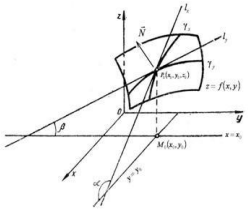
SELECTED EXCERPTS FROM THE BOOK "LEAN IN ACTION"

THE LION COMPANY HAS TWO TECHNICAL OBJECTIVES

According to a zoological interpretation of the Life Cycle Theory, the hawk companies circle over the market at the stages of product intro and product growth. When the market is saturated, it is taken over by lion companies. Then when the product is at the end of its life cycle, there are the jackal companies which glean the meat off the carcass of the rest of the market.



The lion company has two intelligent technical tasks to resolve. The first of these is to create a construction which is suitable for real production, which is designed in such a way as to use small number of materials, components and assembly units. The second task of the lion company is to create a technology consisting of a small number of optimized, checked and stabilised processes and operations. In fact, the predominant advantage of the lion is its powerful technical resource – its designers, constructors, technologists, testers and other personnel who are capable to create from the project a production with optimized, stabilized and high value added processes.

The lion, unlike the hawk, focuses on technical and organisational solutions related to product and technology. The hawk quickly develops a new product and puts it on the market, without much thought for price and technical improvement. How does a lion achieve price 2 times, or 20 times, or 200 times lower than a hawk? It achieves this much lower price because it has the technical resource to excel in design and technology. The lion creates structures suited to real production, and which are designed for implementation with a small number of materials and a small number of operations. Furthermore, the technology must be designed to include a small number of processes and operations, capable of being optimised, verified and stabilized. In the case of "lion" type companies, it isn't the skis riding the skier, but the skier riding the skis. The allusion to skiing (understand "technologies") is important because in many companies' technology is not mastered and when the production results are good or not good, it is not even known why it happened.

EXCERPT FROM CHAPTER 01. KEY IDEAS OF LEAN

BARRIERS TO COMPLIANCE WITH TECHNOLOGICAL COST LIMITS

There are reasons why technological cost limits are burdened with falsifications. One reason is overstocking on the pretext that a given material is in deficit or a delay on the part of the supplier. Today we have the material, tomorrow we don't. Let's buy now and let's buy as much as we can. Any reader of this book could acquire a wasteful manner of beer drinking, if they knew there were 20 beers in the fridge. It would be a completely different manner, if there were only two beers.

Another reason may be an unreported dependence on the length of a given batch. In the case of short batch (not always), the relative cost limits are higher. Most things get distorted when rework operations are possible. In the case of possible repeat operations, we cannot specify technological cost limits.

There is a risk contained within the term "Technically acceptable scrap rate". Let's assume permissible scrap to be 5% and real scrap to be 6%. We should say: "We have 6% scrap, one percentage point above the technologically permissible 5%". This is a long sentence which is why we refer to 1% scrap. But this is untrue, the scrap is 6%. If we have reduced scrap to 2%, we should say: "We have 2% scrap, three percentage points lower than the technologically permissible rate of 5%". However, this sentence is also long. So, we say we have no manufacturing scrap, which is also not true, because we have 2%. If we assume that we are working with a pre-affirmed norm of technologically permissible scrap, this means that we have accepted excessive costs in terms not only of materials and blanks, but also all other types of production resources. We see a paradox in industries which manufacture to order. An order for 100 units. We start with 110 blanks because we have a 10% scrap norm. However, we're performing better, and produce 105 finished products rather than 100. The order is for 100. What do we do with the extra five? They go into scrap, because there's no customer for them. So, if real scrap falls below the level of normal scrap, we make a loss. We have to discard a perfect product. That's ridiculous, isn't it! Another thing that may prevent us from complying with the technological cost limits is time or batch reporting, rather than orders. When reporting is based on time or batches, we can always transfer resources from one period to another (or from one account to another), thus concealing any breaches of technological cost limits. The greatest scourge are punitive models for reporting and paying for labour costs. It's quite natural that if a person is afraid of being punished, they will hold something back in order to prevent non-compliance and thus avoid punishment. The Lean philosophy is not compatible with a punitive model for reporting and payment.

EXCERPT FROM CHAPTER 02.
DESCRIPTION AND MEASUREMENT OF PRODUCTION

WE HAVE OUR OWN MUDA

This is something beyond the bounds of Japanese and American imagination! We have created Muda of our own. These Muda are mainly due to the "legacy circumstances" in Bulgaria and everything related to it – unusable areas and buildings, unnecessary materials, supplies, devices and tools, unfit machines and installations.

Some time ago, a machine building company near Botevgrad City was planning to build a new facility, in order to expand production. They had seven warehouses. After conducting an inventory, it turned out that two warehouses were sufficient. They had enough room for two new workshops. They had three other warehouses left. They were rented out.

