

## **THE CONCEPT OF A PROCESS**

**Everything is a process. Whether it is admitting a patient in a hospital, handling customers at a checkout counter, opening a new account for a bank's customer, or packaging a product for shipment to a customer – all involve a series of activities that are interrelated and must be managed.**

### **WHAT IS A PROCESS?**

**A process is a series of activities or steps used to transform input(s) into output(s). An input or output may exist or occur in the form of data, information, raw material, partially finished units, purchased parts, product or service, or the environment. It is the steps used by an individual or group to perform work or a complete task. It is sometimes referred to as a technique, method or procedure. The absence of a clearly defined process makes any activity subject to an arbitrary mode of execution and its outcome or output subject to unpredictable performance. In order to “do it right the first time” and “do the right things right,” processes must be effectively managed. When processes are not adequately managed, quality will regress to mediocrity.**

### **Example of a Process**

**A well-known process involves packing and shipping a finished product to a customer. The input to the shipping department includes the finished product, the customer's name and address, invoice information, etc. The transformation process entails inspection, making the box, labeling, packing the product, and arranging for shipment. The output in this case is a successful delivery. feedback loop in this case is the customer reporting back on the condition of the product when it was delivered and whether it was the right product, model, brands, color, quantity and performance. Everything is a process – whether opening a new account at bank, taking a customer's order at a drive-thru window of a fast-food restaurant, processing an engineering design change, generating a purchase order, or admitting a patient to a hospital.**

**One of the primary objectives of total quality management (TQM) is to create processes in which individuals or groups will “do it right the first time” and “do the right things right.”**

### **Types of Processes**

**There are three (3) types of processes, as follows:**

**Management process:** This entails the method(s) used by management in executing their management functions. Three key functional area used by management are planning, organizing and controlling.

**Functional process:** A functional process consists of the methods used to achieve functional objectives within a group or by an individual.

**Cross-functional process:** This includes the method(s) used to achieve objectives that require participation or input from more than one group or individual. For example, the problem of minimizing breakage of a fragile product might require input from the shipping, design, marketing, packaging and manufacturing departments. Similarly, the problem of an adverse drug reaction in a hospital may require the involvement of the pharmacist, the ordering physician, a registered nurse, and a unit secretary. Each group or individual controls one or more of the sub processes affecting the problem.

### **The Total Process**

TQM calls for an evaluation of the total system, not just the sub-systems. The danger of sub-optimization always exists in that sub-processes instead of the total process are optimized. In many instances, the total process is not defined, and therefore, accountability is conspicuously absent. Each internal customer provides intermediate inputs or receives intermediate outputs throughout the process. These intermediate inputs and outputs are used to achieve the final outcome of the organization. The external customers provide an initial input to or receive final output from the process. Because everyone in an organization serves a customer or serves someone who does, everyone is therefore, part of a customer-supplier chain. No worker's task is isolated. Consequently, no worker is expected to either accept or pass on defective work or product.

### **The Feedback Loop**

The need to constantly improve processes makes it imperative that a feedback loop be introduced into every process. This feedback loop becomes the link between the output or outcome and the input. It provides the system with an opportunity to evaluate the gap between the expectation of the customer (internal or external) and what is produced or delivered by the supplier. The real value of feedback lies in its usefulness in analyzing the process of transformation.

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## **PROCESS APPROACH IN TOTAL QUALITY MANAGEMENT**

**The process approach includes establishing the organization's processes to operate as an integrated and complete system: The management system integrates processes and measures to meet objectives. Processes define interrelated activities and checks, to deliver intended outputs.**

### **What is a Process Approach?**

**A process approach means an organization manages their business as a system of processes – not departments or people or products. This works because if you have a good process, you'll have good results. Think about making cookies – if you follow a proven recipe (series of processes), it will provide good cookies (output). The interactions (the inputs and outputs that tie the processes together) between these processes is important. If you look at the simplified diagram below, the output of one process is the input of another process, which stresses the importance of not treating each process as an individual silo (department, job, etc). Each process needs to ensure it delivers (outputs) what the next process needs (inputs).**

**ISO 9001 promotes the process approach to managing an organization, and examines over 20 processes in its scope, including the entire Quality Management System (QMS) working as a process. Thus, you must document how you're going to address these processes and (procedures are a good way to do that). ISO 9001 introduces the term process approach in the Introduction, and is again addressed in the section Leadership, stating that managers need to promote the process approach.**

### **What are processes, inputs and outputs?**

**Every organization is made up of a series of interacting processes. A process is a set of activities that uses resources (people, machines, etc.) to transform inputs into outputs.**

**As a process approach can often become a complex system with too many processes, inputs and outputs, it is recommended to use a diagram or flowchart to allow you to better visualize the input-output relationship.**

**The ISO 9001 Standard is designed to manage and improve processes.**

**First, you identify your key processes.**

**Second, you define standards for those processes.**

**Third, you decide how the process will be measured and evaluated.**

Fourth, you document your approach to achieving the desired quality, as determined by your measurements.

Fifth, you continuously improve.

Once these are identified, an organization can ensure its processes are effective (the right process is followed the first time), and efficient (continually improved to ensure processes use the least amount of resources).

The effectiveness of the entire system is determined by the effectiveness of each process and the interactivity of these processes within the system. By establishing quality objectives and auditing how effectively the processes fulfill those objectives, an organization can determine whether the processes add value or need to be improved. Using the Process Approach while designing and developing a quality management system (QMS) enables this to happen.

