

A study by Staufen AG
and the Institute for
Production Management,
Technology and Machine
Tools (PTW) of the
Technical University (TU)
of Darmstadt



25 YEARS OF LEAN MAN AGE MENT

LEAN YESTERDAY, TODAY AND TOMORROW

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“Only by implementing lean management tools and the philosophy behind it can an operation achieve all its goals and transform itself from poor dog to top dog.”

Marcel Monti Fackert,
Head of Process and Organizational Excellence, Linde Material Handling GmbH



25 YEARS OF LEAN MAN AGE MENT

Editorial



Wilhelm Goschy, Managing Director, Staufen AG

”Back in the early 90s, when I was a student, I became fascinated by lean management. For me, ‘The Machine That Changed the World’ became much more than required reading.“

DEAR READERS

Twenty-five years ago, the book **“The Machine That Changed the World”** leveraged lean management internationally. Well before the nineties, there were many approaches to making industries more efficient and effective. But it wasn’t until the publication of this classic, written by James P. Womack, Daniel T. Jones and Daniel Roos, that a management approach could rightfully claim to have created a lasting change in the shop floor culture worldwide.

Shortly after the appearance of this book, the classical mass production model became outdated, and before too long, Germany adopted modern, flexible production methods modelled on Toyota’s production system. Back in the early nineties, when I was a student, I became fascinated by lean management. For me, “The Machine That Changed the World” became much more than required reading. I was impressed with the theory, and after my studies, when I worked with the automobile manufacturer Porsche AG, I had the opportunity to discover the effect lean can have when it is put into practice. I had been infected by the lean manufacturing virus and at the end of the 90s I decided to help other companies in Germany implement lean management.

Lean management may have started as a tool and method for production departments, but now it is much more.

In an exclusive interview (see page 14) for our study, Daniel T. Jones describes it as follows: “We started by concentrating on lean tools, then on building a management system to support these tools. Then we focused on a method that would transform an organization.”

Now lean management is about creating learning organizations that enable companies to quickly adapt to changes and challenges. Lean management is nothing new, but it provides companies with the basics they need to gain control over the technological developments in a fast-paced, digitally networked world.

We find ourselves on the threshold of a new industrial age, and it is important for companies to know where they stand and whether they have what it takes to implement lean manufacturing and become a smart factory. Staufen AG decided that the 25th anniversary of the lean manufacturing classic would be the perfect opportunity to ask companies whether lean management has changed the way we work, and whether there are still any bumps on the road to implementing it. The response was overwhelming. More than 1,300 executives from Germany took part – significantly more than ever before in a study on this topic. This is a clear sign that German industry continues to value lean management.



About the study

For the study 25 Years of Lean Management, Staufen AG consultants, together with the Institute for Production Management, Technology and Machine Tools (PTW) of the Technical University (TU) of Darmstadt surveyed industries in Germany, Austria and Switzerland in February 2016.

1.526

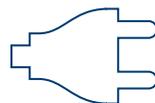
executives total
took part
in the study.

1.347

of them were from Germany.

2/3

Are in the fields of
mechanical and plant engineering,
automobile and electronics
industries.





LEAN PRODUCTION CONTINUES TO LEAD THE WAY

Prof. Dr.-Ing. Joachim Metternich,
Deputy Director of PTW, TU Darmstadt

In Germany, lean production has travelled a long and sometimes rocky road. In the nineties, automobile original equipment manufacturers (OEM) and their suppliers made their first forays into 5S, setup time reduction/optimization, Kanban and group work. They had been galvanized to act when they saw the competitive threat posed by the far east and the ground-breaking work in the book by Womack, Jones and Roos, **"The Machine That Changed the World"**. With no understanding of the philosophy behind lean production or a sound foundation in the culture behind it, this project-driven process was often doomed to failure. In the second wave of lean production, which rolled into Germany in the last decade under the term value stream management, the concept of production flow became the guiding principle in lean activities. With the goal of stabilizing processes and reducing lead times, projects driven by lean production moved to the top of the priority list and became part of a broader context.

The result was a marked improvement in quality, productivity and inventory. However, the true goal of lean management had not been achieved: that of maintaining a lean, learning organization in which processes and employees develop at the same rate. The improvements were management driven and implemented with the help of internal and external teams of consultants. Organizations are still looking for a way to maintain a truly continuous improvement process, as is shown in this panel study.

What can be done to ensure that

- Employees spot deviations and recognize ways in which the process can be improved, but also have the desire to create improvement?
- The desire to implement change is not reward-driven?
- Employees constantly develop better solutions to existing problems?
- Leaders support and encourage their employees to implement daily improvement practices?

The questions above can be answered within the context of the introduction of shop floor management, which is currently a hot topic in the lean community.

Many companies have already established a highly developed lean production system and are gradually reaching the point where improvements are being made. They now know that changes have to be made at the product development stage when it comes to simplifying material supply or ensuring an assembly process that is error-free. They also understand that constant planning is required to ensure process stability and short lead times. In order to ensure that the next level of excellence is reached, lean thinking must encompass all areas of the organization, from development to distribution. However, simply transferring well-known methods does not ensure success. A sound understanding of lean thinking is instrumental in determining the best lean approach, whether it is at the development or the distribution level. For this reason, many organizations have adopted the term lean management instead of lean production.

The current topic Industry 4.0 is the cause of some confusion in the lean community. It promises optimization, rather than continuous improvement.

It allows for complexity and self-controlled systems in a world where, for years now, stability has been the guiding principle. Outside of ideological discussions, as shown in the results of our panel study, there is nothing that contradicts this statement. If anything, lean management and Industry 4.0 complement one another. It is seen as a source of potential, particularly in the field of process improvement. Take for example a defective product: a sound knowledge of its processing data makes it possible to quickly and precisely determine the origin of the error and stop the process at that point. Another example might be the opportunity to standardize a product, especially in single-piece production, where the product controls the process and generates a set of standardized instructions.

One thing is certain: lean production continues to lead the way. It is a value-based approach that drives employees to seek ways to improve the process. It creates standards and a management system, the context for big data. We know for a fact that the evolution of lean will continue to be a fascinating topic for the next 25 years.

“The evolution of lean will continue to be a fascinating topic for the next 25 years“



“Lean management is not a necessary evil; it is the first step on the road to improvement. Long-lasting transformation starts with a strategy, one that is followed systematically at the management level.”

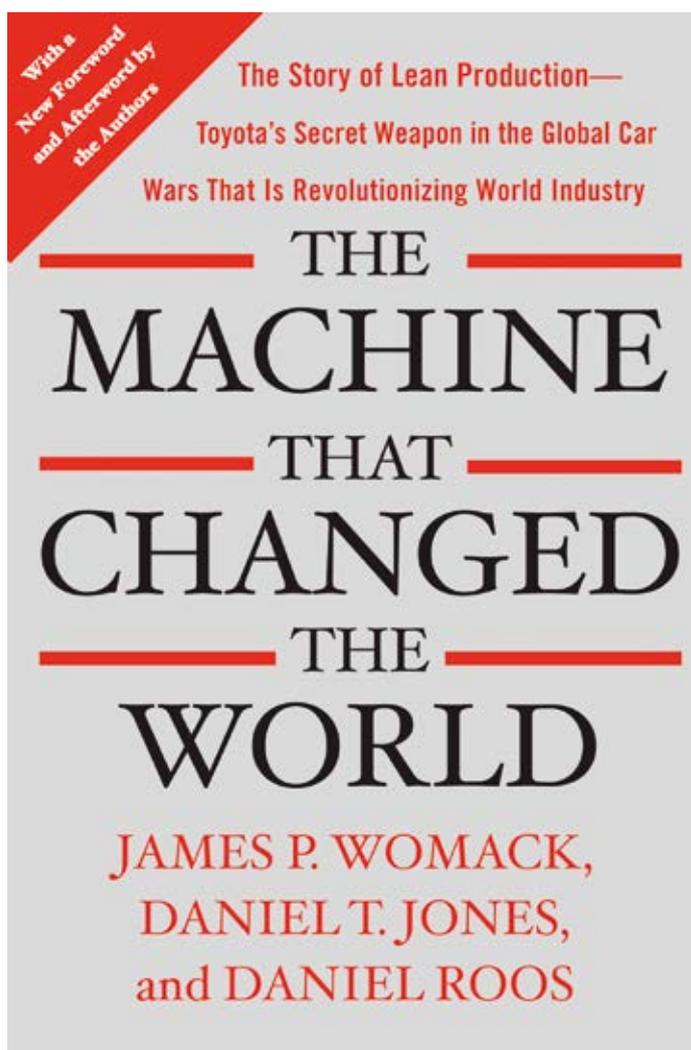
Christian Schneider,
Manager of Serial Production Punching and Forming Technology / Manger Tool
Manufacturing Service, voestalpine AG



EX PERTS TALK ABOUT LEAN MAN AGE MENT

LEAN MANAGEMENT IS HOTTER THAN EVER

Founder of Lean Enterprise Academy,
Co-author of
"The Machine That Changed the World"



Our best seller, **"The Machine That Changed the World"**, was one of the first books to document the full potential of lean management in the early nineties. It was very well received at the time, as it was based on precise benchmarking data and it revealed the production capacity of lean production as compared to mass production.

The results were not to be overlooked. Toyota's continuous success was also garnering a lot of interest and drawing attention to lean management.

“The German industry began to take note of lean manufacturing when they were faced with growing international competition and a steady exodus of production facilities to the east, where wages were lower.”

Since that time, many industrial companies have implemented lean production, and their competitive advantage is growing. However, this step towards lean management was not an easy one for German companies. At first, supporters of so-called computer integrated manufacturing (CIM) and the unions showed objections to lean manufacturing. Although, in theory, CIM was associated with deserted factories, the unions at the time were fighting for autonomous production teams. Lean greatly contributed to this discussion: lean represented one-piece-flow and not mass production.

Even if this is not always initially apparent, lean management ensures industry jobs, even in Germany. It improves a company's competitive edge. Companies that fall behind in the competitive race are the ones that have to let employees go.

TOYOTA IS STILL CONSIDERED THE BENCHMARK

Lean management is hotter than ever. It differentiates itself from all other modern management methods. And Toyota continues to serve as an impressive point of reference. The automobile manufacturer continues to develop lean thinking, constantly analyzing existing methods and technologies. For the Japanese, the statement “It won't work”, is merely a feeble excuse for not having tried harder. Furthermore, lean's goal is to get the entire workforce involved in the learning process. It's important to note that lean management does not rely on a few experts to design a better system for others to work with, as is the case with many other management approaches, but rather, to give the employees the scientific tools that they need to be involved and implement to the daily improvement process.

CONQUER CHANGE WITH LEARNING ORGANIZATIONS

As scientists, we have deepened our understanding of lean in the past 25 years by discovering what works and what does not. At first, we focussed on lean tools, and then we focussed on building up a management system that would support it. Eventually, we strived to change the organization as a whole. Now it is clear that the essence is to create a learning organization in which managers become mentors to their employees, constantly coaching them to develop and implement improvements. We have also begun to observe how lean works in the digital world when it comes to software development and the fast-paced world of innovations.

One thing is certain: the worlds of software and hardware are rapidly converging. It comes as no surprise to see that software development is also implementing lean management methods to improve its performance. The challenge is to integrate the activities of the software developer into every facet of the company, rather than having the developer work in isolation to create solutions that are used by others.

MANAGERS MUST PROVIDE ON-SITE SUPPORT

As shown by Staufen AG's lean management study, while many German industries are implementing lean, there is still potential for improvement. Numerous companies might be using lean technologies and methods to establish lean production; however, when the safety buffers and nets are removed, companies need a management system that can respond quickly to the inevitable disruptions at the operational level. This is only possible if employees on the production line not only find the source of the problem, but also look for and find the solution.



Prof. Daniel T. Jones

To make this happen, a company needs managers who take the time to support their employees on site. They have to provide their employees with the tools they need to improve their work and the processes on an ongoing basis. This will change the way in which managers work at least as much as it will change the work methods of the employee on the production process. However, many German managers still feel more at ease in the office, evaluating data, than they do on site.

AN EXCITING FUTURE FOR LEAN MANAGEMENT

I would like to conclude by saying that lean production does not only strive to optimize existing operations and processes. It is much more about taking into consideration the limitations of

the current processes, the system's technical possibilities, and user feedback, and to then acknowledge and process this information as a whole. In other words, lean is about accelerating dynamic improvements.

Would I write the book "The Machine That Changed the World" the same way, if I wrote it today? I would build upon it and combine the ideas behind lean learning and lean thinking. And I would look beyond production. What is particularly fascinating is to see how lean thinking is now extending beyond production-based industries to other sectors – a development that is especially obvious in Great Britain, for example, from the retail sector, the construction sector, service providers, administrative bodies and the healthcare sector. Lean management has an exciting future.

LEAN MANAGEMENT: THE MANAGER AS TEACHER AND STUDENT



Dr. Michael Ballé,
Lean Leadership Expert, Author of
“The Lean Manager”
and “Lead with Respect”

To a great extent, lean management is a management system. It can be taught and learned, even by those you’d least expect it from. Good lean management is characterized by the fact that it can’t be recognized as such. We want managers who are passionate and knowledgeable about their products and services and can interact easily with their employees. A good manager is expected to establish a mode of thinking within the team that enables the team to solve problems. These techniques contribute to improving the job a bit more every day.

This can prove to be quite a challenge and a source of stress for employees. That is why we need managers who are calm and understanding and don’t tend to act rashly. We also look for managers who listen and can analyze a situation, and then persevere when it comes to finding a solution. The key to success on the shop floor is to define the problem as a group and only then, to discuss possible solutions. Managers have to be interested in the problem itself, and also support their team leaders’ ideas.

Last but not least, managers must also be open to learning. They have to be able to look at the ideas and come to the right conclusions on the shop floor, and to adapt the processes respectively. Good lean managers are not always recognized as such, as they are often quiet, thoughtful and reserved.

“It has come to our attention that lean culture is suited to the generation currently entering the workforce, the so-called millennials.”

In my experience, this generation is not as ideological, but is much more pragmatic and sociable than the previous generation. Of course there are many different personality types among millennials.

