

Collinson

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**Using lean methodologies
to improve performance**

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1 Introduction

Lean thinking has developed rapidly in the last twenty years from its traditional roots in manufacturing, particularly in automotive production. It has been extended successfully to back-office, administrative functions the health service and many other sectors. A number of organisations have now successfully applied lean principles across its full operating structure and throughout its supply chain.

Lean is the name for a set of tools, techniques and values, initially involving specialists who work with other managers and the staff to take diverse measurements and integrate them into a broad assessment of the whole business. The aim is to make it self-sufficient in continuous improvement.

Lean is the heir of Method Study, Work Measurement, and Value Chain Analysis; of manufacturing engineering and of workplace design; and of some behavioural techniques developed continuously since the 1930s. These tools have had three aims

- Economy – to reduce the cost of inputs to processes
- Efficiency – to reduce the time and cost per unit from processes
- Effectiveness – to increase the value added to the output - its utility and quality from the customer's perspective.

Lean, the latest and most focused of all efforts to boost productivity, places a distinctive emphasis on defining waste and wastefulness, aiming also to reduce inputs and increase outputs to match customers' demands.

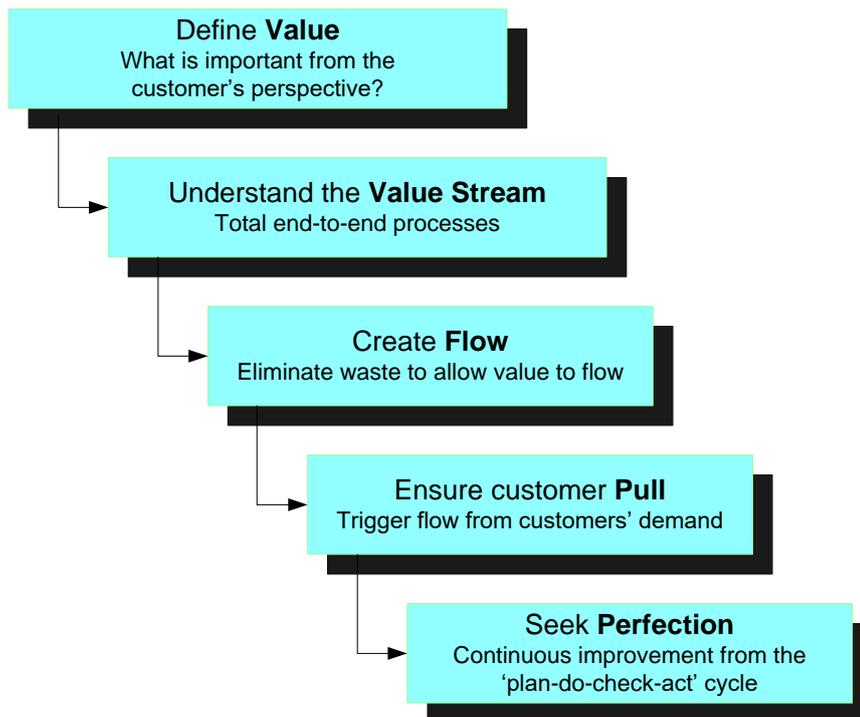
Adopting a lean approach is unlike most other traditional improvement activities. It demands active involvement by senior executives, commitment of full-time resources and a significant re-thinking of current ways of doing things. And, at the outset an 'Education' phase is essential to introduce lean ideas and demonstrate how they will improve performance.

A full transformation to lean has these characteristics:

- it is based on established and proven methods
- there is a high degree of engagement with employees (consultants facilitate and coach, rather than lead)
- substantial improvements in performance are achievable – much faster processing time, reduced waste, increased capacity and lower costs
- the initial focus on one set of activities (a value stream) can be scaled up later to embrace the whole organisation
- continuous improvement is an integral part of the programme.

2 Lean principles

Since the 1990s lean thinking has been distilled into five key principles:



Lean always defines value or output from the perspective of the customer. An activity that adds value is any operation that directly and positively changes what is done to meet customers' demands. Conversely, any activity that does not add value is deemed wasteful. Practitioners in Lean learn how to distinguish between activities that do and do not add value for the customer.