A QMS using the process approach (guided by standards) can meet their customers' (internal or external) requirements and continual improvement in:

- The organization's overall function- the series of processes
- Processes – the conversion of inputs into output
- Results – Products and services resulting from processes
- Quality – fulfilling requirements/objectives
- Environment – preventing pollution and waste to improve the new bottom-line
- Safety removing unacceptable risks for the people supporting the processes

The Process Approach enables the organization to meet customer requirements and deliver continual improvement.

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## PROCESS MANAGEMENT

- Planning and administrating the activities necessary to **achieve high quality in business processes**; and also identifying **opportunities for improving quality** and operational performance – ultimately, **customer satisfaction**.
- Process **simplification** reduces opportunities for errors and rework.
- Processes are of two types – value-added processes and support processes.
- Value-added processes – those essential for running the business and achieving and maintaining competitive advantage. (Design process, Production/Delivery process)

- Support processes – Those that are important to an organization's value-creation processes, employees and daily operations.
- Value creation processes are driven by external customer needs while support processes are driven by internal needs.
- To apply the techniques of process management, a process must be **repeatable and measurable**.
- **Process owners** are responsible for process performance and should have authority to manage the process. Owners could range from high-level executive to workers who run a cell.
- Assigning owners ensures **accountability**.

## PROCESS CONTROL

- Control is the activity of ensuring the conformance to the requirements and taking corrective action when necessary.
- Two reasons for controlling the process
  - Process control methods are the basis of **effective daily management of processes**.
  - **Long-term improvements** can not be made to a process unless the process is first brought under control.
- Short-term corrective action should be taken by the process owners. Long-term remedial action should be the responsibility of the management.

Effective quality control systems include:

1. Documented procedures for all key processes
2. A clear understanding of the appropriate equipment and working environment
3. Methods of monitoring and controlling critical quality characteristics
4. Approval processes for equipment
5. Criteria for workmanship: written standards, samples etc.
6. Maintenance activities

## PROCESS IMPROVEMENT

- Customer loyalty is driven by delivered value.
- Delivered value is created by business processes.
- Sustained success in competitive markets require a business to continuously improve delivered value.
- To continuously improve value creation ability, a business must continuously improve its value creation processes.
- Continuous process improvement is an old management concept dating back to 1895. However, those approaches were mainly **productivity related**.
- More recently (1951) Toyota implemented **Just-In-Time** which relies on **zero defects** and hence continuous improvement

## OTHER TOOLS: FLOW CHARTS

- Process map identifies the **sequence of activities** or the flow in a process.
- Objectively provides a **picture of the steps** needed to accomplish a task.

- Helps all employees understand **how they fit into the process** and who are their suppliers and customers.
- Can also pinpoint places where quality-related measurements should be taken.
- Also called process mapping and analysis.
- Very successfully implemented in various organizations. e.g. Motorola reduced manufacturing time for pagers using flow charts.

## CONTINUOUS IMPROVEMENT

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### Continuous improvement process: A 6 steps guide to implementing PDCA

By Madeline Miles

Human transformation hinges on the idea that we can better ourselves and our organizations.

So when it comes to the continuous improvement process (Plan, Do, Check and Act or PDCA), it's an investment in reaching our full potential. This journey isn't a one-size-fits-all when it comes to implementing improvement strategies or improvement techniques. It's a deliberate process that requires observation, analysis, planning, and action.

But continuous improvement also is built on the idea that coaching can help people — and organizations — along the way. Like coaching, continuous improvement is an ongoing effort. It's built on a foundation of teamwork, a strong company culture, and feedback. But it also requires support and continuous improvement tools to help keep skills and capabilities sharp.

Everyone has the potential to grow and transform. We know businesses are made up of people. So when you invest in your people, you invest in the success of your organization.

Sometimes, continuous improvement is the smallest change that adds up over time. Other times, continuous improvement goes hand-in-hand with adapting to change and building resilience to stay competitive in today's market. Regardless, the process generates results without the pain that comes with making big changes at once.

If it seems like there's room for improvement at work, or if you want to become an industry leader who stays ahead of the curve, use continuous improvement as a framework for making positive changes.

**What is continuous improvement?**

Continuous improvement is the process of making small incremental changes that add up to significant results based on deliberate observation of current processes.

**Also known as Kaizen, the continuous improvement method originated in Japan. Today, it's been adopted by businesses across the globe as a way to achieve operational excellence.**

**The main idea behind continuous improvement is that no process is perfect and there is always room for improvement. The goal is to squeeze out waste, optimize resources, and empower employees to make changes that improve the company's bottom line.**

**Process improvement consultant Brian Ragone says it is "system thinking where we build feedback loops so we get information from current processes and reflect on how to improve them."**

**Ragone says the focus of continuous improvement is three-fold:**

- **Improving tools and materials**
- **Improving people and relationships**
- **Improving the work environment**

**That often means removing bloated tools. Other times, it's improving documentation about how you work, so anyone can come in and get started immediately. It's also upskilling your people. Finally, it's removing barriers from communication or just friction in work relationships.**

**Finally, it's improving the physical, and psychological safety of your people at work.**

#### **The 4 stages of continuous improvement**

**Continuous improvement is sometimes called the PDCA cycle, which stands for Plan-Do-Check-Act. And those are the four stages of continuous improvement.**

##### **Plan: Brainstorming and planning**

**Identify an opportunity for improvement and put together an action plan for management. For example, you notice that your conversion rates are below average for your industry. So you determine that you'll send a nurture email sequence in addition to calling your leads.**

##### **Do: Testing solutions**

**Once you've identified an opportunity and determined how best to address it through change, implement that change on a small scale. We do this to objectively measure its effectiveness. For the email sequence example above, that may mean only emailing a small percentage of leads (20% for example).**

