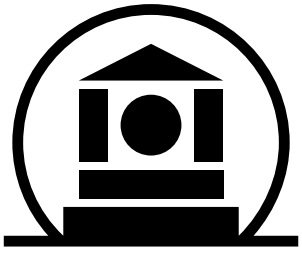
TRUE LEAN

Your guide to the fundamentals connecting purpose, process and people

RUDY GORT



Contents

Success is based on leadership, incorporating quality, valuing a long-term mission and learning by doing.

1 The origins and evolution of lean

In the nineteen-seventies, the world experienced an oil crisis[2]. Japan was one of the worst affected countries. During that time, however, Toyota appeared to have remarkably few problems. How was the company able to recover so quickly? This phenomenon attracted the attention of the Japanese government, researchers and the rest of the world. An initial analysis highlighted striking ways of thinking and working, but what most people saw and copied were merely the tools. However, tools and methods are not a secret weapon for transforming a company. Toyota's continued success stems from a more deep-rooted business philosophy. They call it the Toyota Way, which others have renamed 'lean'.

In order to understand this philosophy, we must go back to its origins. Section 1.1 tells you about the organisational principles behind the system and takes a look at the founding fathers and other key players who influenced the philosophy. Section 1.2 explains how lean became more widely known outside of the Toyota organisation. The broader perspective, that of the lean management system and its three value streams, is described in section 1.3. Finally, section 1.4 returns to the core: the culture and the leading principles.

2 Middle Eastern countries raised the oil price by 70% and reduced oil production month-on-month by 5%, causing the price of a barrel of oil to soar.

Around 1930, Sakichi's son started to build cars using the money he earned from the patent rights, and in 1937, he founded the Toyota Motor Corporation.

Long-term mission

Sakichi could have retired if he had wanted to, living off the money he earned from exploiting his patent, but that had never been the intention of his invention. He wanted to relieve his mother and the entire community of the heavy labour involved in weaving. His purpose was to make a contribution to society.

Sakichi handed this challenge of bettering society over to his son, Kiichiro Toyoda (1894-1952). In 1950 this manifested itself in the way Kiichiro took responsibility for something nobody could do anything about: crippling post-war inflation. To protect the company against bankruptcy, everybody was asked to accept a 10% reduction in their salary. When that was still not enough, he was forced to ask 1,600 employees to voluntarily stop working for the company, which resulted in strikes. He gave the right example by stopping, which resulted in others doing the same and this ultimately saved the company from bankruptcy (Toyota 2012f). Until today, thinking beyond personal interest is part of Toyota's philosophy, to think of the organisation's long-term interest and to take personal responsibility for problems. But before Kiichiro stepped down, he had done a great deal for Toyota.

Learning by doing

Sakichi saw that the world was changing. Cars were going to be the technology of tomorrow and looms the technology of yesterday. Therefore, Kiichiro was given the task of expanding the car business. He studied to be a mechanical engineer, not only at university, but also by doing things himself. The knowledge of making engines served Kiichiro well. He not only continued to build on his father's philosophy and approach to management, he also added some innovations of his own. He continued to develop his talents and in 1927, he introduced a production method based on a conveyor belt that resembled the assembly line of a textile factory (Toyota 2012e). His ideas were further influenced by an educational trip to a Ford factory in Michigan to see the car industry and by American supermarkets that restocked products on the shelves only after they had been sold (Toyota 2012g).

His vision formed the basis for the *just-in-time* concept (JIT), the second pillar of Toyota's production system, which includes the *kanban* system, modelled on the supermarket approach. According to Jeffrey Liker (2004), author of *The Toyota Way*, it was Kiichiro's leadership style, in particular, that left a big mark on Toyota, as his father's leadership style had done. In 1935, Eiji Toyoda (1913-2013) was given the task by his cousin Kiichiro of overseeing the construction of a new factory near Nagoya (this location is now called Toyota City). At the same time, he searched for reliable suppliers of car parts (Toyota 2012b).This is another example of learning by doing. It was unthinkable to leave the company in the

hands of people who had never gotten their hands dirty and who did not love the car industry. These core company values formed the development and selection of every generation of leaders. Eventually, Eiji became Chairman of the Toyota Motor Corporation.

1.1.2 Sources of inspiration and their context

Toyota's founders were inspired by Henry Ford and William Edwards Deming in particular. The context of the country in which the Toyota factory was located was part of the reason Toyota was forced to take a radically different direction than American industrialists.

Ford's flow principle

The step from manual work to mass production was made possible thanks to precision machine tools and, consequently, the manufacture of exchangeable parts (standardisation). But it was Henry Ford who turned the production world upside down in 1913 with the development of a continuous assembly line for his Model T and in doing so he showed the power of flow. To achieve this, the work had to be organised in a logical sequence and materials and subassemblies had to be fed to the main assembly line. Ford did not just build a factory, he built a complete production system. The output from one group became the input for another. The production system was like a giant river fed by the tributaries that constantly flowed into it.

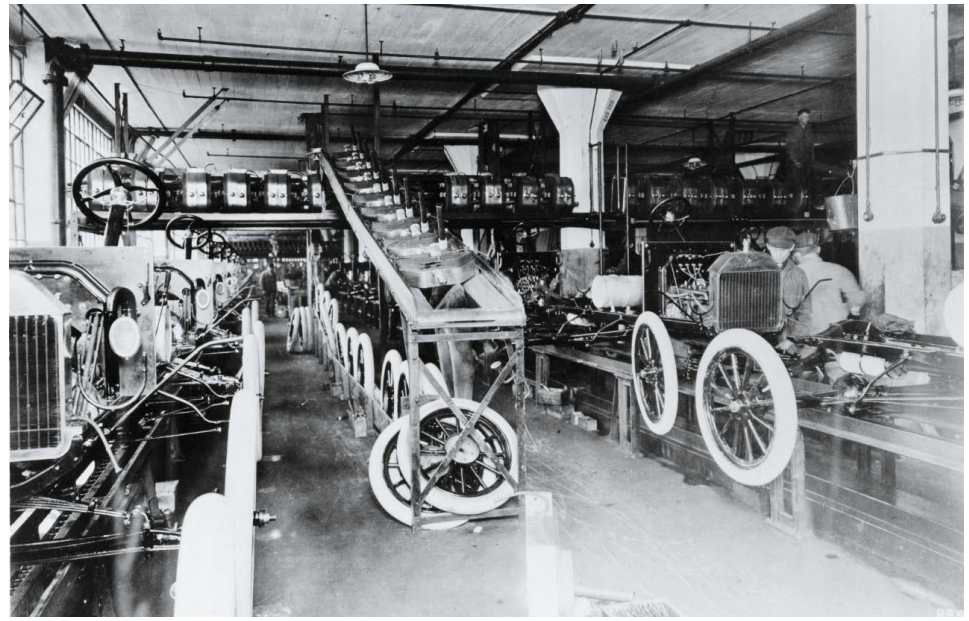


Photo 1-1. Assembly line flow at Ford, 1914 (credit: www.fordmediacenter.nl).

