

July 2014

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Mastering lean

1. Introduction

Lean has been proven to be a powerful methodology for improving business performance. Lean is defined as "a business philosophy with the primary objective of eliminating waste, where waste is defined as any activity that does not add value to the product or service delivered to the customer". It seeks to create a business environment that is heavily focused on problem identification and problem solving.

2. The essence of lean

The core of lean manufacturing, or also known as lean enterprise or lean production, is eliminating waste from processes. Organisations need to "focus relentlessly" on eliminating all aspects of the process that add no value from their customer's perspective to improve efficiency, effectiveness and profitability. However, a popular conception that lean is suited only for manufacturing is untrue. Lean can be applied in every business and every process. Lean is a way of thinking and acting for the entire organisation.

While traditional business environments tend to be directive in nature – with instructions and policies cascading down from upper levels of management in a one-way flow – a lean culture encourages frontline workers to identify problems and develop ideas for improvement, while managers facilitate and support frontline workers in successfully developing and implementing solutions.

This unique feature of lean separates it from traditional process improvement and re-engineering projects. Lean is synonymous with the spirit of continuous improvement, whereby staff and managers continuously assess processes and strive to find ways to make things work better. The lean mindset is one of "we are never quite finished" and embraces performance issues and process breakdowns as opportunities for improvement, rather than as failures.

3. Seven deadly wastes

Traditional lean identifies seven key areas of waste. The table below describes these wastes and the suggested countermeasures.

Seven wastes	Description	Countermeasures (Lean tool)
Overproduction	Making something before it is truly needed. This is a particularly serious form of waste as it leads to excess inventory that is often used to mask other underlying problems and inefficiencies.	<ul style="list-style-type: none"> ▪ Pace production so the rate of manufacturing matches the rate of customer demand (Takt Time). ▪ Use a pull system to control how much is manufactured (Kanban). ▪ Reduce setup times so that smaller batches can be economically manufactured (Single-minute Exchange of Dies – SMED).
Waiting	Time when work-in-process is waiting for the next step in production (no value is being added). It can be truly illuminating to look at the time from order to shipment and ask – how much of the time is actually spending on true value-added manufacturing.	<ul style="list-style-type: none"> ▪ Design processes so that the flow is continuous and there are minimal (or no) buffers between steps in production (Continuous Flow). ▪ Use standardised work instructions to ensure that a consistent method and consistent times are used for each step of production (Standardised Work).
Transport	Unnecessary movement of raw materials, work-in-process or finished goods.	<ul style="list-style-type: none"> ▪ Design a linear, sequential flow from raw materials to finished goods (Value Stream Mapping). ▪ Make sure work-in-process is not placed into inventory (Continuous Flow). ▪ Avoid continual changing of job priorities (Theory of Constraints).
Motion	Unnecessary movement of people – movement that does not add value.	<ul style="list-style-type: none"> ▪ Ensure that work areas are logically organised (5S). ▪ Consider alternate arrangements of equipment that reduce motion (Value Stream Mapping).

Overprocessing	More processing than is needed to produce what the customer requires. This is often one of the more difficult wastes to detect and eliminate.	<ul style="list-style-type: none"> ▪ Compare customer requirements to manufacturing specifications (Kaizen). ▪ Look for potential simplifications to the manufacturing process (Kaizen).
Inventory	Product (raw materials, work-in-process, or finished goods) quantities that go beyond supporting the immediate need.	<ul style="list-style-type: none"> ▪ Bring raw materials in only as they are needed (Just-in-Time). ▪ Reduce or eliminate buffers between steps in production (Continuous Flow). ▪ Refer to overproduction countermeasures (Takt Time, Kanban, and SMED).
Defects	Production that is scrap or requires rework.	<ul style="list-style-type: none"> ▪ Design processes so they are less likely to produce defects (Poka-Yoke). ▪ Design processes to detect abnormalities so they can be immediately corrected (Jidoka). ▪ Look for the single most frequent defect and determine why it occurs (Root Cause Analysis). ▪ Create work instructions that provide a consistent method of manufacturing the part (Standardised Work).

Source: Intro to lean. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from <http://www.leanproduction.com/intro-to-lean.html>

An eighth waste

One of the “extremely important” forms of waste that is not mentioned above is unused human potential. This form of waste results in all sorts of lost opportunities such as lost motivation, lost creativity, and lost ideas.

One of the reasons that this form of waste is often underemphasised or even ignored in organisations is that responsibility for it lies squarely on the shoulders of management. Unused human potential often results from management policies and management styles that

diminish employee contributions. By way of contrast, developing strong coaching skills for managers can be very effective in strengthening employee contributions.

4. Key lean principles

There are several key lean manufacturing principles that need to be understood in order to implement lean. Failure to understand and apply these principles will most likely result in failure or a lack of commitment from everyone in the organisation. Without commitment the process becomes ineffective.

There are five principles to lean:

(i) Identify customers and specify value

The starting point is to recognise that only a small fraction of the total time and effort in any organisation actually adds value for the end customer. By clearly defining value for a specific product or service from the end customer's perspective, all the non-value activities – or waste – can be targeted for removal.

