Watch out for the tool heads!

Everything you need to know about lean manufacturing tools and why they won't work in service organisations

Foreword

I gained an antipathy to change by tools training and projects in the early Eighties while studying TQM programmes that failed. In essence the theory in the toolbox was diametrically opposed to the theory of the firm, so what would you expect to happen? Of course people do get improvements with tools but these are insignificant when compared to the benefits from changing the system, as Deming and others observed and as Taiichi Ohno proved beyond doubt.

I took the view it is better to teach perspective – how to think – and if tools help, people will 'beat a path' to the cupboard door. For example it is more important to teach the value, importance and issues associated with managing flow than teaching how to map a flow. I am still of that view. What's more teaching tools very rarely results in a change to the system.

Command and control managers like to buy change by training and projects, unaware that change really requires changing the system and unaware that means first being prepared to change the way they think about the design and management of work.

These issues have arisen again over the last year. People who are advocates of lean manufacturing tools are claiming they can be applied to service organisations. It is not a position I support. So I decided to organise a Vanguard Network day to discuss the issues[1].

This paper is a summary of the day. I am grateful to Stuart Corrigan, Andrew McLean and Stephen Maddocks, Vanguard people who first learned 'lean' in manufacturing, for their input; and thanks to Bridget Kelly for writing it up.

John Seddon
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[1] In this paper we discuss only those tools we have seen employed in service organisations, there are many others. For a comprehensive guide to lean manufacturing tools I recommend John Bechino's book: The Lean Toolbox, ISBN: 0 9513829 8 5

Overview of content

A brief history of 'lean'

Lean was (and remains) the first challenge to command and control thinking. In order to understand the nature of the challenge we look at the history of command and control and the advent of lean. The history helps us understand where the tools came from and how they and 'lean' got their labels.

An essential guide to the lean manufacturing tools

An overview of the manufacturing tools we see being promoted to service organisations: 5S, takt time, Poke Yoke and Value Stream Mapping. We explain how they got developed, what they do and the benefits they can bring to manufacturing organisations.

How does service differ from manufacturing?

We will then contrast service and manufacturing, to make the case that service is different. The essential difference is that there is inherently greater variety in demand; the customers are involved in production. Because of this the whole rationale for what to do and how to do it, if you want to be 'lean', changes. To improve service, cut costs, increase revenue and improve morale you need completely different methods.

The Vanguard Method

Vanguard has developed a unique method for applying Taiichi Ohno's ideas to service organisations. We will demonstrate the approach with practical logic; you will be able to see the common sense of the Vanguard Method.

Tool head excesses

We then illustrate how the unthinking application of lean tools from manufacturing actually works against 'lean' principles, risking the creation of waste in both production and human terms.

Conclusions

We conclude by arguing that not only do the tool heads risk losing the opportunity to improve our service organisations, they diminish the likelihood that even manufacturers who employ the tools will achieve 'lean' systems.

A brief history of 'lean'

Mass production

The roots of mass production go back to Adam Smith who, in the 1750s, started experimenting with breaking down craftwork into simple repetitive tasks. He separated the activities required to manufacture a pin from a single craft based job to numerous standard and simple tasks. These tasks could then be carried out by un-skilled workers. He discovered the benefits to be greater consistency and lower unit costs.

In 1841 Joseph Whitworth had a different problem. He manufactured parts in a world where no two bolts would fit the same nut. Every machine shop cut their own threads to suit their application. The result was a complete lack of interchange-ability and no standard parts or replacement parts. His solution was to create a standard thread that meant replacements parts could be sourced with minimum effort. The Whitworth standards are still with us today.

Wind the clock forward to 1920's and we find Henry Ford has utilised both of the above ideas. He built the first mass production system: standardised production and assembly, high volume at low cost (economies of scale). Henry Ford famously halved the cost of manufacturing and doubled the workers' wages and, moreover, made good profits. Standardisation solved the production problems and was essential in dealing with the challenges he faced, i.e. creating and maintaining the methods for manufacturing and assembly using a multilingual workforce.

The scope and value of standardisation is illustrated by the fact that you can swap a Model T 1932 carburettor with a 1908 carburettor and it will fit and work just as it was designed to, even today!

But what was the consequence for the workers?
What had Ford done to craftsmen-like activity?
What was the impact on morale under this regime?

East goes West

Taiichi Ohno was given the task of making cars in Japan for Toyota. He went to the US to study how cars were manufactured in the world's largest and most efficient manufacturing plant, Ford's Highland Park plant in Detroit.

Ohno studied Ford's approach intensively for three months. What Ohno saw was:

A mechanised track, a core flow of work, where sub flows fed into the core flow on the track. Every 20 minutes a car came off the line.

He thought of the 20 minutes as a ‘pulse’ or a ‘heartbeat’, representing the flow through the whole plant. In essence, Ohno assumed the secret to effective production was flow. What he ‘saw’ was not the way the Americans thought about manufacturing, as he was to discover later.

When he got back to Japan Ohno faced a series of constraints. He did not have the same target-rich market in which to sell his cars, he also knew that the people buying his cars would want them for different purposes, so making large quantities of the same model wouldn’t suit the Japanese market. Additionally Ohno had limited cash to invest, he could not replicate the huge investment made by Ford in many dedicated lines and multiple giant presses (used to shape car body parts from sheet steel). With only a limited number of presses Ohno had to find a better way of using them to produce different products.