Up to this point, however, millennials appear to be more open to viewing things from different perspectives. And I’m under the impression that they are more inclined to accept that things are not either black or white, but that the key might also be in the grey area in between.

TOYOTA IS STILL CONSIDERED THE BENCHMARK



Dr. Jeffrey K. Liker, Professor of Industrial and Operations Engineering, University of Michigan

FOR LEAN MANAGEMENT

The basic principles behind Toyota's production system and the associated culture of leadership have not changed in the past 60 years. However, certain aspects of Toyota's technical solutions and their culture are always evolving. At the cultural level, for example, Akio Toyoda has done a lot of work in order to combine the slow and smooth decision-making process of the Japanese auto manufacturer with the rapid processes followed in the west. He worked hard to achieve a degree of regional self-sufficiency. Toyota's goal is not to be a Japanese company doing business abroad, but rather, to be a truly global company. To make this possible, significant, ongoing change is necessary.

TAKE YOUR OWN CULTURE INTO CONSIDERATION

One thing is clear. Even today, Toyota is the benchmark for lean management. What I mean is that this company is the best example of a prevailing company culture that unites the principles of respect for employees with continuous change.

Toyota continues to invest a lot of money into employee training, as well as into the development of company culture.

These efforts are exemplary for lean principles, as I like to point out. Another important thing to remember is that companies do not have to follow Toyota's lead step by step. On the contrary, companies should take their own culture and conditions into consideration when implementing lean.

DESPITE THE DIFFERENCES, THE CHALLENGES ARE THE SAME

It is also important to take national conditions into consideration. America is the most individualistic country in the world, and its resistance to the more collective principles of the Toyota method matches its ego – for example, when it comes time to suppress its own interests for the greater good. America is also a country that proudly boasts about its successful rebellion against the status quo, whereas the Japanese are characterized as reserved and humble. Americans don't like to feel that they have been manipulated so that certain standards can be met. Germans, on the other hand, possess a certain sense of self-assurance and are often successful at acting on it. They think very methodically and prefer to start with clear roadmaps and solutions. Meeting standards is second nature to them.

The term bureaucracy was best defined by Max Weber, a German sociologist. In some respects, Germans are like Americans, but in other respects, such as accepting standards, Germans are like the Japanese. But even Germans have their very own, inflexible way of thinking. Seeing technology as a solution is something Germans take for granted, as is the interpretation of lean as a toolkit to mechanically change processes.

One thing that comparing countries illustrates is that lean also has to be experienced differently from country to country. However, the challenges are the same for everyone: the world is complex and unpredictable. That is why it is only through trial and error that we discover how best to deal with the constant challenges that we meet along the way. People are our most valuable resource when it comes to adapting to our quickly changing world. That is why we need to take care of our employees and train them.

CHINESE COMPANIES: MASTERING CHALLENGES WITH LEAN MANAGEMENT

Dr. Marcus Chao,
President, Lean Enterprise China



The rapid economic growth of the past three decades in China has set a new milestone in the history of the global economy. During this time, most Chinese companies used energy and resources to create products and services to create wealth. However, only a few companies made quality, productivity, and service their priority. Those who did were, for the most part, foreign companies. These are the companies that are already using lean management, and they are leaving an impression in China in the form of clearly defined requirements and directions from their parent companies.

Today, state run and private companies must rise to numerous challenges, such as global and local economic recessions, rising labor costs, unstable currencies and stricter environmental and safety requirements.

Managers are forced to find solutions to all these problems. With the help of lean thinking, they can face these problems by initiating process improvements and increasing their competitive edge.

LEARN THROUGH FOREIGN COMPANIES

Some Chinese state-run companies were already trying to learn from Toyota in the early eighties; however, they were unable to incorporate lean management into their day-to-day operations. The rapid turnover of top management and the excessive focus on performance forced management to focus on short term success, rather than on long term sustainability.

Currently, Chinese private companies are well positioned to get on board, as they consist mostly of small and medium-sized companies.

Their leaders are energetic, driven by entrepreneurial spirit and the desire to try new things. Consequently, they are seen as the driving force behind China's next

economic leap. The current development of internet technology is providing many Chinese companies with the opportunity to grow. They are open to change and willing to learn, even from German production companies, who have been leading the world for years. Their technical design and discipline towards process and quality set a precedent, as does the culture of striving for excellence.

NEVER ABANDON YOUR OWN CULTURAL IDENTITY

On the other hand, the Chinese have a traditional culture of respecting their elders, caring for others and continually improving. Many Chinese economic leaders have fought long and hard to introduce the "happiness as enterprise" concept to their companies. We would like to see German companies make it possible to unite traditional Chinese culture and German technology. This would allow us to avoid waste and build up a culture of continuous improvement.

CONSIDER YOUR STRENGTHS AND WEAKNESSES

As is the case for companies in other countries, Chinese companies are currently facing big changes, due to the rise of Smart factories.

Germany developed the Industry 4.0 concept on the basis of specific social and economic facts. The Chinese have much to learn from their German partners in this domain. Nonetheless, they must also take into consideration their strengths and weaknesses.

One thing is clear. Automation and smart manufacturing are still based on a stable and flowing process as well as on continuous improvement. For this reason, it is important for Chinese companies to find their way back to the basics and design effective and efficient processes, despite the new technologies in place. I think that lean management will form the foundation from which Chinese companies will be able to overcome their challenges.

WITH TOYOTA KATA

CREATING A CULTURE OF CONTINUOUS INNOVATION

Bill Costantino,
Kata expert and
founder of the
W3 Group

WHAT DOES TOYOTA KATA MEAN?

The word kata comes from martial arts.

A kata is a pattern of specific movements that the martial artist practices over a lifetime.

Toyota Kata is therefore a structured approach that is practised over and over again, until it becomes second nature.

In martial arts, the student practices his kata under the watchful eye of the master, the sensei.



WHAT DOES TOYOTA KATA MEAN IN A PROFESSIONAL CONTEXT?

At the management level, kata stands for regular improvement through the employee, who is supported by a manager, or mentor. This is how an improvement routine is attained, by approaching a defined target status on a step-by-step basis. A concrete plan could read something like this: cut the error rate in half each shift. By following an iterative cycle of “Plan, Do, Check, Act” (PDCA), the goals are attained collectively, until the goal has been reached and a new goal can be set.

WHAT’S THE LATEST?

Implementing Toyota Kata underlines the importance of routines and illustrates how practical exercises can lead to improvements. This type of management constitutes three important roles: the learner (mentee), the manager (coach) and the second coach. At the start of an improvement process, an external consultant acts as the second coach; later on in the process, a higher level manager acts in this capacity. The coach provides guidance to the mentee in the form of short, daily meetings. In turn, independent problem solvers step forward. They bring their creativity, ingenuity and adaptability to the project, and help introduce new company goals.

HOW IS KATA ABLE TO CREATE A CULTURE OF CONTINUOUS INNOVATION?

Currently, process improvement initiatives take place during big kaizen events and with the involvement of designated experts such as Six Sigma Black Belts, etc. However, these workshops require follow-up activities that often don’t take place. Since improvement ideas are often developed without the involvement of the workforce and are then forced onto them, there is little initiative to implement the improvements. With Toyota Kata, on the other hand, the learner and the coach acknowledge the leadership tasks in the immediate working environment. For example, on the shop floor, the foreman or a team leader and the production manager might be involved. Both are closely tied to the processes and it is in their best interest that the improvements are successful.

WHICH EFFICIENCY IMPROVEMENTS ARE POSSIBLE?

Companies can strive for improvements when it comes to productivity, lead times, quality, costs, effectivity, etc. In the Toyota Kata process, the learner conducts small but easily implemented experiments to gain knowledge and to systematically change the process over time. Ideally, the mentee will conduct one experiment per day. For example, the pharmaceutical company Merck in Elkton, Virginia was able to reduce its downtime of 10,000 seconds per shift to 100 seconds.

WHY SHOULD INDUSTRIES INTRODUCE TOYOTA KATA NOW?

In the past 25 years, many companies worldwide have implemented lean management, often by introducing methods such as Kanban, 5S, setup optimization, etc. In the past 10 to 15 years, the companies realized that in order to network the different tools with one another, they needed an integrated, goal-oriented, systematic approach. Toyota Kata brings this to the next level, because it forces a company to initiate a paradigm shift in its culture, especially at the management level.

With Toyota Kata, managers and team leaders now have the tools they need to coach their assembly line foremen and allow them to implement a structured problem solving process day in, day out. Toyota Kata stimulates employees to use their creativity and innovative capacity to come up with new solutions to meet new challenges.



25 years of lean management –
where does the German industry
stand today?



**WHERE
DOES
THE
INDUS
TRY
STAND
TODAY?**

TIMELINE

25 YEARS OF LEAN MANAGEMENT

Lean yesterday, today and tomorrow

1900 Henry Ford develops the Model T

1937 Foundation of the Toyota Motor Company

1945 Toyota develops the Just-In-Time (JIT) concept

1956 The JIT methodology receives worldwide attention due to Toyota's continuing success
Toyota's executive management visits Ford

1991 Publication of the MIT study "The Machine That Changed the World" by James P. Womack, Daniel T. Jones, Daniel Roos
1994 Foundation of Staufen AG
by Martin Haas and Ralf Stokar von Neuforn

Development and implementation of single methods and tools

Yesterday

The seven types of waste – direct areas

1. Overproduction
2. Stock
3. Scrap and rework
4. Over-processing (inappropriate methods)
5. Transportation
6. Movement
7. Waiting time (of the employee or the product)

+++ Increased understanding of the system / holistic view of processes / production systems are developed and implemented / experts are trained

- Companies get bogged down by focusing too much on methods / improvements are made in isolation from the system / organizations barely accept the systems / the responsibility for improvements is delegated to an expert

Development and implementation of value-adding systems

The four characteristics of lean production

1. **Disturbance free, zero-defect strategy**
 - Solid processes are the basis for the three remaining characteristics
 - Defects are immediately removed
 - Orderliness and tidiness are the foundation of a solid process
2. **Flow**
 - The ideal scenario is a continuous one-piece-flow from the raw material to the finished goods
 - Continuous flow with the lowest possible rate of transferred goods minimizes lead time
3. **Rhythm**
 - A straightened and leveled out production is based on a consistent rhythm
 - Tact time is based on customer demand
 - Standardized work prevents waste
4. **Pull**
 - The pull principle is applied at the remaining interfaces
 - Applying the pull principle always means that some waste is accepted (stock/inventory)

+++ Methods are adapted and implemented / potential improvements are identified

- The interaction between the methods has not yet been recognized / there is no systematic orientation

The seven types of waste – indirect areas

1. Self-induced overproduction of information
2. Overproduction of information from external sources (electronic or physical stock)
3. Scrap and rework (based on incomplete or incorrect information)
4. Over-processing (inappropriate method)
5. Transfer of information
6. Movement / long distances in the office
7. Waiting time of employees or documents

1999 Porsche gets back on the track of profitability using lean production
German managers travel to Japan to learn about lean management methodology

2003 Mike Rother introduces value stream design
Lean thinking moves from production systems to the indirect areas.
Staufen AG adds the holistic lean transformation approach to its performance portfolio.

2004 Dr. Jeffrey K. Liker publishes "The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer"
More and more CIP-experts are trained and lead workshops

Development of leadership performance

Shop floor management – on site leadership
The main success factors:

1. **Leadership principle** – Go&See: the leader knows the processes and problems on the shop floor
2. **Leadership style** – based on the mentor-mentee-principle
3. **Leadership instruments** – Interactive info-centers on the shop floor using real-time data
4. **Manager-to-staff ratio** – Reduced to an effective ratio of eight to ten employees

+++ Leaders become lean pioneers / organizations strategically implement lean management / development of lean leadership

- Leaders are often not fully qualified to develop lean in depth / the challenges of the future need to be addressed

2005 Daimler AG introduces shop floor management in its plants.
Lean thinking is transferred from production into the indirect areas

In addition to consulting, the qualification of managers and employees becomes more important. The formation of the Staufen Academy completes Staufen AG's consultancy approach. The "See, Learn, Act and Live" approach leads companies to the top.

2007 The first lighthouse projects using shop floor management are carried out
Improving leadership performance is recognized as being essential to consultancy. By following the shop floor management approach, Staufen AG ensures the success of lean while creating a new leadership culture.

2010 Establishment of training and qualification of lean experts
Lean is no longer a task for experts – it is introduced at the management level
Internationalization takes place / lean thinking spreads from its principle locations in Germany to plants and subsidiaries all over the world

Shop floor management evolves with the times and is deployed at the virtual level using the software ValueStreamer®
Lean management is digital, future-oriented and can be used across a connected world.

New business models are developed and pioneers establish their spot at the top of the market
Industry 4.0 / Smart Factory appear on the scene



Tomorrow

Industry 4.0 / Smart Factory complement lean management and continue to develop.
Digitalization plays an increasingly important role.

Status quo

3.1

After a few decades of implementing lean management in Germany, companies need to be asked whether they have maintained the status quo, or challenged and improved it. Where do companies stand in terms of implementing and establishing a solid foundation of lean management?