Operational excellence

According to Liker (2004), operational excellence is Toyota's strategic weapon. Operational excellence (best total cost) is one of the three disciplines of market leaders, alongside product leadership (best product) and customer intimacy (best total solution). The market leaders go beyond operational competence, product differentiation and customer responsive, respectively (Treacy & Wiersema 1995).

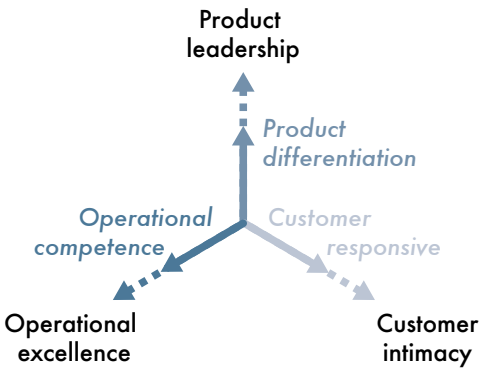


Figure 1-6. Conformity versus leadership with regard to customer value (Treacy & Wiersema 1995, p.45).

Treacy and Wiersema recommend focussing on one discipline of leadership at a time, to avoid not achieving any of them. It is possible, though, to go from one type of market leadership to another. Therefore, excel in one type of leadership first before taking on another one, just as Toyota has done with its luxury brand Lexus, which is an expression of product leadership.

Scrum

Scrum is a framework that was created at the start of the nineteen-nineties in response to an investigation. The investigation recognised a rugby-type approach (scrumming), with multidisciplinary teams quickly and flexibly developing new products (Takeuchi & Nonaka 1986). Scrum is mainly used to put into practice the main points in the Agile Manifesto. "Scrum is based on a simple idea: if you start a new project, regularly scrutinise it, make sure everything is going in the right direction and be sure that what you are doing is what people want. Also, ask yourself whether there are ways to improve your work method, to work more quickly and better and also what is stopping you at this moment in time from doing just that" (Sutherland 2015, p.16). Just like you would with lean. This is not surprising, because many ideas on which scrum is based originate from Taiichi Ohno's Toyota Production System according to Sutherland. See video tip below.

AgileCamp 2017 Dallas: "Scrum the Toyota Way"
Nigel Thurlow, former colleague of Sutherland, explains the origin of scrum.

Six Sigma

The Six Sigma strategy, based on statistical process control (SPC) techniques, was developed in 1986 to support Motorola's search to reduce faults by minimising variability in its processes (Assen, Notermans & Wigman 2007). The name Six Sigma (6σ) refers to the aim of having no more than 3.4 faults per million cases. Six Sigma focuses on improving value-adding processes, while lean focuses on the entire value stream and the flow between value-adding processes. It is, therefore, logical that lean and Six Sigma are regularly combined (Lean Six Sigma).

However, Six Sigma is notoriously known for training large groups of green and black belts, something supporters of true lean do not care for. It costs a lot of time and money, and besides, training courses and a nice certificate do not say much about the culture of improvement. Lean is about taking a certain approach every day and experimenting, and aiming to succeed using simple and inexpensive resources.

Total Productive Maintenance (TPM)

Lean requires a high degree of stability so that the flow is not repeatedly interrupted. Machines must, therefore, be maintained continuously. This preventative maintenance is called Total Productive Maintenance (TPM). The principle of TPM started at the early nineteen-seventies at Nippon Denso, a member of the Toyota Group (Narusawa & Shook 2009). With TPM, everybody who uses a piece of machinery is taught how to clean it, inspect it and maintain it (Ohno 1988). Some manufacturers, including Heineken, use TPM as their most important lean tool.

Toyota Production System (TPS)

According to Ohno (1988), the Toyota Production System (TPS) is not just a production system; its strength is that it is a management system. TPS forms the basis of a large part of the lean production movement that has dominated, together with Six Sigma, the trends in the production world for the last thirty years, which probably explains the confusion. Later, you will learn that TPS is only a small part of the entire lean management system.

Total Quality Management (TQM)

Total Quality Management (TQM) is also part of the basis of the lean way of thinking. The TQM concept has been developed based on the teachings of well-known quality gurus, such as Deming, Crosby, Juran and Ishikawa. In short, TQM is a management philosophy for long-term success by means of a continuous process of improvement and focus on customer satisfaction. With TQM, all the members of an organisation participate in improving the processes, products and services, as well as the culture in which they work. That is why the word 'total' is included (Buchanan & Huczynski 2004; Liker 2004).

1.3 Lean is more!

"The tools and techniques that people in the West like to pick out are often only the easy, short-term ones." – Peter Hines

Lean is mainly regarded as a production philosophy. That has to do with its origins; in the eyes of many, Toyota is no more than a production company. Also, after lean became better known, it first gained fame in the production world. This may have something to do with the context, the tangibility that people need to copy something. Because that is what often happens: people merely copy superficial tools related to lean. Later, you will learn that lean is about more than just tools. In this section, I would first like to show you how Toyota sees itself: more than just processes and production, but a total management system.

1.3.1 More than just processes

People often say that lean is nothing special. "We are already doing it," they claim. Those companies should ask themselves whether what they are doing is based on a long-term view. Is the focus on satisfaction, not only the customer's, but that of everybody involved? Is everything taken into consideration to properly define value? Is everybody involved in time, so that everything possible is done to allow the value to flow all the way along the value stream without any interruptions?

And is this done every day just a little bit better than the preceding day? That is an extremely creative process, but also very unnatural, as you will find out later.