We have more Muda. A large volume of additional and auxiliary processes and operations due to a lack of control over the core process. Complicated control systems, as well as correction processes and operations embedded in the technology itself, because we do not know how to achieve quality from the outset. Inexplicably long preparation and finishing times, because there is little or no technological provision for the preparatory and finishing operations. Next, we will see an example of a plant in which the preparatory and final times in total are ten and more times longer than the main times.

A sea of unnecessary documents, rules, data and records, partly due to the mechanical implementation of ISO 9001, but much greater than the inability or reluctance to create a simple but efficient management system.

Incompetent executives and illiterate performers, an increasingly widespread phenomenon in large companies. This can lead to a multiplier effect of illiteracy and powerlessness in the high levels of the management pyramid.

Pointless subordination and inefficient control, especially if foreign rationalist management models are overcooked.

The last three Muda exist elsewhere in the world to a greater extent than in Bulgaria. But we have them too. The fact that they exist elsewhere doesn't excuse us.

EXCERPT FROM CHAPTER 03. THE SEVEN MUDA

FIRST TIPS FOR CREATING A VALUE STREAM MAP

Where do we start? We suspect that in a given product line there are large losses, and we will probably start from there. If some essential elements of the production are changed, then we should have to build a new pictogram. That's the first bit of advice. The second bit of advice is important. It was emphasized in Chapter 02 relating to production description and measurement that when we collect data on operations and processes, we start from scratch, as if no one before us has described these operations and processes. We don't trust any previous data that's available at the firm. Even if the data was correct at the time of gathering, it may have become obsolete over time or there may have been a strong subjective factor in generating this data and it may have been deliberately distorted. We have to pay particular attention to production capacities! We have seen a number of reasons for concealing real capacities. Attention to technological cost limits! There are reasons why norms can't always be trusted. Here, the principle is that we believe only that information which we have personally obtained, whether through observations and measurements or otherwise.

More pieces of advice. When several people work together, then we need to adopt a unified system of pictograms. We need to have someone, let's call him editor-in-chief, to summarize and assemble the results. We collect data as the Japanese says: "Go to Gemba and get them, they are there". Gemba is "on the shop floor". Bulgarians say: "See it with your eyes, touch it with your hand". Data is not collected from a desk by digging through computers and dusty folders. We have to go to the shop floor and stand next to the worker. We collect personal data "on-site". We describe the processes from the customer right back to supply. The rule is not explicit, but if the books recommend it, it might make sense. Anyway, this is the advice, and we accept it. But with the condition that the rule applies more to inverse tree process, such as in the assembly industries. In the case of linear types of processes (processing industries) and branching tree processes (manufacturing industries) I do not see any serious reason why the flow cannot be described in the opposite direction – from input to output. We described production from the input to output in the example of Voestalpine FAE. Starting from a small number of types of sheet steel, they produce hundreds of types of base plates for railway turnouts. How did we choose the base plates for the first VSM. We chose two sets of base plates – one base plate with the most sophisticated technology and the longest trajectory of movement around the plant, and the other base plate with the largest volume of sales.

INTRODUCTORY WORDS FOR 5S SYSTEM IN WORKPLACE

Sorting! – 1S, Straightening! – 2S, Shining! – 3S, Standardise! – 4S, Sustain! – 5S.

There is no way that manufacturing can be fully effective if its building cells are ineffective. The building cells of production are workplaces and work sections.

The idea of the 5S System is to take five steps.

Step one – Sorting! – Select everything you need and remove everything unnecessary, so that everything you need is at the workplace and there is nothing superfluous (needed or superfluous for the work you're currently doing in the workplace).

Step two – Straightening! – Arrange the workplace in a way as to guarantee the worker a safe and harmless workplace and simplify and facilitate their work as much as possible, especially in shortening the operation times.

Step three – Shining! – Cleanliness in many industries is an element of technology. But there is another side – when the workplace is clean, it affects you motivationally. If you work in a pigsty, you feel like a pig.

The rules for the first three steps (Sorting! Straightening! Shining!) must be defined and shown to the people who will perform them, in an understandable way. This is step four, Standardize! Create standards! – standards for proper selection, standards for proper arrangement, and standards for proper cleaning.

The achievements of the first four steps must be sustained and improved. Step five – Sustain! It is not enough to have rules for choice, arrangement and cleaning and to have announced and explained them in an appropriate way.

Plus, all this requires compliance discipline and a mechanism to review and improve these rules.

It can be said straight away that 5S can be implemented in a few months, but people need more time to get used to the rules. So far, we have not seen a stabilized 5S System before the third year of implementation.

In Chapter 05 of this book, there are notes of instruction – do one, do two, do three. There are guidelines as well – do this and do that. There are instructions, it's better to do this, not this. There are prohibitions – don't do this or that.

There are also examples that make it easier to choose the best solutions.