Ohno’s only choice was to shorten the length of time it took to change the presses at each product change; he learned he could operate by changing more frequently. This flew in the face of ‘economies of scale’ but Ohno found that it was actually cheaper to operate this way.

This was counter-intuitive; Ohno sought understand why less units and greater variety actually meant lower costs. He learned that the true costs of production are end to end and he discovered that having more variation in the line left fewer parts tied up in inventories and work in progress. This meant although the unit cost for each product was higher the total costs of production were considerably lower. He discovered economy of flow was superior to economy of scale.

The assumption of the mass producers was that if you move to manufacturing in smaller batch quantities, costs would go up. Despite this Ohno saw a batch size of one as the ideal. He learned that working on the flow of work end to end and cutting the time used to reset machines led to better throughput; also lead times fell, inventory fell and quality increased. Ohno’s quick changeover approach to production was ideally suited to the market, people wanted variety and he was able to build variety into the system.

A further problem facing Ohno was the loss of skilled workers going off to war. Faced with losing those who knew the jobs the best, he decided to capture the knowledge to enable semi skilled workers to produce a similar level of productivity and quality. This required standard methods for carrying out specific tasks. With a standard work approach and standard products Ohno was able to analyse the system in very specific terms and improve design, machines or method accordingly. The variation in output was no longer be hidden behind different work methods of individuals.

When a car is ordered from Toyota it triggers the plant to manufacture the car – regardless of the make or model of the car or indeed the colour of the car. It is a ‘pull’ system, nothing happens without an order. Ohno saw management’s role as working

across the whole system to ensure that all the tasks of manufacturing fitted together to allow the production line to work to the beat of the heart: the demand of the customer.

The most important lesson from the Toyota Production System is that the methods employed by Ohno were developed in response to defined problems and, in turn, those problems were framed by the way he thought about the design and management of work.

West goes East

Struck by the 'economic miracle' of the Toyota Production System Western business leaders visited Japan. When asked by their visitors "How do you do it?" the Japanese were perplexed and answered: "But we learned it from you!"

When they visited the Toyota Production System, Westerners found to their amazement a way of working that made perfect sense; they saw solutions applied in specific situations which meant, for example, that change-over of tooling could happen unbelievably quickly, they saw workplace organisation of a type that tamed the workplace into a safe and tidy place to be. They saw design of products for assembly that meant the product could only ever be assembled correctly, they saw workers and managers huddled around problems working to solve them using interesting techniques. Not surprisingly they thought to themselves… 'we'll have some of that!!'

Tools – the codification of method

It was in this environment that the 'lean manufacturing tools' emerged. While they were developed as working methods in the Toyota System, people sought to codify the methods; hence the tools were born. Codification meant words had to be chosen to describe the tools, SMED, 5S, Poke Yoke and so on. But the codification of method missed just one important issue, thinking. Whilst the tools were and are accurate descriptions of what happens in terms of method, it is the context that is more important.

To Ohno it was intuitive. It was a way of behaving when faced with problem that needed solving. It was both conceptual, for example focus primarily on flow not function and behavioural: If you found a problem it was normal to talk about it, get data about it, share it with colleagues and experts; learn the right way to fix it and then apply the solution in a way that was focussed on this 'learning'. It was based on both knowledge and empiricism. When faced with another problem the same principles would be applied as before. In effect it was what we might call a learning and knowledge culture.

The desire to codify led to the selection of those things that appeared to be making the big differences and describing them as a series of tasks or steps to be undertaken. Codification itself suited the command and control culture. Tools could be taught, directed at problems (as defined in the current view) and reporting on progress could be institutionalised through the hierarchy. It is a stark contrast in leadership: learning and method through active involvement versus tools training and projects with involvement limited to specifying (the wrong) problems (or specifying them wrongly) and receiving reports on progress.

Ohno's culture was one of learning how to make the work work better in order to create value for customers. To work this way needs reliable methods to produce products that assemble and function faultlessly, for without this waste appears. But the more important part of the phenomenon was perspective, the way the work was approached; it was that which lay behind the tools and ironically, because of tools remains hidden to managers of a different mind set.

The intent of the codifiers was and is honourable, they want others to gain the same benefits; but their mistake is a mistake of intervention. The solution does not lie within the toolbox; it lies in the way we think about the design and management of work. We now see organisations investing in tools training and project reporting. We should be investing in changing thinking.

It is for this reason that we developed the following comparison:

Command and control thinking		Systems thinking
Top-down	**perspective**	Outside-in
Functional specialisation	**design**	Demand, value and flow
Separated from work	**decision-making**	Integrated with work
Output, targets, standards: Related to budget	**measurement**	Capability, variation: related to purpose
Contractual	**attitude to customers**	What matters
Contractual	**attitude to suppliers**	Co-operative
Manage people and budgets	**role of management**	Act on system
Control	**ethos**	Learning
Reactive, projects	**change**	Adaptive, integral
Extrinsic	**motivation**	Intrinsic

Figure 1: Command and control thinking versus systems thinking

The Toyota Production System was labelled 'Lean' by Womack, Roos and Jones in their seminal work: "The Machine That Changed the World". The word represented the ideas of economy of effort, minimising waste and joined up thinking in terms of working hand in hand with suppliers to manage flow; the consequences were low cost, low inventory and fitness for purpose.