(ii) Identify and map the value stream

The value stream is the entire set of activities across all parts of the organisation involved in jointly delivering the product or service. This represents the end-to-end process that delivers the value to the customer. Once what the customer wants is understood, the next step is to identify how to deliver that to them.

(iii) Create flow by eliminating waste

Typically when the value stream is first mapped, one will find that only five percent of activities add value, which can rise to 45 percent in a service environment. Eliminating this waste ensures that the product or service "flows" to the customer without any interruption, detour or waiting.

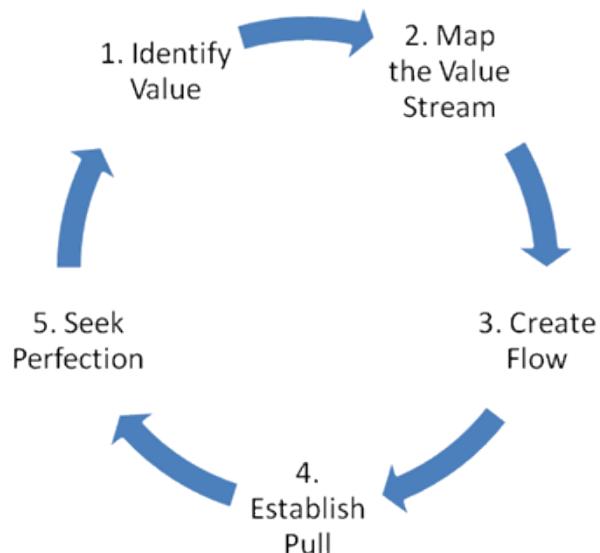
(iv) Respond to customer pull

This is about understanding the customer demand on the service and then creating the process to respond to this. Hence, producing only what the customer wants and when he wants it.

(v) Pursue perfection

Creating flow and pull starts with radically re-organising individual process steps, but the gains become truly significant as the entire steps link

together. As this happens more and more, layers of waste become visible and the process continues towards the theoretical end point of perfection, where every asset and every action adds value for the end customer.



Source: Principles of lean. (n.d.). *Lean Enterprise Institute*. Retrieved July 2, 2014, from <http://www.lean.org/WhatsLean/Principles.cfm>

In following these five principles of lean, one will implement a philosophy that will become “just the way things are done”. It ensures that the organisation is driving towards the overall organisational strategy by constant review of the processes to ensure that they are constantly and consistently delivering value to the customers. This allows the organisation to maintain its high level of service whilst being able to grow and flex with a changing environment and it does this through implementing sustainable change.

5. Getting started with lean

Great results can come from mastering a simple technique and applying it consistently. Improvements in productivity can be achieved through small daily increments. Hence, organisations can embark their lean journey with a simple strategy.

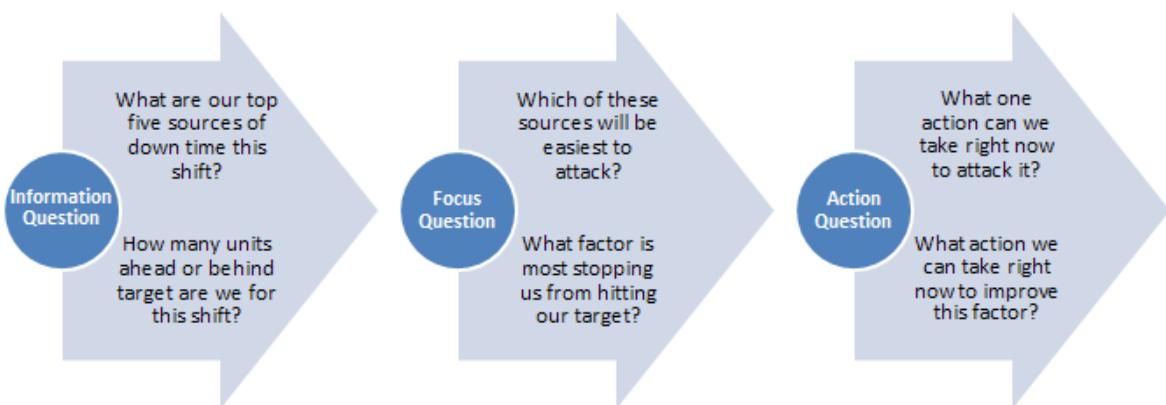
Three simple steps

One of the most powerful ways to reduce down time is for each of the line teams to identify and fix one problem each day. One small, incremental win that can be identified and fixed within the same day.

The key to success is to follow these three simple steps to make it happen:

- Use existing information to identify the losses;
- Review the losses and focus the team's attention on the biggest loss or easiest win;
- Agree on one action that can be completed during the shift to reduce the loss.

In many cases, their Overall Equipment Effectiveness (OEE) improves by ten percent or more when managers consistently apply this strategy over a period of at least three months. Below are some examples of the three simple questions.



Source: Improve production today. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from <http://www.leanproduction.com/improve-production-today.html>

6. Lean tools

Lean has a very extensive collection of tools and concepts. Surveying the most important of these, understanding both what they are and how they can help is an excellent way to get started.