EXCERPT FROM CHAPTER 05. 5S SYSTEM IN WORKPLACE

DIFFERENT NUMBER OF TECHNOLOGICAL DEVICES IN LONG AND SHORT BATCH

Number of orders	Number of collets
20	50
50	20
100	10

For a short batch, a smaller number of technological devices are used.

We see a tech gadget called a Collet. The customer order is for 1000 units. We can cut this batch into 20 production orders of 50, or 50 orders of 20, or 100 orders of 10. We can see how many Collets there are in all three cases. In the first case 50, in the second 20, in the third only 10.

Number of lots	Length of lot (m)	Number of balises
1	5000	500
5	1000	100
10	500	50

We will consider a similar case with a large and small number of signal balises when repairing a 5000 m road section, broken down into shorter or longer repair lots. The balises are 10 meters apart regardless of the length of the lot.

If the repair is done at one time, the lot is as long as the road section, i.e. 5000 meters, 500 signal balises are needed. If the repair is done in 5 lots of 1000 meters, 100 signal balises are needed. If the repair is done in 10 lots of 500 meters, only 50 signal balises are needed. Balises are not cheap.

Let us assume that there may be other reasons for economic efficiency or another kind of appropriateness to make repairs at once all over the section.

If there's anyone who can give money without taking it out of their own pocket, everything looks fine.

EXCERPT FROM CHAPTER 06. SHORT BATCH PRODUCTION

THE TOURIST BACKPACK TASK

	Five orders awarded for production, but it does not have the capacity to take them all				
	Order 1	Order 2	Order 3	Order 4	Order 5
Revenue per order	P1	P2	P3	P4	P5
Readjustment time	T1	T2	T3	T4	T5
Order efficiency vs. readjustment time	P1 / T1	P2 / T2	P3 / T3	P4 / T4	P5 / T5

Let's take a look at an interesting example – that of the tourist backpack.

The volume of the backpack is limited to, say, 80 litres. The things we want to put in the backpack amount to a lot 180 litres. We have to decide which things we can take and which things we have to leave behind. The things we want to take are inseparable things like a sweater or thermos. There a no half-sweaters or half-thermoses. Moreover, our need for things is different, and this need is discretionary.

A backpack is a backpack. We are talking about manufacturing orders and production capacity. Different orders 1, 2, 3, 4, 5. The revenue from an order is P, and the time for readjustment the equipment for this order is T.

The P/T coefficient characterizes order efficiency versus the readjustment time needed for it. We will try to fill the backpack (i.e. to put into production) only such orders where the P/T ratio is high.

Given this assumption, certain low-performance orders are eliminated, despite the risk losing their customers. Only higher-performance orders remain.

Orders which go into production are completed to a high level of quality, and on time, to the satisfaction of the customers. The orders are indivisible – we can only complete entire orders, not parts of orders. Since the orders are indivisible, it is quite possible that part of our production capacity will remain idle. However, we still need to try to maximize our profits through a rational scheme of readjustment the equipment.

I am absolutely convinced that the planning departments of our companies do not have the software to resolve this undoubtedly useful task of order prioritisation.

EXCERPT FROM CHAPTER 07. SINGLE-MINUTE EXCHANGE OF DIE (SMED)

FIRST STEPS AND RISKS IN THE IMPLEMENTATION OF TOTAL PRODUCTIVE MAINTENANCE

Target units or equipment are chosen, also criteria for maintenance centring. It is assessed whether the maintenance is appropriately positioned in the organisational chart. Conditions are created for autonomous maintenance. The most important of these are freedom of action and "first level" maintenance manual. This is followed by a change in the maintenance planning mechanism.

There are plenty of risks! Let's take a look at them one by one. The biggest risk lies in the unsuitable choice of target units or equipment. I will say here that I do not know what is suitable or unsuitable, if there are no clear and unambiguous criteria as to what this choice is aimed at. Suitability of choice is the responsibility of the company management.

In a lot of companies, the logic is to start where things are a cause for concern. For example, units with insufficient capacity, equipment in bottlenecks, the most expensive equipment and equipment with the slowest rate of return, as well as unique equipment. In other companies, the logic is to start where there is a high level of readiness – where there is previous experience or the necessary competence and/or where things are expected to happen without particularly high human resistance. The thought process in some companies is – let's focus our TPM on equipment in the initial stages of the production process, because if the equipment there is causing faults, in the next stages of the process there will be entire chains of faults. Naturally, the selection of target units and/or equipment for pilot work on the implementation of the TPM can be done on the basis of other arguments. The other thing to consider is the difficulties in collecting and analysing data, especially the risk of subjective distortion. In large companies especially, when the management hear and like the notion of TPM, they say: "We'll implement TPM, but not partially, we'll implement it completely. But if it's going to take more than three months to implement it, we may as well not bother at all". We'll hear that reasoning. In order to reduce the risk, we need to implement TPM in one unit or for one type of equipment. Once we learn how it works, we'll expand the application. But we'll be walking a well-trodden path with no pitfalls. Another risk for TPM is not to receive or to have weak "white collar" support. This is understandable, especially if we have too many white collars. There may be resistance from specialized technical personnel. They're afraid that their authority will be undermined. It will take away their role of a demigod who determines the destinies of the company's technical problems. Manufacturing fires are also a risk, they also divert attention from TPM.