Many people initially believe that lean techniques are mainly about reducing costs. That is not quite true, though. Lean is, in fact, the only obtainable and sustainable way of reducing costs, while at the same time, shortening lead times, improving quality and providing customers with exactly what they want when they need it (Womack & Jones 2003). The problem is that most companies get stuck at the process level of Liker's 4P model.

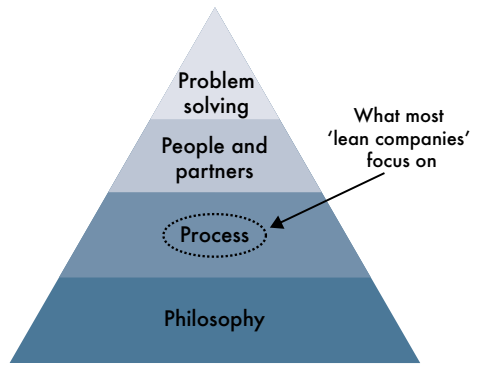
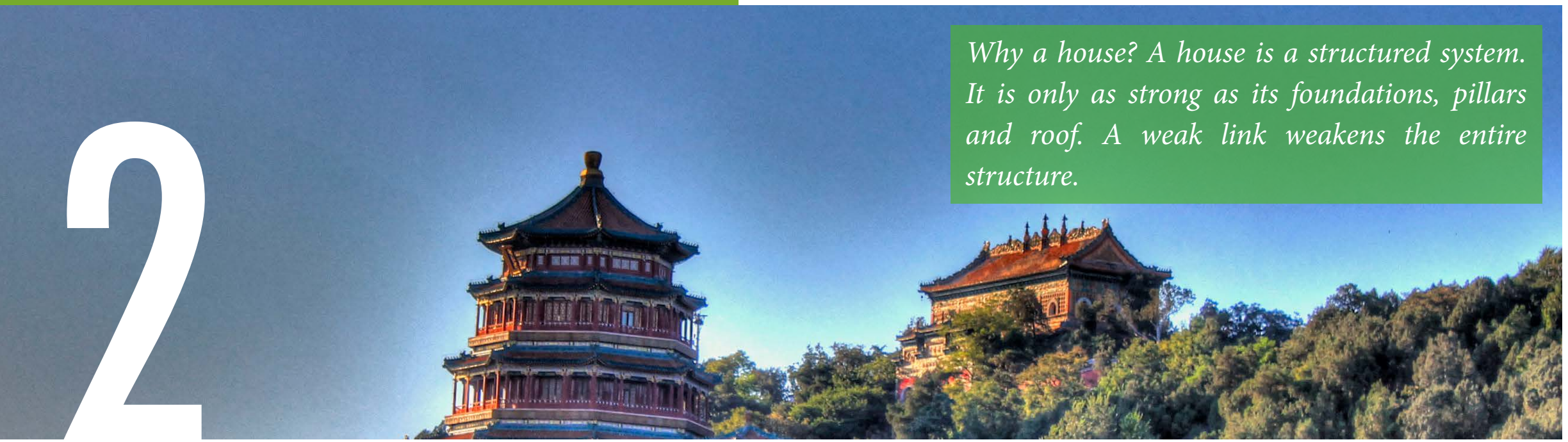


Figure 1-7. 4P model of *The Toyota Way* (Liker 2004, p.13).

Since most organisations focus on the processes, lean ends up being merely a cost reduction tool. However, they are missing something vital: the focus on customer value (purpose) and on making the lives of co-workers (people and partners) in the process more pleasant. It is the interactions that make it possible to improve processes that are important. The tools and techniques that people in the West like to pick out are often only the easy, short-term ones. The long-term approach to problem solving and the necessary interaction between the different fields are lacking, which explains the absence of real progress (Hines 1994; 2009). Without adopting the other three Ps, you just plod along, because the improvements are not made from the heart, which means that they cannot be maintained throughout the entire company. The performance, therefore, falls behind that of companies that adopt a genuine lean culture.

1.3.2 More than just production

It is not surprising that lean is associated with production. It comes from the production sector, was given the name 'lean production' and for many years, it has been the most commonly used strategic weapon in that sector. As a result, we have been blinded to what it actually stands for: something more than production alone. Morgan and Liker (2006) believe that, nowadays, it is much more about excellent product development, which is an entirely different context.



2

Why a house? A house is a structured system. It is only as strong as its foundations, pillars and roof. A weak link weakens the entire structure.

The five main elements of the house of lean

The level of performance that can be achieved by following the lean philosophy is very appealing to companies. Many readers will have wondered how Toyota does it. The company's operational excellence is partly based on tools and quality improvements, which has made them famous in the production world. However, tools and methods are not secret weapons for transforming a company. Toyota's continued success stems from the coherence between all the lean principles and the perseverance in working on them every day.

The house metaphor provides a good visualisation for these principles and their structural dependence. Everybody understands that a house must be built on firm ground; a base formed by shared values for a long-term mission, i.e. a purpose (section 2.1). People usually build with a purpose, to have a proverbial roof over their head, which is about added value for the customer and, in a broader sense, general customer satisfaction (section 2.2). The foundations provide a stabilising base and support a gradual flow of value (section 2.3). The walls, or 'pillars' in this metaphor, support the roof and provide built-in quality and timeliness (section 2.4). But what is a house without people living in it? They are the core of the house. They help stop natural decline and keep the house alive by their lean behaviour (section 2.5). Together, these five main elements form a coherent system: the house of lean.

visualisation is to communicate the shared organisational objectives to the employees at every level of the organisation" (p. 166). Visual management ensures alignment when used correctly.

A view on objectives for the entire organisation

Everybody who has visited Scania Trucks Production in Zwolle, the Netherlands, will have seen that the company holds its staff meetings standing on the shop floor, surrounded by up-to-date performance indicators and other highlights. The various levels of the organisation, including management, hold meetings one after the other. This way, any important issues reach senior management within two hours.

Toyota uses *hoshin kanri* to align the various disciplines, from design to engineering, and ensure they remain focused on their technical expertise. In Japanese, 'hoshin' means compass needle or direction and 'kanri' means management or control. The term 'hoshin kanri' refers to how to get everybody to move in the same direction (alignment) in order to achieve the objective. The commonly used term for this is 'strategy deployment'.[11] This method is used to split higher goals into goals that are understandable on the shop floor (Dennis 2007). It works as a transparent communication process when aligning people and resources for the benefit of improvement tasks.