Waste is a key concept in Lean. It takes many forms. People and processes waste time, space, buildings, products, services, and so on. In any business that is failing, the waste may get so dense that it 'strangles' the organisation. Once employees and managers absorb and act on the notion that waste is 'everything and anything that does not add value' all kinds of waste can be revealed. People who could see no waste before begin to see excess in the way most operations are performed.

Waste is broken down into three types:

'Muri' or Overburden waste occurs when

- people or machines are pushed beyond their capacity
- excessive demands are placed on people or machines

'Mura' or Waste arising from unevenness or inconsistency occurs when

- the use of a person or a machine is irregular or inconsistent
- there are imbalances or fluctuations in the pace of production

'Muda' or Operational waste occurs when

- activities take place that do not add value to the product or service
- overburden and unevenness inevitably create different types of operational waste.

Seven categories of 'operational provision' waste

- over-production - producing goods too soon, or when they have not been ordered
- inventory – all aspects of the business: buildings, services, unnecessary raw materials, work in progress, finished stocks etc
- transportation – Moving things in and between facilities, picking them up, shifting them around, setting them down and stacking them
- overly complex processing - unnecessary processing, procedures or steps (work done that adds no value)
- idle time - People or equipment that are waiting to work cannot be adding value: idle time disrupts the flow of effort and slows productivity
- re-working - of defective units that should have been right first time
- motion - the movement of people that adds no value to the product

Five categories of 'consumption' waste

- don't waste my time - customers needing to queue and wait to be serviced
- deliver where I want – providers not delivering a product or service at a convenient location
- deliver when I want – providers not delivering a product or service at a time convenient for the customer.
- reduce the number of decisions I must make - unnecessary processing, procedures or decision required to be performed by the customer (work done that adds no value)
- solve my problem completely - the service or product does not fulfil the full requirements of the customer

2.1 A transformation to lean

Leaders should realise that change is not an event but a process. Progress is in phases that take time to work through and complete. But skipping stages creates only the illusion of speed, rarely a satisfying result. And if victory is declared too soon, momentum and hard-won gains can be lost and the desired change thwarted.

There are seven primary phases within the transformation to lean.

Phase 1

'Get ready'– managers seek possible ways to improve and to give the employees at least an inkling that the status quo is not acceptable.

Phase 2

'Steady' – leaders set a programme and a method of improvement and encourage employees to contribute to any analysis and to question and test the proposed solutions.

Phase 3

'Go' – improvement is made in fits and starts as employees learn how best to do it. Emphasis is on raising the performance of one product or service rather than them all. Leaders, accepting that mistakes can be made, demand worthwhile results - 'half the bad, double the good' - and that benefits are reflected in the bottom line.

Phase 4

'Go quicker' – after the first improvements, the same products or services are given a tougher challenge – to improve as much again, but faster. Only once the staff has become proficient and learned the lessons can it move on to other products or services.

Phase 5

'Go broader' – now there is sufficient competence and confidence, it is time to spread new skills throughout the firm - to improve all products and services in all departments and functions. Leaders should clearly enunciate a new ETHOS: there is no going back! Increased productivity and service are noticed by customers and can speed up growth.

Phase 6

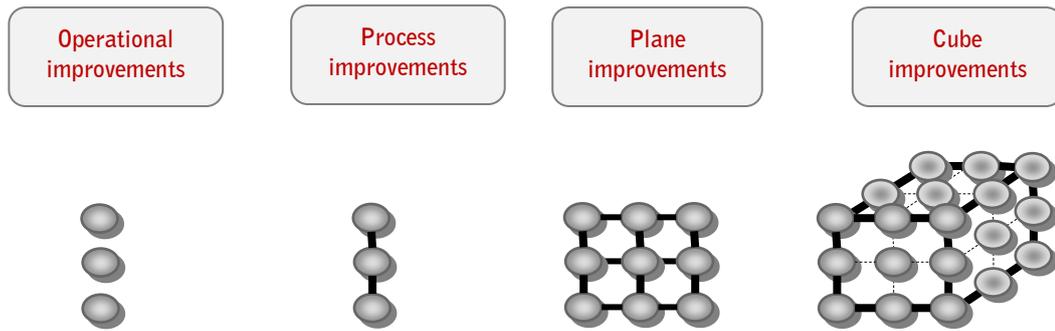
'Go deeper' – production, service and support will have passed through four or five cycles of improvement. The demarcated roles and responsibilities of departments and their employees will start to blur. As waste continues to be stripped away, each employee's responsibilities will grow in a loose structure of semi-autonomous teams. All employees should be focused on the 'three zeros' challenge; 'zero waiting, zero defects, and zero waste'.

