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Productivity in Food Manufacturing and Services

1. Introduction

Productivity is the key differentiating factor for achieving success, and the key to survival particularly in today's increasingly competitive environment.

2. Why Raising Productivity is Important?

In order to be competitive, the food manufacturing and services industry needs to constantly innovate and adopt productivity improvements. With rising business costs, it is critical for organisations to raise their productivity to attain sustainable growth and improve their efficiency.

Hence, businesses in the industry are urged to take-up productivity initiatives in areas such as manpower training and development, innovative and higher-value products, collaboration for economies of scale, and automation and process improvements.

3. What are the Challenges Faced by the Industry?

The tight labour market and rising costs are two issues that contribute to a challenging operating environment and affect the productivity of the food manufacturing and services industry in Singapore. A study by The Boston Consulting Group in 2012 reveals four challenges faced by the industry: labour shortage; rising costs; expansion issues; and ensuring sustained performance improvements.

Other challenges include:

- Slow in adoption of automation and productivity improvement tools
- Lack of economies of scale due to limited domestic market
- Low level of innovation to create higher value-added products

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- Lack of skilled manpower and inability to attract and retain talent

4. How to Improve Productivity?

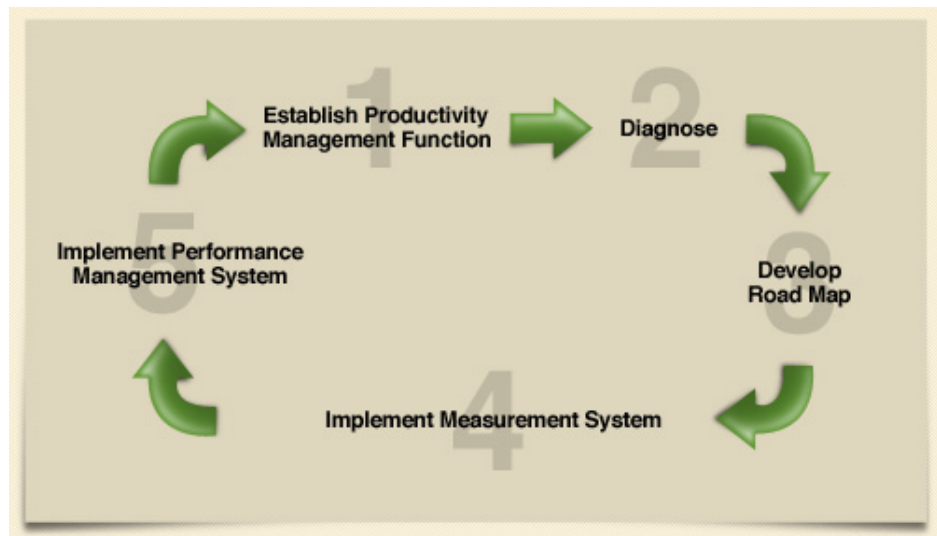
4.1. Productivity Tools and Techniques

There are a variety of productivity tools and techniques that can be adopted by companies. Below are some examples of the tools and methodologies.

Integrated Management of Productivity Activities (IMPACT) Framework

The IMPACT framework is developed by SPRING Singapore, and guides organisations in managing and improving productivity in a systematic manner. It comprises steps and tools that can be used to put in place systems and processes that ensure the productivity improvements are sustained.

The five inter-related phases of the IMPACT framework is presented in the diagram below.



Source: Productivity methodologies: IMPACT framework. (n.d.). *Productivity@Work*. Retrieved May 3, 2013, from http://www.waytogo.sg/howto-improve-productivity/method_impact_framework.html

More information on the IMPACT framework can be obtained from the guide published by SPRING Singapore, entitled “A Guide to Integrated Management of Productivity Activities (IMPACT)”.

The guide can be downloaded from the following website:

<http://www.waytogo.sg/download/Guide-to-IMPACT.pdf>

Lean Manufacturing

Lean is a systematic, continuous improvement approach that concentrates on creating more value for customers by eliminating activities that are considered waste, i.e., any activity or process that consumes resources and adds cost or time without creating value. Lean applies to the entire organisation and supply chain. It can provide the foundation for widespread organisational improvement.