'Lean' was the term coined by Womack, Roos and Jones in their book " The Machine That Changed the World". They used 'lean' to describe Toyota's system. Taiichi Ohno did not call it 'lean'.

Creating the label 'lean' (what it is), leads naturally to the notion of tools (how you do it), obscuring the importance of perspective (how to think about it). Obscuring the importance of perspective leads to a failure to realise that Ohno's ideas represent a

philosophy for the design and management of work that is diametrically opposed to today's norms.

An essential guide to the lean manufacturing tools

In this section we explain the tools being promoted as 'solutions' to service organisations, illustrating how they are used in manufacturing. For each tool we address the questions:

- What is it?
- How does it work?
- What benefit does it bring to manufacturing?

Five S

What is it?

5S is a tool that is used to provide a standard workplace environment, enabling standardised work and it helps remove waste. 5S provides visualisation of the work and waste, it enables you to see flow. 5S involves employees in maintaining an organised, efficient, safe and clean workplace.

5S is known as many things: 5S, 5C, Cando, Work Place Organisation (WPO), illustrating the fact that codification often results in a struggle to properly and accurately describe the purpose.

Below are translations and pronunciations for each of the steps in 5S with a brief description:

Seiri	"Say-ree"	Sort	Instant disposal of unnecessary things, arrangement or re-organization
Saiton	Say-ton	Set in order	Put things in order
Seiso	Say-soo	Shine	Clean to original condition, do clean work positively
Seiketsu	Say-kit-sue	Systemise, Standardise	Clean, pure, untainted workplace. Free from bad habits
Shitsuke	Shit-zuk-ay	Sustain	Be well mannered, use polite behaviour, be disciplined. Maintain what has been achieved.

The philosophy behind 5S is: Order, organisation, discipline, elimination of bad habits and wasted effort.

Looking at 5S this way illustrates the link between the language, the meaning of the words, and their application. These words are inherent in the Japanese language. For example, three of the four words above contain the word 'sei' which means 'to arrange, to create sequence'. The Japanese word for production is seizou, meaning organising into a whole. In this sense 5S is an intuitive aspect of the approach to working. Command and control thinkers would say they too are concerned with organising into a whole but in practice their methods and measures are concerned with the management of parts, not the whole.

How does 5S work?

The idea is that through a systematic approach, workplace ownership can be increased. This encourages self-discipline and the improvement of the quality and safety of the workplace environment. It also ensures the workplace is well organised and the workflow can be easily seen.

The 5 S or 5C activities are as follows:

Sort	Clearout & Classify	Bin what you don't need - free-up space. If not sure, use a red tag – ask who owns it – can we bin it? Store other things not needed Often short blitz sessions
Set in order	Configure	Set in order – a place for everything and everything in its place. E.g. shadow boards / fixed capacity shaped shelves Order what is remaining according to frequency of use Create a standard layout. (Quickly able to see if everything is in its place)
Shine	Clean & Check	Ensuring equipment is fit for purpose
Standardise	Conformity	Establish best way to do things and format. Make the new the standard & communicate it
Sustain and Improve	Custom and practice	Make it a habit and review frequently

The benefits of 5S in manufacturing

Standardisation and 5S go hand in hand. In manufacturing 5S is a solution to problems of organisation, order and safety in the workplace, it helps to improve visual management in the workplace, it enables you to see flow clearly and it ensures safety in operations. Seeing and standardising flow are essential prerequisites to improvement in manufacturing organisations. For this reason 5S is something you generally do first.

Takt time

What is it?

Takt time is the available time to meet demand divided by customer demand. It is an essential method for understanding at what rate parts need to flow to meet the requirement of the whole, and the requirement of the whole is driven by the rate of customer demand. In simple terms takt time is mathematics for managing flow throughout the system at the rate of demand.

In German takt means heartbeat or rhythm. Takt is not a Japanese word.

In the 1950s Ohno had a problem. Toyota was making trucks and tractors and getting a lot of demand because of the Korean war. But because of the war it was difficult to bring in raw materials. As a result Ohno found he often ended up trying to complete a month's production in the final two weeks of the month.

Ohno set out to deal with this problem by seeking to understand what the system would need to do in order to meet demand. He took the expected demand over a given time and divided it by the time available to meet that demand. This gave him the 'takt' time, which allowed him to understand if the system was producing enough or too much at any given time and in any place.

Ohno did not use the label takt time. He saw the 'heartbeat' as a way to manage production.

Example: Bottled Water Co.

The number of bottles of water a shop sells will vary enormously.
A large supermarket will sell lots more than a corner shop.

What would affect sales?

- The weather – if it's a hot day they will sell more
- Promotions
- Health scares…etc

How does a bottled water company deal with this variation in demand?

Hold stock. Costs rise with inventory and warehousing.
Forecasting.