Below is a list of the top 25 lean tools that organisations can explore. While many of these tools can be successfully used in isolation, which makes it much easier to get started, the benefits will compound as more tools are used, as they do support and reinforce each other.

Lean tool	What is it?	How does it help?
5S	Organise the work area: <ul style="list-style-type: none"> ▪ Sort (eliminate that which is not needed) ▪ Set In Order (organise remaining items) ▪ Shine (clean and inspect work area) ▪ Standardise (write standards for above) ▪ Sustain (regularly apply the standards) 	Eliminates waste that results from a poorly organised work area (e.g. wasting time looking for a tool).
Andon	Visual feedback system for the plant floor that indicates production status, alerts when assistance is needed, and empowers operators to stop the production process.	Acts as a real-time communication tool for the plant floor that brings immediate attention to problems as they occur – so they can be instantly addressed.
Bottleneck Analysis	Identify which part of the manufacturing process limits the overall throughput and improve the performance of that part of the process.	Improves throughput by strengthening the weakest link in the manufacturing process.
Continuous Flow	Manufacturing where work-in-process smoothly flows through production with minimal (or no) buffers between steps of the manufacturing process.	Eliminates many forms of waste (e.g. inventory, waiting time, and transport).
Gemba (The Real Place)	A philosophy that reminds us to get out of our offices and spend time on the plant floor – the place where real action occurs.	Promotes a deep and thorough understanding of real-world manufacturing issues – by first-hand observation and by talking with plant floor employees.
Heijunka (Level Scheduling)	A form of production scheduling that purposely manufactures in much smaller batches by sequencing (mixing) product variants within the same process.	Reduces lead times (since each product or variant is manufactured more frequently) and inventory (since batches are smaller).
Hoshin Kanri	Align the goals of the company	Ensures that progress towards

(Policy deployment)	(Strategy), with the plans of middle management (Tactics) and the work performed on the plant floor (Action).	strategic goals is consistent and thorough – eliminating the waste that comes from poor communication and inconsistent direction.
Jidoka (Autonomation)	Design equipment to partially automate the manufacturing process (partial automation is typically much less expensive than full automation) and to automatically stop when defects are detected.	After Jidoka, workers can frequently monitor multiple stations (reducing labour costs) and many quality issues can be detected immediately (improving quality).
Just-In-Time (JIT)	Pull parts through production based on customer demand instead of pushing parts through production based on projected demand. Relies on many lean tools, such as Continuous Flow, Heijunka, Kanban, Standardised Work and Takt Time.	Highly effective in reducing inventory levels. Improves cash flow and reduces space requirements.
Kaizen (Continuous Improvement)	A strategy where employees work together proactively to achieve regular, incremental improvements in the manufacturing process.	Combines the collective talents of a company to create an engine for continually eliminating waste from manufacturing processes.
Kanban (Pull System)	A method of regulating the flow of goods both within the factory and with outside suppliers and customers. Based on automatic replenishment through signal cards that indicate when more goods are needed.	Eliminates waste from inventory and overproduction. Can eliminate the need for physical inventories (instead relying on signal cards to indicate when more goods need to be ordered).
KPI (Key Performance Indicator)	Metrics designed to track and encourage progress towards critical goals of the organization. Strongly promoted KPIs can be extremely powerful drivers of behaviour – so it is important to carefully select KPIs that will drive desired behaviour.	The best manufacturing KPIs: <ul style="list-style-type: none"> ▪ Are aligned with top-level strategic goals (thus helping to achieve those goals) ▪ Are effective at exposing and quantifying waste (OEE is a good example) ▪ Are readily influenced by plant floor employees (so they can drive results)
Muda (Waste)	Anything in the manufacturing process that does not add value from the customer's perspective.	Eliminating muda (waste) is the primary focus of lean manufacturing.
Overall Equipment Effectiveness (OEE)	Framework for measuring productivity loss for a given manufacturing process. Three categories of loss are tracked: <ul style="list-style-type: none"> ▪ Availability (e.g. down time) ▪ Performance (e.g. slow cycles) 	Provides a benchmark/baseline and a means to track progress in eliminating waste from a manufacturing process. 100% OEE means perfect production (manufacturing only good parts, as fast as possible, with no down time).