Phase 7

'Go farther' – the objective is to extend the approach beyond the business's boundaries; to improve the processes for upstream supply and downstream consumption. Leaders should be willing to make changes in the organisation to benefit suppliers and customers. Once organisations work together harmoniously, the end product, service, and value offered to the customer can be completely redefined.

2.2 Graphical representation

- Set a strategy and targets for improvement
- Build a lean infrastructure, and design the future state operating model
- Build model cells for a single process = operational improvements
- Link model cells to create flow = process improvements
- Accelerate and expand the transformation to encompass the full organisation, continuously increase the pace of change = plane improvements
- Extend the transformation external to the organisation and into the supply chain = cube improvements



3 Starting a new programme

3.1 Leading from the top

Successful lean transformations are always led from the top. Senior executives must set the strategy, make a strong and visible commitment, participate directly in implementing the system and instruct middle managers to do likewise.

Responsibilities

The responsibilities of senior managers are:

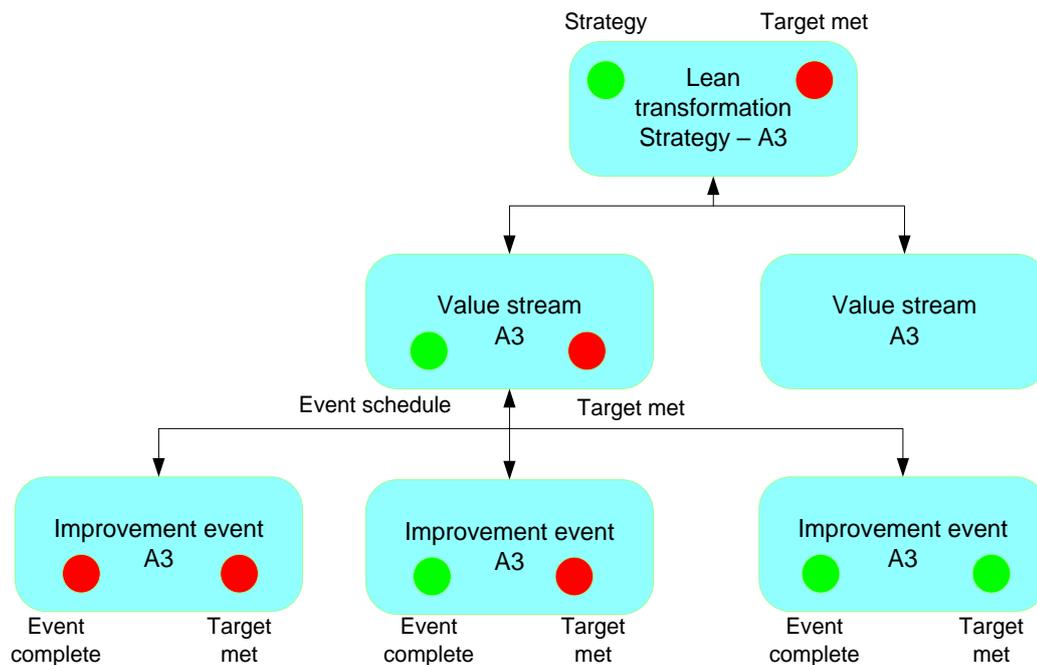
- to build a full-time lean team
- to take part every year in an event - value stream analysis - and in another to improve processes
- to review improvements at a value stream level once a month, and to review improvements at a strategic level quarterly
- to tackle the 'anti-bodies' within the first few months.
- Strategy, structure and governance

A single A3 sheet of paper provides a structured framework to define and communicate the strategy and activities that flow from it. It is a consistent and logical tool used to prepare, decide, implement, monitor and sustain improvements. For example:

Title: _____ Team: _____
 Date started: _____ Current Review team: _____
 date: _____