First, the good news:

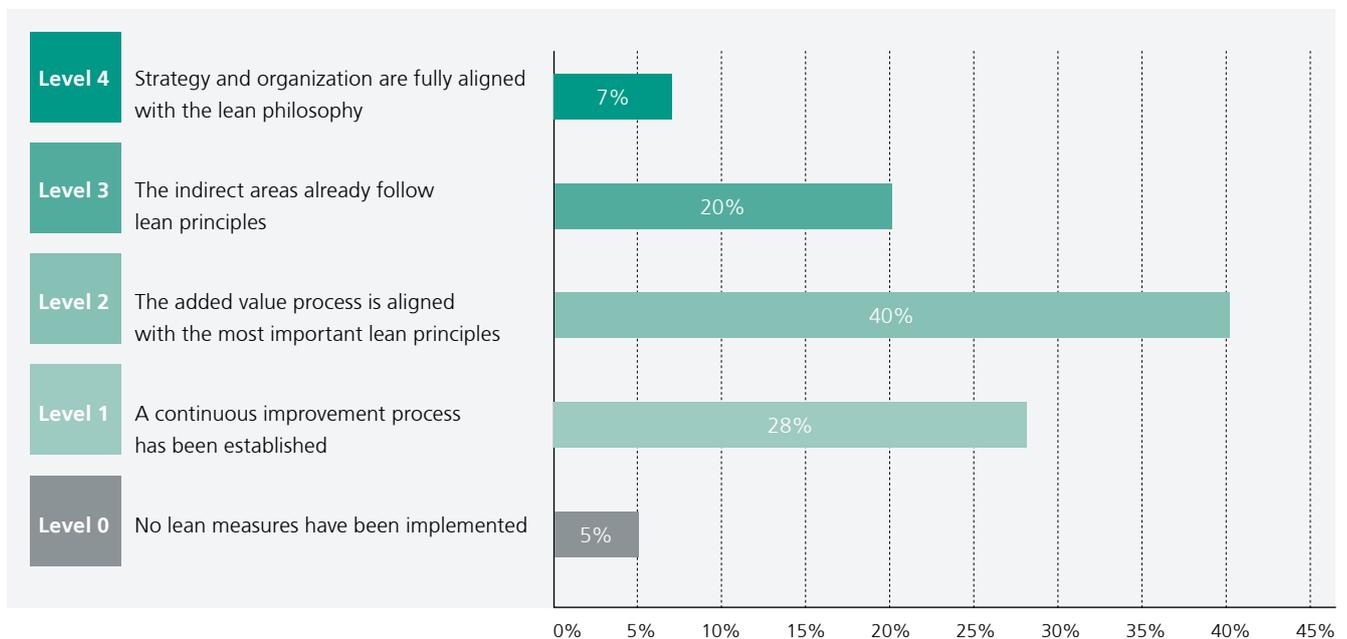
95 percent of respondents have taken the first steps to implement lean management.

The bad news:

So far, only a few (seven percent) of the companies fully align their strategic and organizational approach with lean philosophy (Level 4).

Also: Nearly three out of ten companies (28 percent) are still at Level 1 and have only been focusing on implementing a continuous improvement process. They mainly work with lean methods and tools, but are not yet living the lean culture. In addition, 40 percent have aligned their entire value-adding process with lean principles (Level 2). On top of that, 20 percent of the surveyed managers reported that the indirect areas already follow lean principles. The Lean Management Index, developed by the Staufen AG management consultancy, shows that Germany ranks 49 on a scale of 0 to 100.

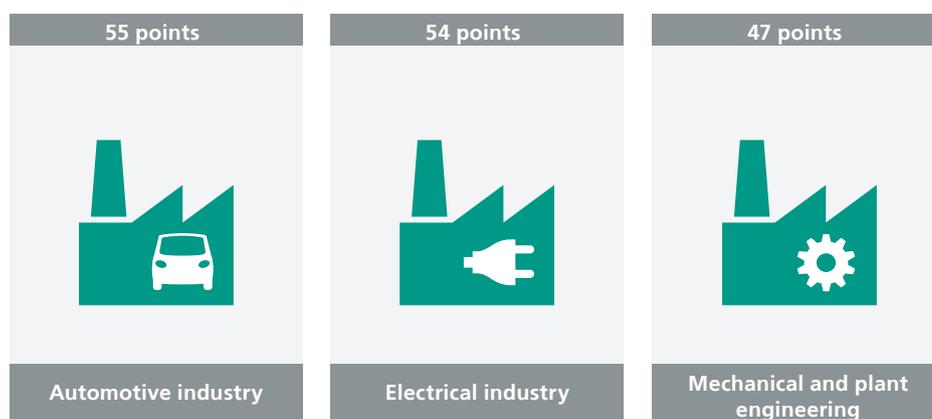
To what extent have you established lean management methods in your company?



The automotive industry is well above average: in 38 percent of the companies, lean philosophy prevails not only at the production level, but also at other levels of business (Levels 3 and 4). By comparison, only 24 percent of companies in the mechanical engineering sector are at the same level.

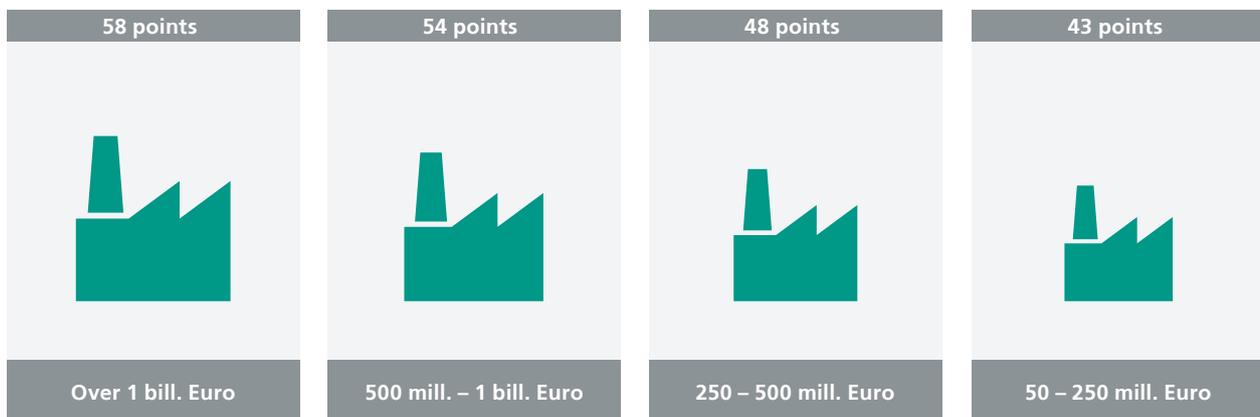
Respondents in the electrical industry see themselves similarly advanced with respect to lean. The electrical industry ranks at 54 points on the Lean Management Index, as compared to the automotive industry's ranking of 55 points.

Lean Management Indices: Evaluation by industry sector



A look at the size of the companies that took part in this study (in terms of revenue) reveals the following: companies with higher revenues tend to have better established lean methods than companies with smaller revenues. Four out of ten companies with an annual revenue of more than one billion Euros have also integrated lean principles into indirect areas or even extensively into their strategy and organization, whereas as only half as many companies with revenues ranging from 50 to 250 million Euros have done so. On the other hand, every third small business (36 percent) is still at Level 1, limiting itself to continuous improvement processes.

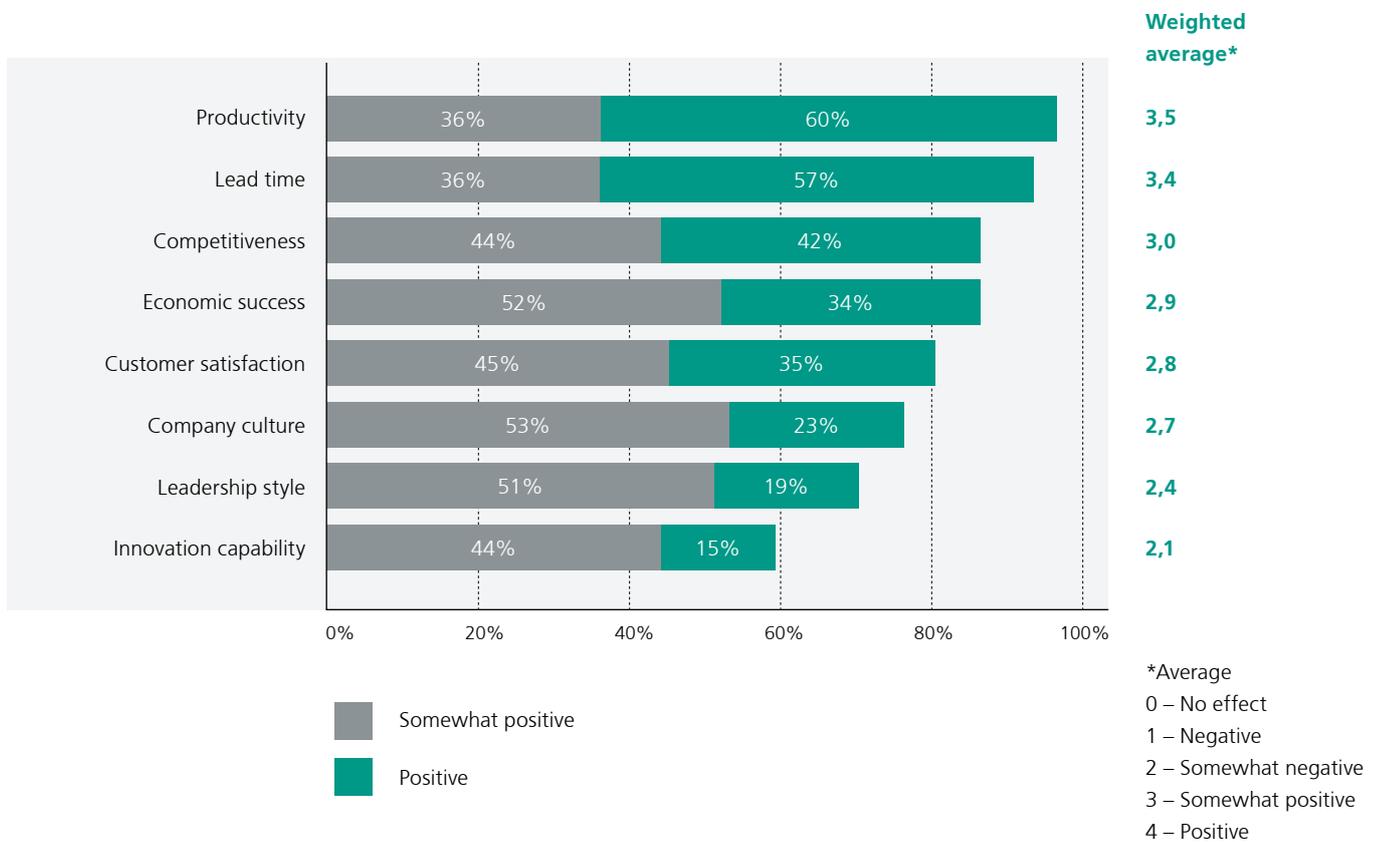
Lean Management Indices: Evaluation based on revenue



What is the effect of lean 3.2 management?

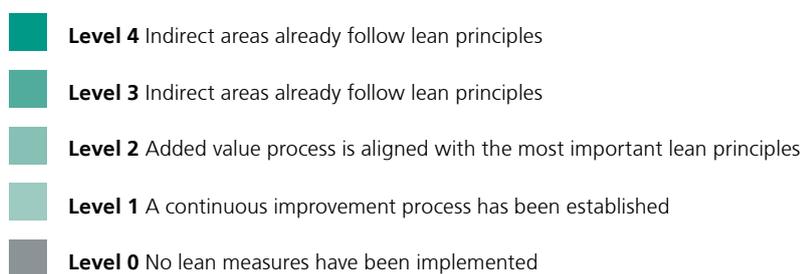
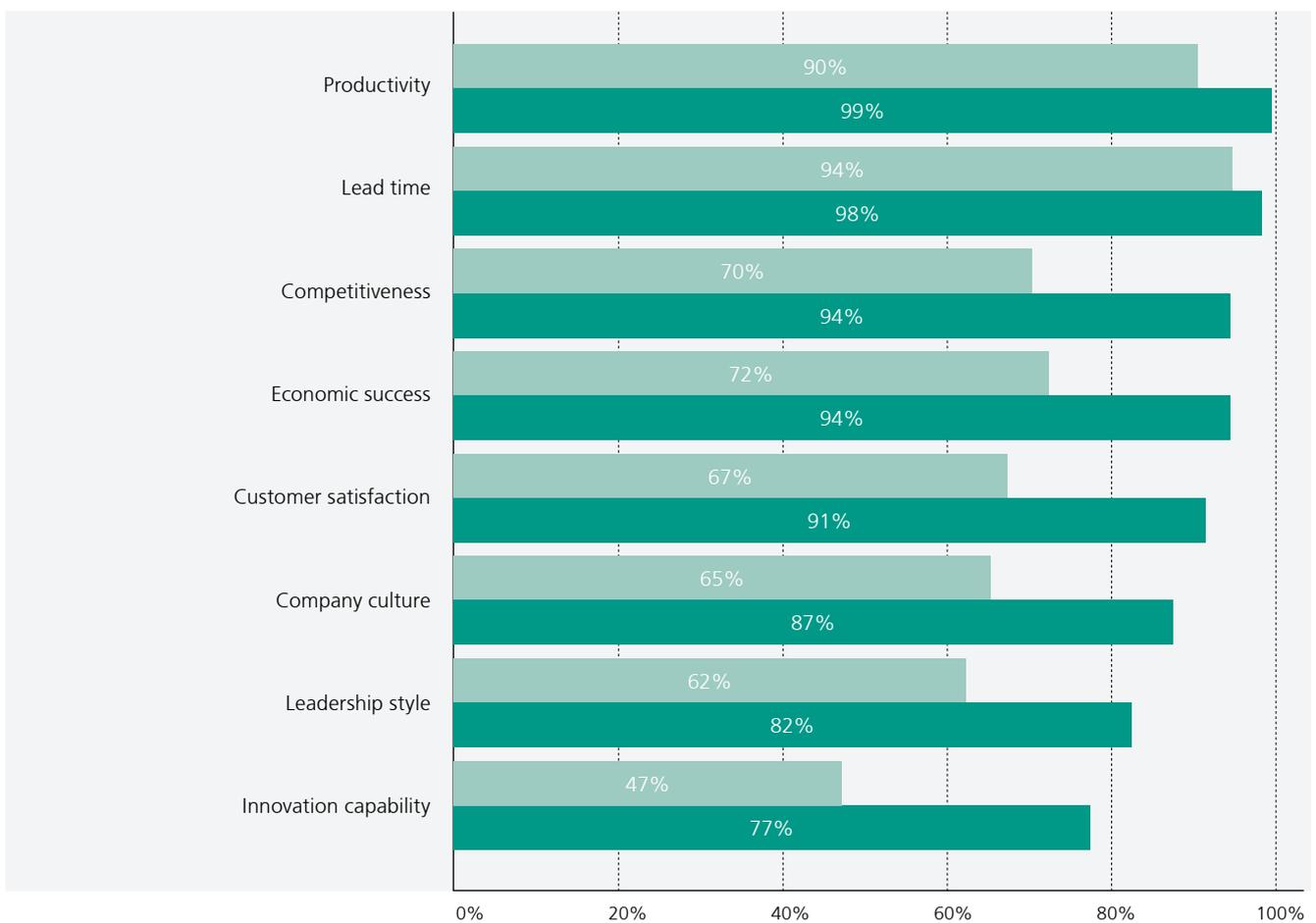
According to 90 percent of the respondents, lean management has a positive effect on productivity and lead time. Not surprisingly, it improves internal processes. Furthermore, lean management successfully increases competitiveness, economic figures and customer satisfaction. What is striking is that considerably less managers feel innovation capability has been positively affected. Also, many companies feel that lean management has relatively little effect on leadership styles.