	<ul style="list-style-type: none"> ▪ Quality (e.g. rejects) 	
PDCA (Plan, Do, Check, Act)	<p>An iterative methodology for implementing improvements:</p> <ul style="list-style-type: none"> ▪ Plan (establish plan and expected results) ▪ Do (implement plan) ▪ Check (verify expected results achieved) ▪ Act (review and assess; do it again) 	<p>Applies a scientific approach to making improvements:</p> <ul style="list-style-type: none"> ▪ Plan (develop a hypothesis) ▪ Do (run experiment) ▪ Check (evaluate results) ▪ Act (refine your experiment; try again)
Poka-Yoke (Error Proofing)	<p>Design error detection and prevention into production processes with the goal of achieving zero defects.</p>	<p>It is difficult (and expensive) to find all defects through inspection, and correcting defects typically gets significantly more expensive at each stage of production.</p>
Root Cause Analysis	<p>A problem solving methodology that focuses on resolving the underlying problem instead of applying quick fixes that only treat immediate symptoms of the problem. A common approach is to ask why five times – each time moving a step closer to discovering the true underlying problem.</p>	<p>Helps to ensure that a problem is truly eliminated by applying corrective action to the “root cause” of the problem.</p>
Single Minute Exchange of Die (SMED)	<p>Reduce setup (changeover) time to less than 10 minutes. Techniques include:</p> <ul style="list-style-type: none"> ▪ Convert setup steps to be external (performed while the process is running) ▪ Simplify internal setup (e.g. replace bolts with knobs and levers) ▪ Eliminate non-essential operations ▪ Create standardised work instructions 	<p>Enables manufacturing in smaller lots, reduces inventory, and improves customer responsiveness.</p>
Six Big Losses	<p>Six categories of productivity loss that are almost universally experienced in manufacturing:</p> <ul style="list-style-type: none"> ▪ Breakdowns ▪ Setup/Adjustments ▪ Small Stops ▪ Reduced Speed ▪ Startup Rejects ▪ Production Rejects 	<p>Provides a framework for attacking the most common causes of waste in manufacturing.</p>
SMART Goals	<p>Goals that are: specific, measurable, attainable, relevant, and time-specific.</p>	<p>Helps to ensure that goals are effective.</p>
Standardised Work	<p>Documented procedures for manufacturing that capture best practices (including the time to complete each task). Must be</p>	<p>Eliminates waste by consistently applying best practices. Forms a baseline for future improvement activities.</p>

	"living" documentation that is easy to change.	
Takt Time	The pace of production (e.g. manufacturing one piece every 34 seconds) that aligns production with customer demand. Calculated as Planned Production Time / Customer Demand.	Provides a simple, consistent and intuitive method of pacing production. Is easily extended to provide an efficiency goal for the plant floor (Actual Pieces / Target Pieces).
Total Productive Maintenance (TPM)	A holistic approach to maintenance that focuses on proactive and preventative maintenance to maximise the operational time of equipment. TPM blurs the distinction between maintenance and production by placing a strong emphasis on empowering operators to help maintain their equipment.	Creates a shared responsibility for equipment that encourages greater involvement by plant floor workers. In the right environment this can be very effective in improving productivity (increasing up time, reducing cycle times, and eliminating defects).
Value Stream Mapping	A tool used to visually map the flow of production. Shows the current and future state of processes in a way that highlights opportunities for improvement.	Exposes waste in the current processes and provides a roadmap for improvement through the future state.
Visual Factory	Visual indicators, displays and controls used throughout manufacturing plants to improve communication of information.	Makes the state and condition of manufacturing processes easily accessible and very clear – to everyone.

Source: Top 25 lean tools. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from <http://www.leanproduction.com/top-25-lean-tools.html>

7. Building a lean innovative organisation

Below are four key ways organisations can build lean innovative organisations on a sustainable basis:

- (i) Promote a culture that encourages the open mindset required to question the current state of the business and the products and services offerings. Place 'disrupting' minds and people in each area of the business.
- (ii) Create a business model that aligns all aspects of the organisation (processes, people, strategy, technology and organisation) with the customers' needs and continuously eliminates waste and unnecessary work. Answer the following questions: Are we doing the right things? Are we doing things right?
- (iii) Deliver innovation more quickly by developing the ability to work with people inside and outside company borders using a defined set of processes.



- (iv) Listen to customers' ideas, suggestions and pain points. Value-creation opportunities migrate as a market becomes more refined or fragmented and as customer needs change and become more elusive. To be successful in this volatile environment, businesses must adopt a customer-centric mindset, relinquishing outdated ideas and instead observing and evaluating actual customer behaviour and feedback in new and inventive ways. Dedicate resources for key products or services that can cross organisational boundaries all along the value chain – from idea generation to the commercialisation of new products and services – to respond to the voice of the customer.

Case Study

Khoo Teck Puat Hospital

Khoo Teck Phuat Hospital (KTPH) is a new hospital built in the northern part of Singapore. Central to KTPH's productivity mindset is the drive towards continuous improvement, enhancing customer experience and optimising the use of labour. These productivity initiatives have started bearing fruit.

Continuous improvement

The drive towards continuous improvement at KTPH is driven by top management. This positive mindset is further ingrained in KTPH's culture since it is KTPH's mission to provide "good quality and hassle-free healthcare" and hence, the need for the hospital to continuously strive to improve the productivity of processes and staff.

The objective is to translate these improvements into benefits, such as more patients served and shorter waiting time. KTPH adopts the Toyota Production System (TPS) to improve productivity and the delivery of healthcare. One of the tools used in TPS is value-stream mapping (VSM). VSM allows staff at KTPH to improve productivity by identifying and eliminating waste between processes.

An example of how KTPH has improved productivity is the set-up of a 'one-stop pharmacy' within the Day Surgery Centre and the A&E centre. This removes the need for patients to queue separately for prescriptions at the main pharmacy. This initiative has resulted in 70 percent of patients with non-life threatening conditions at the A&E leaving the hospital within one hour.