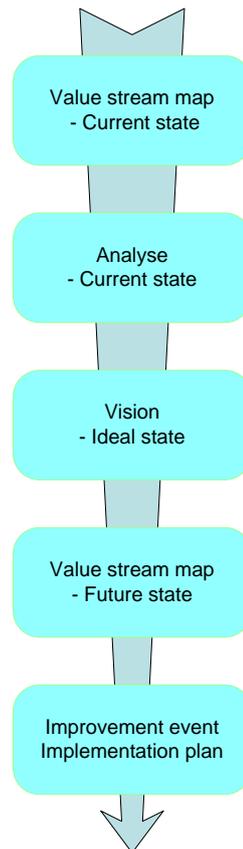
1 Reasons for action	4 Gap analysis	6 Completion plans
2 Initial state	5 Solution approach	7 Confirmed state
3 Target state		8 Insight

The A3 format is used to record each level of activity. A programme covering the whole organisation can be managed simply in a way that reflects lean philosophies. The A3 structure provides an immediate visual overview:



Once a strategy has been agreed and the governance system and structure put in place, a core 'Lean Team' must be trained. Their priorities are:

- to learn and become internal lean specialists
- to train fellow employees in the tools and principles
- to develop additional internal, lean specialists
- to follow up the events to ensure progress is sustained
- to build a lean improvement system and define standard work
- to work closely with Team Leaders and Sponsors to implement improvements and to ensure that the benefits are fully realised.



3.2 Mapping and analysing the value stream

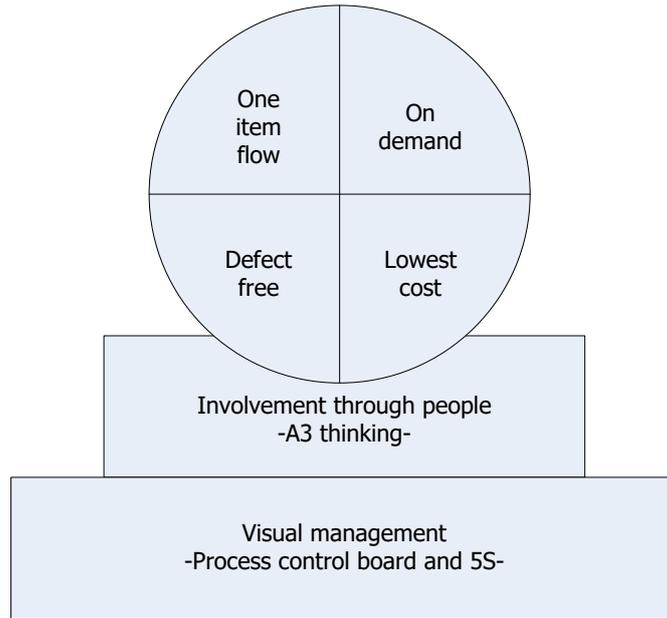
This is typically the first visible event and sets the tone for each subsequent step. It concentrates on one, selected value stream, which is directly linked to the organisation's strategy. The mapping should reveal and quantify the current sources of waste, unevenness and overburden. It develops a shared vision of what might be achieved and offers a visual model of the future state representing how value will flow once improvements have been implemented.

The map predicts the potential prize from adopting a new approach. The route to an improved value stream is planned – through the implementation of lean model cells. The team work together collaboratively, share ideas and reinforce a collective commitment to change.

3.3 The basic features of a flow cell

To design and build a flow cell three concepts need to be adopted; 'the four cornerstones', 'the two foundation stones', and 'the three challenges'

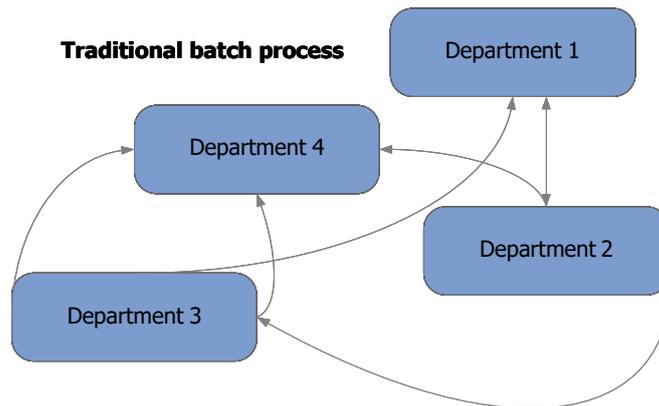
- Adoption of the four cornerstones are required to create the most efficient and effective processes
- Adoption of the two foundation stones are required to sustain improvements and prepare for more
- Adoption of the three challenges of 'zero delays', 'zero defects', and 'zero waste' are required to provide the momentum towards continuous improvement.