Lean embraces five main principles:

- (i) Specify what creates value from the customer’s perspective; what the customer is willing to pay for.
- (ii) Identify all the steps across the whole value stream from raw materials to finished goods which deliver customer value.
- (iii) Make sure those steps flow better; eliminate delays and interruptions to create a smooth process.
- (iv) Let the customer pull value and deliver it when the customer wants it, not when you want to supply it.
- (v) Strive for perfection by continually removing successive layers of waste.

The principles of lean also apply to the product development process and the provision of service and back office support. Lean thinking can also be extended to product design and development by identifying bottlenecks in those processes that create unnecessary delays.

5S

5S is an abbreviation for the five Japanese workplace improvement practices of *seiri* (sort), *seiton* (set in order), *seiso* (shine), *seiketsu* (standardise), and *shitsuke* (sustain). The method of 5S is one way to engage people and contribute to culture change.

The 5S methodology, also referred to as a housekeeping methodology, is a visually-oriented system of cleanliness, organisation, and arrangement designed to facilitate greater productivity, safety, and quality. It engages all employees and is a foundation for more self-discipline on the job to achieve better work and product quality. 5S improves quality and productivity through “maintaining an orderly workplace and using visual cues to achieve more consistent operational results”. It also encourages employees to improve on their working environment and assist them in reducing waste, unplanned downtime, and in-process inventory.

In many instances, 5S provided the foundation for the implementation and sustainability of many other popular productivity programs like total quality management (TQM), total productive maintenance (TPM), and just-in-time (JIT) production systems.

Total Productive Maintenance (TPM)

Total Productive Maintenance or TPM is a proven methodology used to optimise and increase machine productivity. It comprises a systematic maintenance programme that involves an established process for maintaining plants and equipment. TPM involves employees at all levels and aims to make processes more reliable and non-wasteful. It also focuses primarily on manufacturing.

The goal of TPM is to “continuously improve all operational conditions, within a production system, by stimulating the daily awareness of all employees”. Through the implementation of TPM, it is hoped to maximise the total effectiveness of production system and markedly increase production. It brings maintenance into focus as a “necessary and vital” aspect of the business, and aims to prevent every type of loss (zero accidents, zero defects, and zero failures for the total life).

TPM also plays a part in increasing employees' morale and job satisfaction, and should not be regarded as a non-profit activity. Down time for maintenance is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. Meanwhile, emergency and unscheduled maintenance should be kept to a minimum.

4.2. Leadership and Management

In a labour intensive industry, people and their skills are central to all attempts to enhance productivity. Empowerment and high-involvement work practices can impact on productivity improvement. An effective leadership will lead to higher organisational performance. Leadership by example plays a strong role in creating a positive and productive workplace culture, and inspiring others to pursue those opportunities which have been identified. Meanwhile, an effective management is important in achieving higher productivity in the industry.

Leadership and management are critical factors in a productive and competitive business. Leadership, in particular, is considered as one of the most important issue in determining the productive capability of the organisation. While certain leadership styles contribute to productivity, others constrain it.

4.3. Manpower Training and Development

One of the key methods to optimise the workforce to achieve higher labour productivity is training. Skills shortages stifle growth potential and training is the crucial first step in boosting the organisation's productivity level. Effective training and development can yield significant returns as a key driver in sustaining the organisation's competitive advantage. The knowledge, ability and skills of employees also contribute to workplace productivity. Thus, ongoing investment in foundation, technical, supervisory and managerial skills, together with improvements in work organisation, can help improve the productivity and performance of organisations.

Well-trained employees are more capable and more willing to take control over their jobs as they acquire positive attitudes. Employees who are

properly trained are also more capable of answering the questions of customers, which in turn builds customer loyalty. Employees who understand the business complain less, are more satisfied and are more motivated, which leads to better management-employee relations. Workforce training and development, therefore, is a crucial investment strategy.

Some of the benefits of workforce training and development include:

- Increased staff morale and job satisfaction
- Highly motivated employees
- A willingness to adopt new technologies and methods
- A flexible, creative, innovative workforce
- Reduced employee turnover
- Enhanced company image and status
- Increased efficiencies and productivity resulting in financial gains to the company.