Making deviations visible

Another important aspect of visual management is that it visualises deviations (Womack & Jones 2003; Liker 2004). An untidy workplace prevents this, because you can no longer see the wood for the trees. It is then no longer possible to see what is normal and what is not, and consequently, problems remain invisible until they become serious. By then, they are no longer just problems, but crises that you have to fight. Managers then have to rush from one problem to the next, which is what we call crisis management.

What you want is an environment in which unwanted tendencies are brought to light and dealt with at an early stage. Such an environment can be created using concise, powerful reports (called 'A3s', after the paper size). Another tool is a status board, which indicates what important information is needed when. If the delivery of this information is delayed, it is noticed immediately. Not after a couple of weeks or months, but within a day or two. A status board or Project Tracking Board used correctly results in a culture of permanent improvement (Morgan & Liker 2006).

11 Hoshin kanri is not only referred to as strategy deployment, but also as *hoshin management, policy management* and *policy deployment* (Dennis 2007, p.x).

In my experience, providing insight into potentially difficult project issues has enormous impact, because they can be dealt with sooner.

Photo 2-1. Making project issues visible and dealing with them in a controlled way also creates stronger relations within teams (credit: Logiqs).

The objective is not only to make things visible. Visualisation must support employees in understanding the situation and in contributing to improvements. Therefore, ensure there is an opportunity to add an explanation to the information, detailing why something did not go to plan. Those explanations then provide input for the team to implement improvements in order to structurally eliminate flow breakers.

Workplace organisation with 5S

The fact that most people consider it normal for their workplace, whether it is an office, a construction site or a factory, to be untidy shows what their point of reference is. This is not the case for a well-organised factory or any other well-organised workplace: you should be able to eat off the floor there. This has to do with being proud of your place of work and, more so, with professionalism. After all, which top chef would want to work in an untidy kitchen? In lean terms, the tool used to keep a workplace logically organised and to develop ownership of the workplace is called 5S, which stands for the five steps of the process of organising the workplace, all starting with the letter 'S' (Teeuwen 2010).

1. Sort (*Seiri*): sort items by necessity and by how often they are used, and get rid of the items you hardly ever need.
2. Set in order (*Seiton*): give everything a logical, easily findable, visible place in the order in which they are used.
3. Shine (*Seiso*): cleaning is an inspection round to observe deviations; tools without deviations are reliable and important for a stable process.

- Mura stands for unevenness, fluctuation and variability. An uneven workflow is fairly common in organisations. One moment, there is too much work and people have to work overtime and the next, there is not enough work and people fear losing their jobs. Neither case is beneficial for optimal performance. Mura is both the cause of and the solution to the other two.

- Peaks in the workload lead to overburdening, or muri. The overburdening of people can result in careless work, which leads to quality problems, potential safety risks and people calling in sick. The overburdening of machines leads to faults and defects and overburdened processes lead to an exponential increase in lead times. When working under great pressure, people are inclined to skip process steps, which results in faults and rework further in the process. It is the start of a downward spiral, which causes the pressure to increase even more.

- Most people only concern themselves with muda, the most well known of the three. What they see is work that adds no value, a situation of underproduction or overcapacity that they can make more profitable. It is the low-hanging fruit of waste. However, without tackling the large fluctuations, the peaks and troughs will always remain and you will simply be banging your head against the wall.

The trick is, therefore, to level out the peaks and troughs as much as possible by spreading out the workload. In lean terms, levelling out the workload is called *heijunka* and it consists of two parts: levelling out the volume and levelling out the product mix (Narusawa & Shook 2009).

"It may well be the most counter-intuitive lean principle: going faster by working slower."

Levelling out the volume

The first step in heijunka is levelling out the total work volume with the objective of creating an overall constant rhythm in the workload. That means you don't produce thirty products one month and fifty the next, even if that is what customer demand requires. Otherwise, you would be gearing everything towards meeting this kind of peak in customer demand, which costs money. Most organisations are cost conscious, and therefore don't take this approach. They would rather ask their employees to work harder, which leads to overburdening. They can also employ extra workers, which eases the overburdening slightly, but raises costs and increases variability, because temporary employees are never as well trained for the job as permanent employees.

It is, therefore, better to invest time and energy in the only truly tenable approach: levelling out the workload. Customer demand is averaged out or levelled as much as possible. In this case, that would be forty products a month. You do not necessarily have to produce the same number of products every month, but the differences should be kept as small as possible. The peaks and troughs are then evened out.

"Speed is meaningless without continuity." – Taiichi Ohno

How do you do that? If possible, you should control customer demand so that the flow of orders is more constant. For example, you could pass on reduced costs to the customer as a discount. Small stocks of finished products are used to deal with the remaining differences, allowing you to deliver on time. You may well be thinking "That isn't lean!". Yet as paradoxal as it may seem, it definitely is.

Some people think that with lean, everything you do is based on customer demand, but that is one of the apparent paradoxes. Even though you could rely on customer demand in a true one-piece-flow environment, it is not recommended, because it causes irregularity. After all, one day, week or month, you will have too much work and the next, you will not have enough (Narusawa & Shook 2009). Therefore, a small stock of finished products is required to ensure fluctuation in customer demand doesn't upset the levelled workload. This surprises most people, as they believe stocks are not allowed with lean. The importance of heijunka is underestimated, however (if people are even aware of the principle), causing just-in-time to be counterproductive, which leads them to believe that lean does not work. Therefore, use heijunka to suppress fluctuations in customer demand. That way, you avoid a great deal of waste in the entire process by allowing a small amount of waste at the end (Liker 2004).

2.4 The pillars: quality and timeliness

"Coherence between the pillars is reminiscent of a sports team; requiring individual qualities as well as teamwork."

The jidoka and just-in-time pillars (also called quality and timeliness, respectively; sections 2.4.1 and 2.4.2) try to eliminate all flow breakers and waste in order to deliver the best possible quality in the shortest production and delivery times at the lowest cost and using the fewest resources possible. Therefore, both pillars are necessary to support the system. The coherence between both can be compared to a sports team: jidoka represents the skills and talents of the individual players, while just-in-time represents the teamwork required to achieve the agreed goal (Ohno 1988).