##### **Check: Verifying the effectiveness**

**Did the change work? We need to know before we can apply it organization-wide. If our test 20% of leads convert better than the other 80% who don't receive nurture emails, for example, we can conclude that the change was effective.**

##### **Act: Implementing the solution**

**Once you confirm that your solution is effective, it's time to deploy it organization-wide to reap the benefits.**

## **Continuous improvement methods**

**There are several methods for continuous improvement. Here are five of them:**

- **The Lean Method**
- **The Kanban Method**
- **Six Sigma**
- **Total Quality Management**
- **Agile Methodology.**

### **The Lean method**

**The Lean methodology is a continuous improvement framework that was originally developed for manufacturing. It has since been adopted by businesses in other industries. The goal of Lean is to eliminate waste and improve efficiency. And it does that by streamlining processes and eliminating non-value-added activities.**

### **The Kanban method**

**The Kanban method is a framework that helps you visualize your work and optimize your workflow. The key principle of Kanban is to break down your work into smaller tasks and then track the progress of each task through every stage of your workflow. This helps you identify bottlenecks and areas of inefficiency so you can make improvements.**

### **Six Sigma**

**Six Sigma is a statistical framework that helps you identify and eliminate defects in your process. The goal of Six Sigma is to achieve near-perfection by reducing defects to a Six Sigma level. That's a defect rate of 3.4 errors per million opportunities.**

### **Total Quality Management**

**Total Quality Management (TQM) is a framework that ensures that your products meet or exceed customer expectations. TQM is built on the foundation of continuous improvement. It emphasizes the need to systematically identify and address quality issues.**

### **Agile Methodology**

**The Agile methodology is a framework for managing software development projects. Agile emphasizes iterative development, rapid prototyping, and constant feedback from stakeholders. The goal is to help teams create and launch high-quality software products in a fast and efficient manner.**

**Why is continuous improvement important?**

**Increased efficiency and productivity**



**Because you're constantly identifying areas where your processes can be improved, you can create a more streamlined workflow that cuts down on wasted time and resources. As a result, your team will be more productive.**

#### **Improved employee engagement and relationships**

**As Ragone stated, continuous improvement focuses on people and relationships just as much as it focuses on tools. The feedback loops in continuous improvement mean that employees watch out for opportunities for improvement in communication.**

**When employees feel like they are a part of a continuous improvement process, they are more engaged and invested in the success of the company. And you'll have better relationships between employees and managers and a more positive work environment overall.**

#### **Reduced waste**

**By eliminating defects and streamlining processes, you can improve the quality of your product or service. This not only leads to happier customers but can also save you money in the long run by reducing the need for rework and replacements.**

#### **Reduced costs**

**In addition to reducing waste, continuous improvement can also help you save money in other ways. For example, by streamlining your process, you may be able to reduce the amount of inventory you need on hand. And by identifying errors early, you can avoid the cost of fixing them later on.**

#### **Improved customer satisfaction**

**When you eliminate waste and defects, you end up with a product or service that is more likely to meet customer expectations. As a result, your organization will experience increased customer satisfaction.**

#### **Reduced cycle time**

**One of the benefits of making small improvements is that you can do it quickly. This means you can get your product or service to the market faster and start seeing results sooner.**

#### **Increased innovation and staying ahead of the competition**

**Continuous improvement helps you stay ahead of the competition by encouraging you to constantly explore new ways to improve your process. And by making small changes, you can test out new ideas quickly and cheaply to see if they're worth pursuing.**

**When you have a system in place for making small changes on an ongoing basis, you'll never stop improving.**

#### **Allows agility and adaptation to change**

**In today's business environment, adapting quickly to change is critical to success. Building resilience as an organization is no longer a nice to have. It's a must for every**

**business. Continuous improvement helps you build a system that makes it easier to test out new ideas and quickly implement changes.**

### **The 6 steps in continuous improvement**

**There are many ways to implement continuous improvement in your organization, but the most common method involves the following six steps:**

#### **1. Assess your current state**

**The first step in any process improvement initiative is to figure out where you are today. This can be done by mapping your current processes.**

**"Process maps help you understand your current workflows and allow you to spot opportunities for improvement (if any)."**

**Brian Ragone, Founder and Process Management Consultant at Puzzle**

**Ragone says this is the most important step in all forms of process improvement.**

**Walk through your current business processes with the people involved. Document every step (even those you deem irrelevant). Write down the order your people complete those steps in through the end of the process.**

**Next, create a flow chart using a process mapping tool to show your ordered process' steps so you can see every detail with a birds-eye view**

**Then identify the role responsible for each step in your process and the tools used. Project management tools, like Asana, can help with this process. Remember, continuous improvement is about your tools and materials, people and relationships, and environment.**

**You should begin to spot gaps and opportunities for improvement now.**

#### **2. Identify the root cause of problems**

**Once you know where your process breaks down, it's time to find out why. To identify the root cause of a problem, ask these five questions:**

- 1. What happened?**
- 2. When did it happen?**
- 3. Who was involved?**
- 4. What were they doing?**
- 5. What were the conditions under which it happened?**

#### **3. Develop a solution**

**Now that you know where your process is breaking down and why, you can create a plan to address the problem.**

**This plan should involve the people who are responsible for the steps in your process. Brainstorm potential solutions and then choose the one that promises to be most effective.**

#### **4. Implement the solution**

**Once you have a solution, it's time to create a plan for implementing it.**

**This plan should include a timeline for execution, a list of responsibilities, and any resources you'll need. Then, put the plan into action.**