4.4. Process Improvements, Automation and Innovation

Automation

Implementing automation can offer a wealth of benefits. It can result in cost reduction, quality improvements, and faster responses to changing environments. Automation can also help organisations to innovate, streamline processes, maximise efficiency and improve services.

For example, through a productivity improvement project, Baker's Oven, a local manufacturer and wholesale supplier of western and traditional pastries and cakes, installed a turnkey line for the production of frozen dough and pies at their 600-square metre food factory. The automated production line synchronised the bakery equipment and reduced manpower utilisation by 50 percent. The enhanced production capacity resulted in increased revenue, as well as a better workplace environment for the employees as it eased movement and minimised product transfer.

Another example is Ruyi, a Chinese fast-food concept establishment under the TungLok Group, which have been successful in improving their workflow processes and productivity by leveraging on technology. Automation has replaced certain laborious tasks, freeing up precious man-hours for other priorities. For example, the gyoza machine can produce about 1,000 pieces of gyoza per hour versus about 500 pieces per hour per person when produced manually. Ruyi also uses several innovative appliances in their kitchen, such as the automatic fryer and automated noodle boiler. The fryer fries items such as rice or noodles within the pre-set time, with ability to adjust the speed and temperature of the wok according to requirements. Meanwhile, the noodle boiler cooks noodles automatically and lifts it out from boiling water at the pre-set cooking time. These appliances simplify food preparation and ensure that the food flavour is even and consistent. At the same time, employees are able to multi-task in the kitchen and focus on providing value-added service to their customers.

Innovation

Innovation can differentiate, generate new markets and create value in a competitive marketplace. However, it is important to note the need for customers to understand the benefits of the new product or service to clinch the sale.

In 2011, Sakae Sushi, Singapore's largest sushi chain, introduced a new ordering and payment system. Customers can make their order through the iPad 2 or from service crew using iPod touch handheld wireless ordering system. They also have the option of paying using the first integrated mobile e-payment system that provides the convenience for settling credit card payment and receipt printing at their seats. Customers can also order take-aways via the automated teller kiosks. They can tap on the touch screen monitor to select items and return to pick up the prepared food at a stipulated time. With these technologies in place, each payment is expected to be 25 percent faster and service teams will be able to handle 2.5 times more take-away orders.

Due to Singapore's small domestic market, increasing export sales is also a key productivity improvement lever to increase demand and production volume. Developing new, innovative

and higher-value products is a way for food manufacturers and service providers to create demand.

One example is Ellaziq, which produces Halal-certified pâté (meat spreads) with innovative flavours – three poultry-based and three seafood-based. With these products, Ellaziq became the first local company to provide flavoured pâté to the local market. Additionally, through its participation in the 2012 Gulfood Expo, Ellaziq was able to draw great interest, receive positive feedback and gain an edge to engage higher-end customer segments, such as airlines and hotels, and penetrate into new markets.

5. Productivity Measurement and Analysis

5.1. Why Measure Productivity?

Measurement plays a critical role in the management of productivity in an organisation. Productivity measurement is a prerequisite for improving productivity, as it helps to determine the progress and provides information on how effectively and efficiently the organisation manages its resources. It allows organisations to critically analyse their business, and is useful in assisting organisations achieve and maintain a high level of performance, and particularly improving the efficiency of various operations within the organisation. Through productivity measurement, organisations would be able to assess areas where it is performing well and highlight the important areas for improvement.

Following the assessment, organisations would have a clearer picture of their productivity strengths and weaknesses relative to their competitors in their industry. The assessment also assists organisations to ascertain, plan, control and improve efficiency at different levels, apart from facilitating the comparison of performance of different companies within a market or industry. As such, it assists the organisation in setting improvement targets for their long term strategic plans, and in developing suitable competitive strategy. It also helps them in making better decisions about investments in processes, methods, tools and outsourcing. Productivity measurement also plays a part in motivating employees through the payment of incentives for

high productivity. The availability of comparative performance data itself becomes a tool for self motivation of employees.

5.2. How to Measure Productivity?

Productivity is “the relationship between the quantity of output and the quantity of input used to generate that output”. It measures the effectiveness and efficiency of the organisation in generating output with the resources available.