2.4.1 Jidoka: built-in quality

Jidoka, the left-hand pillar, concerns the quality in the process. It refers to the ability to detect and stop deviations, so that no defects are produced or passed on. It is the lesser-known pillar of the two, but it is as important as just-in-time. After all, delivering quality to the customer is the driving force behind your value proposition and adding value for the customer is your reason for existing. Therefore, make sure never to compromise quality (Liker 2004). Furthermore,

total quality control is an essential condition for just-in-time to be successful, because just-in-time does not tolerate rework or rejects. Nevertheless, as Deming (1982) proved, merely reserving more money for quality does not improve quality, while using knowledge in a clever way does.

"It is not possible to repeat too often that waste is not something which comes after the fact. Restoring an ill body to health is an achievement, but preventing illness is a much higher achievement."
– Henry Ford ([1926] 1988, p.101)

The jidoka principle goes all the way back to Toyota's founder Sakichi Toyoda and his invention of the automatic loom. One of his inventions was a tool that could detect a broken thread (he attached weights to the threads, which would fall onto a plate if the thread broke and this would stop the machine). This is essential, as it offered people the possibility to solve problems and prevent further quality issues (Toyota 1995c). It was a simple idea that resulted in deep insight: quality must be built into the process, because it is too late to check quality at a later time. To achieve this, it is necessary to give power back to the workers and continually stimulate them to use this empowerment.

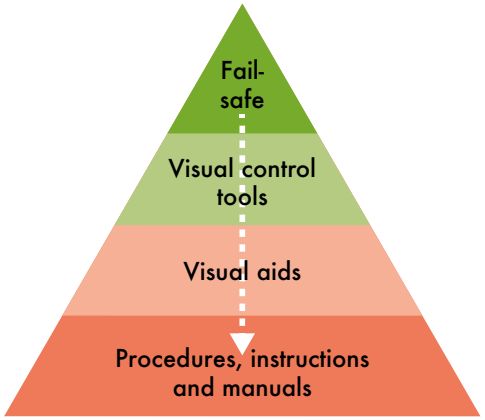


Figure 2-4. Compliance Pyramid: first try to make it fail-safe and if that is not possible, drop down a level in the pyramid.

According to Narusawa and Shook (2009), a mechanism that effectively prevents errors satisfies the following criteria:

- It is simple, robust and requires little maintenance.
- It has a high level of reliability.
- It has been designed specifically for the situation in which it is used.
- It is inexpensive.

Give empowerment

A craftsman making a product controls the quality himself. When people started mass-producing products, production, brainwork, and also quality control, were separated from each other ('thanks' to Henri Fayol). Quality systems, such as ISO-9001, have not really helped to change this (Brown et al. 2005; Maylor 2005). Most companies that observe ISO-9001 place the responsibility with a staff department and use annual or biennial audits to check whether the rules are observed. People are very tempted to rely on stacks of bureaucratic documentation, but that does not improve things for the customer.

Do not confuse quality and standardisation in a lean system with bureaucratic systems such as ISO-9001, which are used as a detailed handbook with inflexible standard procedures that must be followed, or with quality departments that use statistical methods to analyse a large flow of data, such as is the case for Six Sigma.

With lean, the responsibility for quality lies with the person working with the process. You can build a feature into a machine so that it automatically detects a deviation and stops the process, but how do you do that with people? You can achieve this by giving every team member the responsibility and moral obligation to stop the process (by pressing a button, pulling a wire or giving a signal) as

soon as a deviation from the standard is observed. They feel the power, the true empowerment, given to them and because of that, they know that they are being taken seriously.

Inno-Versity Presents: "Greatness" by David Marquet
About the commander of a submarine who gave his crew empowerment.

A principle, not a technique

You can imitate jidoka principles by buying a nice andon system with wires and lights everywhere, but that in itself does not teach the employees the jidoka principles. According to Liker (2004), jidoka only works if you clearly explain the principle of "bringing quality problems to the surface" (p.138) to the employees, so that they can rectify problems and prevent them from happening in the future. Team leaders must be on standby in case assistance is needed. Therefore, it is better to spend money on teaching employees problem-solving techniques than on technical gadgets. In the first phase, a red, green and yellow flag are perfectly fine as an andon signal.

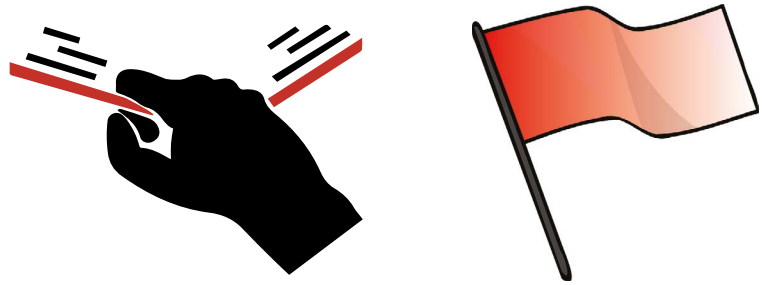


Figure 2-5. A call for assistance does not require technical gadgets, such as an andon cord and lights!

It turns out that it is difficult for this principle to be accepted, because employees assume that they will be blamed for poor work if they give a stop signal. After all, the unwritten rule is that it does not matter how you do it, so long as you achieve the agreed target! That is the notorious 'management by numbers' (Deming 1982, p.24). In such a system, too much production is not a problem, but you will be criticised if you do not produce enough. Quality problems are simply removed from the process, so that production can continue. These faults are examined at a later time by a dedicated department. As a result, it often takes months to convey to somebody that it is essential that they give a stop signal in the event of a problem.

It is vital to continuously stress the principle of zone control, which is something which cannot be done by training. The manager has to be present on the shop floor every day to encourage employees to 'pull the andon cord'.