Human Resource Officer, Lynn Gah of Alexandra Health, says "Productivity gain occurs when work becomes less of a hassle". This is exhibited by KTPH's Kaizen trolley. The Kaizen trolley is a specially designed trolley that minimises the need for nurses to get supplies from their central station. This reduces the nurses "walk time".

Customer experience

The drive towards providing "hassle-free" healthcare has enabled KTPH to enhance patient experience. The 'patient first' mindset is not only part of KTPH's mission and vision, but is also the cornerstone of decisions at KTPH. For example, to enhance the efficiency of outpatient clinics, returning patients

are given a journey chit upon registration to keep them informed of the various stations they will have to go through such as consultation, laboratory, X-Ray and pharmacy. To reduce unnecessary patient movement around the hospital, clinics and associate health services are logically clustered. For example, a patient visiting the orthopaedic department can now easily access X-ray services within the orthopaedic department rather than queuing separately at the radiology area.

Optimising use of labour

One of the initiatives that have been undertaken by KTPH to boost the productivity of staff is the development of Advanced Practice Nurses (APNs). The APNs are deployed to clinics to perform some of the functions that are performed by doctors. This enables the APNs to apply their advanced training and skills while freeing doctors to focus on more complicated cases.

For example, APNs in KTPH's Diabetic Centres are able to prescribe patients certain medicines which reduce waiting time for patients who previously had to make an appointment with a doctor for such prescriptions. This has also enhanced productivity.

Another initiative that has led to KTPH improving its productivity is its decision to not outsource housekeeping services, which are usually outsourced by other healthcare organisations. Housekeeping personnel are called "Environment Service Associates (ESA) at KTPH. As the name suggests, the ESAs perform more value-added activities rather than just housekeeping. ESAs are also given the responsibility of infection control and ensuring that the hospital's environment is conducive to healing.

KTPH's slew of initiatives to improve productivity arises from its strong emphasis on continuous improvement, enhancing customer experience and optimising the use of labour. Any enterprise in any industry can experience productivity gains if these three areas are given emphasis.

Blastech Abrasives Pte Ltd

Blastech Abasies Pte Ltd was established in 1989. The local leading company provides quality blasting and painting services to the steel work industry. In the past, the company has handled several projects for shipyards in Singapore and around the region, which includes blasting and painting. However, due to the rising demand for their services, Blastech "extended their services to other areas of the steel work industry like thermal spray aluminium coating."

The company today has facilities spanning 400,000 square feet and housing "excellent automated and manual machines" and are also equipped to handle large volumes of blasting and painting jobs.

With the assistance of external consultants, the company conducted a study to assess its efficiency of the painting production line in the manual blasting and painting plant. It was conducted using an integrated set of methodologies combining both traditional lean and six sigma concepts to "provide the necessary tools to address all aspects of quality, cost and delivery to the painting process line. It included an initial state analysis, root cause analysis, implement process changes and implemented monitoring and control systems to maintain the improvement."

After the assessment, the team singled out the following six key areas for improvement: (i) zoning; (ii) restructuring roles; (iii) integrated planning system; (iv) monitoring overall labour efficiency; (v) quality monitoring; (vi) up-skilling; and (vii) a rewards and incentive programme. These changes and improvement were all focused on enhancing production planning, up-skilling of tradesmen and detailed quality monitoring mainly at the Manual Blasting Chamber and Painting Production Area at Blastech.

At the end of the full project which lasted for four and a half months, the team found that the labour efficiency has improved by 30 percent and painting productivity has increased by 20 percent. Through the tools and methodology utilised, both quality and performance loss have greatly reduced by 50 percent thus resulting in an increase of productivity and production capacity of the plant by 20 percent. With this, the company has estimated a potential increase of revenue from an average of S\$306,458 in WY2010 to S\$367,750.06.

Overall, it was noted that the goals set out at the start of the study has been achieved at the end of the project with successful results. As part of the future activities to sustain the improved productivity, the company has plans to embark on



Productivity Link

more new and innovative projects like the usage of tablet computers.

Articles can be retrieved from NLB's e-Resources –
<http://eresources.nlb.gov.sg>

Books are available at the National Library.

Recommended Readings

Basu, R. (2011). *Fit sigma: A lean approach to building sustainable quality beyond Six Sigma*. Hoboken, N.J.: Wiley.
[RBUS 658.4013 BAS]

Basu, R. (2009). *Implementing Six Sigma and Lean: A practical guide to tools and techniques*. Amsterdam: Elsevier Butterworth-Heinemann.
[RBUS 658.4013 BAS]

Black, J. R. (2008). *Lean production: Implementing a world-class system*. New York: Industrial Press.
[658.5 BLA]

Venegas, C. (2007). *Flow in the office: Implementing and sustaining lean improvement*. New York: Productivity Press.
[RBUS 651.3 VEN]

References

Badea, F., Deac, V., & Parvu, F. (2011, May). European approaches on the concept of lean management. *Review of Internal Comparative Management*. 12(2): 240-249. Retrieved July 2, 2014, from
<http://www.rmci.ase.ro/no12vol2/03.pdf>

