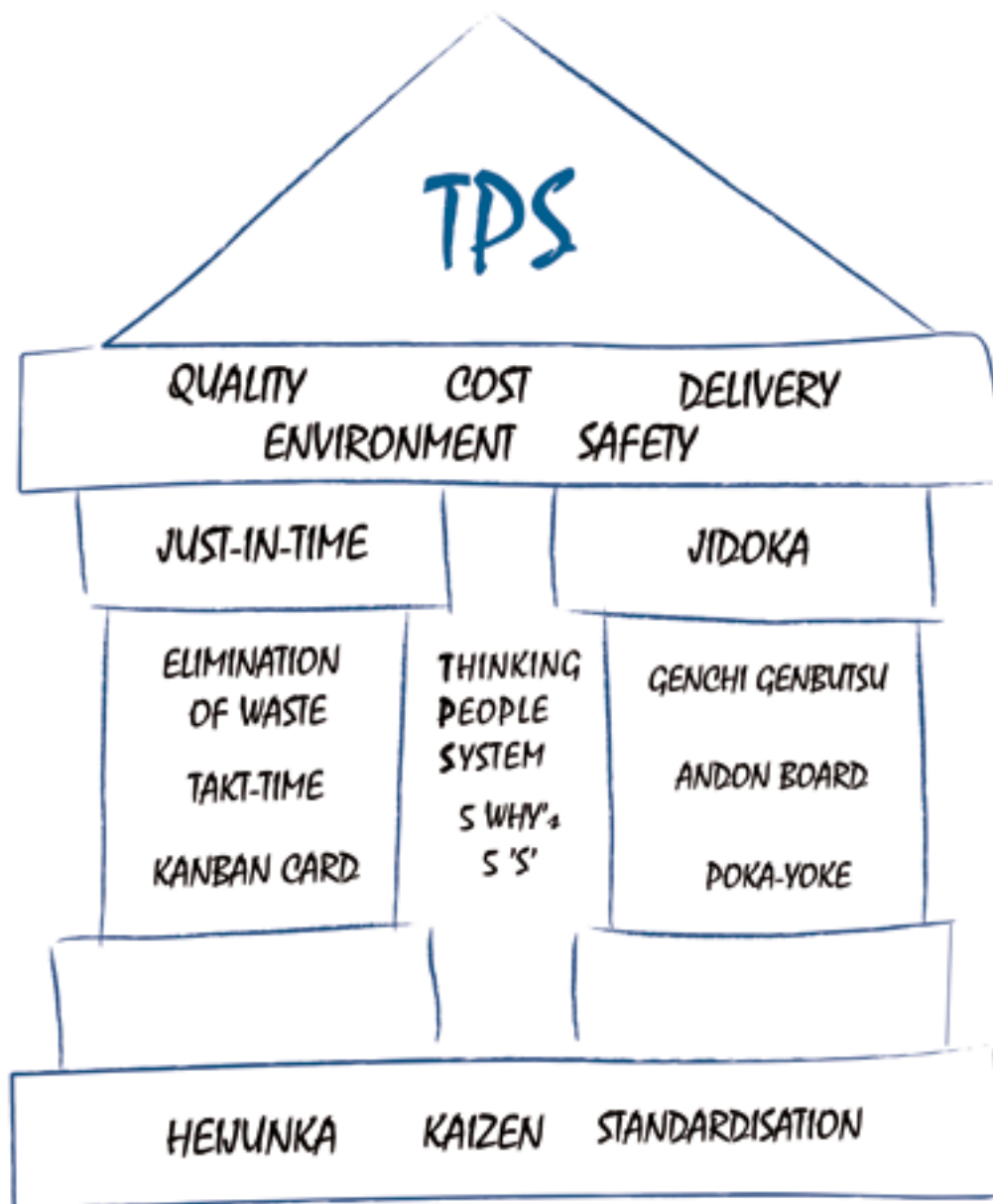


GENCHI GENBUTSU

"Going to the source to find the facts to make correct decisions, build consensus and achieve goals."

Toyota Production System Definition

The Toyota Production System empowers team members to optimise quality by constantly improving processes and eliminating unnecessary waste in natural, human and corporate resources. TPS influences every aspect of Toyota's organisation and includes a common set of values, knowledge and procedures. It entrusts employees with well-defined responsibilities in each production step and encourages every team member to strive for overall improvement.