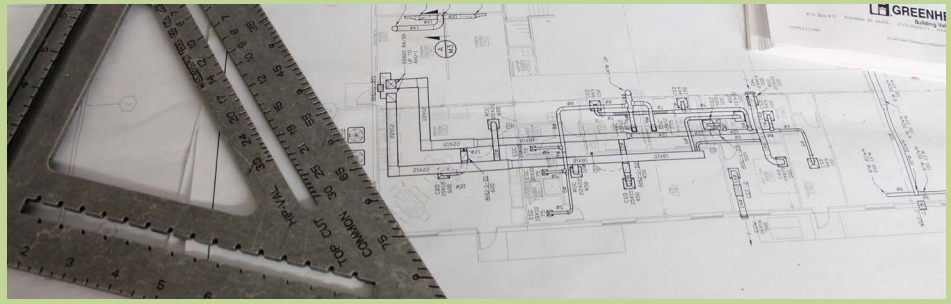
relevance, but do they make us understand the real context of what is going on or the nature of the problem? Ohno (1988) said this: "Data are highly regarded, but I consider facts to be even more important" (p.18). The problem with all this data is that it is one step further away from the process, from the place where things are happening and it is only an indicator of what is going on. What is important is what is hidden behind the indicators. Compare it to the work of a forensic scientist who investigates a crime scene. The 'crime scene' could be regarded as not only the place where a crime has been committed, but also all the other places where traces of the crime can be found.

Drawings are made in an office without knowing the situation outside the office

"On one occasion, footing for a road sign post had to be built. RWS issued a drawing with a carriageway with three lanes, while there were, in fact, four."

"A bridge in the polder had been designed and it was to be built on 20-metre long concrete piles. You could never get the piles to the site, let alone the pile driver. I decided to use steel piles, which you could get to the site in two parts."

(From a discussion on LinkedIn in the Cobouw group. 'Great essay by a trailblazer about the use of lean in the construction sector.')



This 'crime scene' is called gemba in lean terminology and it is the place where managers should spend most of their time.

Management on the shop floor

Management is about continuously focussing on improvements. For every management change, the best place to start is with yourself. A manager's time must be focussed on being proactive, with the emphasis on preventing problems, instead of spending the day troubleshooting, or being reactive. Although people are proud of putting out fires, it does not improve the process. Managers should spend more than half of their time on improvement activities (Rother 2010; Tanaka 2011b). Most managers, however, work in a very haphazard way going from one extreme to the other. This way of working leads to poor decision-making, because not enough time is taken to make a thorough analysis or consider things properly.

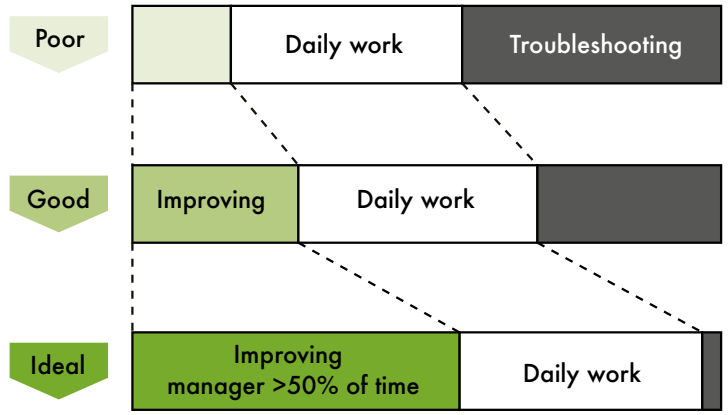


Figure 2-18. Managers should spend more than half of their time on improvement activities instead of troubleshooting (Tanaka 2011b, p.8).

The lean philosophy implies that you manage on the shop floor, the gemba, and not from a posh office some distance away. Only then can you develop the employees by actively coaching them, showing commitment, being accessible, knowing what is going on, seeing things for yourself and making this behaviour the standard. However, merely copying this gemba behaviour results in a superficial way of checking things out on site, or as Deming (1982) puts it: "management by walking around is hardly ever effective" (p.22). The reason is that a manager who only walks around has no idea what questions to ask and generally does not stay in one place long enough to get the right answer. What is important is whether the situation can actually be analysed. For that to be possible, you have to thoroughly understand the processes and be able to critically evaluate them. The trick is to get to the root cause of the problem and to communicate this to other people in an understandable way. Mike Rother's coaching kata (2010) clearly shows this principle using five coaching questions:

1. What is the target condition (the challenge)?
2. What is the current condition? This means: go and look for yourself. Do not trust reports.
3. What obstacles do you think are preventing you from reaching the target condition? Which one are you addressing now? This means: accurately observe the process or the situation.
4. What is your next step (start of the next PDCA cycle)?
5. When can you go and see what you have learnt from taking that step?

This is about exemplary behaviour. Exemplary behaviour is important because what people do is not an individual choice, but comes from copying others. Imitation is a common learning method, which people start applying from a very young age. In organisations, people may well listen to what managers have to say,

2.6 Conclusion

"A learning organisation deliberately allows contradictions and paradoxes." – Wierdsma & Swieringa

It should be obvious that lean is about the whole house. Every part is important and they are all connected. However, the stabilising foundations, the quality pillar and, in particular, the heart and soul of the system are not given enough attention. It is true that companies want to avoid quality problems and, therefore, rework for the customer. However, they are just wasting their time if they attempt to improve the flow of unstable systems. Others go too far and focus only on reducing variability and improving quality using, for example, Six Sigma tools, which also leads to an imbalance. Or they only concern themselves with culture, while behaviour can also be influenced using the correct methods. What is needed is a balance in the use of the methods of the house of lean. That is why it is such a powerful model.

But why is this not so easy to do? Attentive readers may have already noticed that the system is full of internal contradictions. I think the most striking contradiction is the attitude of doing things slowly in order to be able to eventually go fast. A number of other striking, seeming contradictions are given here next:

- Cherish stability ⟷ Continuous improvement
- Andon stops ⟷ Flow and productivity
- Thoroughly consider alternative solutions ⟷ Develop quickly
- Heijunka ⟷ Just-in-time
- Scaling down ⟷ Efficiency
- Demanding ⟷ Respect
- Standardisation ⟷ Creativity
- Value your own skills ⟷ Trust suppliers
- Attention for quality ⟷ Lower costs
- Teaching thriftiness ⟷ Investing heavily

These seeming contradictions make lean difficult to grasp. By nature, people want to choose one thing or the other, while the trick is to make something that meets both conditions. Most companies find it difficult to deal with paradoxes. A modern organisation should embrace both extremes: optimisation and innovation. Wierdsma and Swieringa (2011) say the following about that: "In a learning organisation, conflicts are not seen as threats that must be avoided, but as challenges that must be dealt with in order to continue to stimulate dialogue about rules, insight and principles" (p.130). Toyota has proven to be the master of contradictions (Hamel 2002; Osono et al. 2008). Therefore, embrace contradictions as a way of life!