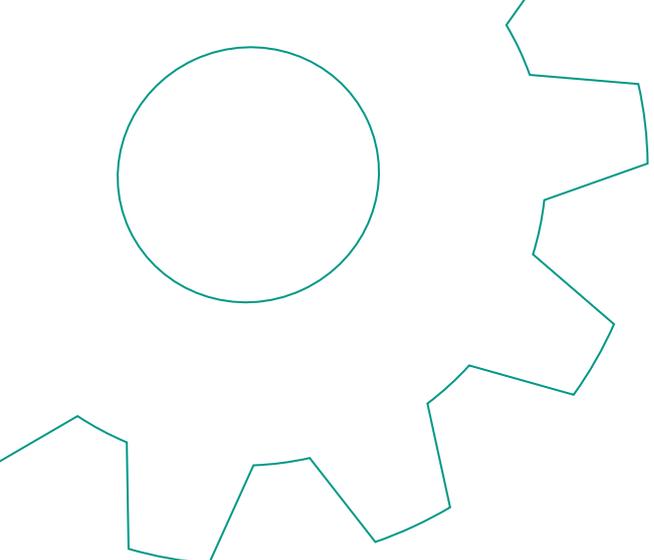
Where has lean management had an effect in your company?



Where has lean management had an effect in your company?

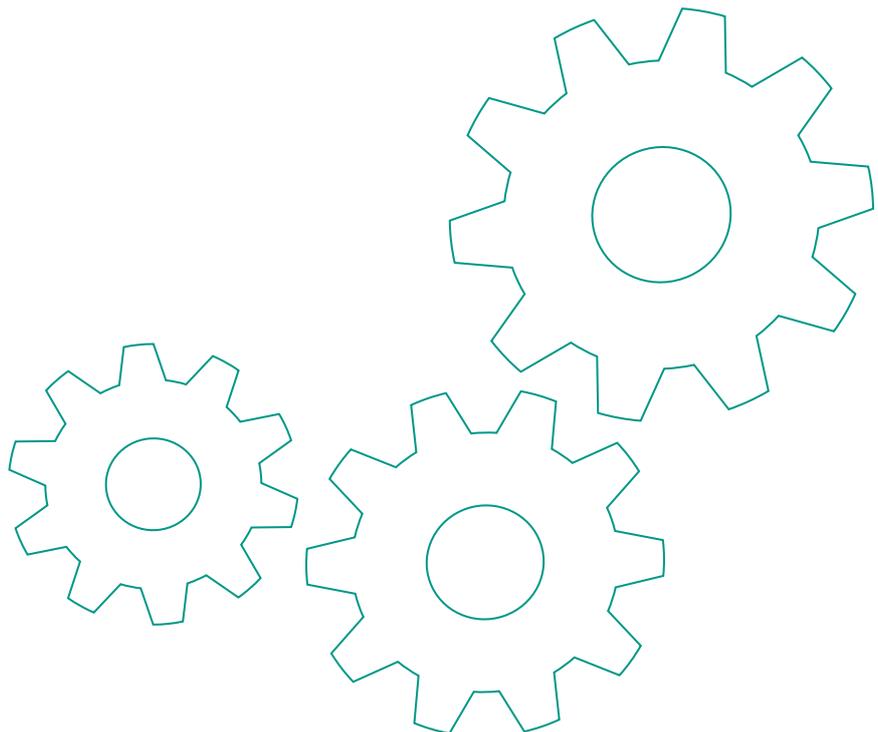
Evaluation based on the degree to which lean has been established within the company:
Positive / somewhat positive answers





The results also show that lean management is particularly effective if it evolves from a multi-year project to a culture that is implemented in a permanent and consistent manner. Companies that have implemented lean principles in their indirect areas or are instituting lean at a strategic and organizational level benefit significantly more in all relevant fields than companies that have just begun to implement lean in specific areas.

This is particularly evident in terms of the effects on innovation capability. The higher the level of lean management integration within the company, the greater the ability of a company to adapt to a changing market, and the greater the company's degree of preparedness for the ever-changing challenges of the future. So far, many companies have not been able to fully identify this connection, as confirmed by the experience of Staufen AG in the field.

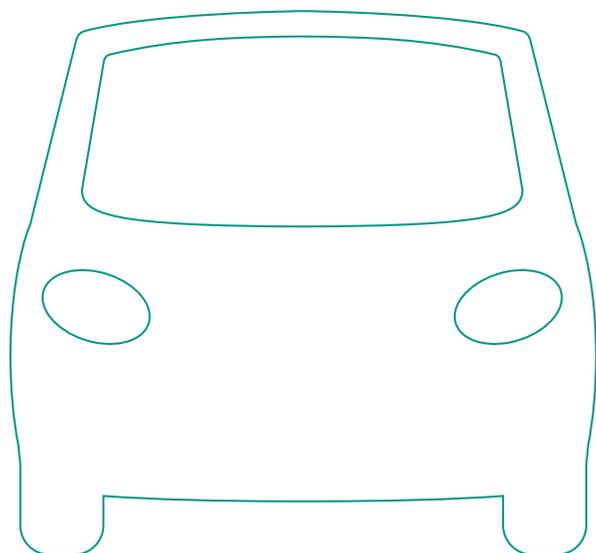


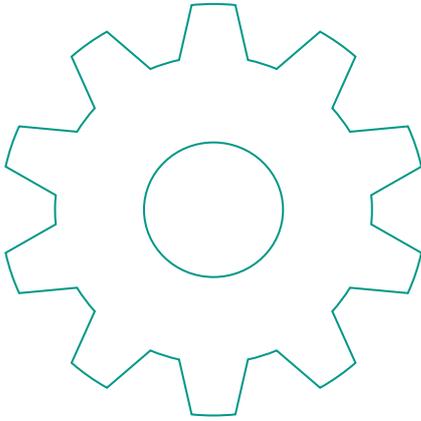
The automotive industry

benefits

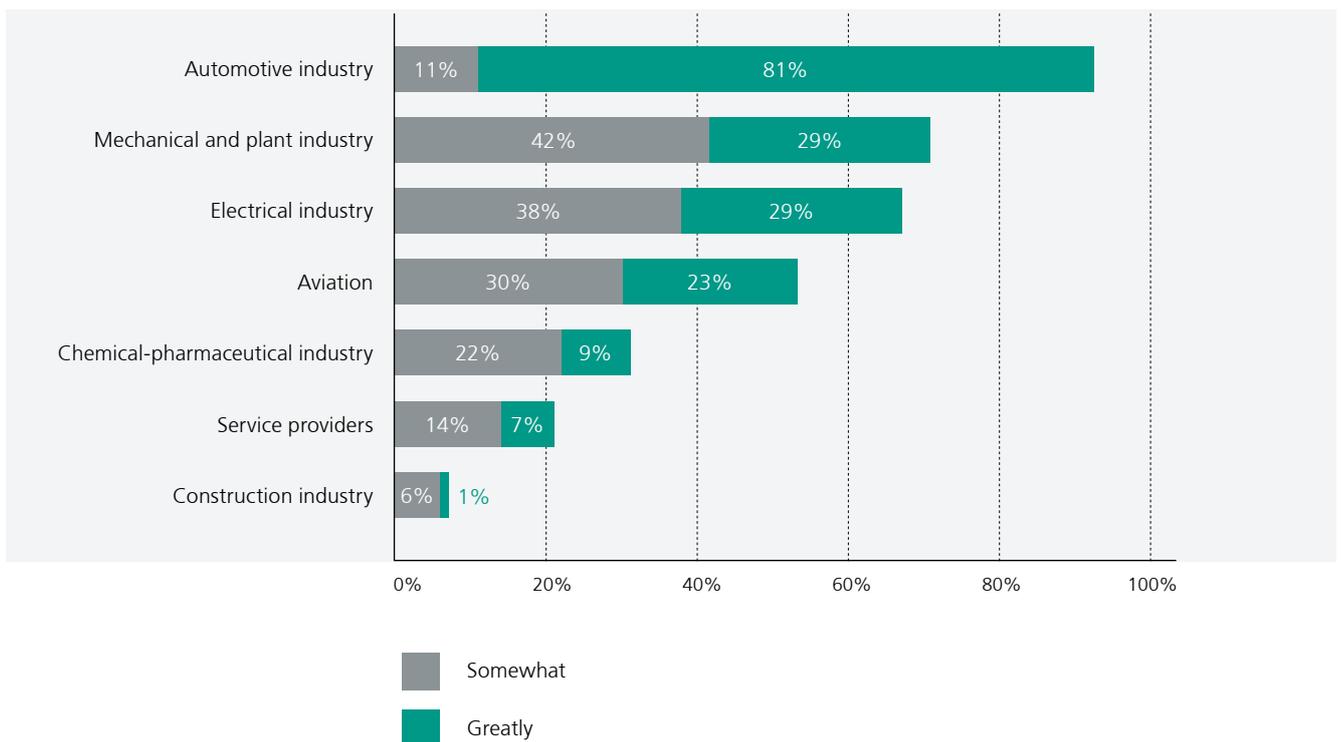
3.3 the most

The Lean Management Indices for the automotive and electrical industry and the mechanical and plant engineering industry, as illustrated in Chapter 3.1, show that these three industries have established the strongest lean cultures. The whole group of respondents agrees that these industries have very successfully managed to change their ways of working. There is one clear answer to the following question: “Which industry has been most impacted by lean management?” More than nine out of ten respondents cite the automotive industry, which realized very early on that it was worthwhile to follow Toyota’s model. The second-most affected industry, evaluated at 71 percent based on the respondents, is mechanical and plant engineering, and the third-most affected industry, at 67 percent, is the electrical industry.

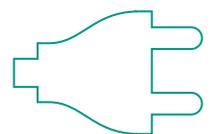




To what extent have the different industries in Germany benefited from lean management?



The construction industry ranks last. Only seven percent of the managers surveyed believed that this branch benefits from lean management. While this low ranking may come as a surprise, it reflects reality. Only in exceptional cases have lean principles been put into practice in the construction industry.



Production

is the main
focus

3.4

Lean management is still primarily focused on production and production-related areas such as logistics and maintenance.

The remaining areas are rarely the focus of lean management, as the results of the study demonstrate.

”Changes brought about through the implementation of lean management and, respectively, lean development, began by significantly improving workflow and efficiency, which led to increased customer satisfaction.

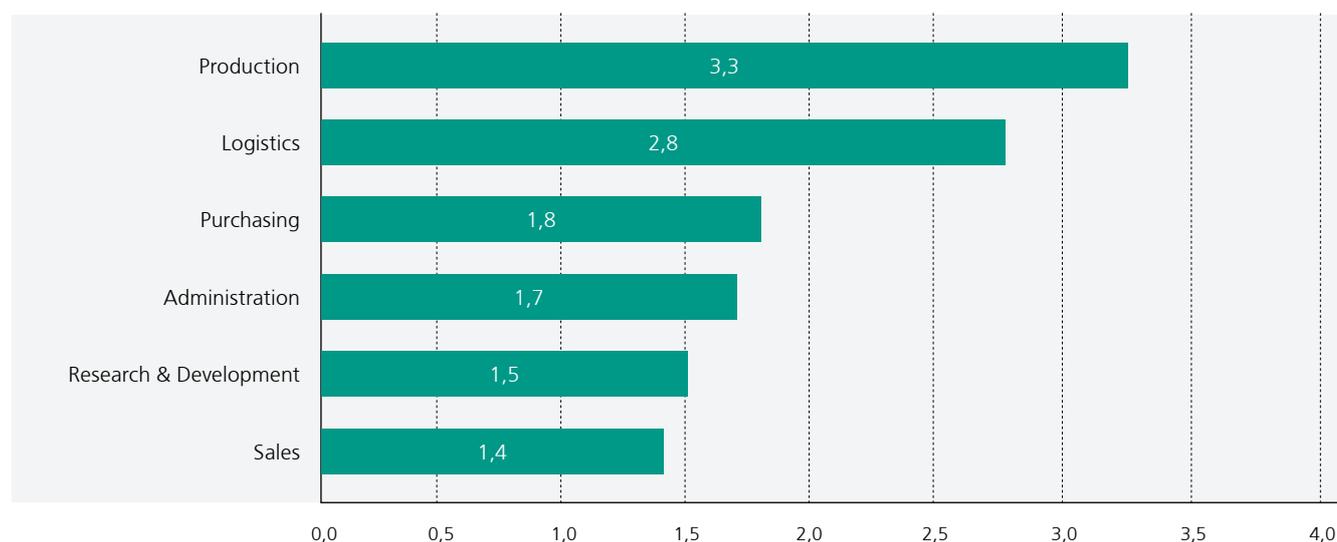
I believe that the continuous pursuit of this strategy will result in a measurably higher throughput in product development and measurably improved innovative strength.“

Dipl.-Ing. Frank Mücke, Group leader New Electronic Conception
and Product Care, Weinor GmbH & Co. KG