TPS History

Sakichi Toyoda founded the Toyoda Spinning and Weaving Company in 1918. He developed the first steam-powered loom that could detect a broken thread and stop itself automatically. This innovation led to the wider principle of *jidoka*, or automation with a human touch – later to become one of the two pillars of TPS.

Some years later in 1937, Sakichi's son Kiichiro founded the Toyota Motor Corporation. Kiichiro took his father's concept of *jidoka* and developed his own complementary philosophy – just-in-time – which would become the other pillar of TPS. He visited Ford's mass production plants in Michigan to study their use of assembly lines.



Taiichi Ohno

After World War II, the need to be able to manufacture vehicles efficiently was greater than ever. Kiichiro's younger cousin, Eiji – later to become president and chairman of Toyota Motor Manufacturing – tasked one of Toyota's young engineers, Taiichi Ohno, with the job of increasing productivity.



Ohno's achievement was to marry the just-in-time concept with the principle of jidoka. In 1953, Ohno also visited the USA to study Ford's production methods, but he was much more inspired by American supermarkets. He noticed how customers would take from the shelves only what they needed at that time, and how those stocks were quickly and precisely replenished. Ohno had the insight that a supermarket was essentially a well-run warehouse, with 'goods-in' closely matching 'goods-out', and no space for long-term storage. On his return to Japan, Ohno developed the same idea into the kanban concept. Ohno also learnt from the American pioneer of quality control, Dr. W. Edwards Deming. The aim of Deming's method was to improve quality at every stage of a business, from product design, through manufacturing, to aftersales service. Deming taught that each stage in a manufacturing process should be thought of as the previous stage's customer, which fitted very well with Kiichiro's just-in-time philosophy, and the principle of kaizen. Today, Ohno is considered the true architect of TPS, having developed it into a practical method and, crucially, having made it work on the shop floor.



The Toyota Production System as it is today has been developed and refined over several decades. However, the benefits that can be derived from the techniques and management processes at its heart can equally be applied to other types of business as we progress further into the 21st century.

TPS has been implemented throughout Toyota, giving tangible benefits in the quality and reliability of Toyota's products and services.

The Toyota Production System has established a global reputation as a leading business philosophy that delivers measurable benefits in terms of efficiency and quality in manufacturing. Many manufacturers have aimed to adopt TPS principles, and academics and management consultants worldwide have developed strategies and business improvement programmes based on TPS.

Just-in-Time – smooth, continuous, optimised workflows

The Toyota Production System fulfils customer demand efficiently and promptly by linking all production activity to real marketplace demand. Just-in-time production relies on finely tuned processes in the assembly sequence using only the quantities of items required, only when they are needed.

Imagine a process designed to produce six different types of product, where the total weekly demand for the range of products varies up and down by 25%, and the daily mix of product types is continuously changing.

A planning challenge, but also a typical scenario in many types of business in which the process (manufacturing or otherwise) has to continuously respond to demand. TPS has responded to this reality of life by developing an approach that can meet the challenge in an efficient, cost-effective way.

HEIJUNKA – LEVELLING THE FLOW

The term heijunka describes the foundation of the TPS approach to just-in-time processes – ones in which inventory costs are minimised by having the parts required arrive at their point of use only as they are needed.

Unevenness in workload is known as mura. Heijunka is the elimination of mura by levelling the volumes to allow a smooth, continuous and efficient flow. It is the opposite of mass-production series, in which high volumes of a single product are produced, often significantly unrelated to demand.



With heijunka a process is designed to switch products easily, producing what is needed when it is needed, and relying on production. Any variations in volumes are accommodated by establishing a level-average demand rate.

The practice of heijunka also eliminates muri – overburden or strenuous work that can also lead to safety and quality problems. Both mura and muri are thought of as types of muda, or waste, and should be eliminated.



Push-system



TPS pull-system

ELIMINATION OF WASTE – MUDA

Waste – defined as anything that does not add value – includes things that might not normally be considered as waste such as overproduction, holding too great an inventory, the need for rework, and unnecessary movement, processing and waiting.

TAKT TIME – THE HEARTBEAT OF PRODUCTION

Time planning is central to TPS. Takt is the rate of customer demand – essentially, what the market is requiring be produced. Takt time is the term given to a work-cycle that fulfils each customer's demand. The key is that the work-cycle should be synchronised with demand to avoid under- or overproduction. Takt time determines the flow-rate and allows the calculation of how much work can be accomplished. Optimisation of takt time reduces waste and inefficiency by eliminating the risk of time delays, or excess production, throughout the process.