#### **5. Evaluate the results**

**After you've implemented your solution, it's time to see if it worked.**

**Evaluate the results of your solution against your original goals for improvement. If it didn't work as planned, go back to step three and brainstorm another solution.**

#### **6. Standardize the process**

**If your solution was successful, congratulations! The last step is to make sure the process is followed correctly from now on.**

**To do this, create standard operating procedures (SOPs) that describe the steps in your process. These SOPs should be clear and easy to follow so that anyone can do them.**

**You should also create checklists or flowcharts that can be used as a reference when following the process.**

**But remember that solutions are never final with the continuous improvement model. Establish feedback loops that let you continually access your processes for improvement.**

#### **7 ways to improve continuous improvement**

**There is always room for improvement in any process, even a process that's designed to be improved. Here are a few ways you can make your continuous improvement efforts even more effective:**

##### **1. Create feedback loops**

**The best way to encourage continuous improvement is to create a culture that supports it. Encourage employee involvement by asking for and receiving feedback.**

**And when employees make suggestions, take them seriously and give them the resources they need to make those improvements. It can also help in your employee engagement efforts.**

##### **2. Focus on the customer**

**The goal of continuous improvement is to create a better product or service for your customers. So, it's important to keep them in mind when you're making changes.**

##### **3. Set SMART goals**

**SMART goals help you benchmark your progress and see if you're making the improvements you want.**

##### **4. Be flexible**

**Don't be afraid to change your plans if you find a better way to do something. The whole point of continuous improvement is flexibility in how we approach work and changes.**

#### **5. Be willing to be wrong**

**If you're getting feedback from your employees, not all of it will be the feedback you like. Remember to approach all feedback with an open mind.**

**As Glenn Rogers, CEO of Float tells his team, "Seek continuous improvement by welcoming feedback rather than defending against it. Your self-improvement journey requires education, seeking advice from others, and a willingness to be wrong."**

#### **6. Communicate your plans**

**Make sure everyone in your organization knows what your plans are and how they can help. Good communication will help everyone stay on the same page and work together to improve your processes.**

#### **7. Celebrate your successes**

**When you make a successful improvement, take the time to celebrate it. This will help motivate your team members and show them that their efforts are appreciated.**

### **Set on your continuous improvement journey**

**Continuous improvement is a powerful tool for any organization. By using it, you can make small, incremental improvements that add up to big results over time.**

**The key to success with continuous improvement is to start small. Don't try to do too much at once. Instead, make one or two incremental changes focusing on one area at a time.**

**Remember, the goal is to make your process better, not perfect. There will always be room for improvement, so don't strive for perfection.**

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**Continuous improvement models are the continued enhancement of goods, activities, or techniques through small-scale and significant advancements. These initiatives may aim for breakthrough progress at once or incremental growth over time.**

#### **What Are Improvement Models?**

**Quality Improvement models define the steps to be taken to achieve goals. These models can be used by any entity like companies, individuals, and even governments. They can be used for big advancements or small impactful changes.**

#### **Key Principles of Improvement Models**

- **Plan: Identify a chance and make a new strategy.**
- **Action: Apply the change gradually.**

- **Check:** Examine the outcomes of the change using data to assess if it had an impact.
- **Act:** If the transformation was successful, put it into practice on a larger scale and monitor your progress constantly. Restart the cycle if the modification was unsuccessful.

Businesses fail if they are not managed properly and efficiently. A workflow is really a hand tool to have. It thus makes a lot of sense to have these tools in your belt.

### **What Are the Continuous Improvement Models?**

There are various models for continuous improvement. Some are as follows.

#### **1. Kaizen Continuous Improvement**

Kaizen, a Japanese phrase that means improvement, aims to eliminate waste at all costs. Given its prevalence in production, where first employees are frequently best capable of recognizing bottlenecks in the production process, it is an inclusive approach of continuous improvement in that possibility for development is expected to be recognized by everybody from the CEO downwards.

This implies, however, there is a particular cultural component to Kaizen, and that to foster employee recommendations, procedure and protocol adoption must coexist with social re-alignment to the continuous improvement model.

Kaizen has several guiding concepts and applies underlying procedures like PDCA and root cause assessment.

There are two unique components when Kaizen is applied for continuous improvement: flowing kaizen and procedure kaizen. The former is based on tiny adjustments that individuals can make rapidly to increase efficiency, whereas the latter is concerned with how data, products, and ideas flow throughout the organization.

#### **2. Lean and Agile Continuous Improvement**

Lean agile emphasizes effective working practices while providing clients and others with high-quality products. Businesses can maintain their competitiveness when they consciously enhance procedures. To ensure that needs are always satisfied or surpassed, lean principles take the value for customers of any choice into account.

Five fundamental ideas underpin the application of lean methodology:

- **Value:** In just about any case, without the need for a clear understanding of what it is going to take to achieve customer satisfaction, the business cannot proceed. You must determine the ultimate objective (value) that buyers are looking for in the service or product.
- **Worth:** Eliminating waste makes sure that your business doesn't spend a lot of money on activities and procedures that don't provide any benefits. Additionally, and maybe most significantly, the client receives just what they require.
- **Flow:** companies must develop cross-functional groups, decompose and reorganize production procedures, and manage employee workloads if they are to successfully implement this type of methodology.

- **Pull:** By implementing a pull approach, you produce goods and services only when they are required rather than in advance, which results in an expanding collection or to-do list that must be held and handled, draining your financial resources.
- **Perfection:** Implementing lean requires time, and only going through the procedure once is not sufficient. Create a culture of continual development.