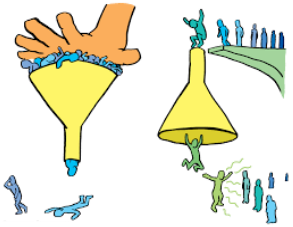
PROTOTYPE "IN JAPANESE"

Well-researched production does not pose the risk of nasty surprises. Let's try to understand the "Prototype in Japanese". When the Japanese make a prototype of a new product (or sample or trial series), they deliberately do so in a problematic work environment in which production factors are taken almost to the limits of non-conformity.

Materials with very broad tolerances are deliberately used.
They use suitable materials, but they're on the verge of non-conformity.
They deliberately use machines that are about to undergo capital repairs. They're still working machines, but almost to the point of non-conformity.
They deliberately use recently recruited, trained workers, but have not yet fully mastered their work and are therefore at risk of making mistakes.
Then if despite using shoddy materials, derelict machines and inexperienced personnel, they obtain a successful sample, all the units of regular production will be better than the sample. We do the opposite of the Japanese – we look for special materials, we use precision machines, we engage the most experienced people. Then we are always unpleasantly surprised that in regular production we fail to obtain repeatability and reproducibility.
The "Japanese Prototype" is the forerunner of the idea of polyvariant technologies (aka "quasi-exhaustive technologies") based on favourable and unfavourable variations and/or combinations of production factors which have been well researched. From delivery to delivery, the characteristics of the materials change. The physical condition and the technological setting of the machines change. People are different. Atmospheric conditions change and affect the working environment. At a given moment, the production factors can combine in a different way, and for each combination there is a range of technological variants. There could be 30 in total. Today's production factors are in combination No 16, and technology variant No 16 is valid. So today we're going to use technology number 16.
So, we realise that documents such as a "Technical requirements change order" or "Limited timescale change order" have no place if you use such a model of technology.
Here's a summary. If we have studied the production process in advance, we can develop solutions to possible problems in advance.

EXCERPT FROM CHAPTER 09. SINGLE ELEMENT FLOW & CONTINUOUS FLOW

TO UNDERSTAND THE DIFFERENCE EVEN MORE CLEARLY



A comparison of the two images gives a clear explanation. The right image shows a Pull Flow. It might flow at a lower flow rate, but it flows constantly and evenly, without tension. The image on the left shows a Push Flow. It contains unfinished production that is clogging the flow and prevents it from moving smoothly.

The image shows something else. On the left is a Push Flow. The hand that symbolizes the pushing mechanism is crushing the orders. Beneath the funnel on the left, orders are damaged and unfortunately crushed. To the right is the Pull Flow. The orders willingly leap into the funnel and happily jump out of it. Let me say it again, because it is extremely important – the Push Flow is a source of constant organisational and psychological stress.

WHEN WE DISRUPT OUR OWN STREAM

Here's a line of cars in a motor procession. Due to unforeseen circumstances encountered on the road, if the speed of the first car fluctuates by plus or minus 5 km/h. The second car, in order not to drop behind, varies its speed by plus or minus 10, then the following cars – by plus or minus 15, by plus or minus 20, by plus minus 25. This example reminds us that the greater the number of operations in the process, the more likely it is that the latter operations will become unstable as a result of destabilizations in its first operations. Let's recall. The lion company designs a process with a small number of operations, not only because it is cheaper, but also to make the process more stable in its entirety. The fact that the process is more stable given the smaller number of operations does not always and necessarily mean that we need to reduce the number of operations. This result may also be achieved by grouping similar or related operations. The island does not always fully cover production, or at least rarely does. In most cases, the island covers only one part of the entire production process, i.e. some distinct group of related operations. If the island includes only part of the process, and if in such an island production is shaky, then the production is shaky only within the island itself, and this will not cause the production flow in its entirety to shake.

EXCERPT FROM CHAPTER 10. INVERSE PLANNING & PULL FLOW

PREREQUISITES FOR IMPOSING JUST-IN-TIME SYSTEM

The Just-in-Time System was born for the automotive industry. It is now rapidly entering new industries. How did it become the knight on the white horse?

Important prerequisites are the fragmentation and diversification of production, leaning increasingly towards the customer individualization of the final products.

Globally, there is a trend towards make-to-stock production to give way to make-to-order and catalogue production.

In the case of make-to-order production, there are certain signs that they are close in nature to catalogue production. Yes, in the case of the catalogue production of certain products, the nomenclature is relatively small when compared to that of make-to-order production of the same or similar products. But how much smaller is this nomenclature? It is growing and growing...