Takt time and heijunka mean having the ability to be flexible according to demand and ensuring the process is smooth, continuous and measurable.

KANBAN CARD

In order to have flexibility and efficient, smooth workflows, it is necessary to have the right things at the right place at the right time. In TPS it means having just the right components to build the product.

The kanban card is the simple, highly-visible device that TPS uses to call-up components as they are required. This means only a minimum stock of components is held in the assembly area. Before stocks need replenishing, a kanban card instruction from the operator ensures a just-in-time delivery. The process is based on a 'pull' principle – with items called only as they are required, as opposed to a 'push' principle that may not take account of actual need.

... and what it means for business

A smooth, continuous and optimised workflow, with carefully planned and measured work-cycle times and on-demand movement of goods, reduces the cost of wasted time, materials and capacity. Team members can concentrate on their tasks without interruption, which leads to better quality, timely delivery, and peace-of-mind for Toyota's customers.



Kanban card

Jidoka – building in quality

When it comes to quality, there is no room for compromise in the Toyota Production System. The TPS principle of jidoka builds quality checks into each step of the production process. By ensuring that all processes are visible, jidoka helps ensure that abnormalities are made visible and addressed immediately.



Andon board

Jidoka translates as “autonomation” and can be described as “automation with a human touch”. Quality is monitored throughout, with each team member being responsible for performing quality checks before delivering the goods-in-process to the next point in the production line. If a defect or error is identified it is addressed immediately – even if this means temporarily stopping production.

GENCHI GENBUTSU – GOING TO THE SOURCE

Improvements are often made as a result of discovering problems. Therefore, problems need to be properly understood through genchi genbutsu, which means ‘going to the source’ of the problem and assessing it for yourself rather than relying on information supplied by others, in order to gain a complete and accurate understanding.

ANDON BOARD

The andon board is a simple but highly-visible electronic sign displaying the status of production lines. It notifies management immediately if a worker has identified a fault, precisely identifying its location. Workers take responsibility for production quality, with the power to stop the production line as required. The production line will not be restarted until the reason for the fault has been resolved.

STANDARDISATION

Another key element for quality assurance is a focus on standardisation. Developing and relying on standardised work tasks not only ensures consistently high levels of quality, but also maintains production pace and provides a benchmark for implementing continuous improvement.



MISTAKE-PROOFING AND LABELLING

Devices that make it difficult or impossible for a worker to make typical errors at his or her workstation are a common sight on Toyota production lines. Known as poka-yoke, this principle is a simple but creative and reliable way to reduce errors and maintain quality. Furthermore, all commonly used items are clearly labelled so that they can be found and used by everyone with the same ease.



... and what it means for business

Maintaining quality throughout the production process has helped to build its reputation for quality. TPS empowers each Toyota team member to check for quality, to point out and fix any inconsistencies or defects, and to prevent inferior quality products from being passed on to the customer. And the TPS advantage does not end when the customer takes delivery. Toyota's high-quality products mean customers benefit from better productivity, less downtime and a greater return on their investment.

Kaizen – improvement is a continuous process



In many organisations the process of change can be challenging. At Toyota change is a way of life, thanks to the company's fundamental philosophy of continuous improvement known as kaizen. Kaizen means that all team members throughout the organisation are continuously looking for ways to improve operations, and people at all levels in the company support this process of improvement.

Kaizen also requires clarity in terms of what is to be achieved – setting clear objectives and targets for improvement. It is very much a matter of positive attitude, with the focus on what should be done rather than what can be done.

TPS – THE 'THINKING PEOPLE SYSTEM'

In TPS, team members are invited to think about the process and make timely decisions in order to keep it running smoothly, rather than merely operating like machines. This involvement creates responsibility for the success of the process, increasing both morale and quality. This is also essential for the success of kaizen. Every morning an asa-ichi meeting is held to discuss quality deviations and eliminate their causes.

Kaizen is not just based on improvements only being developed and implemented by experts or management. Instead, it involves everybody, relying on the extensive knowledge, skills and experience of the people working directly in the process. For example, at Toyota Material Handling Europe's production sites about 3,000 proposals for improvements are made in a typical year.

TESTING THE LOGIC – '5 WHYS?'