### **3. Lean Six Sigma Continuous Improvement**

The **Six Sigma improvement model** seeks to reduce errors, malfunctions, and any deviation from the defined process to improve the quality of the output overall. The term refers to the 99.99966% completion rate.

Based on whether the Six Sigma model for quality improvement is being applied to enhance an already-existing business operation or construct a new one, it employs one among two techniques. Various methods for quality control and procedures, such as the Five Whys, logical design, and economic evaluation, are applied in these approaches.

Lean Six Sigma trains you in the design process, risk assessment, and benchmark skills so that you can lead qualitative management efforts and analyze data creatively and statistically

### **4. DMAIC Continuous Improvement**

One of the most well-known and frequently employed techniques for enhancing corporate operations or organizations is the DMAIC model.

But what is the DMAIC model?

Five stages make up the DMAIC: define, measure, analyze, improve, and control. The DMAIC application's foundational phases enable us to enhance an already-existing management function or the effectiveness of the entire organization.

The DMAIC method is driven by data and takes into account every minute detail. It provides thorough suggestions for enhancing a company's operations or procedures. Each industry or profession can use this model.

### **5. Total Quality Management**

Total quality management is the ongoing process of identifying and minimizing or eradicating production defects, optimizing the distribution network, enhancing customer experience, and guaranteeing that staff members are trained to the highest standards. The goal of total quality management is to hold each party responsible for the whole standard of the finished item or service.

An organized method of managing an entire organization is total quality management. Through ongoing practice improvement, the procedure seeks to raise the caliber of a group's outputs, such as its services and products. The criteria established as part of the process can take into account both organizational objectives and any existing industry norms.

**Industry standards may involve conformity to numerous rules and policies controlling the functioning of a certain firm. These standards could be established at several stages. Production of goods in accordance with an accepted standard, even if the benchmark is not supported by official legislation, is another example of industry norms.**

## **Steps to Apply for an Improvement Strategy**

### **1. Use Kanban board**

**By restricting the amount of work in process, the Kanban board is a flow visualization tool that can help you make your production line clearer and more efficient.**

**Your group's productivity will improve as soon as you discover the critical work stages with this increased level of candor and take steps to fix them.**

**Teams may easily visualize and control their operations using kanban boards by using Cards, Columns, and others.**

**As you apply Kanban, you'll be able to begin simply and gradually add long-lasting, sustainable results to your operations, which will allow, among many other things, increased productivity, decreased anxiety, and better quality.**

### **2. Seek input from many sectors of your business**

**Management and personnel, market researchers, and financial controllers are among many sectors of a business. Take input from these sectors to develop long-term, mid-term, and short-term business goals. Assign deadlines to these targets and then beat these targets at a faster rate.**

### **3. Break big initiatives into small-scale changes**

**The yearly deadlines should be broken down into half-yearly, monthly, weekly, and daily deadlines. Yearly deadlines seem impossible to achieve without these breakdowns.**

**Adhere to these deadlines. Initiate gaps to counter missing deadlines. However, try to ensure that the deadlines are met, without the use of the gaps.**

**Usually, a business has a branch-like structure. With these small initiatives in mind, the leader should assign work and deadlines to one lower branch and then repeat these procedures and assign work further.**

### **4. View the process as an ongoing effect**

**This process has, in fact, an ongoing effect. The daily deadlines achieved throughout the company lead to weekly, monthly, and yearly goals. This is also the way to achieve century-long goals if intended. Having a workflow removes chaos and anxiety from running a business.**

**A company or employee should neither feel the anxiety of what to do next nor be burdened by an extremely high workload.**

**There are many improvement models best suited for any company needs. They must be used to achieve long-term and short-term goals with efficiency. Deadlines must be met for the accomplishment of long-term goals.**

**Stagnancy kills a company faster than anything else. Continuous improvement leads to a more sustainable development of goods, companies, and individuals. Identify the key points that are missing in your ideal self. Aim to improve upon them using these models.**

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## **WHAT IS KAIZEN?**

### **What is Kaizen? – Five S of Kaizen**

- **“Kaizen” refers to a Japanese word which means “improvement” or “change for the better”. Kaizen is defined as a continuous effort by each and every employee (from the CEO to field staff) to ensure improvement of all processes and systems of a particular organization. Work for a Japanese company and you would soon realize how much importance they give to the process of Kaizen. The process of Kaizen helps Japanese companies to outshine all other competitors by adhering to certain set policies and rules to eliminate defects and ensure long term superior quality and eventually customer satisfaction.**

**“Change is for good”.**

- **Kaizen means “continuous improvement of processes and functions of an organization through change”. In a layman’s language, Kaizen brings continuous small improvements in the overall processes and eventually aims towards organization’s success. Japanese feel that many small continuous changes in the systems and policies bring effective results than few major changes.**
- **Kaizen process aims at continuous improvement of processes not only in manufacturing sector but all other departments as well. Implementing Kaizen tools is not the responsibility of a single individual but involves every member who is directly associated with the organization. Every individual, irrespective of his/her designation or level in the hierarchy needs to contribute by incorporating small improvements and changes in the system.**

### **Five S of Kaizen**

- **“Five S” of Kaizen is a systematic approach which leads to fool-proof systems, standard policies, rules and regulations to give rise to a healthy work culture at the organization. You would hardly find an individual representing a Japanese company unhappy or dissatisfied. Japanese employees never speak ill about their organization. Yes, the process of Kaizen plays an important role in employee satisfaction and customer satisfaction through small continuous changes and eliminating defects. Kaizen tools give rise to a well organized workplace which results in better productivity and yield better results. It also leads to employees who strongly feel attached towards the organization.**