A global phenomenon is rising land prices. In the 1950s and 60s, expensive land prices put a lot of pressure on the Japanese. They were unable to build spread out single-storey factories like anywhere else in the world.

Thus, two concepts emerged in Japan. One was for factories to be designed vertically: the working operations on the floor, intermediate storage and inter-operational transport are under the floor or on the ceiling.

The other and more interesting concept for us is Lean – the irreconcilable struggle with the unfinished product, stocks and queues and all the other types of Muda that uselessly occupy these areas which we are always short of.

There is also a premise that motor transport prices tend to fall, not in absolute terms, but relative to the price of the goods transported.

Also, today's shipping and logistics allow groupage and other forms of combining cargo or optimizing routes.

A long time ago, we thought that rail transport and transport by large trucks were more efficient, but they are not, especially if the delivery time costs money.

An increasing level of resources are being invested into inter-factory transport using trucks, cargo vans, and pickups.

That is precisely what we are about to observe more clearly.

EXCERPT FROM CHAPTER 11. JUST-IN-TIME PRODUCTION AND DELIVERY

BAD WAYS TO FORCE UNCLOGGING

Let's look at a few not very sensible and primitive ways of forcefully dealing with bottlenecks. If we rely on these ways, we may temporarily or partially resolve an ongoing and perhaps local problem, but because we will not have attacked the causes of the problem, it will recur.

The introduction of bonuses in the bottleneck for timely execution of an urgent order may lead to its urgent completion. However, from that moment on after you've let the genie out of the bottle, any subsequent order, whether urgent or not, will be deliberately delayed until bonuses are promised. Persons working in the wider areas before and after the bottleneck will also ask for a bonus, and in order to provide their own arguments, they will skilfully conceal their real capacities.

The temporary introduction of additional operative personnel into the bottleneck is also a frequent solution. If they have the qualifications, yes... If they don't, the time in the bottleneck will be wasted and it will become even more narrow.

There is also the vicious practice of making fervent speeches and holding desperate meetings about the urgency of an order. There is a hidden risk that every order will become urgent if there are no speeches and meetings for it.

In some companies, the bottleneck is managed under supervision and/or with the direct involvement of a line manager. And then (out of sight and out of mind...) every place will become a bottleneck, if it's out of the sight of the top company management.

Other companies have the practice of the bottlenecks being overseen by a hard line manager who tightens discipline. This creates conflicts between people in the bottleneck and people in other places. The risks of an increase in internal and even external personnel turnover also grow. A panic decision is taken to replace the direct boss in the bottleneck on the fly. Such a decision might be all right once or twice. However, once it becomes a regular practice, it brings about uncertainty and a lack of clarity in career growth. It can create a tainted atmosphere between the individual levels and units, inflaming smouldering conflicts, and gives rise to turnover of middle and direct managers.

EXCERPT FROM CHAPTER 12. LEAN AND BOTTLENECK MANAGEMENT

PRIORITY BY ORDER EXECUTION TIME

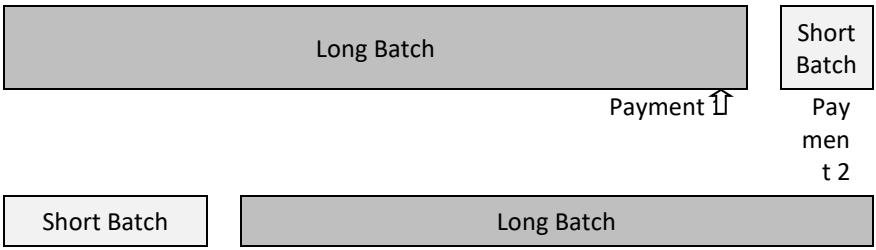
We first produce those orders which we will be able to complete in a shorter time. The orders that take more time are left to wait. This is almost the perfect order from at least two points of view. On one hand, the total waiting time in the production order queue will be reduced. On the other hand, this order will allow us to load our production capacities relatively evenly.

Let's imagine a dentist's office. There's a queue in front of the cabinet of patients who didn't book an appointment in advance and there's no patient with an emergency. What's going to happen? The dentist comes out and starts asking, "What are you here for, what are you here for, what are you here for?". And no one's his friend. They're all equal. "Who will the dentist invite to come in?". The one he can serve most quickly.

That's like a really experienced production manager. He's least willing to begin production of the slower orders and/or the longest batch. Slow orders, as well as long runs, clog up and block the plant, while short runs and quick orders quickly knock on the door of traders and senior management.

The experienced production boss runs to the high-ranking bosses and cries for more people, more machines and more areas to put out fires.