Blastech Abrasives Pte Ltd – WSQ Certified Productivity and Innovation Manager. (n.d.). *SMF Centre for Corporate Learning*. Retrieved July 2, 2014, from
<http://www.smfccl.sg/index.php/about/success-stories/blastech-abrasives-pte-ltd-wsq-certified-productivity-and-innovation-manag>

Gilbert, R. (2014, April 7). *The discipline of innovation: Be lean*. *MNP Consulting*. Retrieved July 2, 2014, from
<http://mnpconsulting.ca/media-centre/blog/2014/4/7/the-discipline-of-innovation-be-lean>

Improve production today. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from
<http://www.leanproduction.com/improve-production-today.html>

Intro to lean. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from
<http://www.leanproduction.com/intro-to-lean.html>

Khoo Teck Phuat Hospital (KTPH). (n.d.). *Productivity@Work*. Retrieve July 2, 2014, from
<http://www.waytogo.sg/news-case-studies/casestudy/Id=NTQ3ZjM3MjAtMjNhMC00NzgyLWIwNjctODkzMzFiYTdkZDhm>

Lean thinking and methods. (2011). *United States Environmental Protection Agency*. Retrieved July 2, 2014, from
<http://www.epa.gov/lean/environment/methods/index.htm>

Marsh, B. (2014, January 30). The power of lean part I: Finding value for your customers. *MNP Consulting*. Retrieved July 2, 2014, from
<http://www.mnp.ca/en/media-centre/blog/2014/1/30/the-power-of-lean-part-i-finding-value-for-your-customers>

Marsh, B. (2014, February 12). The power of lean part III: Finding value for your customers. *MNP Consulting*. Retrieved July 2, 2014, from
<http://www.mnp.ca/en/media-centre/blog/2014/2/12/the-power-of-lean-part-iii-critical-flow>

Marsh, B. (2014, February 29). The power of lean part IV: Finding value for your customers. *MNP Consulting*. Retrieved July 2, 2014, from
<http://mnpconsulting.ca/media-centre/blog/2014/2/20/the-power-of-lean-part-iv-moving-forward>

Principles of lean. (n.d.). *Lean Enterprise Institute*. Retrieved July 2, 2014, from
<http://www.lean.org/WhatsLean/Principles.cfm>

The five principles of lean thinking. (n.d.). *Cardiff University*. Retrieved July 2, 2014, from
<http://www.cardiff.ac.uk/lean/principles/>

Top 25 lean tools. (2013). *LeanProduction.com*. Retrieved July 2, 2014, from
<http://www.leanproduction.com/top-25-lean-tools.html>

What is lean? (2009). *Lean Enterprise Institute*. Retrieved July 2, 2014, from
<http://www.lean.org/whatslean/>

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SINGAPORE PRODUCTIVITY ASSOCIATION

The Singapore Productivity Association (SPA) was set up in 1973 as an affiliated body of the then National Productivity Board, now SPRING Singapore. Its objective is to promote the active involvement of organisations and individuals in the Productivity.

CPP Course Syllabus	
CPP	CPP (Retail)
Module 1: Understanding Productivity (Duration: 1 day) <ul style="list-style-type: none"> • Introduction to Productivity and Quality Concepts • Factors Affecting Enterprise Productivity • Productivity Movement in Singapore • Productivity Promotion in Businesses • Productivity Challenges 	
Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days) <ul style="list-style-type: none"> • Business Excellence • Productivity Measurement & Analysis • Process management: <ul style="list-style-type: none"> ▪ Cost of Quality ▪ Lean Six Sigma ▪ Process Mapping & Analysis • Integrated Management Systems 	
Module 3: Innovation & Service Excellence (Duration: 3 days) <ul style="list-style-type: none"> • Knowledge Economy & Innovation • Service Excellence • Team Excellence 	
Module 4: Critical Success Factors (Duration: 1 day) <ul style="list-style-type: none"> • Management Commitment • Managing & Sustaining Change • Overcoming Resistance to Change • Training and Education • Planning for Implementation and Control of Productivity Improvement Programme • Briefing on project assignment & Role of Productivity Practitioner 	

As part of the CPP curriculum, participants are required to start a productivity improvement project upon completion of the in-class component. Project guidance will be provided by a professional consultant assigned for this purpose and is for a total of 2 man-days.

Funding & Payment

The course is supported by the Singapore Workforce Development Agency (WDA). Funding is available at 70% and 50% of the course fees respectively for SMEs and MNCs/LLEs/Statutory Boards. Please find the prices payable in the net fee table below:

For All Entities:	Nett Fee:	Nett Fee (with GST):
All Entities (\$3950)	\$1,185	\$1,267.95

Here are the schedules for CPP:

CPP (Generic)

Jun-14		
Date	Module	Time
Monday, 23 June 2014	Module 1	9-5 pm
Wednesday, 25 June 2014	Module 1 & 2	9-5 pm
Wednesday, 2 July 2014	Module 2	9-5 pm
Friday, 4 July 2014		9-5 pm
Monday, 7 July 2014	Module 2 & 3	9-5 pm
Wednesday, 9 July 2014	Module 3	9-5 pm
Monday, 14 July 2014		9-5 pm
Wednesday, 16 July 2014	Module 4	9-5 pm