Productivity is defined as a ratio of output to input:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

Measures of Output

Output could be in the form of goods produced or services rendered.

Output may be expressed in:

- **Physical quantity**
At the operational level, where products or services are homogenous, output can be measured in physical units (e.g. number of customers served, number of books printed, etc.). Such measures reflect the physical effectiveness and efficiency of a process, and are not affected by price fluctuations.
- **Financial value**
At the organisational level, output is seldom uniform. It is usually measured in financial value, such as: sales, production value, and value added.

Measures of input

Input comprises the resources used to produce output.

The most common forms of input are:

- **Labour**
Labour refers to all categories of employees in the organisation. It includes working directors, proprietors, partners, unpaid family workers and part-time employees.

Labour can be measured in three ways:

- Number of hours worked – It reflects the actual amount of input used, excluding hours paid but not worked, e.g. holidays, paid leave
 - Number of employees engaged – A more commonly used measure, as data on hours worked may not be readily available.
 - Cost of labour – Includes salaries, bonuses, allowances and benefits paid to employees.
- Capital
Capital refers to physical assets such as machinery and equipment, land and buildings, and inventories that are used by the organisation in the production of goods or provision of services. Capital can be measured in physical quantity, for example number of machine hours, or in financial value, net of depreciation to account for the reduced efficiency of older assets.
 - Intermediate input
Major categories of intermediate input include materials, energy and business services. Such input can be measured in physical units, for example kilogram, kilowatt per hour, or financial units such as cost of energy and materials purchased.

Productivity indicators

Productivity indicators “measure the effectiveness and efficiency of a given input in the generation of output”.

Two examples of productivity indicators are:

- Labour productivity
Labour productivity is the most common measure and is defined as value added per employee. It reflects the effectiveness and efficiency of labour in the production and sale of the output.

- Capital productivity
Measuring the effectiveness and efficiency of capital in the generation of output, capital productivity is defined as value added per dollar of capital. Capital productivity results from improvements in the machinery and equipment used, as well as the skills of the labour using capital, processes, etc.

More information on productivity measurement, the concepts, steps on how to set up a measurement system and the practical applications of productivity measurement can be obtained from the guide published by SPRING Singapore, entitled "A Guide to Productivity Measurement".

The guide can be downloaded from the following website:

http://www.spring.gov.sg/resources/documents/guidebook_productivity_measurement.pdf

Case Study

Heinz Frozen Food Co.

Heinz has become a staple brand for consumers for many years. It is renowned for being one of the world's leading producers of healthy and convenient foods. Heinz Frozen Food Co. manufactures food products that include entrees, snacks and desserts.

Setting the Strategy

Heinz Frozen Food Co. set its sights on improving its manufacturing and maintenance process efficiency with leading-edge technology. They knew that implementation of a new system would require a monumental change in culture for its employees. Heinz conducted analysis of several competitive applications, and later chose an enterprise asset management (EAM) application.

Upon the implementation, manufacturing and maintenance employees started using the EAM. The company soon gained better visibility into their processes and realised that more progressive lean manufacturing and lean maintenance practices would enable more significant efficiencies.

Heinz then began incorporating lean manufacturing and maintenance practices. They started to identify maintenance waste elements – those that did not add value, in concert with lean manufacturing and maintenance. They also started to understand change enablers such as awareness of what needs to change, understanding of their goals and objectives, and engagement by everyone from the top management to those performing the tasks. Once all of the change enablers aligned to achieve the targeted results, the company began realising efficiency improvements. The EAM implementation brought improved results to the company in a short time.

Seeing Results

Heinz was able to continuously adapt the system and incorporate lean maintenance processes in a timely and cost-effective manner. As Heinz began removing common maintenance waste from the process, it began an integrated approach to designing and improving manufacturing and maintenance work toward the ideal internal customer-focussed state.

The primary lean tools that the company adopted were EAM, maintenance planning, preventive maintenance, total productive maintenance, reliability-centred maintenance, and reliability engineering to eliminate failures. Other lean tools it used were 5S, to keep things in order; 5 Whys, to ensure ease of use; Kanban, to provide a visual representation of progress in the work cycle; Hansei, to enable reflection upon errors and correction of them; Genshi Genbushu, to allow seeing the work to spark ideas on how to improve; and Kaizen, to review four-hour progressive manufacturing tasks to eliminate waste.