PRIORITY OF SHORT BATCH RESULTS IN FASTER PAYMENTS



There is another important advantage of prioritising orders according to the length of the batch, respectively according to the time for completion. First, we produce the shorter batch. And then we produce the longer batch last. This allows us to receive a small part of the payments earlier.

EXCERPT FROM CHAPTER 13. LEAN AND QUEUES MANAGEMENT

NO LOSSES FROM SURPLUSES AND INSUFFISANCES

Losses, especially those related to surpluses and insufficiencies, are directly linked to the delivery size, or also the delivery period. By ordering less often and in bulk, the more likely we are to accumulate surpluses.

And if we experience a problem of insufficiencies, it will last a long and painful time if the next delivery is late. In the case of large-scale deliveries, we have big surpluses and serious insufficiencies.

Conversely, in the case of small deliveries, even if we accumulate an excess, we will quickly get rid of it. If we end up running an insufficiencies, and the next delivery is literally due within days, there are no risks for business. There's a story that we'll borrow from our neighbour and then we'll clog it up again.

Surplus and insufficiencies punish us and show that we are sinners and that we lack faith in a higher power. We need a Guardian Angel. The Guardian Angel in this case is the gentle supplier who is used to the notion of delivering frequently in small batches. And before we know it, we are embraced by the spirit of a lasting partnership. And if a surplus arises, then the Guardian Angel will deliver less next time. He might even be willing to buy back any excess.

If we find ourselves in a position of insufficiencies because the supplier is used to deliver frequently small quantities, he will make urgent deliveries in the necessary quantities to plug the holes. The supplier will save us from both surpluses and insufficiencies. This is the Guardian Angel, the supplier who has acquired the manner of delivering frequently and in small quantities.

BALANCE OF FORCES

A fundamental principle of logistics states: "Work with those who are equal to you!". It doesn't feel comfortable being a small customer of a very large supplier. And it's not at all comfortable being a big customer of a very large number of small suppliers. In the latter case, there is a solution and it is in the integral suppliers.

The supplier and producer must be of the same calibre. Let's remember the principle of working with same-calibre suppliers. Most of our purchasing problems come from the fact that we are not equal in power to our suppliers.

EXCERPT FROM CHAPTER 14. LEAN AND STOCKS MANAGEMENT

QUICK RESPONSE QUALITY CONTROL (QRQC)

Quick Response Quality Control (abbreviated as QRQC) is a variant of Daily Management or at least the logic is similar – a fast and standardized response to an anomaly. The QRQC method is a creation of the French company Valeo – a major supplier of the automotive industry. The QRQC method is based on two central ideas. One idea is that if a problem arises, we stop the process and we don't release it until the problem is resolved. The second idea is to implement a standardised batch of measures to address possible direct causes of the problem.

In more detail, the QRQC method contains four successive steps.

Step 1 rests on the principles of Jidoka and Autonomation and contains three parallel actions – detecting the problem (Action 1), stopping the process (Action 2), describing everything known about the problem (Action 3).

Step 2 consists of two parallel sub-steps. One is to disclose the problem to those units and positions that may be affected by the possible consequences or possible spread of the problem. The problem is detected in machine X and is due to unsuitable material Y. This material can be sent to other machines, let's warn people there. Here we can recall the practice of Jidoka Yokoten from Chapter 08 for TPM. The second sub-step of step 2 is to disclose the problem to all units and persons who are proven to be competent or may be competent with regard to the possible causes of the problem. This means waiting for their help.

Step 3 – Quickly find and address at least the direct causes. This is done at the place where the problem comes to light, as soon as it has arisen and together with the owners of the process. Why with the process owners? First, because they have an opinion about the problem. And secondly, because they will be expected to support the decision, even if it is given by other people.

Step 4 – Check that the problem has been resolved effectively and permanently. Finally, information is submitted to the stakeholders and units that the problem

has been resolved, along with details of the solution. So, if the same problem comes up somewhere else, we have a ready-made answer on how to resolve such a problem.

In short, this is the QRQC method. We saw it being implemented at the Ossam foundry in Lovech City, part of the Metal Technology Group. A similar methodology is applied in Festo Production Ltd in Sofia City and Montupet Ltd in Russe City, as well as in several other companies.

EXCERPT FROM CHAPTER 15. DAILY MANAGEMENT

BACKGROUND OF KAIZEN TEAMS

A short pre-history... In the early 1950s, two Americans, Joseph Juran and Edward Deming, gave TQM courses to several owners and managers of Japanese companies. This was followed by large-scale training programmes in which owners and managers cascaded what Deming and Juran taught their management teams. They then cascaded it to middle managers, and they cascaded it to lower management levels. For the most part, all this was organized by the Japanese Union of Scientists and Engineers, which was then chaired by Professor Kaoru Ishikawa. By the end of the 1950s, almost all Japanese leaders at all levels had been trained in the ideas and principles and methods of TQM. At the end of the 1950s and in the 1960s, the timid idea emerged that operative personnel should also be included in the continuous improvement activities. That's how quality circles were born. According to literature, in the 60s and 70s 1.5 million proposals were made and over 30% of them were implemented. The Americans say that if they're doing it in Japan, why can't we do the same. In the 1970s, the idea of quality circles moved to America, then to Western Europe, and from there in the 1980s it came to us.