The problem is variation in demand, which will lead to variation in production and thus inefficiencies. If you make too much it costs you in raw materials and storage; and lost profit if you use promotions to get rid of the excess. If you make too little it costs you in lost business and, possibly, penalties with major customers.

We will take a typical summer period when we expect the demand to be about 25 million bottles:

This is over a 16 week period
They work a 6 day week using the other day for cleaning and maintenance
24 Hour shift pattern
16 x 6 x 24 gives 2304 hrs available
Demand / Time available: 25,000,000 divided by 2304 = 18,851 bottles per hour

18 851 bottles per hour is the what the heartbeat or rhythm of the whole system needs to be; it is the primary guide for production.

Now that we have this figure what happens if it rains? What happens if a machine stops? What about variation? The answer is the takt time is varied to react to changes as required.

The production must be a stable, standardised flow otherwise takt time will be irrelevant. Takt time works like a faster / slower control on the system, allowing you to produce in accordance with variation in demand. The system is, therefore, flexible and responsive. Without takt time other problems within the process and the demand would be hidden by production variation and tampering by the managers. With takt time, bottlenecks within and outside the process can be understood and managed.

Benefits of using takt time in manufacturing

Takt time gives you a volume control for the management of production against demand. It is essential in managing flow against demand. The benefits in manufacturing are the ability to produce to demand with better control and predictability. Like so much of the Toyota Production System its effect is to clear away the chaff of management's 'created variation' so that the real causes of variation can be addressed.

Poke Yoke

What is it?

Poke Yoke is a tool for error prevention and mistake proofing, the idea is to design products and processes to detect errors before they become defects, thereby improving productivity and reliability

Poke Yoke is the label used generally, but if you look at Ohno's written work he describes the idea as Baka Yoka. Changing Baka to Poke was driven by a combination of political correctness and Western interpretation. "Baka" means mild chump/idiot/fool and "Yokeru" means to avoid bad situations or move out of the way to avoid being in danger. When translated into English Baka Yoka means fool proofing. It would seem this was not palatable and so a similar word was utilised which translates as mistake proofing (although Poke has not been listed as mistake anywhere we have looked!).

How does it work?

A machine has an automated stopping device built in to prevent it from doing the wrong thing. It means one operator can man several machines, as the machines will signal when someone is required to fix a problem. This ensures problems are loud, visible and obvious, guaranteeing they are dealt with.

In command and control designs we build in inspection (which only leads to more errors) whereas in Baka Yoka the next process is inherently a quality check. If there is a fault the process stops; the problem then gets rectified at source and never returns.

Examples of the application of Poke Yoke include gauges where all but the 'OK' reading is blanked off. This means if you can't see the needle on the gauge then there is a problem.

Benefits of Poke Yoke in manufacturing

Poke Yoke prevents errors moving forward in the production line. In this way it is a method for controlling and improving the flow of production. Note that the control is designed into the work, sending a signal to the worker to act.

Value Stream Mapping

What is it?

Value Stream Mapping (VSM) is a method for visualising and thus understanding a flow, end to end. In many manufacturing environments the end-to-end flow is difficult to see. In "Lean Thinking", Womack and Jones defined five key steps for going lean: Identify the value stream, understand value, flow, pull, perfection. VSM is primarily concerned with the second and third steps: understanding value and flow. Without managing value work through a flow it is difficult if not impossible to make any real steps towards a true pull (make to order) system. The ability to identify key product

flows and understand them from end to end is central to the improvement of manufacturing flows. VSM can be used to illustrate problems and trigger solutions or to build information required to redesign a manufacturing flow entirely.

How does it work?

VSM requires gathering the following data:

- inputs
- processing times
- waiting times
- batch sizes
- value adding time
- waste

The idea is that you build the whole picture before you decide where to act.

Here is an example of a value stream map[2]:

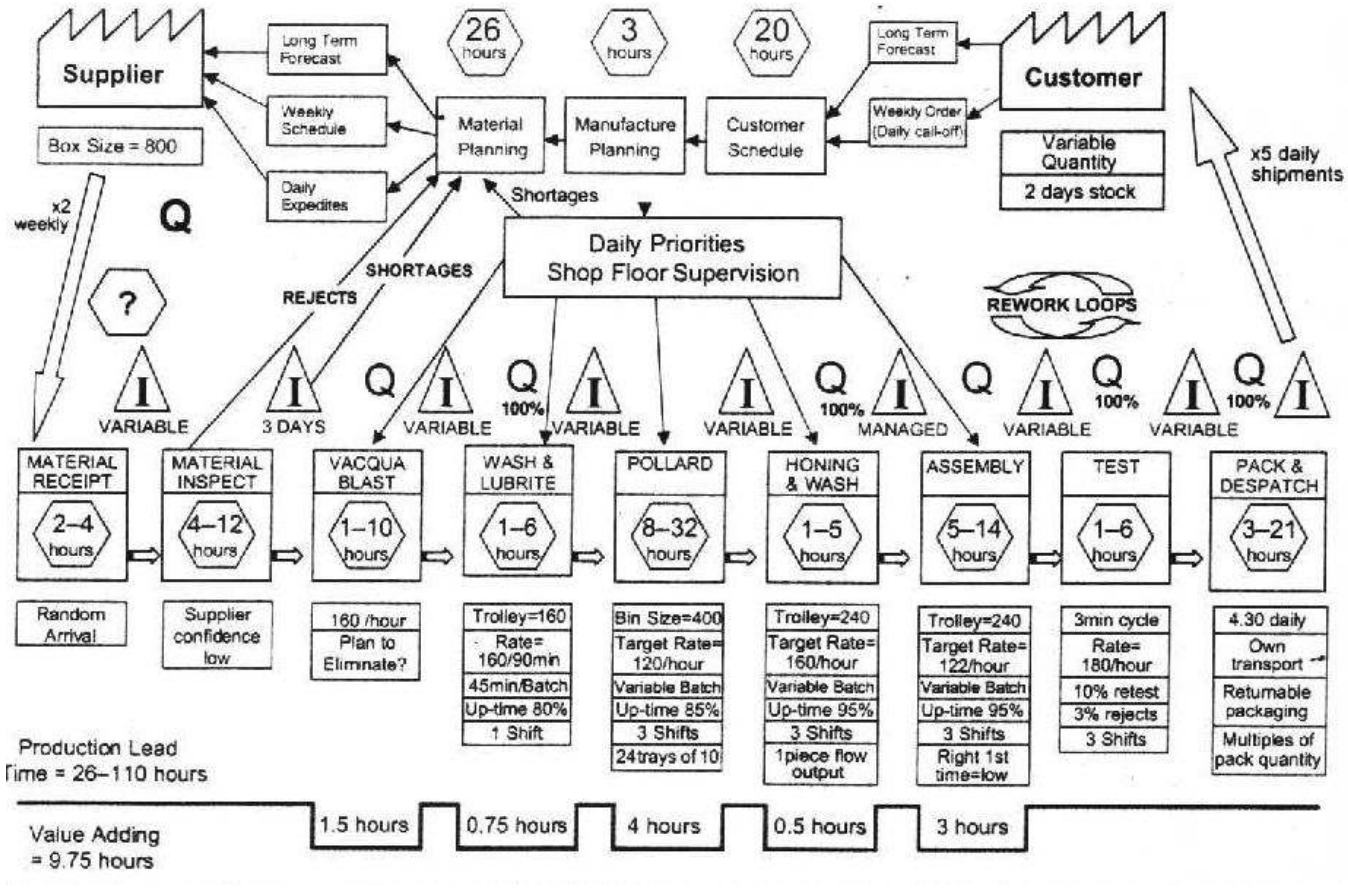

Figure 2: Value Stream Map

[2] Reproduced with the permission of the author from: The Lean Toolbox, John Bechino

In building a value stream map, the first step is to map the physical process, described above in the rectangles running horizontally through the middle of the map. The hexagonal shapes within the rectangles then detail the cycle time for each process. Below this you add information relating to batch sizes of incoming goods, machines speeds, downtime and uptime percentages for machines and so on. This information gives a detailed insight into what is actually happening on the shop floor.

The next important rows are the Qs and Triangles above the physical process. These detail the quality check points and the typical inventory found between each process. Above this are the management activities, detailing the nature of control within the organisation, planning methods and frequencies both at shop floor level and above. It also contains information about the frequency of customer orders and typical order characteristics. The current method of planning and communication is also detailed here, with different styles of lines for electronic or non-electronic approaches.

The final and perhaps most important detail is the value adding ratio, found at the bottom of the map. This is the ratio of time spent on value adding to non-value adding activities. It should be remembered that typical manufacturers struggle to achieve better than 5% value-add whilst world leaders such as Toyota operate at around 20%. It should be understood that the value-add ratio is never an impressive figure.

Benefits of VSM in manufacturing

VSM can be used to identify and target some or all of the seven wastes:

- Output quality/defects
- Overproduction
- Inventory
- Transportation
- Motion
- Waiting/delays
- Processing time

By visualising the process with this level of detail and quantity of information tackling problems becomes substantially easier. Any activities undertaken will be from an end-to-end perspective rather than specific to activities, therefore there will be no downstream negative impacts of local solutions. That is, solutions will be undertaken in terms of impact on flow, rather than activity improvements for their own sake.

Merely building this map would give a sufficient understanding of the flow to trigger some improvements. But VSM also provides the opportunity to redesign the whole flow. The understanding gained from this exercise can be used to build a future state map based on the optimising the end-to-end flow.

In order to do this the map is analysed to find what processes are the bottleneck activities, i.e. have slower cycle times than the rest and/or which are less reliable or have other restrictions upon them. From this the flow capability can be compared to

the takt time for demand. If it exceeds the available takt time then there is a capacity issue, if not then the activities will have to be balanced around the takt time.

In *Figure 3*, two examples of activities that exceed the takt time are given. In the first the solution could simply be to separate some of the assembly work and attach it to the previous painting process. In the second however, it is unlikely that part of the tempering process could be detached to the previous activity. The flow therefore has a bottleneck around the tempering activity. Since this problem is now understood in terms of flow it can be designed out or at least worked around, whilst prior to this understanding this problem would have caused some level of chaos.