The Toyota Way: 14 Management Principles From the World's Greatest Manufacturer
By Jeffrey Liker.
Contains a detailed explanation of the entire philosophy following 14 principles.

Lean Thinking: Banish Waste and Create Wealth in Your Corporation
By Womack and Jones.
A must-read classic about lean which explains the value stream thought process.

Kaizen Express: Fundamentals for Your Lean Journey
By Toshika Narusawa and John Shook.
A concise but powerful book with clear drawings and a comprehensive explanation.

In fact, they were not a little better, but a lot better – two to ten times better across a range of performance metrics.

3 The power of lean

In the previous chapter, I discussed lean in detail. You now know where it originates from and why all the elements of the house of lean are important. You also know that the system is difficult to grasp, because it contains so many internal contradictions. Nevertheless, nowadays, you cannot escape lean. But where does all the interest come from? Most people only see the advantages of the increased performance, but how big is the potential performance improvement? And are there other advantages?

We will see that the Iron Triangle, the concept that better and faster are accompanied by higher costs, no longer applies (section 3.1). Things can actually be done better, faster *and* cheaper! Who wouldn't want that? Furthermore, the totally different approach to efficiency (smaller instead of larger volumes) and to involving personnel (drawing on their brainpower) makes organisations more flexible (section 3.2). Combined brainpower also brings the ability to innovate (section 3.3) and to learn (section 3.4). For organisations that want to be capable of reacting quickly in these dynamic and complex times, this is the ultimate goal.

an essential requirement, the brainpower of each individual must be utilised in order to be able to continuously adapt to demand. For that reason, not using the brainpower of the employees is seen as the biggest waste, as you have read in section 2.5.

Toyota gives more room to craftsmanship

Toyota replaces robots by people. All things considered, robots cannot improve processes, while improving processes is essential for every lean system. People see opportunities for improvement better if they are part of the process themselves, after which they can improve the process.

In a rather uplifing way, these people are referred to as 'gods'.
http://www.bloomberg.com/news/2014-04-06/humans-replacing-robots-herald-toyota-s-vision-of-future.html
So, Toyota gives more space to craftsmanship, which goes totally against the current trend.

To draw on this potential, it is necessary to invest in training. Each individual must be trained so they are able to perform a number of different tasks (cross-skilled): not only production, but also maintenance, updating data, holding quality inspections and more. And the more this is done, the more flexible a worker becomes. These flexible employees are organised into groups that function nearly autonomously in the sense that they operate independently of managers, so that they can react more quickly to changes than when following the rigid, traditional way of working (Krafcik 1988; Ohno 1988; Brown et al. 2005; Wierdsma & Swieringa 2011).

As you can see, lean is an extremely effective management system that ensures an organisation can adapt to unpredictable, dynamic circumstances and can satisfy customers. Nowadays, this is called agility. Since situations constantly change, there is little point in teaching people how to act in a certain situation. It is more important that people learn to understand situations and react to them in a way that furthers the organisation (Ohno 1988; Rother 2010; Wierdsma & Swieringa 2011). You can see how this works in section 3.4.2, "Short-cyclic learning".

That brings things full circle. Lean combines the best of two worlds. It is a system that achieves high efficiency and is flexible, allowing high-quality products to be produced in a cost-effective way, with high variety and in low volumes (Krafcik 1988). This is shown in the graph below. What is more interesting, though, is the ability to adapt, which is relevant in all types of environments, not just in a production environment, but certainly also in today's increasingly prevalent knowledge-intensive environments.

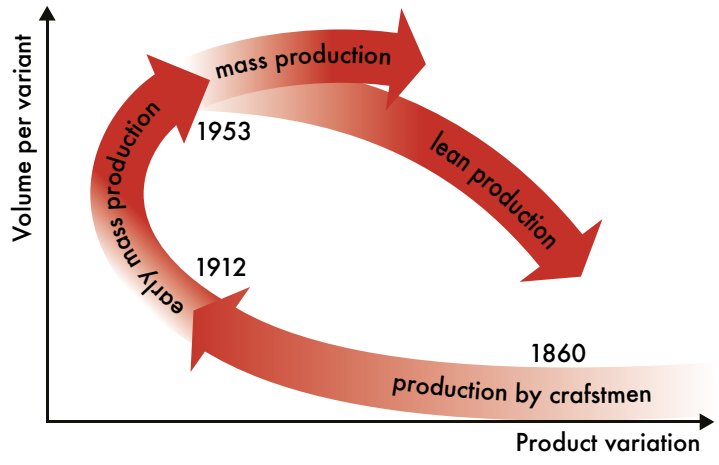


Figure 3-3. From production by craftsmen (very low volume/very high variety/high costs) via early mass production, or pure Fordism (high volume/very low variety/low costs), to classic mass production (very high volume/low variety) or to lean production (low volume/high variety).

suppliers (Hines 1990), and the fact that they are local makes this somewhat easier. As a result of the close collaboration, they can work towards a common goal: value for money and high quality from a very efficient supply chain.

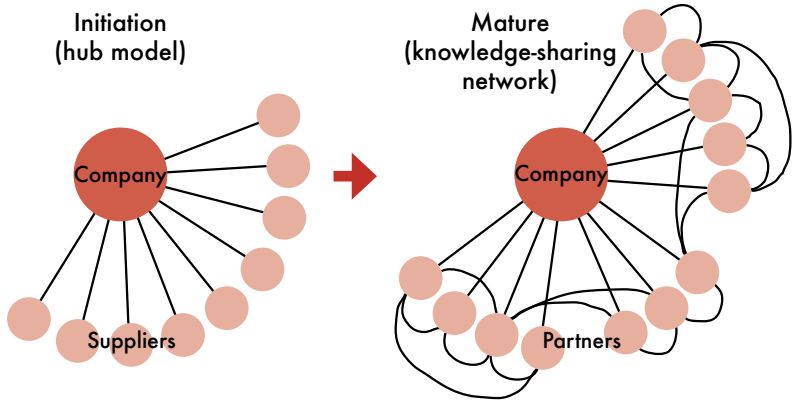


Figure 3-4. Organisation-transcending knowledge sharing with suppliers and partners: evolution from hub model to a knowledge-sharing network (Dyer & Hatch 2004, p.9).