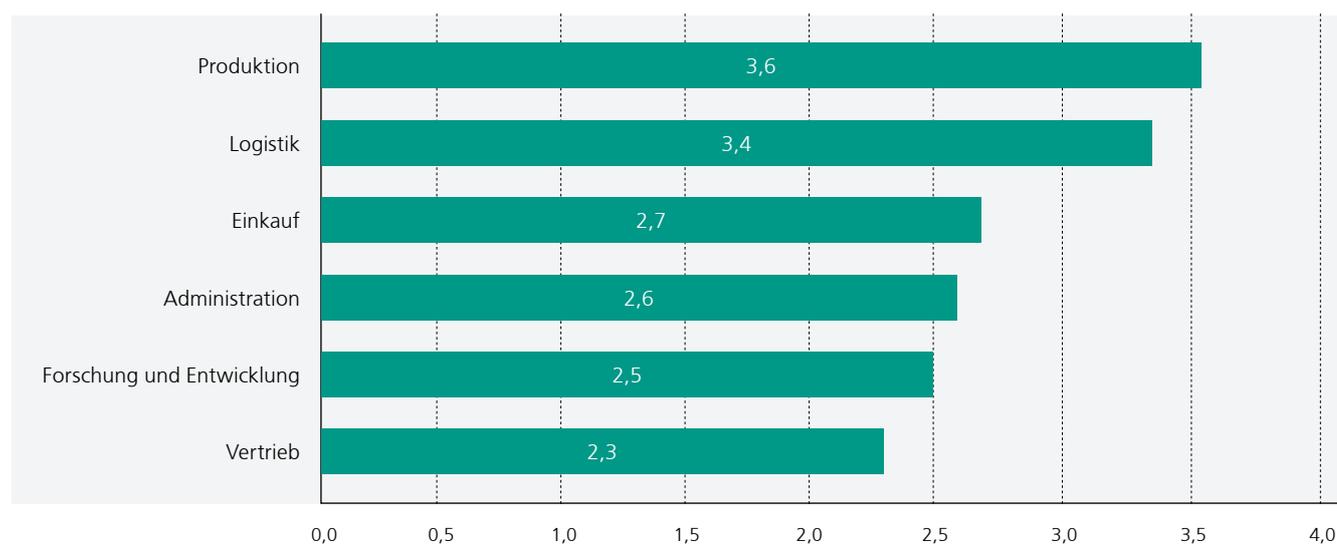
However, there is a huge need for change in the indirect areas, i.e. in product development, purchasing or sales. Long waiting and searching times and uncoordinated processes between departments impact overall lead times and the level of customer satisfaction. As of yet, companies are still not exploring whether indirect areas can contribute to streamlining the value stream.

As stated in Chapter 3.2, this is also true for research and development. Only a fraction of the companies surveyed (17 percent) have integrated lean management into this extremely vital part of the organization. The reason could be that at first glance, lean and creative innovative work do not fit together. This might be true when looking at lean as just a toolset. However, lean is much more. It is a management system that supports the work of researchers and developers. It can greatly contribute towards successfully dealing with shortening product life cycles.

To what extent has lean management made its way into the different areas of your company?



To what extent will lean management make its way into the different areas of your company in the next **ten years**?



*Average:

0 – Not at all

1 – Somewhat

2 – Partially

3 – Almost fully

4 – Fully

The companies have realized, though, that lean management is also the source of potential to all areas outside of production. When respondents were asked where they thought lean management would be in ten years, results clearly shifted. According to respondents, most industrial companies will rely on lean management to improve their indirect functions, such as purchasing, administration and research and development. For example, while only 24 percent of the purchasing departments are currently implementing lean, 63 percent will implement lean in the next ten years.

Among the more experienced and advanced companies, the forecast of the surveyed companies was significantly higher. Based on the positive experience of lean management in the field of logistics, a sea change is predicted, with companies predicting an implementation rate of 90 percent.

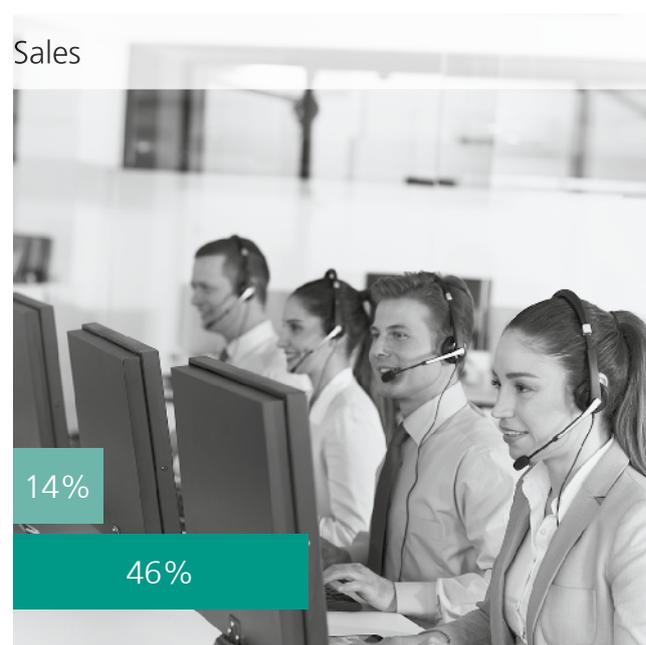
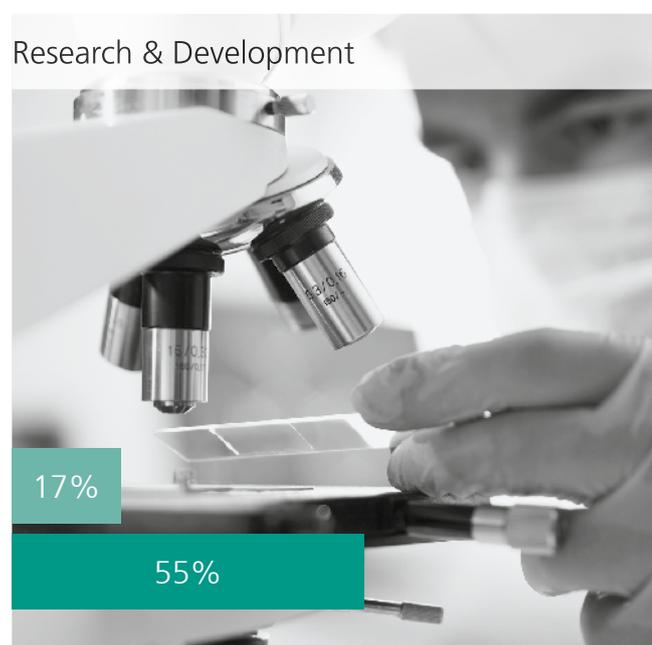
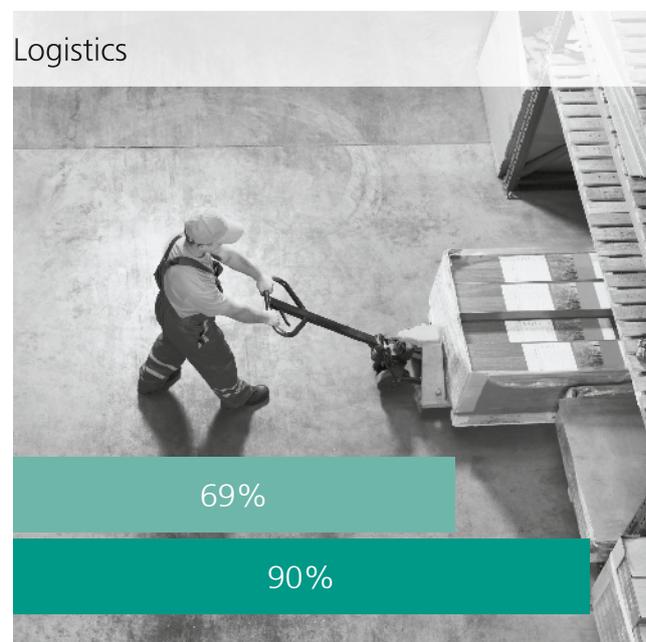
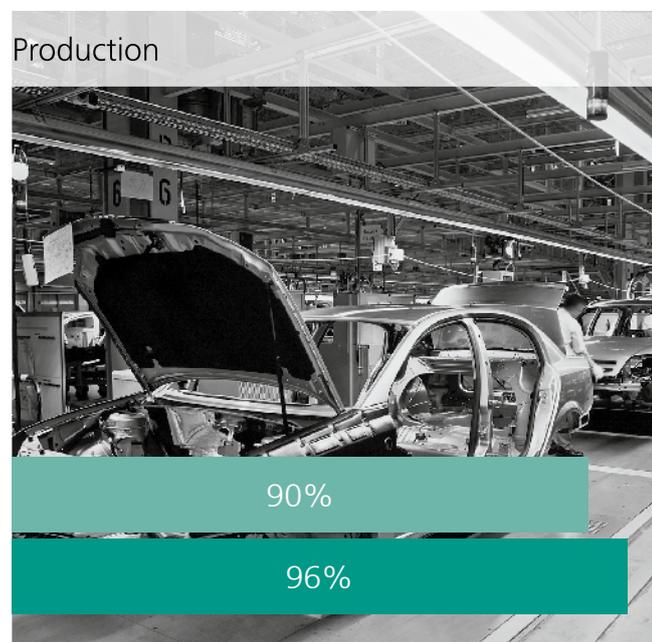
”Many companies only see lean management as a cost reduction tool. This point of view is a huge obstacle for innovations, and therefore poses a real problem. Lean management is a philosophy, a mindset. The methods need to be applied holistically to ensure a fast response to the changing needs of the market. Doing so creates an “innovation pull” from within the company for process and product innovation.“

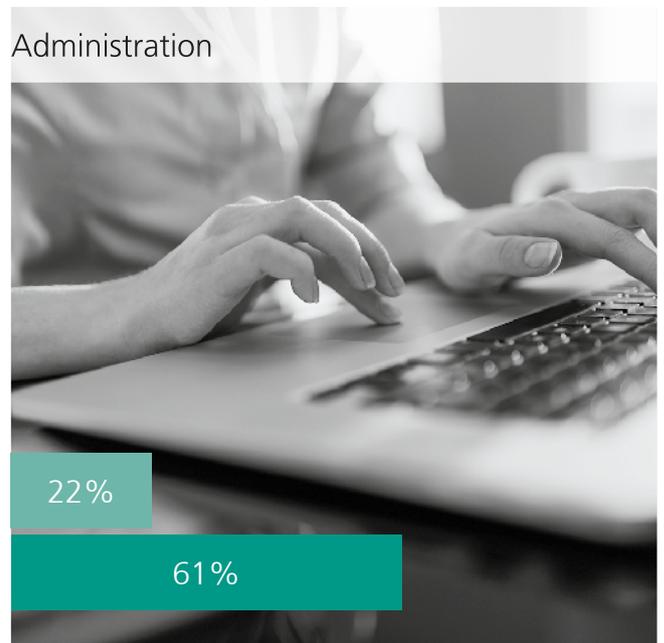
Patrik Saile, Operations Manager, SPX Flow Technology Rosita GmbH

The degree of lean management implementation in different areas of a company – today and in ten years.

High / rather high answers

- Today
- In ten years





“Lean management at the administrative level helps to reveal the company’s existing potential. In particular, switching from top-down to bottom-up improvements while involving employees in the CIP process ensures long-lasting success.”

Process

improvements

take

3.5 precedence

In response to the question as to how well companies are positioned regarding lean management methods, process improvements and waste reduction show the best results, receiving a grade of 2.4 (marks from 1 to 6, with 1 being the best possible). This reflects a typical day in the life of a German business: when it comes to implementing the lean principles, processes take priority.

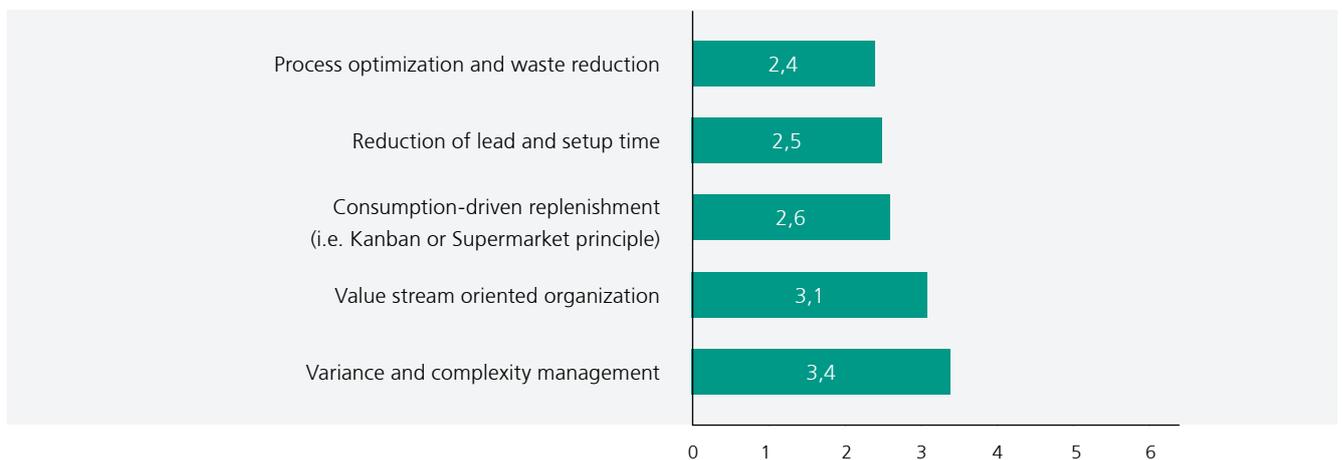
In contrast, variance and complexity management is the last item on the priority list. Once again, it can be observed that companies implement lean management only at the production level, rather than seeing it as a holistic system.

The better the lean principles are established in a company, the greater the degree of success when it comes to applying individual lean methods. Companies that are just getting started do not rank higher than “satisfactory”, even for the simplest methods like process optimization and waste reduction.

These methods have already been established in companies where the indirect areas already follow lean principles or where strategy and organization are fully aligned with lean philosophy (Levels 3 and 4). These companies rank at 2.8 (out of 6), whereas the managers of the companies that have just implemented a continuous improvement process (Level 1), rank themselves at 4 (out of 6).