Kaizen requires the logic and benefit of all improvements to be carefully evaluated before implementation. The concept of '5 whys?' is employed to achieve this. Every planned improvement needs to be tested by questioning 'why?' at five levels to ensure that the logic and value of the improvement is clear. This reduces the risk of making changes without sufficient justification.

A CULTURE OF CONTINUOUS IMPROVEMENT – ‘5S’

The Toyota Production System goes beyond principles that are purely related to production processes. It also extends to the whole organisation – sales and marketing, administration, product development and management.

Every employee, regardless of position, receives the same treatment. Toyota takes care to nurture a sense of pride and efficiency in the workplace. This is supported by ‘5S’:

- **SEIRI** – Sifting
- **SEITON** – Sorting
- **SEISO** – Sweeping and cleaning
- **SEIKETSU** – Spic-and-span
- **SHITSUKE** – Sustain

These principles ensure that every team member is actively involved in keeping processes as effective and efficient as possible.

... and what it means for business

Kaizen is one of the foundations of the Toyota Production System – not only a process but also an attitude. Toyota’s constant striving for improvement ensures that its customers will always enjoy excellent products that use the most advanced and reliable technologies. Toyota also works with its customers to achieve improvements in its services to them, to optimise their investment in Toyota products.



The Environment – Toyota's commitment

Throughout its wide range of activities Toyota always considers the environment as part of its daily operations. Its policy is to analyse the effects of every stage in its products' lives: development, manufacturing, operation, and recycling.

TPS philosophy also includes the 3Rs – reduce, reuse, recycle. With respect to manufacturing, the reduction of waste (muda) is one of the key principles and, therefore, benefits of TPS. Reduction of waste in processing, inventory, conveyance, overproduction, motion, waiting, and manufacturing defects delivers direct environmental benefits.

At a lower level, waste sorting has long been practised at Toyota Material Handling Europe's manufacturing plants. TMHE's manufacturing sites have all achieved ISO 14001 certification.



... and what it means for business

Toyota has a policy in place to reduce CO₂ emissions, use resources more efficiently, and reduce environmental risk factors. Considering the environment at all four stages of a product's life is the responsible approach and leads to real environmental benefits for Toyota's customers with respect to their responsibilities towards environmental issues.



TPS is concerned with **Health and Safety**

Safety is always the focus in all of the complementary philosophies and practices that make up TPS. Not just a priority but a necessity. The tireless effort to do things in the best possible way could never progress if safety were to be compromised by apparent efficiencies. When processes are improved to increase quality, safety is also improved.

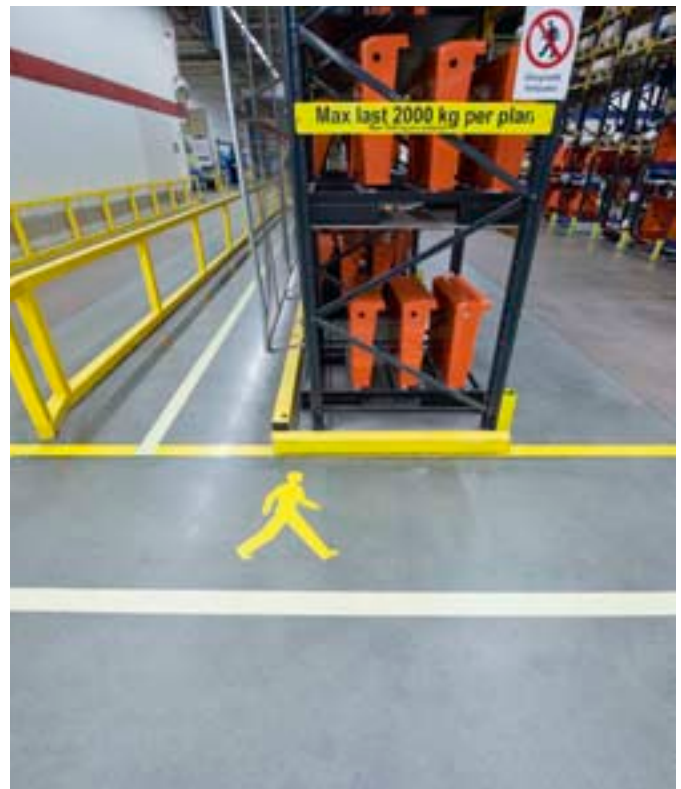
Manufacturing sites have achieved OHSAS 18001 certification – the international standard for occupational health and safety management. They work to anticipate and reduce potential risks factors efficiently and strive to prevent workplace accidents. The maintenance or improvement of health, safety and ergonomics are essential when processes are revised or new equipment is considered.