3.3.2 Upstream effectiveness

Another large strategic advantage for true lean manufacturers is the fact that their designs are considerably easier to build, which results in a higher quality compared to their Western counterparts. Quality appears to be the property most related to the origin of the design and lean organisations are much better at making a good design (Krafcik 1988). This is due to the interaction between designers and builders, which makes designers more open to feedback from the Production department and ensures that problems actually are investigated by production employees, because they have a common goal and do not have an insular mentality.

The amount of waste that can be removed from production (efficiency) is limited if product development becomes a limiting factor. The opportunity to influence a product's quality, costs and production efficiency is the greatest during the development phase (effectiveness). A drastic increase in quality and flexibility for the customer – while simultaneously saving costs, so that the product becomes more interesting – requires a complete redesign of the product, and manufacturability (design for assembly) plays a major role in this (Womack & Jones 2003).

The power of lean production is, therefore, only felt if the lean principles are also applied to product development, an upstream process. It is with good reason that one of the main objectives of an effective product development system is to create

designs and processes that support both high quality and easy production (Morgan & Liker 2006; Ward 2009), which is also helpful for cost-effective innovation.

3.3.3 Cost-effective innovation

If you offer customers a larger number of different models, fewer models of each type are produced. In other words, the sales volumes of each individual model are reduced. As a result, the development costs are divided over fewer products, which increases the cost per product. Therefore, the development costs for each model must be reduced to make it financially viable. Consequently, there is less room for error. Obviously, product quality may not be reduced, while the development time and production time become increasingly shorter. For many, that is an insurmountable paradox.

Not for Toyota. The company has proven (see Table 3-2) that it is not only capable of developing products quickly, but can also supply better products at a lower cost. Lean product development and lean production must, therefore, form a synergy so that products of unprecedented quality can be launched flawlessly. As a result, innovations in the product development process have accelerated. It is, therefore, a good idea to take a look at the Toyota Development System (TDS), a system that has also been extensively researched, albeit a bit later than the Toyota Production System.

Table 3-2. Faster, better and cheaper, also for product development (based on Morgan & Liker 2006, p.11).

	North Amercia + Europe + Japan	**Toyota**	**Difference**
Development time (months)	24.3	15	38% faster
*No. of 1st places**	15	39	2.6 times better
R&D $ to turnover	5.1	3.6	30% lower costs

*) In *J.D. Powers Initial Quality Studies* over 5 years (2001-2005).

B

Bibliography

Adler, P.S., Mandelbaum, A., Nguyen, V. en Schwerer, E. (1996) 'Getting the Most out of Your Product Development Process', *Harvard Business Review*, (March-April), pp. 1–15.

Argyris, C. en Schön, D.A. (1978) *Organizational Learning: A Theory of Action Perspective*. Addison-Wesley: Boston, MA.

Assen, M.F. van (2012) *Operational Excellence (OpX) & Lean Six Sigma*. TiasNimbas Business School: Tilburg.

Assen, M.F. van, Notermans, R. en Wigman, J. (2007) *Operational Excellence nieuwe stijl*. Academinc Service Sdu: Den Haag.

Ballard, G. (2008) 'The Lean Project Delivery System: An Update', *Lean Construction Journal*, pp. 1–19.

Ballé, M. en Ballé, F. (2009) *The Lean Manager: A Novel of Lean Transformation*. Lean Enterprise Institute: Cambridge, MA.

Bitran, G.R. en Morabito, R. (1996) 'An overview of tradeoff curve analysis in the design of manufacturing systems', *Gestão & Produção*, 3(2), pp. 0–28.

Boerman, P. (2014) 'Goof Hamers: 'Vanderlande gaat 10 à 20 procentper jaar groeien'', *Management Team*, mei.

Brouwer, J.J. (2003) *Schaduwen over de woestijn: Strategie, management en organisatie van het Duitse en Britse leger van Versailles tot El Alamein*. Uitgeverij Van Gruting: Utrecht.

Brown, S., Lamming, R., Bessant, J. en Jones, P. (2005) *Strategic Operations Management*. 2nd ed. Elsevier Butterworth-Heinemann: Oxford.

Buchanan, D.A. en Huczynski, A. (2004) *Organizational Behaviour: An Introductory Text*. 5th ed. Pearson Education Limited: Harlow.

Buijs, J. en Valkenburg, R. (1996) *Integrale produktontwikkeling*. LEMMA BV: Utrecht.

Collins, J.C. en Porras, J.I. (1994) *Built to Last: Successful Habits of Visionary Companies*. HarperCollins: London.

Convis, G. (2001) 'Role of Management in a Lean Manufacturing Environment', *SAE International*. Available at: http://www.bxlnc.com/download/Role-of-Management-in-a-Lean-Manufacturing-Environment.pdf (Consulted: 1 Oct 2010).

Deming, W.E. (1982) *Out of the crisis*. 2000 ed. MIT Press: Cambridge, MA.

Dennis, P. (2007) *Getting the Right Things Done: A Een praktische handleiding voor planning en uitvoering*. Lean Management Instituut: Driebergen.

Dixon, N.M. (1999) *The Organizational Learning Cycle: How We Can Learn Collectively*. Gower Publishing: Farnham.

Drucker, P.F. (2008) *The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management*. HarperCollins: New York, NY.

Dyer, J.H. en Hatch, N.W. (2004) 'Using Supplier Networks To Learn Faster', *MIT Sloan Management Review*, 45(Spring), pp. 57–63.

Egan, J., Raycraft, M., Gibson, I., Moffatt, B., Parker, A., Mayer, A., Mobbs, N., Jones, D.T., Gye, D. en Warburton, D. (1998) *Rethinking Construction*. Department of Trade and Industry: London.

Elsen, L. van den (2010) 'The Toyota Way within Louwman & Parqui B.V.: editie Heembouw.' Toyota Nederland: Raamsdonksveer.

Elsen, L. van den (2014) 'Lean Purpose The Toyota Way.' Toyota Nederland: Raamsdonksveer.

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Any questions, tips or ideas?

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"Lean is not a destination,
but a way of travelling."
– Rudy Gort