Milton Slagowski, Maintenance Manager at Heinz Frozen Food Co. notes, "We used EAM features such as KPI (key performance indicator) inboxes and reports to see our hours worked per month, rework hours, overdue PMs, and planned-hour ratios. Then we tweaked our processes to achieve our efficiency goals. Reactive maintenance amounts to tremendous waste, whereas planned maintenance enables 30 percent more actual work to be completed. Using EAM and lean practices, we can verify that working out a maintenance plan ahead of time saves three to five times the total time invested."

Additional and unnecessary maintenance time also translates to astronomical cost increases. Slagowski reported that reactive maintenance costs US\$400 per hour, and corrective action costs US\$200 per hour. However, with planned maintenance, in which they incorporate lean practices with EAM, the cost is only US\$75 per hour.

New maintenance practices that resulted in culture changes at Heinz proved positive in many ways. The maintenance planners started interacting with the maintenance performing professionals and together documented and sustained best practices and gained employee involvement and communication with the aim to help each other reach common goals.

Heinz has also claimed considerable gains in process efficiency. Following the use of EAM and lean practices, Heinz have realised 10 percent to 11 percent efficiency improvements, and their maintenance costs have dropped by 5 percent to 10 percent. On its journey to optimally streamline its manufacturing and maintenance processes toward its production-focused ideal state, Heinz embraces continuous improvement.

In summary, EAM has helped Heinz Frozen Food Co. to gain:

- 10 to 11 percent efficiency improvements in areas such as maintenance stores and production
- 5 to 10 percent reductions in maintenance costs

- World-class levels of maintenance inventory management: 1 percent of estimated replacement value
- Low total cost of ownership

Jumbo

Jumbo is a Singapore seafood restaurant group that was established in 1987, with its first restaurant located in the East Coast Seafood Centre. Jumbo has since grown into a group of six restaurants, serving live seafood prepared in familiar local and Hong Kong styles.

Upgrading and Retraining Courses

CEO Ang Kiam Meng emphasised that the “business is always about people and is only as strong as its weakest link”. He regularly sends his staff for upgrading and retraining courses. All staff are given the opportunity to attend courses conducted both internally and externally, catering to their various expertise needs, ranging from language to service soft-skills.

Mr Ang notes that these courses also serve as an encouragement to foreign workers, hence boosting productivity as they feel that they are being taken care of. He highlighted that this has become an imperative in recent years, as service standards have noticeably dropped.

The upgrading and refresher courses offered to staff have also possibly contributed to the lower turnover rate for Jumbo group. The group boasts a large crew of long-serving staff, with about 200 of its 800 employees having stayed for more than five years and close to 100 who have served more than 10 years.

Central Kitchen

One of the productivity initiatives that have been undertaken by Jumbo is the development of the central kitchen. Despite giving the formula and recipe, as well as sharing trade secrets with their chefs, the chilli crab tasted different at all the outlets. As it is important for them to maintain consistency of taste across different outlets, the head chef had to go around to each outlet to standardise the taste and texture. This resulted in a waste of manpower.

Their HACCP (Hazard Analysis and Critical Control Point)-certified central kitchen thus handles central purchasing, as

well as standardising the food quality. The semi-processing of products also enables outlets to cut down on their workload and increase their productivity, spending more time generating dishes rather than preparing them.

Among the benefits of having the central kitchen is, busy outlets can now extend their business hours, at the same time increase their sales, and allowing for more productive work to be done as the tedious work can be completed in the central kitchen with the help of machinery. Essentially, with less people Jumbo has been able to achieve more.

The concept of central kitchens is starting to be increasingly adopted in Singapore. However, Mr Ang qualified that “it is not cheap to have a central kitchen”, and “you need to have volume”.

Overseas Expansion and Retail Products

As the group celebrated their 25th anniversary in February 2012, they were looking into expanding overseas, and venturing into Indonesia and China. Jumbo has also “delved into the retail market”. Their retail products offering include chilli crab paste, black pepper crab spice, and Ng Ah Sio Bak Kut Teh.