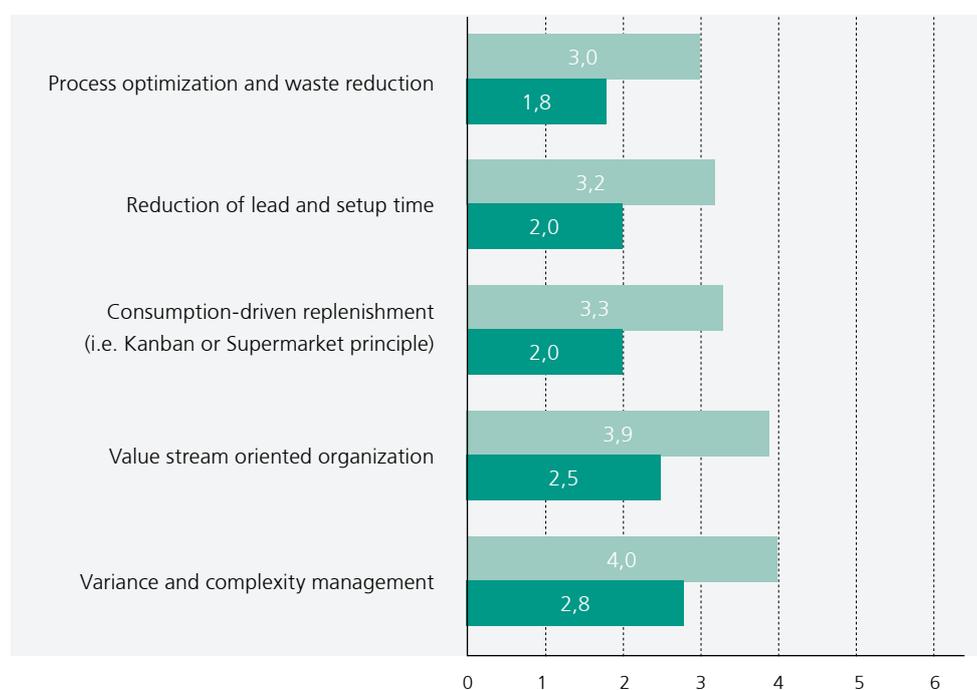
How well is your company currently positioned regarding lean management methods?

Average grades



How well is your company currently positioned regarding the following lean management methods?

Evaluation based on the degree to which lean has been established within the company and the average grade



- Level 4** Strategy and organization are fully aligned with the lean philosophy
- Level 3** The indirect areas already follow lean principles
- Level 2** The added value is aligned with the most important lean principles
- Level 1** A continuous improvement process has been established
- Level 0** No lean measures have been implemented

”From the outset, employees must be closely involved for lean management to be successful. There is no other management concept where the person, the employee and the leader, as well as their competencies and attitude play such an important role.“

Martin Holder, Board member, WAFIOS AG

”Lean management is value-driven and should be perceived as a part of the company culture that not only improves processes, but also continuously empowers and enables its employees. Eventually, this transformation process ensures and leads to the development of a learning organization.“

Ralf Neugebauer, Senior Vice President, Plant Manager Villingen,
Continental Automotive GmbH

Leadership performance needs to 3.6 catch up

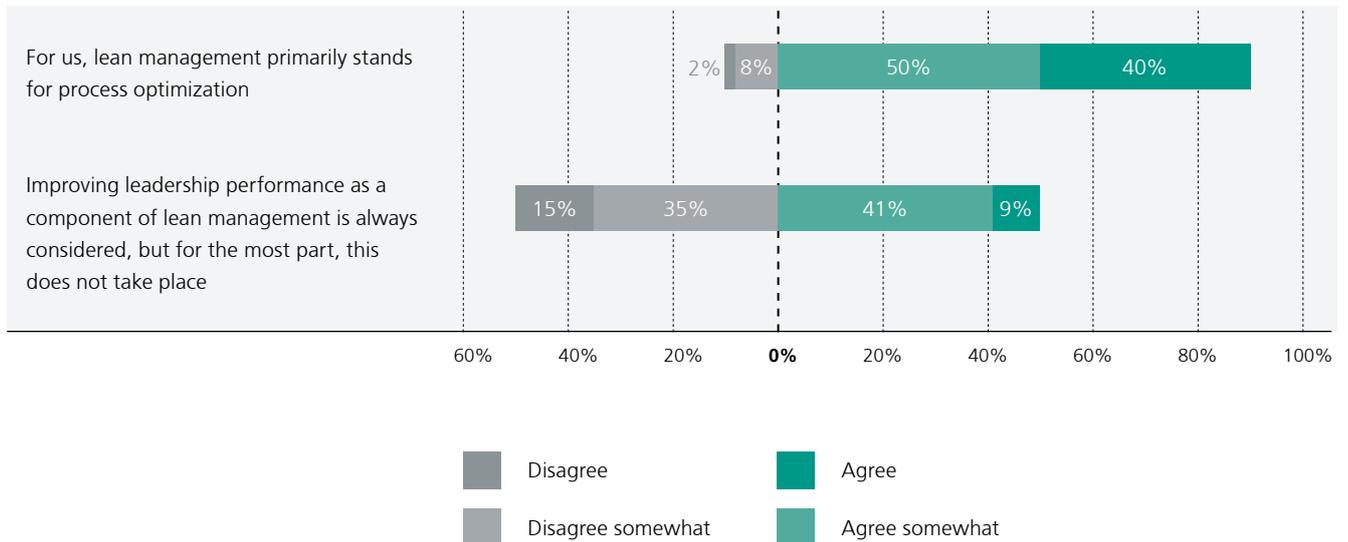
The study reveals that every fourth company in Germany can be considered as advanced in terms of lean management. An already consistent and extensive implementation, as stated by the study participants in the self-assessment, still has room for improvement, even according to the “lean experts”. This becomes very clear, when looking at the leadership performance, which becomes increasingly important, especially when considering the upcoming era of digitalization.

Most of the managers surveyed (90 percent) consider that lean management still stands primarily for the optimization of processes. This also holds true for companies that state that lean management has become a part of their culture across the organization. Therefore, every second company was considering leadership performance as part of the improvement process, but this important component is often neglected in the rush of everyday business life.

In addition, the knowledge and understanding of so-called lean leadership and its implications is not widespread. Many leaders find it difficult to correctly evaluate their leadership performance. This is understandable, because process improvements are clearly visible, whereas leadership performance cannot be seen. The effects of a good leader are more indirect and long-term; the results aren't immediately obvious.

Nevertheless, the results of the study correspond to experience gained in the field: many German companies concentrate on establishing lean processes, rather than working on leadership behavior. Improving the consistency of an extensive lean management implementation is a valid goal and is one of the basic leadership tasks.

Lean management is interpreted differently among different companies. What is your view on lean management?



“If we still want to be a successful producer in Germany 25 years from now, lean management is mandatory. We started with lean management and lean administration two years ago, and today, I can’t imagine our enterprise without it. A lean management that is truly understood and well implemented can change the DNA of the whole company.”

Jochen Lütkemeyer, Managing Partner, elero GmbH Antriebstechnik

Shop floor management

is often

3.7 misunderstood

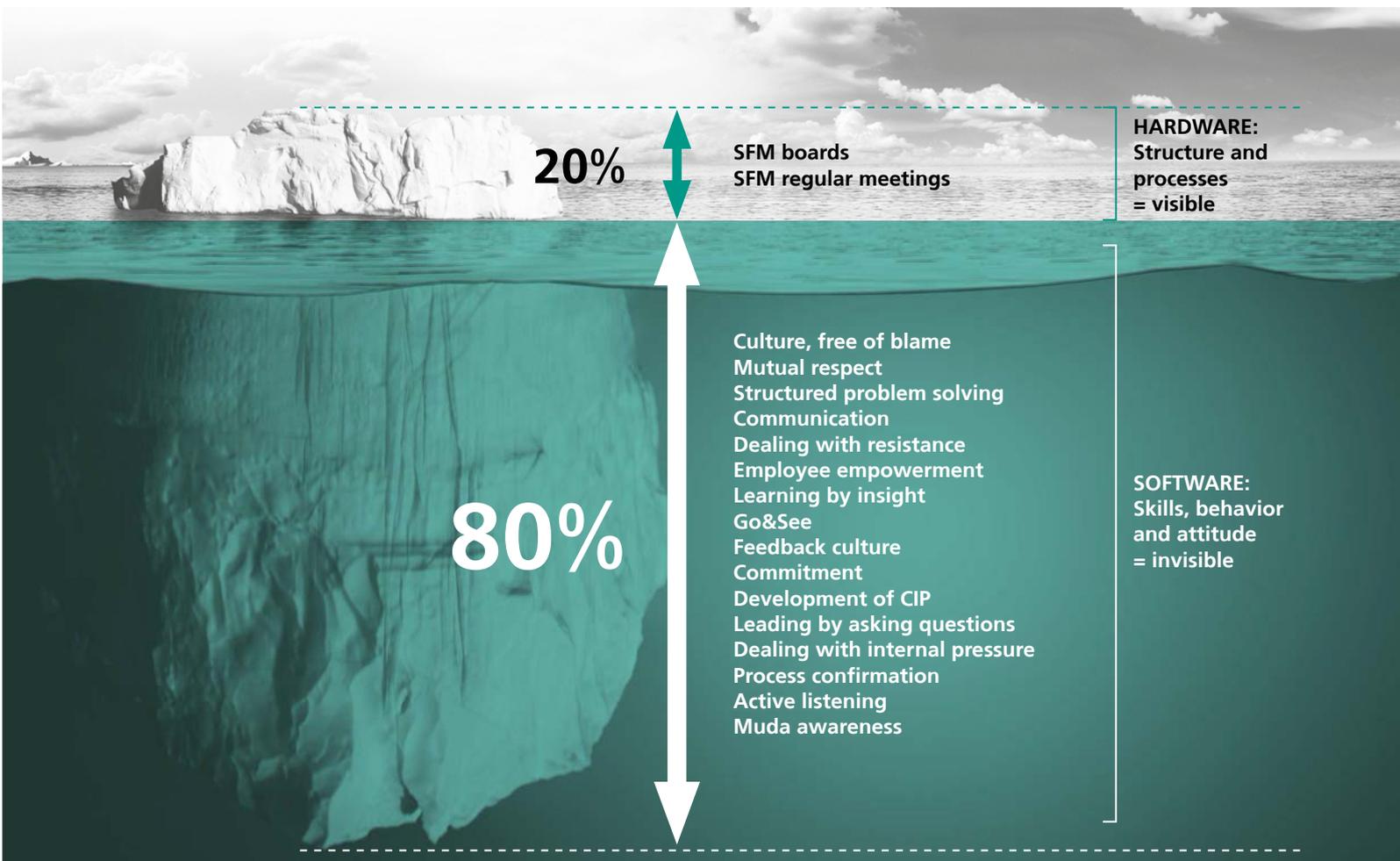
The really successful companies have already realized that true excellence cannot be achieved through process excellence alone. True excellence is based on a combination of process and leadership excellence – a result of the interaction between leadership instruments and leadership behavior, right on the shop floor. This means that a significant component on the road to success is to change leadership behavior in the long term, from the CEO all the way down to the team leaders. More and more companies are starting to implement shop floor management. In shop floor management the leader is trained to evolve from the traditional manager to a mentor and coach. It is important to also make use of supporting tools, such as info-centers with whiteboards, visualization of KPIs and a daily production management schedule.

A fairly large number of respondents answered in the affirmative when asked whether shop floor management had already made its way into the company.

However, a detailed look puts this response into perspective: almost every second study participant (46 percent) said that leadership performance did not improve through shop floor management or if it did, it only improved somewhat. On top of that, 38 percent of the managers were critical of the measures regarding throughput and quality, stating that they showed only a minimal or no improvement.

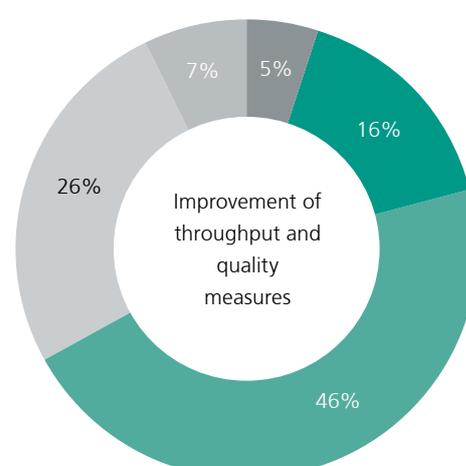
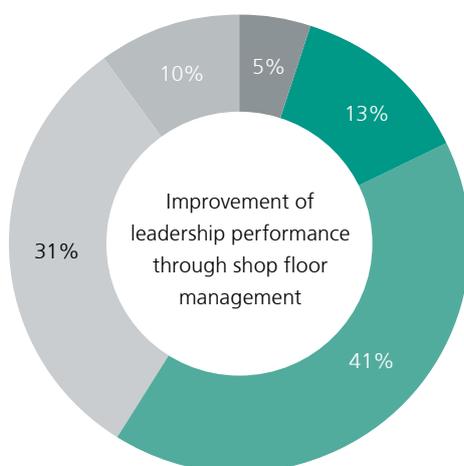
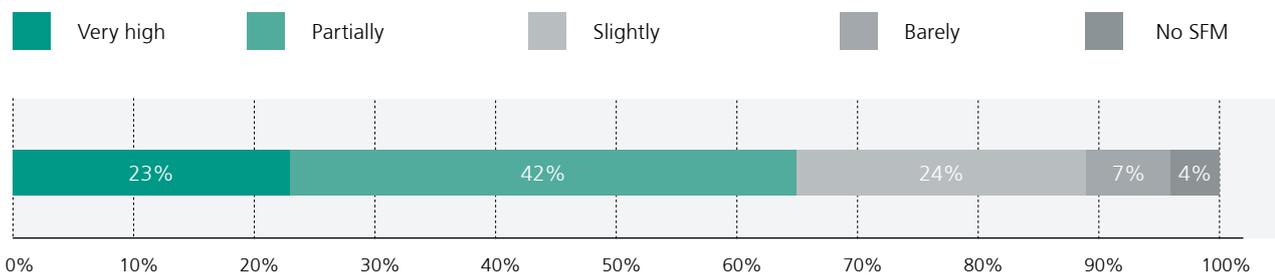
The reason for this is based on a false understanding of shop floor management. Lots of managers have been focusing on leadership instruments, but haven't changed their own behavior. Only a long-lasting change of leadership behavior results in a change in the company culture and eventually leads to the improvement of measures. Many companies only realize what shop floor management and lean leadership really stand for when looking at Best Practice examples

Shop floor management boards and regular meetings are the visible part of shop floor management (SFM). In the end, SFM can only be successful when based on a long-lasting implementation of the part that can't be seen.