A lot of our enterprises embraced this initiative with the almost unwavering faith that Bulgarian quality would soon approach and exceed the world level.

You are holding in your hand a book by a proud mentor of a quality circle which won first place in a national competition in 1987. It was a hygienists' quality circle in a big hotel in Albena (major Black Sea Resort), consisting of ladies with at least one university degree. They analysed where guests discarded their cigarette butts and optimized the locations of the ashtrays in the hotel lobbies and corridors. For this purpose, they used the Concentration Chart and the Spaghetti Diagram.

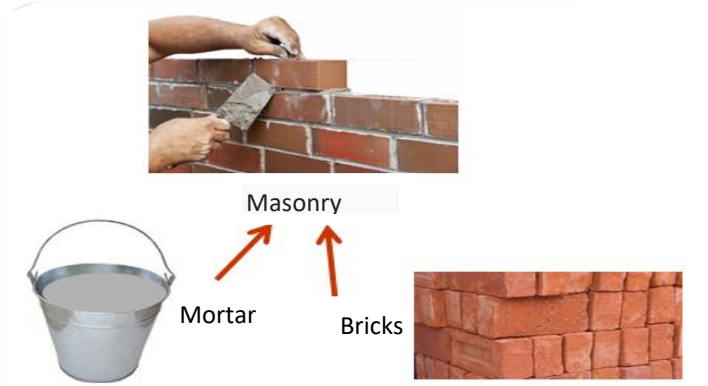
In the 1980s, although there were quite a few active quality circles, an error was made in the US and Western Europe, as well as in Bulgaria. This mistake was that

the leaders relied on the workers to lead the process of improvement. The leaders said: "Let them do the work, we will just stand by and applaud".

Quality circles in the United States, in Europe and in our country failed and disappeared due to the ridiculous mistake in thinking that the improvement activities can be fully entrusted to the worker, without the managers and technical specialists having previously contributed to the quality through whatever depended on them.

EXCERPT FROM CHAPTER 16. OVERALL PARTICIPATION IN CONTINUOUS IMPROVEMENTS

LEAN MASONRY



When I was out fishing for bream, I learned something which expanded my own knowledge, and I will tell it to you.

I was staring at the float, and I heard someone behind me giving orders.

I noticed that the apprentice was working with four buckets and carrying two buckets for the master. I turned around curiously. A white haired master bricklayer and a young apprentice boy were laying the bricks for a tall furnace. Just to clarify, the work site was pretty small.

Every ten minutes the master shouted loudly: "Bricks...! Mortar!" Andon calling for Kanban. The apprentice was carrying a barrow with 12 bricks on his back. Then two buckets of mortar – as much mortar as is needed for 12 bricks.

When the apprentice left the full ones, he took the two empty buckets away, returned them, and while waiting for Andon, he filled them with mortar. In other words, he had additional buffer hardware.

When his master shouted, "Bricks...! Mortar!", the apprentice immediately sustains the process. What I was seeing was a pull and push stream, a balanced and continuous flow, a perfect flow. The bricklaying team hadn't been trained in terms of Lean.

However, they managed to build the furnace by noon and left.

Another team with a more cumbersome production organisation would probably have taken a few days to build the furnace.

EXCERPT FROM CHAPTER 17. LEAN THINKING. LEAN AND ANTI LEAN

THE PROS AND CONS OF PILOT PLANTS WITHIN A GROUP OF COMPANIES

Advantages	Disadvantages
Criteria are selected to easily and quickly achieve significant and visible benefits	This may delay or hinder the transfer of good practices and thus cause discouragement
They have the incentives to run faster along the Lean tracks	Maintaining distance from other plants to protect their pilot role
They accumulate valuable know-how with regard to the specifics of deployment	It's not properly documented. They're not willing to share it with the other factories

In some company groups one of the plants of the group is appointed as a pilot plant and this pilot plant leads the pack in terms of all kinds of innovations and improvements, which then cascade to other plants in the group.

Let us look at the advantages and disadvantages of pilot plants.

A pilot plant is selected according to criteria of high technical, technological, educational and organisational level. This high level ensures indirectly that this plant achieves significant and visible results easily and quickly.

If there are drastic differences in the levels of the pilot plant compared to the other plants in the group, the transfer of pilot innovations and improvements may be delayed or impeded. This will lead to discouragement.

The management of the pilot plant has incentives to keep the plant running quickly along the Lean tracks. The management has an interest in keeping a distance from the other plants in order to protect the pilot role of its plant.

The pilot plant accumulates valuable know-how on the specifics of deployment.