Jul-14		
Date	Module	Time
Monday, 21 July 2014	Module 1	9-5 pm
Wednesday, 23 July 2014	Module 1 & 2	9-5 pm
Wednesday, 30 July 2014	Module 2	9-5 pm
Friday, 1 August 2014		9-5 pm
Monday, 4 August 2014	Module 2 & 3	9-5 pm
Wednesday, 6 August 2014	Module 3	9-5 pm
Monday, 11 August 2014		9-5 pm
Wednesday, 13 August 2014	Module 4	9-5 pm

Aug-14		
Date	Module	Time
Monday, 18 August 2014	Module 1	9-5 pm
Wednesday, 20 August 2014	Module 1 & 2	9-5 pm
Wednesday, 25 August 2014	Module 2	9-5 pm
Friday, 27 August 2014		9-5 pm
Monday, 1 September 2014	Module 2 & 3	9-5 pm
Wednesday, 3 September 2014	Module 3	9-5 pm
Monday, 8 September 2014		9-5 pm
Wednesday, 10 September 2014	Module 4	9-5 pm

CPP (Retail)

June 2014		
Date	Module	Time
Monday, 23 June 2014	Module 1	9-5 pm
Wednesday, 25 June 2014	Module 1 & 2	9-5 pm
Wednesday, 2 July 2014	Module 2	9-5 pm
Friday, 4 July 2014		9-5 pm
Tuesday, 8 July 2014	Module 3	9-5 pm
Thursday, 10 July 2014		9-5 pm
Tuesday, 15 July 2014		9-5 pm
Wednesday, 16 July 2014	Module 4	9-5 pm

Jul-14		
Date	Module	Time
Monday, 21 July 2014	Module 1	9-5 pm
Wednesday, 23 July 2014	Module 1 & 2	9-5 pm
Wednesday, 30 July 2014	Module 2	9-5 pm
Friday, 1 August 2014		9-5 pm
Tuesday, 5 August 2014	Module 3	9-5 pm
Thursday, 7 August 2014		9-5 pm
Tuesday, 12 August 2014		9-5 pm
Wednesday, 13 August 2014	Module 4	9-5 pm

Aug-14		
Date	Module	Time
Monday, 18 August 2014	Module 1	9-5 pm
Wednesday, 20 August 2014	Module 1 & 2	9-5 pm
Wednesday, 25 August 2014	Module 2	9-5 pm
Friday, 27 August 2014		9-5 pm
Tuesday, 2 September 2014	Module 3	9-5 pm
Thursday, 4 September 2014		9-5 pm
Tuesday, 9 September 2014		9-5 pm
Wednesday, 10 September 2014	Module 4	9-5 pm

May 2014		
Date	Module	Time
Wednesday, 7 May 2014	Module 1	9-5 pm
Friday, 9 May 2014	Module 1 & 2	9-5 pm
Wednesday, 14 May 2014	Module 2	9-5 pm
Friday, 16 May 2014		9-5 pm
Tuesday, 20 May 2014	Module 3	9-5 pm
Thursday, 22 May 2014		9-5 pm
Tuesday, 27 May 2014		9-5 pm
Wednesday, 28 May 2014	Module 4	9-5 pm

CPP (Food)

June 2014		
Date	Module	Time
Monday, 23 June 2014	Module 1	9-5 pm
Wednesday, 25 June 2014	Module 1 & 2	9-5 pm
Wednesday, 2 July 2014	Module 2	9-5 pm
Thursday, 3 July 2014		9-5 pm
Tuesday, 8 July 2014	Module 3	9-5 pm
Friday, 11 July 2014		9-5 pm
Tuesday, 15 July 2014		9-5 pm
Wednesday, 16 July 2014	Module 4	9-5 pm

Jul-14		
Date	Module	Time
Monday, 21 July 2014	Module 1	9-5 pm
Wednesday, 23 July 2014	Module 1 & 2	9-5 pm
Wednesday, 30 July 2014	Module 2	9-5 pm
Thursday, 31 July 2014		9-5 pm
Tuesday, 5 August 2014	Module 3	9-5 pm
Friday, 8 August 2014		9-5 pm
Tuesday, 12 August 2014		9-5 pm
Wednesday, 13 August 2014	Module 4	9-5 pm

Aug-14		
Date	Module	Time
Monday, 18 August 2014	Module 1	9-5 pm
Wednesday, 20 August 2014	Module 1 & 2	9-5 pm
Wednesday, 25 August 2014	Module 2	9-5 pm
Thursday, 28 August 2014		9-5 pm
Tuesday, 2 September 2014	Module 3	9-5 pm
Friday, 5 September 2014		9-5 pm
Tuesday, 9 September 2014		9-5 pm
Wednesday, 10 September 2014	Module 4	9-5 pm

Core Faculty Members

MR. LAM CHUN SEE

**B. ENG IN INDUSTRIAL & SYSTEMS
ENGINEERING (UNIVERSITY OF SINGAPORE)**

Chun see manages his own consultancy practice, Hoshin Consulting and is also an associate consultant/trainer to the PSB Corporation and Singapore Productivity Association. Prior to running his own practice, he has had years of experience as an industrial engineer with Philips, and trainer and consultant with the then National Productivity Board, APG Consulting and Teian Consulting. He was conferred the Triple-A Award in 1989 for helping to transfer Japanese know-how, particularly in the area of 5S, into local programmes and packages. Throughout his years of consultancy experience, Chun See has assisted many businesses in analyzing their productivity and quality objectives and performance; primarily through the application of the PDCA technique and basic QC tools.