How far has shop floor management made its way into your company?

Degree to which shop floor management has been established within the company



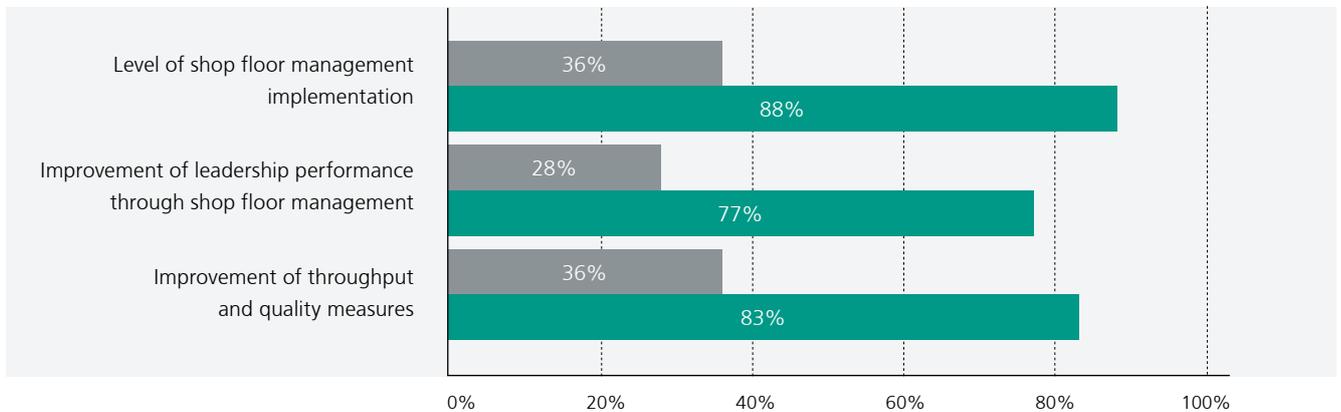
Furthermore, the detailed analyses demonstrate that the higher the level of lean management, the stronger and more effective shop floor management is when it is put into place.

How far has shop floor management made its way into your company?

Evaluation based on the degree to which lean has been established within the company

Answers: Very far / somewhat far

- Level 1
- Level 3 + 4



- Level 4** Strategy and organization are fully aligned with the lean philosophy
- Level 3** The indirect areas already follow lean principles
- Level 2** The added value is aligned with the most important lean principles
- Level 1** A continuous improvement process has been established
- Level 0** No lean measures have been implemented

Usually, the so-called soft factors prevent the effective implementation of shop floor management. Every second respondent feels that that amount of support received from the executive management is insufficient and feels that his/her competence when it comes to problem-solving is not adequate. The reason: leaders are not provided with the knowledge they need to successfully make use of shop floor management.

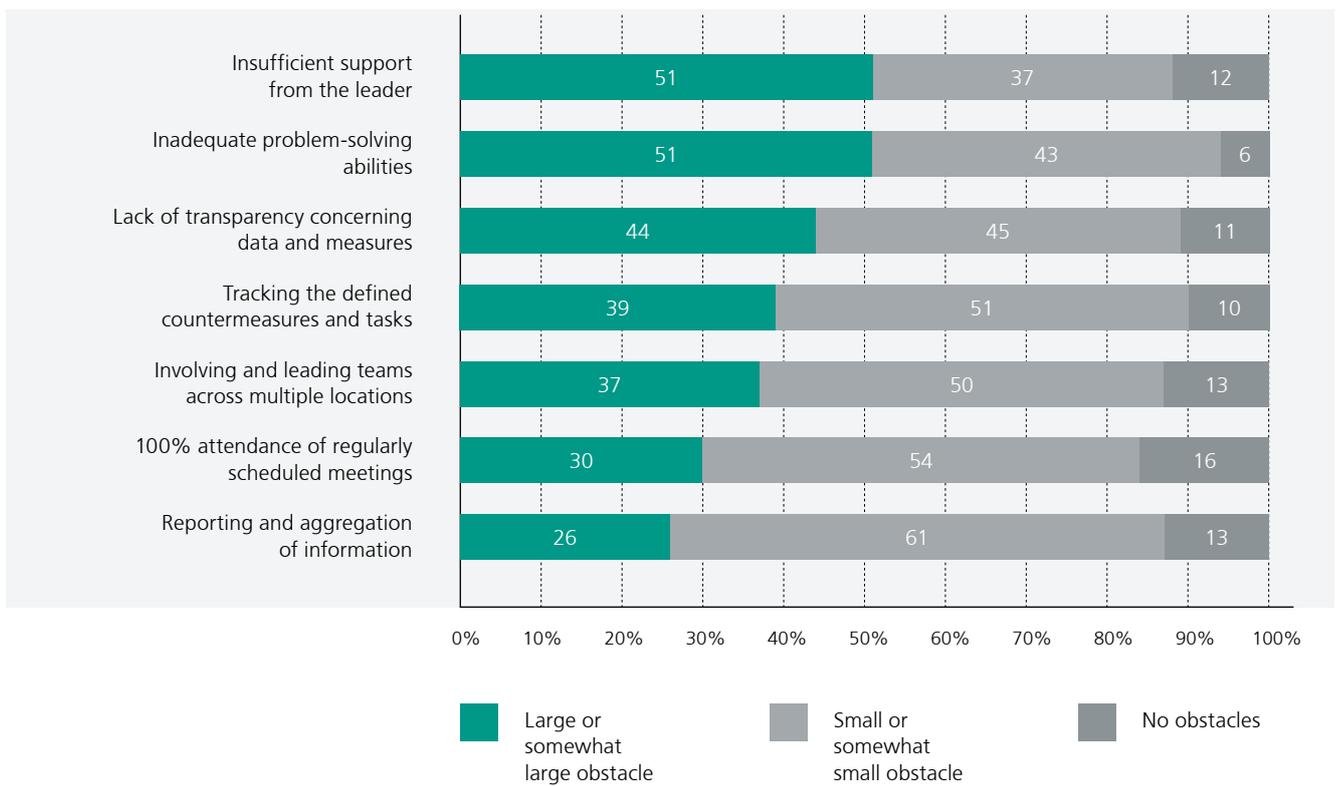
They attend seminars and training sessions, but what they have learned gradually gets lost once they return to their everyday business life. This experience confirms that leaders benefit most from learning when provided with someone who can coach them for a certain period of time in their own company. Only in this way can they truly learn and understand how to change their behavior in order to develop a long-lasting leadership personality.

”Lean means don’t work harder, work smarter.
Lean is a working system that needs to be
learned.

You could say that the lean specialists bring
in a box full of figures, and those affected, the
front-line troops, decide which figures play
what role.“

Uwe Haßler, CEO, K. Dietzel GmbH

In your opinion, what are the obstacles preventing the effective implementation of shop floor management?



Lean management and Industry 4.0

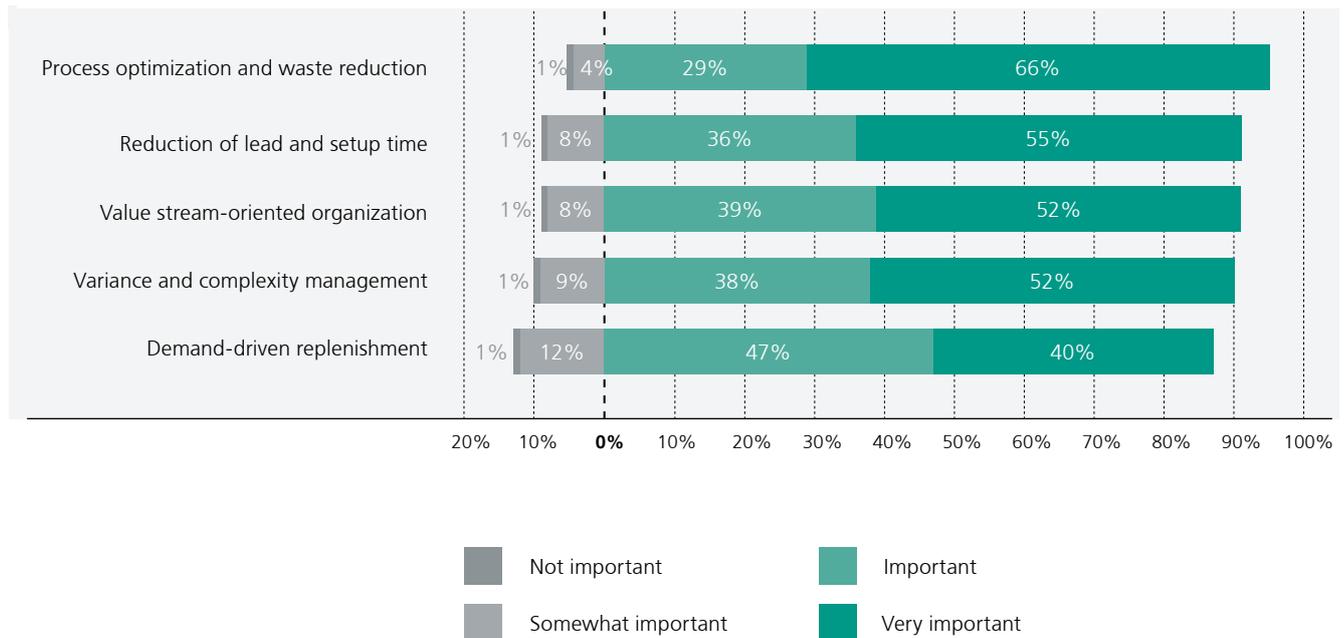
3.8

The road to the world of smart factories with digitalized and connected processes is one that is constantly changing. It is based on existing and efficient production structures and processes. Industry 4.0 is not about having a fully automated factory with an overabundance of the latest in IT technology, but rather, about building the most waste-free factory possible based on the high standards of lean, and then further developing the factory using Industry 4.0 building blocks. The digital transformation from the start to the end of the value chain can only succeed if it is applied across production boundaries.

The study raised the question of the importance of lean management methods for the transition to a Smart Factory. The results could not be more explicit: All methods have been either considered important or very important. Even demand-driven replenishment – the least favorite method – has a popularity of 87 percent.

Chapter 3.5 already described how a company should be position itself using lean management methods. The comparison of those results with the ones shown here provides us with information about where the companies need to improve in order to successfully master the transition to Industry 4.0. Taking this into consideration, there's a need to catch up on every single method, especially in the fields of value stream-oriented organizations, as well as variance and complexity management.

Given the key words lean and Industry 4.0, how important are the following lean management methods for a transition to a Smart Factory?



”Lean is the cornerstone for Industry 4.0. The possibilities arising through Industry 4.0 ensure that lean will continue to evolve. CIP is alive.“

Bernd Hausler, Division Manager Engineering and Manufacturing, ifm electronic GmbH

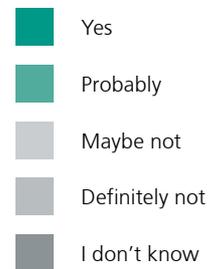
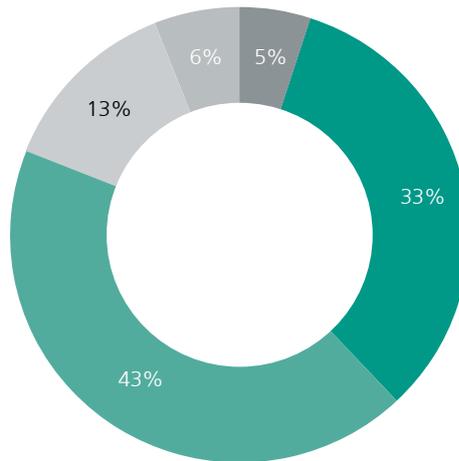
On the way to batch size 1 with lean 3.9 management

At the beginning of the 90's, German companies started implementing lean management to optimize the processes in their factories, using Toyota as their role model. The individualization of society forced them into a situation that was similar to the one the Japanese automotive company was facing in the 50's. Back then, Toyota worked in a very small market (no exports) and needed to flexibly manufacture different types of vehicles. That's how lean management was formed, implementing efficient processes in production, development and administration.

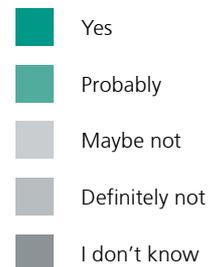
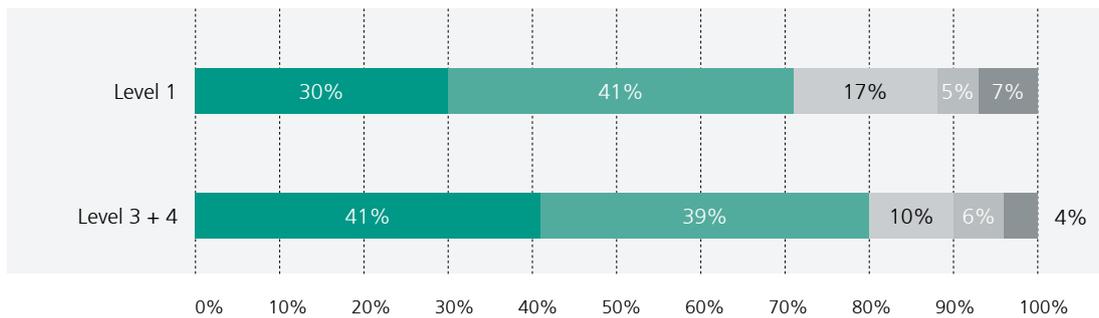
With the transition to Industry 4.0, the trend towards individualization and therefore towards batch size 1 will, once again, definitely be on the rise. The task is to find out how lean management can do justice to this evolution. To the outside world, lean management is seen as process improvement in mass production. The result is obvious: 76 percent of the respondents believe that lean management can substantially support companies on their journey to batch size 1; and with other components of this study, those companies who are already implementing lean are particularly confident that this will be the case.