3.4 Traditional batch and queue process

Operational processes can be viewed as a ‘river’ flowing with inventory and, as with all rivers, they can be prone to flood. The main reason for such flooding is batch and queue processing: where inventory moves in clumps and it is grouped together into batches for processing within separate departments. Batches are retained within the department until all of the units within the batch are completed. This tends to create long flow times.

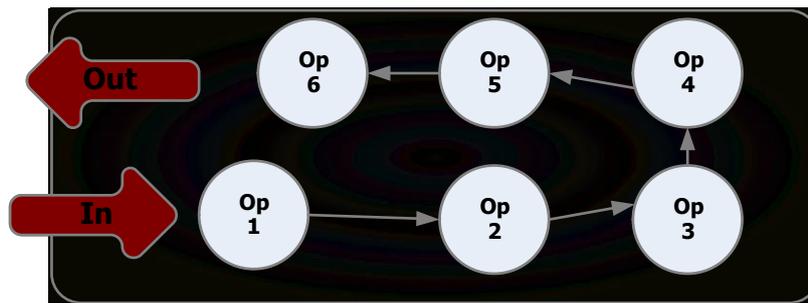
For example:



3.5 Model cell – 1 item flow

By contrast, 1 piece flow processing means that each item is sent to the next process for immediate processing. The flow continues until each unit is completed as a finished product or service. By organizing an item’s flow based upon 1 piece process flow as opposed to departmental batch and queue, the flow time can be minimized. The time to react to any problems or variation in customer demand is also minimized and flow processing is far more flexible than batch and queue processing. For example:

Flow cell



3.6 Building model cells – zero defects

Errors can happen at any stage of a process, even when there is no history of them occurring before. To err is to human. The typical responses are:

- to demand vigilance, exhort employees to be more careful
- to introduce additional checks, consuming additional resources, or
- to eliminate the chance of making the mistake

Mistakes and errors are a result of incorrect actions, so

- prevent as far as possible the occurrence of incorrect actions.

Defects are the result of mistakes and errors, so

- detect mistakes and prevent them from generating defects.

3.7 Building model cells – lowest cost

Standard work is used to define the most efficient and effect way of processing an item, it's two main functions:

- to document the current best known way of doing something and use this as the foundation for training and future improvements
- to recognise and analyse waste.

Standard operating procedures should be trialed, debugged, proven to work every time, communicated and adhered to. It should contain:

- process steps
- process owners
- nominated people who are responsible for each step
- visual documentation of the sequence and quality of work.