MR. LEE KOK SEONG

M.SC. IN CHEMICAL ENGINEERING (IMPERIAL COLLEGE, LONDON UNIVERSITY), B.SC. IN CHEMICAL ENGINEERING (NATIONAL TAIWAN UNIVERSITY)

Kok Seong has accumulated vast experience in the areas of productivity training and management consultancy throughout his 30 years of experience with the Standards, Productivity and Innovation Board (SPRING). He has provided consultancy assistance and training for numerous organisations both within and outside of Singapore in the areas of Productivity Management, Operation and Production Management, total Quality Management, Total Productive Maintenance, Shopfloor Management, Occupational Safety Management, Industrial Engineering Applications and Supervisory Management. He has also been greatly involved in the pinnacle Singapore Quality Award (SQA) initiative since its inception in 1993. his track records include the assessments and site visits of award recipients like Micron Semiconductor (formerly Texas Instruments), Motorola, Baxter Healthcare, Philips Tuner Factory and Teck Wah Industrial Corporation Ltd. Mr. Lee is currently a certified SQA Senior Assessor, as well as a resource person for Basic and

Advanced Training Courses for Productivity Practitioners, a position he has taken on since 2007.

MR. LOW CHOO TUCK

M.SC. IN INDUSTRIAL ADMINISTRATION (UNIVERSITY OF ASTON, UK); B.SC. IN PHYSICS (NUS); DIP IN QUALITY CONTROL INSTRUCTORS (INTERNATIONAL QUALITY CENTRE, NETHERLANDS); CERTIFICATE IN PRODUCTIVITY DEVELOPMENT (JAPAN PRODUCTIVITY CENTRE); CERTIFICATE IN ADVANCED MANAGEMENT DEVELOPMENT (INSEASD)

Choo Tuck currently provides training and advisory services in productivity and quality management to businesses and government in the Asean region and Middle East. He was previously the Executive Director of the Restaurant Association of Singapore as well as the Singapore Productivity Association, and was also the Director for Strategic Planning in SPRING Singapore. During his many years of service with SPRING Singapore, he gained wide experience in productivity training, management consultancy and productivity promotion, and has helped more than a 100 businesses in improving productivity, quality control and business excellence, including organisations such as Cycle & Carriage, Motorola, PUB and DBS. On top of that, he has also served as an Asian Productivity Organisation (APO) expert on Productivity for several APO member countries, and was part of a team of experts engaged by the Singapore cooperation Enterprise to provide productivity expertise to the Government of Bahrain in 2007 and 2008.

MR. QUEK AIK TENG

B.ENG (HON.) IN MECHANICAL ENGINEERING (UNIVERSITY OF SHEFFIELD); DIP. IN BUSINESS EFFICIENCY (INDUSTRIAL ENGINEERING_ (PSB-ACADEMY); CERTIFIED MANAGEMENT CONSULTANT (CMC); PRACTISING MANAGEMENT CONSULTANT (PMC); MEMBER, INSTITUTE OF MANAGEMENT CONSULTANTS (IMC) SINGAPORE

Aik Teng currently manages his own consultancy, AT Consulting Services. One of his most recent projects includes being the LEAD Project Manager for the Singapore Logistics Association. Prior to running his own consultancy, he has been with SPRING Singapore for 20 years, and was the Head of the Organisation Excellence Department from 2004-05. He was also

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SQA Lead Assessor and Team Leader up till 2008 and has been involved in the SQA initiative since its inception in 1993. tasked to start up the consultancy unit within the then Productivity & Standards Board (PSB) to provide training and consultancy services to organisations, his consulting team assisted close to 30 organisations during that period. He was also involved in a project coordinated by the Singapore Cooperation Enterprise (SCE) to assist the Bahrain Labour Fund in their Labour Reform strategy, which included helping the Bahrain government to initiate a Productivity Movement as well as develop the productivity of the local enterprises. In addition, he was appointed as Project Manager to assist the Government of Botswana to implement a national Productivity Movement, from 1994 to 2003. Botswana is currently held as a model of Productivity in the Pan-Africa region.

MR. WONG KAI HONG**MBA IN STRATEGIC MARKETING (HULL), BSC (NUS)**

Kai Hong is a business consultant, management trainer and company director. He has spent almost 2 decades in the consumer products industry, having worked with retailers like Isetan, Metro, Royal Sporting House, The Athlete's Foot and Sunglass Hut; brands like Reebok and Doc Martens; and technology group Wearnes Technology. He has been involved with various functions including operations, business development, project management, human resource, training, marketing, logistics, budgeting and general management. He has developed businesses in Singapore and many Asian cities such as Seoul and Beijing.

For registration or more information, write to us at

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Alternatively, you could also contact our secretariat:

Ms. Angela Poh

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