There's a risk that the plant will be selfish and forget about its pilot mission.

This may give rise to the temptation not to properly document the know-how or, it is all the same, not to share the know-how willingly with other plants.

EXCERPT FROM CHAPTER 18. ORGANISATION FOR LEAN TRANSFORMATION

HOW NOT TO MOTIVATE

Whether we are able or not to motivate, it is more important to know which means of motivation leads to irreversible demotivation. There are many mechanically imported motivational schemes in Bulgaria, which are not only inapplicable in our environment, but are directly contraindicated. Models of motivation, inconsistent with our national characteristics, are doomed to failure or at least will not lead to the expected results. Example: A company located in Panagyurishte City would line up its personnel in the yard in the morning and a company song was sung to the sound of music. After being ridiculed in the town, this practice was abandoned for the nonsense it clearly was. Poster boards of the best workers (employees) for the month (year) corners of labour glory and more nonsense. This was invented in America in the 1930s, then transferred to the USSR and in the 1950s copied in our country. Then in the 1990s, we rejected it, and now we're returning it mainly under the pressure of foreign employers. Example: A brick factory that honours the best workers every month. People light candles and say a little prayer so that this kind of trouble doesn't befall them. Envy doesn't sleep – they get their tyres slashed on their cars, their windows are smeared with slop and tar, in the kindergartens the children of the prize winners are mocked by the children of former prize winners. Another perversion in the mechanical copying of foreign models is public mentioning of the prize winners and public admonishment of others who have been reprimanded. Not to mention the occasions when congratulations are sent to a family of divorced spouses, or the partner is unemployed, or has problems at work. This is known as the "Strong Alert Principle", which states that in order for incentives or penalties to be effective, they must be commensurate with the base salary. Small bonuses are not motivating, they only arouse envy and controversy. Or small sanctions that breed hatred and desire for revenge. There is no motivational effect in

egalitarian, late or pointless awards, or bonuses proportional to a traineeship or salary. In celebration of the 13 centuries anniversary of the founding of Bulgaria, jubilee medals were minted. They were distributed to factories and other organisation according to the size of the work force and were designated to decorate the breasts of the best workers. At the time, I was working in a research institute, in a room with two colleagues. The internal courier arrived at the door without knocking. She had a serious expression on her face. She had a shoe box full of medals in one hand, and a check list and a pen in the other. "Sign here", she commanded as she chucked three medals on the desk and continued around other rooms to get rid of the rest of the medals.

EXCERPT FROM CHAPTER 19. INCLUSION AND MOTIVATION TO PARTICIPATE IN IMPROVEMENTS

LEAN PRODUCTION AND SIX SIGMA

For centuries, armies used smoke screens as a tactical means of misleading their opponent and concealing their forces, positions and directions. A smokescreen is also a means of exhausting your opponent, because by firing into the smoke, they are wasting ammunition. You wear him out by getting him to make unnecessary manoeuvres.

Companies likewise in their fierce competitive battles, also use smokescreens. Rank Xerox in the 1970s used the Benchmarking smokescreen against their rivals. The smokescreen consisted of Rank Xerox making a competitive comparison of the product benchmarks of the world's three best companies, in the aims of specifying areas where they could catch up. It was a smoke screen. In fact, Rank Xerox was far ahead of competitors with their radical technical innovations to reduce toner consumption and bring the service network closer to the point of sales.

The smokescreen of Motorola in the '80s and then of General Electric in the'90s is the Six Sigma approach, which requires knowledge of stochastic modelling and Design of experiments, which most companies do not have.

Lean is an approach to accelerating and levelling the flow – combating losses due to topological, technological or organisational reasons.

Six Sigma is a methodology for improving the quality of the product by stabilizing and optimizing the parameters and modes of the processes.

This is done by applying statistical methodologies by project teams.

The project team defines the task itself and then solves the task itself.

They report the results to management and receive applause.

I'm not going to elaborate. There are reasons, mainly related to the specification for automotive suppliers IATF 16949:2016, which is why the market of Six Sigma has collapsed. This is because the Sigma methods are mostly statistical process

control (SPC) methods, and according to IATF 16949 SPC is a mandatory quality assurance tool.

Then Lean Six Sigma came into the market. In recent years, if something is linked to the Lean mantra, it becomes more marketable. If I decided to sell Lean cucumbers, they're more marketable than other cucumbers.

Sales potential is further strengthened by suggestions that taking a Lean Six Sigma certified course will benefit your personal career. I have my doubts about the curriculum of these courses. Some time ago, a self-confident black belt Lean Six Sigma consultant applied to work with us. I asked him about the difference between Poisson distribution and Boltzmann distribution, and the black belt curiously exclaimed, "What's all this about distribution?".

EXCERPT FROM CHAPTER 20. LEAN AND OTHER APPROACHES TO EFFICIENCY