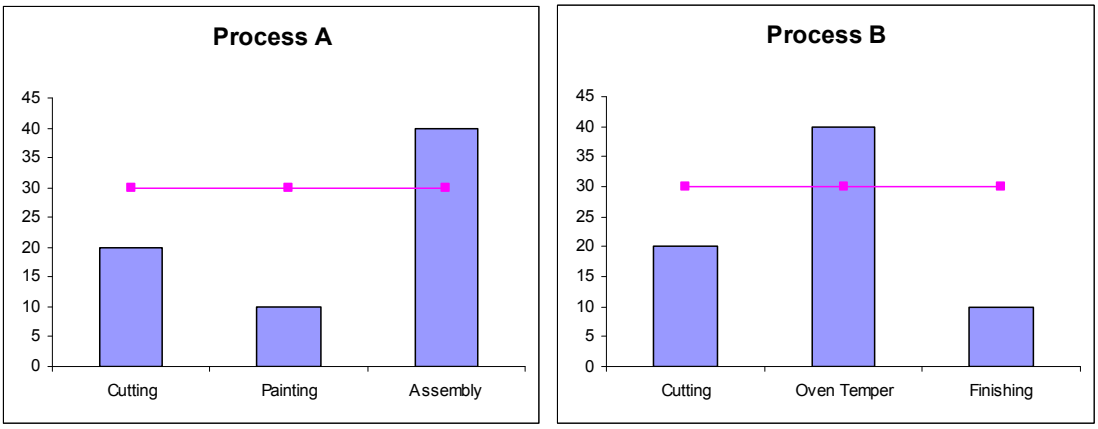

Figure 3: Two examples exceeding takt time

VSM enables the manufacturing process to be redesigned to optimise flow. Without establishing and managing flow it is impossible to achieve sufficient balance and control to implement a pull system: a system that makes to order.

Summary

The tools that have resulted from the codification of Ohno's methods have valuable uses and can solve problems in a manufacturing environment. But it is the philosophy behind the tools – how managers think about the design and management of work that is the key.

"In the beginning there was need" – Taiichi Ohno

The methods developed in the Toyota Production System were responses to identified and understood problems. The methods were developed to eliminate these problems permanently. The choice of method was based on an understanding of the problem, Deming said it with Plan Do Study Act, Ohno said it with "In the beginning there was need" and Vanguard says the same with "Check Plan Do".

The codification of method as tools obviates the first requirement to understand the problem, and, more importantly, to understand the problem from a systems perspective. The problems managers articulate from a command and control perspective are often different (and wrong) problems.

All of the methods (tools) described above were developed to solve problems associated with managing flow at the rate of demand. 5S gets things in order and enables you to see flow; takt time is an essential measure for managing the components of a flow such that they work in harmony, Poke Yoke prevents errors moving forward in a flow and VSM enables a detailed overview of the end-to-end flow in order to determine where to act.

How does service differ from manufacturing?

When the Vanguard team first read Taiichi Ohno's work, we recognised the challenge to translate his ideas for service systems. We knew that service differed from manufacturing in important respects:

Nothing is 'stored' in the way products can be stored
Service is not 'made' by physical (making things) means
Service happens at the points of transaction (we used to call these 'moments of truth')
The service agent is part of the service delivery
The customer is involved in the service delivery

It occurred to us that turning Taguchi's idea on its head was the key. In manufacturing organisations, Taguchi challenged the idea of working to 'standards' or 'blueprints' which meant 'working within tolerances'. Instead he argued that setting any (nominal) value and working to continually reduce variation around it resulted in better quality and lower cost.

Taguchi explained his ideas with a diagram (see figure 4). When making things, the further anything was from the 'nominal value', the greater the economic loss to the system; in simple terms, the more things go wrong, break down or take longer to deal with. Doing more than is required, for example over-specification, is another potential loss.

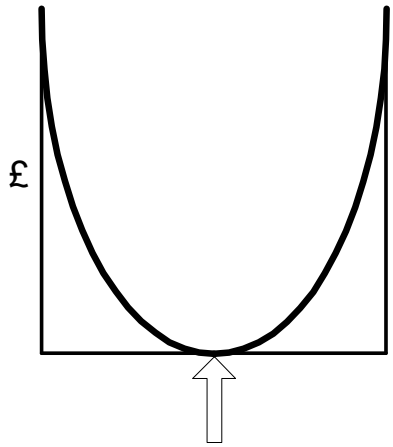

Figure 4: Costs of variation from the nominal value

So, to translate Taguchi's idea for service organisations:

In service organisations it is the customer who sets the nominal value

Think of any service you encounter. If the organisation understands and responds to what matters to you (your nominal value), you experience good service and the organisation is likely to be delivering it in the most economic way. If, for any reason, the organisation does not recognise and respond to what matters to you, your service experience is poorer and the organisation consumes more resources in providing the service. If the experience is poor, it may also cause you to go away. Unfortunately, because many service organisations are designed as command and control hierarchies, service agents are told how they are to behave. When the specifications they work to ignore the 'nominal value' of customers, as they most often do, sub-optimisation occurs.

It is, therefore, essential when translating Ohno's ideas for application in service organisations, to first of all understand the nature of customer demand. Ohno's 'demand problem' was 'which model?' and/or 'how many?' The demand problem in service organisations is quite different.