**Let us understand the five S in Detail:**



- **SEIRI – SEIRI stands for Sort Out. According to Seiri, employees should sort out and organize things well. Label the items as “Necessary”, “Critical”, “Most Important”, “Not needed now”, “Useless and so on. Throw what all is useless. Keep aside what all is not needed at the moment. Items which are critical and most important should be kept at a safe place.**
- **SEITON – Seition means to Organize. Research says that employees waste half of their precious time searching for items and important documents. Every item should have its own space and must be kept at its place only.**
- **SEISO – The word “SEISO” means shine the workplace. The workplace ought to be kept clean. De-clutter your workstation. Necessary documents should be kept in proper folders and files. Use cabinets and drawers to store your items.**
- **SEIKETSU–SEIKETSU refers to Standardization. Every organization needs to have certain standard rules and set policies to ensure superior quality.**
- **SHITSUKE or Self Discipline – Employees need to respect organization’s policies and adhere to rules and regulations. Self-discipline is essential. Do not attend office in casuals. Follow work procedures and do not forget to carry your identity cards to work. It gives you a sense of pride and respect for the organization.**

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## **Kaizen – Continuous Improvement**

Posted by: Margaret Rouse

Kaizen is an approach to creating continuous improvement based on the idea that small, ongoing positive changes can reap significant improvements. Typically, it is based on cooperation and commitment and stands in contrast to approaches that use radical or top-down changes to achieve transformation. Kaizen is core to lean manufacturing and the Toyota Way. It was developed in the manufacturing sector to lower defects, eliminate waste, boost productivity, encourage worker purpose and accountability, and promote innovation.

As a broad concept that carries myriad interpretations, it has been adopted in many other industries, including healthcare. It can be applied to any area of business, and even on the individual level. Kaizen can use a number of approaches and tools, such as value stream mapping -- which documents, analyzes and improves information or material flows required to produce a product or service -- and Total Quality Management (TQM) -- which is a management framework that enlists workers at all levels to focus on quality improvements. Regardless of methodology, in an organizational setting, the successful use of Kaizen rests on gaining support for the approach across the organization, and from the CEO down.

Kaizen is a compound of two Japanese words that together translate as "good change" or "improvement." However, Kaizen has come to mean "continuous improvement" through its association with lean methodology and principles. Kaizen has its origins in post-World War II Japanese quality circles. These circles or groups of workers focused on preventing defects at Toyota and were developed partly in response to American management and productivity consultants who visited the country, especially W. Edwards Deming, who argued that quality control should be put more directly in the hands of line workers. Kaizen was brought to the West and popularized by Masaaki Imai via his book Kaizen: The Key to Japan's Competitive Success in 1986.

## **Ten principles of Kaizen**

Because executing Kaizen requires enabling the right mindset throughout a company, 10 principles that address the Kaizen mindset are commonly referenced as core to the philosophy. They are:

1. Let go of assumptions.
2. Be proactive about solving problems.
3. Don't accept the status quo.
4. Let go of perfectionism and take an attitude of iterative, adaptive change.
5. Look for solutions as you find mistakes.
6. Create an environment in which everyone feels empowered to contribute.
7. Don't accept the obvious issue; instead, ask "why" five times to get to the root cause.
8. Cull information and opinions from multiple people.
9. Use creativity to find low-cost, small improvements.
10. Never stop improving.

## **How Kaizen works**

Kaizen is based on the belief that everything can be improved, and nothing is the status quo. It also rests on a "Respect for People" principle. Kaizen involves identifying issues and opportunities, creating solutions and rolling them out -- and then cycling through the process again for inadequately addressed issues or problems. A cycle made up of seven steps can be implemented for continuous improvement and give a systematic method for executing this process.

## **Kaizen cycle for continuous improvement**

Kaizen can be implemented in a seven-step cycle to create an environment based on continuous improvement. This systematic method includes:

- Get employees involved. Seek the involvement of employees, including gathering their help in identifying issues and problems. Doing so creates buy-in for change. Often, this is organized as specific groups of individuals charged with gathering and relaying information from a wider group of employees.
- Find problems. Using widespread feedback from all employees, gather a list of problems and potential opportunities. Create a list if there are many issues.
- Create a solution. Encourage employees to offer creative solutions, with all manner of ideas encouraged. Pick a winning solution or solutions from the ideas presented.
- Test the solution. Implement the winning solution chosen above, with everyone participating in the rollout. Create pilot programs or take other small steps to test out the solution.
- Analyze the results. At various intervals, check progress, with specific plans for who will be the point of contact and how best to keep ground-level workers engaged. Determine how successful the change has been.
- Standardize. If results are positive, adopt the solution throughout the organization.
- Repeat. These seven steps should be repeated on an ongoing basis, with new solutions tested where appropriate or new lists of problems tackled.

Additional approaches to the Kaizen cycle exist, such as one that is condensed into four steps -- plan, do, check, act, or PDCA. It is also known as the Shewhart cycle or Deming cycle.

## **Types of Kaizen events**

Although the aim of Kaizen is widespread cultural change, the events to kick-start Kaizen efforts or focus on a specific set of problems have evolved.

In the West, these concentrated efforts to make quick changes to achieve a short-term goal are often the extent of Kaizen efforts. There are numerous names associated with Kaizen events, including Kaizen blitz, Kaizen burst, Kaizen workshop, focused improvement workshop, continuous improvement workshop and rapid process workshop. These events can rely on various tools or focus on specific areas, such as 5S, total productive maintenance and value stream mapping.