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

Books are available at the Lee
Kong Chian Reference Library.

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<p>Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)</p> <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 	<p>Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)</p> <ul style="list-style-type: none"> • Delivering Service Excellence • Productivity Measurement & Analysis • Process management: <ul style="list-style-type: none"> ▪ Cost of Quality ▪ Lean Six Sigma ▪ Process Mapping & Analysis
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<p>Module 4: Critical Success Factors (Duration: 1 day)</p> <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 SMEs:	Net Fee	Nett Fee with GST
SPA Member (S\$3,700)	S\$1,110	S\$1,187.70
Non-Member (S\$3,950)	S\$1,185	S\$1,267.95
For MNCs/LLEs/Statutory Boards	Net Fee	Nett Fee with GST
SPA Member (S\$3,700)	S\$185.00	S\$197.50
Non-Member (S\$3,950)	S\$197.50	S\$211.25

Here are the schedules for CPP:

(Retail)

May 2013		
Date	Module	Time
Friday, 3 May 2013	Module 1	9-5 pm
Tuesday, 7 May 2013	Module 1 & 2	9-5 pm
Thursday, 9 May 2013	Module 2	9-5 pm
Monday, 13 May 2013		9-5 pm
Wednesday, 15 May 2013	Module 3	9-5 pm
Monday, 20 May 2013		9-5 pm
Tuesday, 28 May 2013		9-5 pm
Wednesday, 29 May 2013	Module 4	9-5 pm

June 2013		
Date	Module	Time
Wednesday, 5 June 2013	Module 1	9-5 pm
Friday, 7 June 2013	Module 1& 2	9-5 pm
Wednesday, 12 June 2013	Module 2	9-5 pm
Friday, 14 June 2013		9-5 pm
Tuesday, 18 June 2013	Module 3	9-5 pm
Thursday, 20 June 2013		9-5 pm
Tuesday, 25 June 2013		9-5 pm
Friday, 28 June 2013	Module 4	9-5 pm

(Food)

May 2013		
Date	Module	Time
Friday, 3 May 2013	Module 1	9-5 pm
Tuesday, 7 May 2013	Module 1& 2	9-5 pm
Thursday, 9 May 2013	Module 2	9-5 pm
Monday, 13 May 2013		9-5 pm
Wednesday, 15 May 2013	Module 3	9-5 pm
Friday, 17 May 2013		9-5 pm
Tuesday, 28 May 2013		9-5 pm
Wednesday, 29 May 2013	Module 4	9-5 pm

June 2013		
Date	Module	Time
Wednesday, 5 June 2013	Module 1	9-5 pm
Friday, 7 June 2013	Module 1& 2	9-5 pm
Wednesday, 12 June 2013	Module 2	9-5 pm
Monday, 17 June 2013		9-5 pm
Wednesday, 19 June 2013	Module 3	9-5 pm
Monday, 24 June 2013		9-5 pm
Wednesday, 26 June 2013		9-5 pm
Friday, 28 June 2013	Module 4	9-5 pm

(Generic)

June 2013		
Date	Module	Time
Wednesday, 5 June 2013	Module 1	9-5 pm
Friday, 7 June 2013	Module 1 & 2	9-5 pm
Wednesday, 12 June 2013	Module 2	9-5 pm
Friday, 14 June 2013		9-5 pm
Wednesday, 19 June 2013	Module 2 & 3	9-5 pm
Friday, 21 June 2013	Module 3	9-5 pm
Wednesday, 26 June 2013		9-5 pm
Friday, 28 June 2013	Module 4	9-5 pm

July 2013		
Date	Module	Time
Monday, 15 July 2013	Module 1	9-5 pm
Wednesday, 17 July 2013	Module 1 & 2	9-5 pm
Monday, 22 July 2013	Module 2	9-5 pm
Wednesday, 24 July 2013		9-5 pm
Monday, 29 July 2013	Module 2 & 3	9-5 pm
Wednesday, 31 July 2013	Module 3	9-5 pm
Friday, 2 August 2013		9-5 pm
Tuesday, 6 August 2013	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

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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 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 CPP@spa.org.sg.

Alternatively, you could also contact our secretariat:

Ms. Angela Poh

DID: 6375 0938