The Vanguard Method

Because the customer is 'involved in production', in service organisations we need to understand the variety of customer demands and then design the system to absorb that variety. While the methods we developed in Vanguard are consistent with Ohno's philosophy, they are completely different to the methods developed in manufacturing, for they are designed to solve different problems.

The Vanguard Method involves:

Studying customer demand in customer terms
Distinguishing between 'value' and 'failure' demand
Understanding whether demand is predictable or unpredictable
Re-designing services against customer demands
Changing the system (measure, roles and other 'system conditions') to remove the dysfunctional aspects of command and control thinking and replace them with the requirements for managing the work as a system

We will briefly look at the importance of each of the steps in the Vanguard Method.

Studying customer demand in customer terms

If you want customers to 'pull value' from the system, you need to know the nature of demands customers place on the system. If you don't you risk poor service at high cost.

Distinguishing between 'value' and 'failure' demand

Value demands are those you want customers to place on the system. Failure demands are those you don't want. We define failure demands as: **Demands caused by a failure to do something or do something right for the customer**

It follows that failure demand is entirely under the organisation's control. Turning off the causes of failure demand is one of the greatest economic levers available to managers.

Understanding whether demand is predictable or unpredictable

But before managers act on demand it is critical to determine whether demand is predictable or unpredictable. The secret to effective design is the knowledge of demand and its predictability.

Re-designing services against customer demands

When failure demand falls, customers experience better service and costs fall. When service flows are designed against customers' ('nominal') value demands, service improves as costs fall.

Changing the system (measure, roles and other 'system conditions') to remove the dysfunctional aspects of command and control thinking and replace them with the requirements for managing the work as a system

It is as Ohno taught: it is the system that delivers performance. To manage the organisation as a system requires the removal of harmful practices and the establishment of helpful practices. To take one important example: a systems solution requires measures, derived from the work, being used by those who do the work for control and improvement. It means removing all arbitrary measures (for example targets and standards) from the system.

Of course managers cannot be expected to remove the things they are familiar with and have (albeit less successfully) managed with, without first developing understanding. A change of this order requires informed choice.

The Vanguard Method starts at 'check': understanding the 'what and why' of current performance as a system. Check gets you knowledge and hence leads to change that is both predictable and based on informed choice.

Just as Ohno set out to understand and manage the whole manufacturing process as a system, the Vanguard Method does the same for service organisations. Ohno's methods were developed to solve problems associated with managing flow at the rate of demand. Vanguard's methods were developed to change the characteristics of demand and absorb the inherent variety in customer demand.

There are many examples of applications of the Vanguard Method in "Freedom from Command and Control" and the various guides available on the Vanguard web site[3].

Tool head[4] excesses

Unthinking tool heads promote their tools to the detriment of the system. Instead of being focused on what question to ask, how to think about problems, the tool heads do as they have been taught, they apply the tools in an unthinking way. Here are some examples of wrong-headed application for each of the tools we have introduced:

5S

5S is generally thought of as the way to start.

A local authority appointed a consultant to help them with 5S. He instituted black bag Friday, and got people to clean up the office and put things in their correct place. Although every Friday was black bag day, after an initial purge there was not much rubbish to be collected, files were neatly arranged, After the 5S completion, some senior managers were not convinced that anything had changed. Our advice was sought.

As a result of 5S there was not much mess, but there was lots of waste. Much of it was now sitting in computers and thus even harder to see.

5S in service organisations may give the impression of doing something, but nothing really changes.

[3] www.systemsthinking.co.uk
[4] 'Tool heads' is used to signify an unthinking approach to change; it is to 'follow the book' rather than ask the right question.

The picture below demonstrates a 5S office solution, if someone removes a folder it is easy to see where it needs to go back:

This raises the questions: When might this help? Are the resources available in the files important, does accessing them constitute value work? In other words to mark up the files for the sake of the exercise could be failing to ask the important questions. It is to return to the theme: what is the problem you are trying to solve?

In 5S we find the idea ‘everything has its place’ which may be important in sorting out a manufacturing line, but can lead to the following kind of behaviour in offices:

Can you imagine the impact of being told to do this on peoples' morale? In service organisations keeping yourself or your desk a bit tidier will have little impact on the system.

Is 5S the place to start? No, the place to start in service organisations is with studying demand. The problem you want to solve is 'to what extent does the current system absorb variety?' To solve this problem you need to study demand in customer terms and capability of the system to meet customer demands.

The application of 5S in service organisations is solving the wrong problem. Indeed, rather than solving a problem it can create problems.

Standardise first?

The tool heads often start with 5S quoting Ohno as saying you cannot improve without first standardising work. That may be true in manufacturing but it is wholly wrong in service organisations. Indeed the impact of standardisation in service organisations is that it damages the system's ability to absorb variety.

Standardisation in the TPS is essential, it is a manufacturing system. Ohno valued standardisation but more than that he and his workers valued standardisation as a means for learning and improvement. For example, if something 'non-standard' occurs, both the worker and manager would assume there was something to be paid attention to in the work. Command and control thinkers value standardisation for different reasons. First of all if something 'non-standard' happens the manager turns up assuming there is something wrong with the worker, it is axiomatic in command and control thing that the worker should be held responsible for the work they do.