## **Kaizen 5S framework**

A 5S framework is a critical part of the Kaizen system and establishes an ideal physical workplace. The 5Ses focus on creating visual order, organization, cleanliness and standardization to improve profitability, efficiency, service and safety. Below are the original Japanese 5Ses and their common English translations.

- Seiri/Sort (organize) -- Separate necessary workplace items from unnecessary ones and remove unnecessary items.
- Seiton/Set in order (create orderliness) -- Arrange items to allow for easy access in the way that makes the most sense for work.
- Seiso/Shine (cleanliness) -- Keep the workspace clean and tidy.
- Seiketsu/Standardize (standardized cleaning) -- Systematize workplace cleanup best practices.
- Shitsuke/Sustain (discipline) -- Keep the effort going.

## **Advantages and disadvantages**

There are a number of reasons why Kaizen can be an advantage for an organization; however, there are some situations for which it is less suited.

Some of Kaizen's advantages are:

- With its focus on gradual improvement, Kaizen can create a gentler approach to change in contrast to big efforts that may be abandoned due to their tendency to provoke change resistance and abandonment.
- Kaizen encourages scrutiny of processes so that mistakes and waste can be reduced.
- Inspection needs are lessened because errors are reduced.
- Employee morale grows because it can bring about a sense of value and purposefulness.
- Teamwork increases as employees think beyond the specific issues of their department.
- Client focus increases as customer requirements awareness are raised.
- Systems are in place to ensure improvements are encouraged both in the short term and the long term.

**Some of Kaizen's disadvantages are:**

- Companies with cultures of territorialism and closed communication may first need to focus on cultural changes to create a receptive environment.
- Short-term Kaizen events may create a burst of excitement that is shallow and short-lived and, therefore, gets abandoned before long.

**Examples of Kaizen**

Toyota is arguably the most famous for its use of Kaizen, but other companies have used the approach successfully. Here are three examples:

- Lockheed Martin. The aerospace company is a well-known proponent of Kaizen. Through the use of Kaizen, it has successfully reduced manufacturing costs, reduced inventory and cut delivery time.
- Ford Motor Company. When lean devotee Alan Mulally became CEO of Ford in 2006, the auto giant was on the brink of bankruptcy. Mulally used Kaizen to execute one of the most famous corporate turnarounds in history.
- Pixar Animation Studios. Pixar has taken a continuous improvement model that reduced risks of expensive movie failure by using quality control checks and iterative processes.

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**Comprehensive guide to Just-in-Time manufacturing**

Just-in-time (JIT) manufacturing means using the resources at your disposal to their maximum potential while eliminating all waste in the process. This strategy minimizes carrying costs and the need for storage space and maximizes efficiency in production and inventory management all at once.

What sets JIT manufacturing apart from other inventory and manufacturing techniques is the minimal buffer that is created. Typical manufacturing is seen as the production of goods that are then set aside on a shelf to wait for incoming orders.

JIT production works the other way around – an order comes in, and then manufacturing starts, working with just the right amount of supplies and materials.

**Historical background of JIT manufacturing**

Since the early 1970s, just-in-time manufacturing has been applied in production across the globe, but it originated from Japanese businesses. JIT is said to have been developed and perfected within Toyota's car-making plants by Taiichi Ohno, as Toyota was on the hunt for new methods to help them meet customer demands without delays.

As Taiichi Ohno and Japanese manufacturers proved that the JIT philosophy could work, it was adopted in other countries. Especially after the 1973 oil embargo, which led to shortened fossil resources across the globe.

Toyota's case study was backed by examples from Japanese shipyards, which used JIT to reduce inventory levels. Other companies saw how Toyota and Japanese shipyards,

partially due to JIT manufacturing, survived the oil crisis. Both Toyota and the shipyards managed to figure out a way to engage with every employee during the crisis and streamline their manufacturing processes for maximum output. Toyota's production evolved from a curious test into an exemplary success case in only a few years.

Three ways to describe JIT manufacturing

Commonly known as a philosophy originating from Toyota production, just-in-time production is sometimes also described as an environment and control technique.

Now, you might be asking yourself: "How can a manufacturing practice be an environment, philosophy, and technique?"

Let's dissect the question into three puzzle pieces.

Just-in-time manufacturing – a philosophy

JIT philosophy initially focused on the production of goods to meet exact customer demands rather than making and storing them in advance. In this scenario, the customer could mean the final buyer of the product or the next manufacturing process along the production line. Currently, JIT manufacturing is commonly interpreted as production or manufacturing with minimal waste – including time, resources, and materials.

Just-in-time manufacturing – an environment

A JIT environment is established by the previously mentioned philosophy since JIT mandates that you manufacture products efficiently and keep an eye on every production process. Some key elements in this environment are repetitive manufacturing, total quality management, employee engagement, and healthy supplier partnerships.

Just-in-time manufacturing – a control technique

Employees are equipped with just-in-time control methods in their daily operations if JIT manufacturing is implemented at their company. The characteristics of JIT control techniques include:

- A pull system
- Repetitive processes
- Uniform loading
- Production card usage
- A synchronized production center

How does JIT manufacturing work?

Just-in-time manufacturing embodies a demand-pull system instead of the traditional "push" system. Every manufacturing operation produces only what is required to satisfy the demand of the following processes. Components and raw materials arrive in the manufacturing plant on time and are effectively used in production.

Here's a neat graph to explain JIT manufacturing visually.

## Example of just-in-time production

Subway (the sandwich maker, not the NY Metro) is a great real-life example of how a pull-based system works in a different type of industry.