Can lean management help companies keep up with the trend towards higher product individualization (key word: batch size 1)?

Overall evaluation



Evaluation based on the degree to which lean has been established within the company



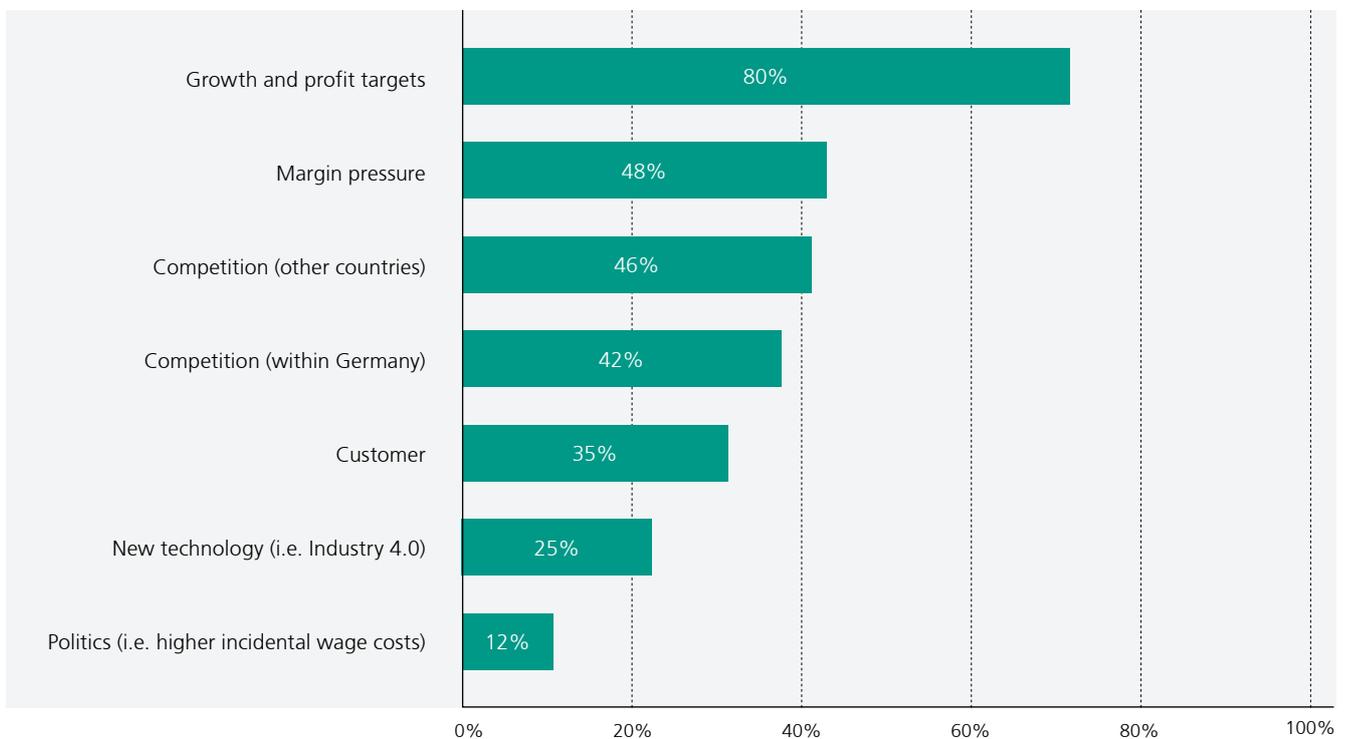
- **Level 4** Strategy and organization are fully aligned with the lean philosophy
- **Level 3** The indirect areas already follow lean principles
- **Level 2** The added value is aligned with the most important lean principles
- **Level 1** A continuous improvement process has been established
- **Level 0** No lean measures have been implemented

Growth and profit are the driving forces of lean 3.10 management

What motivates a company to more fully utilize and further develop lean management? The study shows that the main reasons are daily business-driven growth and profit targets (80 percent). At the bottom of the list of motivating factors (in 2nd and 3rd place) are margin pressure (48 percent) and competition from outside the country (46 percent).

Although Industry 4.0 hasn't yet found its way into daily business, every fourth respondent mentions technology (25 percent) as one of the reasons. What's striking is the fact that mostly companies with a high level of lean management establishment can be found in this group.

How is further development or stronger utilization of lean management currently driven in your company?

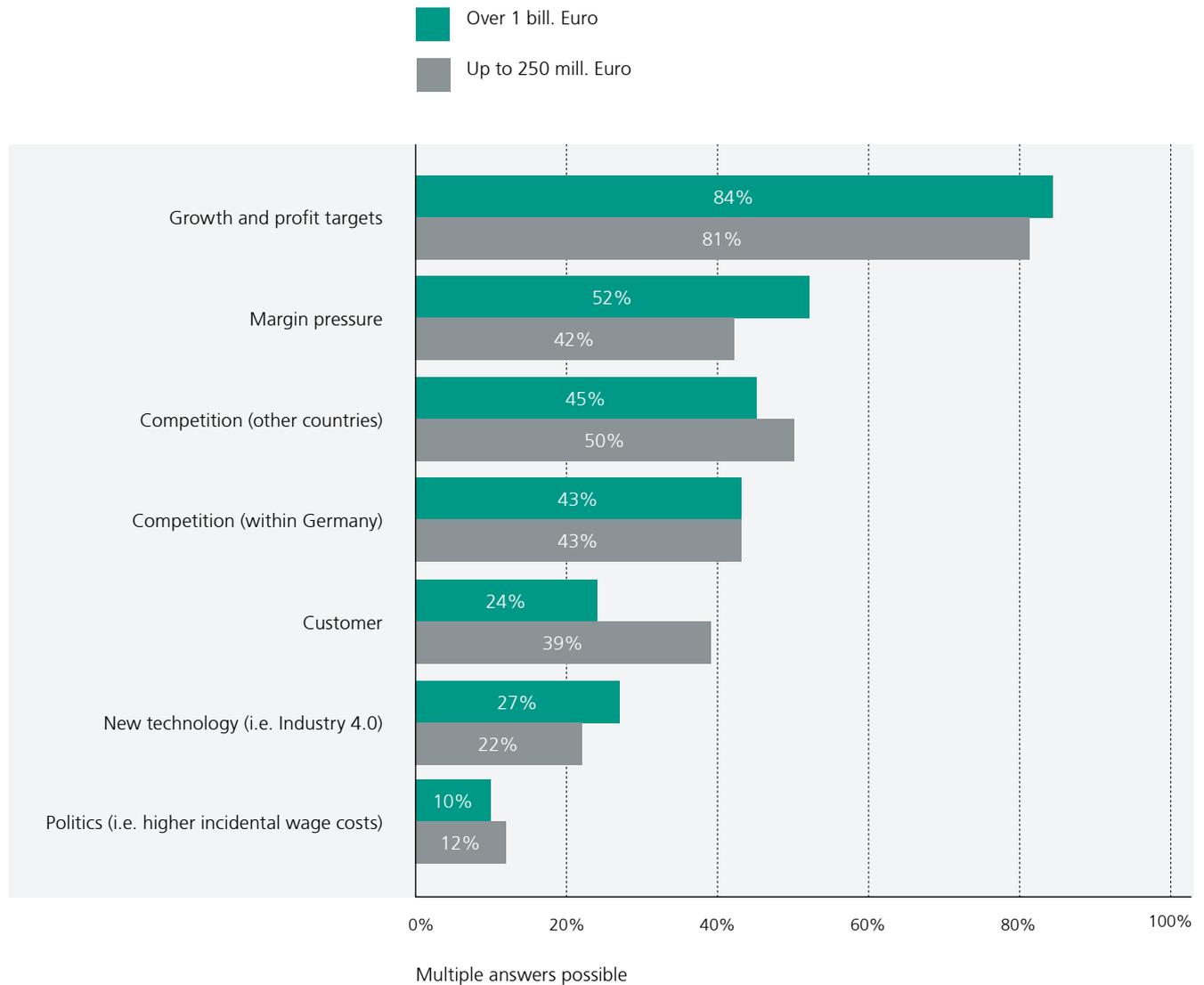


Multiple answers possible

A detailed evaluation based on revenue reveals the different priorities between bigger and smaller companies. Even though growth and profit are the dominating factors for everyone, companies with a revenue of more than one billion Euros place more importance on competition from other countries, whereas companies with lower revenues are more driven by margin pressure and customers.

How is further development or stronger utilization of lean management currently driven in your company?

Evaluation based on revenue



”Lean management and the transformation of our company are decisive in ensuring long-lasting success and the continuation of our production presence in Germany in a globally competitive world where margin pressure and the demand for flexibility, quality and short response times continue to increase.“

Volker Del Monego, Technical Executive Manager, Freudenberg Interlining SE & Co. KG

”Lean management is a strategic competitive advantage that is difficult to copy. In order to unlock it and gain entry, a deep-rooted long-term foundation in the company’s culture is necessary.“

Jens Busse, Director Business West, Roto Frank AG



”Lean management, as a significant success factor of the future, must rise in importance to ensure long-term competitiveness in the Western industrialized states. We are still faced with the enormous challenge of establishing lean as a part of the company and leadership culture.“

Andreas Wagner, Member of the Board / Chief Operations Officer (COO), Schnellecke Group AG & Co. KG

PER SPEC TIVES

Perspectives

Lean management has now become more than just a toolbox approach for companies. It is a management system that, today, is all about building a learning organization that can benefit from permanent improvement. That's how most German companies see it. They have realized that a good portion of their success in the global market is based on their efforts towards efficiency and effectiveness in all areas. They also know that they need to consistently stay on this path during the transition to Industry 4.0 and digitalization.

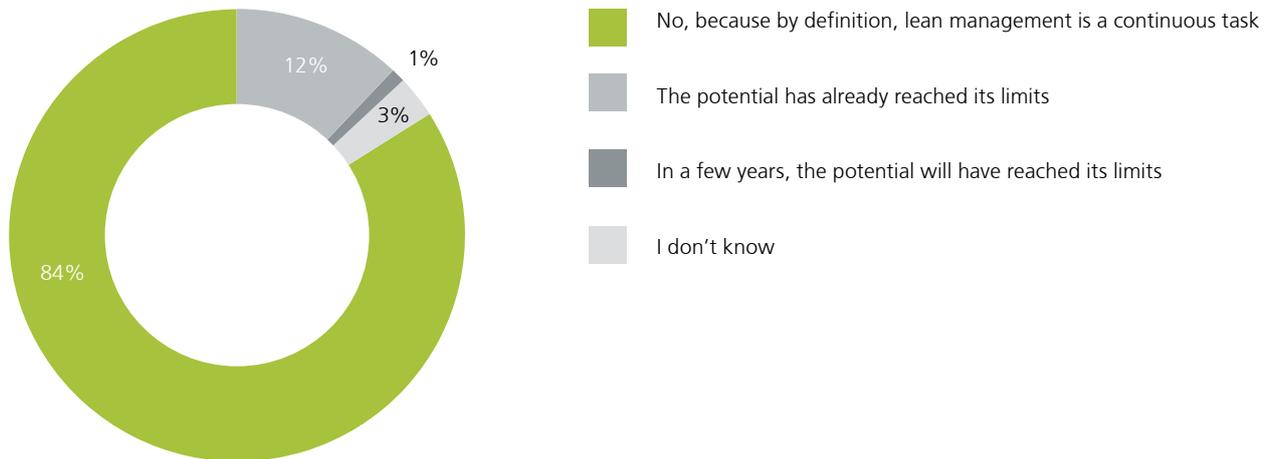
4

Eighty-four percent of the managers are convinced that lean management is, by definition, a continuous task and that its potential for efficiency and effectiveness improvements knows no limits.

”Lean management, as we have implemented it in our production system at Daimler, is a holistic approach that strives for long-lasting operational excellence within our organization. The heart of this system is establishing a culture that consistently pursues the idea of continuous improvements and does not get lost in short-term problem solving, but rather, acts on the long-term company goals. This gives lean management significant leverage for future company success and is highly respected among management.“

Thomas Twork, Foundry Manager Truck Powertrain of the Mercedes-Benz plant in Mannheim

Is there a limit to the potential of lean management to increase efficiency and effectiveness?



At least in the field of production, lean management long ago evolved from being a project to being a culture. The next step is a holistic approach in the sense of a lean enterprise – to be able to master the challenges of Industry 4.0 and the digital transformation from the start to the end of the entire value chain.

”When introducing lean management, we told our employees: lean management is not a diet that will be over in a couple of weeks, it is a permanent dietary change!”

Hans-Peter Lörch, Technical Director, Rosenbauer International AG

”Lean management is not a collection of methods, but rather a philosophy, an inner attitude to strive for perfection.”

Alexander Vetter, Lean Expert, Altra Industrial Motion / Stieber GmbH

Lean management: an international comparison

4

Muda, Mura and Muri – the terminology of the lean world indicates its origin: Japan. Since the middle of the 20th century, the methods of lean management have largely been influenced by the automobile manufacturer Toyota.

The responses of the participants of the study reflected this when they were asked to what extent lean management has made its way into the economy of different countries: Japan ranked first, and Germany ranked second, ahead of the USA.

To what degree do you feel lean management has made its way into the economy of the following countries?

Averages*



* Average:
0 – Not at all
1 – Hardly at all
2 – Somewhat
3 – Quite well
4 – Extensively

Prof. Dr. Daniel T. Jones
on the implementation of lean management in Great Britain

”It is particularly impressive to observe how lean thinking is expanding from the producing industries into different areas – a development that can clearly be seen from the retail industry across the construction sector to service providers, government authorities and healthcare. The future of lean management continues to be exciting.“

Dr. Michael Ballé
on the implementation of lean management in France

”A large number of French companies have implemented lean management programs. Among them, we can find true examples of best practices companies that serve as role models for companies across the world.

On the other hand, we also have many companies that only want to use lean management to improve specific areas, instead of changing their general way of thinking. Here in France, we are as good or as bad as any other country.“

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