Further, command and control thinkers value standardisation as it helps them in their planning and resource management tasks. They are unaware of the need to separate their planning and operations management activities.

In service organisations we see many examples of this failure. Service 'work queues' have standard times; workers have requirements to meet standard work measures (targets). These 'system conditions' have the unintended consequence of driving waste into the system. Just as Ohno used standardisation to learn and improve, in service organisations we find it is vital to use actual data (for example time taken to execute tasks, volumes of tasks done) for learning and improvement, not arbitrary data (which is what standard times become as they do not accommodate variation). Moreover, these measures must be used by those who do the work to understand and improve it. The consequences are not only improved service at reduced cost, morale is transformed.

If you start 'improvement' with standardisation in service organisations, you risk service getting worse, costs rising and morale falling.

Takt time

Takt-time is essential if you want to manage flow at the rate of demand in a manufacturing organisation. But does it have a place in service organisations?

In a recent Harvard Business Review article we see a classic example of the misuse of takt time. The example concerns improving new business processing. Following the principles established for takt time in manufacturing, the author took the volume of new business cases coming in and divided this number by the available resource (manpower hours). To accommodate demand, the author determined that each application would need to be dealt with in the resulting time. It is completely barmy. The consequence is management of the workers with an arbitrary measure. It is command and control thinking; it has nothing in common with Ohno's philosophy.

To improve new business processing you would want to understand the following:

> End-to-end times for new business processing, from when the customer first applied to when the work was completed, showing capability and variation
>
> Proportion of applicants who take up, over time, showing capability and variation
>
> Causes of variation in the flow: dirt in input, failure demand, process design, measures, management behaviour, IT etc

You would then re-design the flow against the value work as defined by the customer using the measures identified above to track improvement, relegating the 'old' ('lagging') measures to keeping score. Consequentially you remove the causes of

failure demand. The result is a new level of capacity, happier customers and happier workers.

Poke Yoke

The most common application of Poke Yoke in service organisations is 'forcing' a service agent to complete a field in a computer screen. Without the field having a value or entry, the process will not continue. Because service agents are (wrongly) targeted on time taken to complete tasks they frequently put any value in that will allow the process to continue. Typically they will use a code or entry they can most easily remember, especially when there are many such codes and finding the right one would take time. The consequence, of course, is dirt in the system.

This kind of rule violates the principle that the worker should be in control. In manufacturing Poke Yoke is used to send a signal from the work to the worker. In service designs, because of the inherent variety in demand the worker needs to be able to control the 'cleanliness' of the work (their input to the next step in the flow). Any rule, set by those above, will be prone to failing to absorb the variety inherent in customer demands. The data required to make clean flow should be the focus of any agent's work in a service design. If the system is designed in such a way that the agent uses these and other data for understanding and improvement the conditions are such that the agent will be more likely to ensure the correct data are used.

In a service design the agent must be responsible for mistake proofing.

VSM

VSM is of little value in service organisations. The mapping work starts with the machines and worker activities in a manufacturing flow. The constraint of machinery is not relevant to a service flow and if work functions are treated as proxies for machinery it is to assume they should be regarded, de-facto, as relevant to the flow. In services the flow is understood by working outside-in, core flows are dictated by customer demands.

Everything that is analysed in respect of the value adding ratio (cycle time, waiting time, downtime etc) requires first of all the standardisation of work, an inappropriate intervention in service design as it drives up costs (as the system is less able to absorb variety).

The analysis of flow in service is concerned with matters such as preceding activities supplying information fit for purpose, rather than levels of inventory in front of processes. To measure inventory in service organisations in this way is to make a fundamental error.

In manufacturing applications of VSM there is a strong focus on the management activities associated with the interface with the customer. In service designs it is far

more effective to have the person supplying the service, at the interface with the customer, to be the means of control.

Conclusions

'Lean' constitutes the codification of method. The methods developed in manufacturing have value there, but to solve the problem in service organisations requires a different approach because service differs from manufacturing in important respects.

Much of the growth of interest in 'lean' for service organisations is due to the application of lean tools in what are called the 'back-office services' in manufacturing organisations, the lean movement has been moving off the shop floor. But before they do we must ask: what has been achieved on the shop floor?

Whenever we see a presentation by a lean manufacturer of their work in 'back offices', we ask, "But have they taken the measure of revenue out of the factory gate off the factories?" If the answer is no, they cannot be working as a pull system. Such organisations are employing lean as they employed TQM, training and projects. With the size of investment you get a return but is it the kind of return you would achieve by transforming the system?

We also see manufacturing organisations using 'lean' tools as a project-based cost-reduction exercise. While cost-reduction is a natural consequence of 'lean', it is not its purpose. The purpose of lean is to increase capacity by designing a system that optimally responds to customer demand.

Today our service organisations suffer high cost and poor quality service. Like manufacturers they have the opportunity to increase capacity by riding the system of waste, the natural consequence of a command and control design, and deliver better service at lower cost. The opportunity will only be realised by changing the system.

Watch out for the tool heads. They risk losing the opportunity to improve our service organisations.