3.8 Building model cells – Process control board

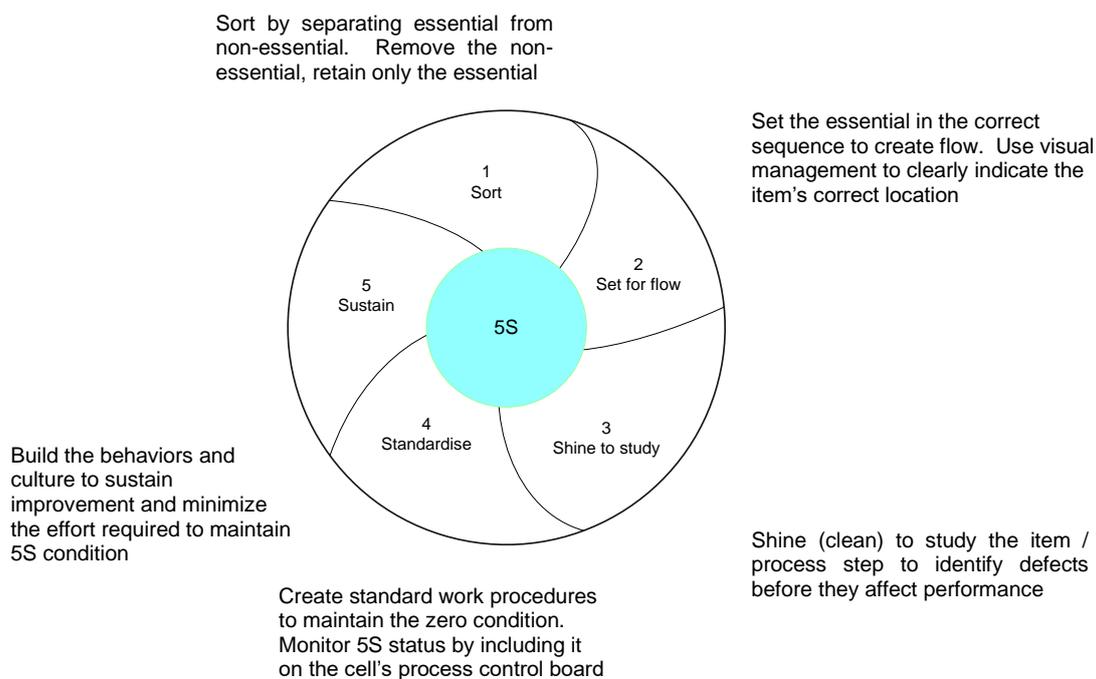
Process control boards (PCBs) display the status of a cell or process and indicate any corrective actions required. They are also used to update the confirmed state portion of the A3 document. The PCB is the nerve centre of the cell and is used for day-to-day management, to review performance and to manage improvement.

PCBs are located close to the working area and typically contain:

- management attendance review sheet
- standard work sheets
- flow cell assessment
- 5S assessment sheet and tracker
- specified data collection – output, demand, resource, etc
- true north measures – quality, cost, delivery, human element
- issue resolution sheet, improvement suggestion sheets
- skills matrix
- team cell and organisation chart.

3.9 Building model cells – 5S

5S is more than a shop floor cleaning campaign, it is a fundamental building block of improvement which can be applied physically to a work place or conceptually to a process or an organisational structure.



Building model cells – Summary

- Move the value-adding steps so close together that waste is impossible
- Have the team members create their own layout to reflect the flow of value
- Balance the work for good flow (standard work)
- Create several standard work scenarios for variations in demand
- Create the capability for quick changeovers to minimize batch sizes and provide the flexibility to match variations in demand
- Have flow created only by flow from downstream
- Train the staff for flexibility
- Stop and fix problems right away
- Involve the team through process control boards and A3s

3.10 Linking model cells***Synchronizing operations to create flow***

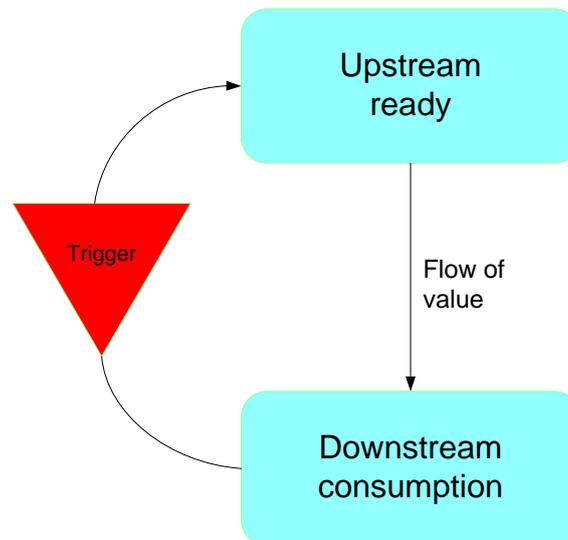
In order to create flow throughout the full value stream the work within the individual cells needs to balance and be synchronized. As the upstream cell 'produces' the downstream cell needs to be ready to accept the item 'just in time', minimizing inventory and the waste created by idle time.

Perfect balance is not the objective as this will either cause over production or operators to relax cycles times to meet customer demand. The aim is to balance operations against the customer's demand - shortening cycles within cells downstream to create a pull effect and minimising stock throughout the value stream.

Trigger and control flow to create pull

The primary function of a pull system is to trigger and control the flow of the value stream. It is a visual process that connects customers to their suppliers and:

- aligns flow processes that cannot be connected in 'single piece flow' cell
- conveys critical information to ensure control, so that the right item is produced the necessary quantity and at the necessary time
- replenishes the consumption of items flowing in a process, allowing close management of inventory
- becomes the autonomous nervous system of the value stream.