This is not new, however. TPS has always used automation and process improvement to protect workers. The flexibility required of team members in TPS helps them to be alert and better focused as their tasks change. In all cases, workstations are designed to be easy-to-use, making work quick, comfortable and efficient.

As with kaizen, all team members, from management to the shop floor, participate in safety training and in making suggestions for improvements in safety across all processes.

... and what it means for business

Toyota maintains health and safety for its team members so they can concentrate on their jobs delivering the best quality products and be more efficient.



What TPS Means for your Business

TPS is an essential part of what makes Toyota different and makes Toyota's products a profitable investment for its customers' businesses. Toyota's customers know what to expect when they buy from Toyota – a business partner with the strength and flexibility to meet the needs of a changing market.

- Quality inherent in Toyota's products, thanks to the company's constant striving for improvement, has direct benefits for their customers...
- Costs are kept to a minimum thanks to a good return on investment based on the productivity and reliability of Toyota's products...
- Delivery is on time, and to the expected standard, allowing Toyota's customers to plan and maintain their operations successfully...
- Environmental concerns are shared by Toyota and its customers, from manufacturing through to recycling at end-of-life. Choosing Toyota products is a good choice for the environment...
- Safety is Toyota's constant concern – both for its employees and for those of its customers. Toyota's processes and products have safety built-in, with clear benefits for productivity and cost



The Toyota Production System – a proven world-class system – benefiting all of Toyota's products – and all of its clients.

TPS – A World-Class System



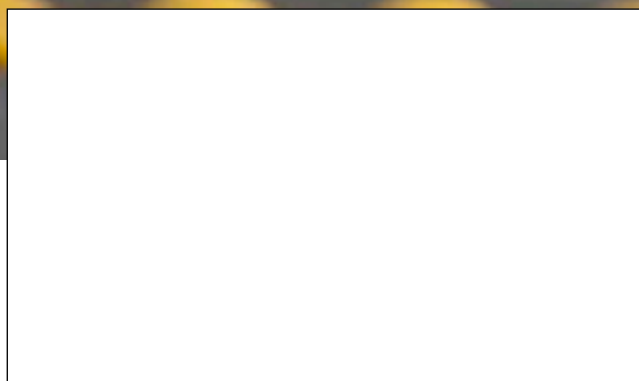
Glossary

- **Andon Board** – The facility for workers to signal problems to supervisors for immediate remedy, stopping the production process if necessary. Workstations along the production line can activate a warning on an illuminated central display board, which constantly displays productivity levels.
- **Asa-ichi Meeting** – A meeting held every morning in Toyota plants to discuss quality deviations and eliminate their causes. An essential part of the practice of kaizen.
- **Genchi Genbutsu** – Going to the source to find the facts to make correct decisions, build consensus and achieve goals.
- **Heijunka** – Levelling the production schedule in both volume and variety. A precondition for just-in-time and elimination of mura, muri and muda.
- **Jidoka** – Making problems visible so that they can be immediately addressed.
- **Just-in-Time** – Making only what is needed, when it is needed, and in the amount needed, delivered just as they are needed (a continuous ‘pulling’ flow of standardised operations).
- **Kaizen** – Continuous improvement. As no process can ever be declared perfect, there is always room for improvement.
- **Kanban Card** – An instruction in the process that parts need to be replenished for production to continue uninterrupted.
- **Muda** – Waste in all its forms (things that do not add value to the final product): overproduction, surplus inventory, rework/correction, motion, processing, waiting and conveyance.
- **Mura** – Unevenness (in workload). Heijunka eliminates mura, muri and muda.
- **Muri** – Overburden or strenuous work, leading to safety and quality problems – more waste.
- **Poka-Yoke** – Mistake-proofing – devices that make it difficult or impossible for a worker to make common errors at his or her workstation. A simple but creative and reliable way to reduce errors and maintain quality.
- **Pull-System** – Items called only as they are needed, as opposed to a ‘push-system’ that may not take account of actual need.
- **Takt Time** – The rate of customer demand – producing only what the market requires, and thereby achieving the optimum duration of the work-cycle that fulfils each customer’s demand.





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