Key elements of a pull system**4 How lean improves the 'bottom line'**

Good service, high standards and committed employees are all very well. But 'Money makes the world go around'.

The cost of purchases is a vital part of the profit and loss statement. But this is primarily determined by the price of commodities and by original equipment manufacturers (OEMs). There is often not much scope for competitive advantage there.

The second, and usually the largest, internal cost is people: their salaries; and the facilities required. And that depends on their productivity. If that goes up, the size – and cost – of the staff should go down.

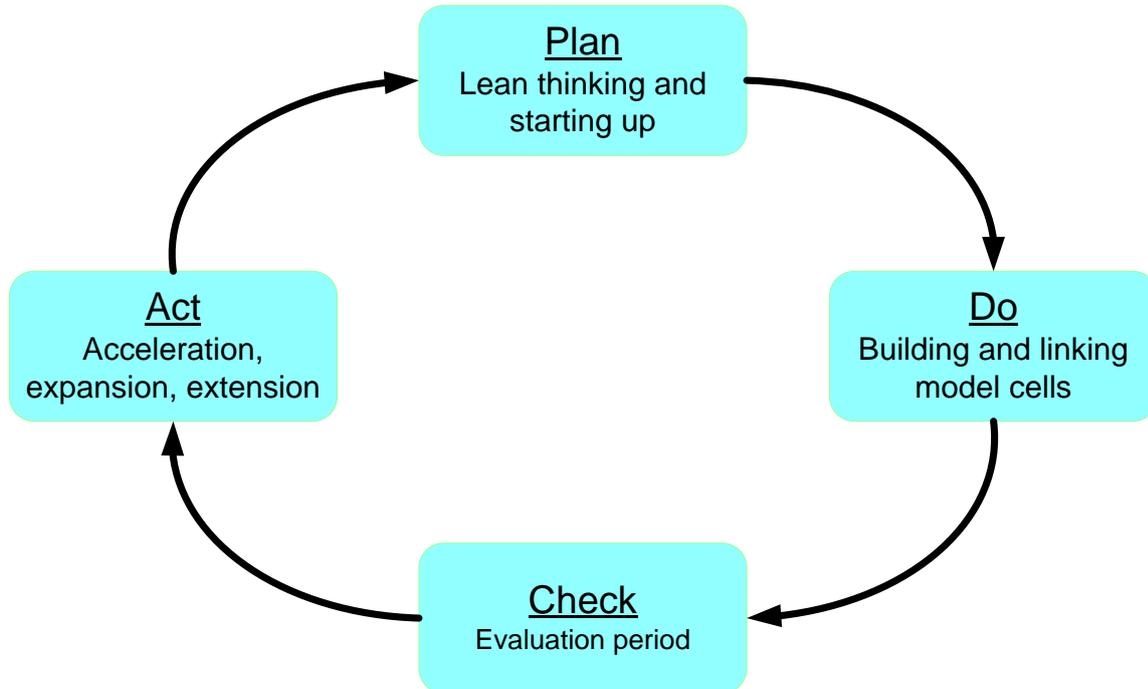
Next, sales and revenue can be boosted by improvements in quality and lead time. Reducing inventory is a start. But the real benefit comes from being a responsive supplier. Cutting lead times by 75% can double or even quadruple the rate of growth, say from 2% to 4% or even 8%.

Then there is quality. Few leaders recognise how closely quality and financial performance are linked. But they are. Firms perceived as excellent generate high returns on investment. But disappointed customers disappear, never to return. Worse still, they tell others. Remember, it is cheaper to retain a customer than to acquire one. To improve quality is one of the best - and cheapest - marketing efforts that a firm can make.

A lean transformation prompts a virtuous cycle: processes speed up; productivity rises; stock is turned over more often; lead times shorten; customers pay faster; fixed and working capital are reduced and net margins increased; debt declines; and marketable assets rise in value.

5 Summary

Lean transformations yield substantial and continuous business benefits. They engage staff throughout the organisation, enrich jobs, reduce complexity and streamline the structure. They can be summarised in a continuous cycle of Plan – Do – Evaluate – Act.



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