What happens at a Subway when a client orders a cheese sandwich?

The sandwich maker fetches the bread and starts to make you a cheese sandwich. The shift manager keeps an eye on the ingredients for making sandwiches and orders more cheese or tomatoes when they see the inventory levels dropping too low. The customer's purchase is a trigger for pulling new materials through Subway's system.

In a push-based system, the shift manager would estimate how many sandwiches they need for any given week or month, using data from past sales and seasonal performance. Then they calculate roughly what type of inventory needs to be ordered in advance.

What is the difference between JIT manufacturing and lean manufacturing?

Just-in-time manufacturing often reminds managers of lean manufacturing, and the terms are sometimes synonymous. However, you should be wary of the nuances that differentiate them.

Lean manufacturing is a production strategy that focuses on reducing waste. Like JIT, lean manufacturing seeks to produce what is needed, when, and in the amount needed.

JIT manufacturing is almost like a subset of lean manufacturing. While both strategies seek to reduce waste, JIT focuses specifically on production timing, while lean manufacturing focuses more on addressing all inefficiencies causing waste of resources across your operations.

## 10 benefits of JIT manufacturing

A just-in-time system requires a thorough plan. Managers need to find employees and capable software to analyze the current supply chain and map out the ongoing and future processes from ordering raw materials to product shipment.

This new master production schedule diminishes the chance of starting off on the wrong foot. The plan ensures that you can reliably monitor the new effects of the JIT inventory management system.

Here are ten both common and proven benefits experienced by thousands of JIT manufacturers.

1. Fast-forwarded production — JIT manufacturing can reduce throughput time, which is beneficial for satisfying the needs of customers who demand a shorter delivery time
2. Increased productivity — JIT manufacturers are always on the hunt to optimize processes, leading to higher productivity
3. Diminished rates of defects — Eliminating issues is always a sound strategy to build customer success and avoid bad reviews

4.      Scaling down WIP processes and products — The fewer “ongoing” processes you have, the clearer your production overview generally becomes
5.      Cutting labor costs — Which manufacturer doesn’t like saving money?
6.      Less space for operations — Because of ordering materials only once the customer places an order, your product is already sold before it’s finished, and you don’t have to store your JIT inventory
7.      Better product quality — JIT systems often include extra quality control measures to make sure that the final product is up to par
8.      Reduced waste — Less time spent on unwanted products means that you can avoid wasting materials, money, and hours
9.      More control in manufacturing — Having a JIT inventory management system enables manufacturers to keep a closer eye on things and spot potential issues before they become actual problems
10.     Local material sourcing — JIT philosophy favors sourcing local raw materials that couriers can deliver to your factory sooner. This leads to reduced transportation costs and time, improving local employment rates

What are the potential pitfalls of using JIT manufacturing?

The biggest challenge by far is logistical and economic disruptions that a business has minimal control over. If a disastrous global event occurs, it can impact a just-in-time manufacturing business more since there is no excess inventory to fall back on. When that happens, sales dry up like grass during a drought.

JIT production could make you very dependent on your suppliers’ performance. If a supplier increases their prices suddenly, it affects your expenses and also causes new issues as you scramble to find a better deal while inventory levels dwindle. If the price surges too high, you risk not making a profit.

JIT manufacturers also find it challenging to rework orders due to low inventory and dependency on original orders. Related to reworking orders is the relative complexity of tracking all processes.

This is where material resource planning software or enterprise resource planning (ERP) software comes into play.

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## PDSA (Plan-Do-Study-Act) Technique for Quality Improvement

What is the PDSA Technique?

The PDSA or the Plan-Do-Study-Act technique is a famous QI or Quality Improvement Tool or Initiative that helps organizations enhance the quality of their products and services. The PDSA technique hinges on the iterative process wherein each cycle begins with planning the quality improvement, actualizing the method or the process for QI, studying

the results to determine whether the QI was successful or not, and then acting upon the feedback for the next cycle to incorporate such feedback.

## Definitions

As the literature mentions, "The PDSA Cycle is a systematic series of steps for gaining valuable learning and knowledge for the continual improvement of a product or process. Also known as the Deming Wheel, or Deming Cycle, the concept and application was first introduced to Dr. Deming by his mentor, Walter Shewhart of the famous Bell Laboratories in New York" (Deming.org).

This means that the emphasis on continuous improvement of products and services through iterative cycles starting with planning and then performing the steps needed to enhance the quality, studying the results to determine what went right and what went wrong, and lastly, incorporating the feedback into the next cycle to make the process better lies at the heart of the PDSA technique.

## Plan-Do-Study-Act Technique

(Source: <https://www.deming.org/theman/theories/pdsacycle>)

## Components of the PDSA Technique

As the figure above demonstrates, the PDSA Cycle starts with the Plan step that entails identifying a goal or an objective and then formulating a plan of action wherein the success metrics or the measures that indicate the determination of the success of the plan are defined followed by a well thought-out strategy to put the plan into action.

Next is the Do Step wherein the actual implementation of the strategies of the plan is done.

After that is the Study Step wherein the outcomes of the implementation are monitored and measured and the determination of the success or otherwise of the plan is made.

The final step is the Act phase wherein the feedback from the previous step is integrated into the learning from the entire process and then based on the same, the goals are adjusted as well as the methods changed to ensure the success of the next iteration and this can also include reformulation or recalibration of the strategy altogether.

## What Each Step in the PDSA Technique Means and How Each Step Manifests

To explain in plain words, the first step in the PDSA cycle is the planning phase where the needed process improvements are finalized in line with the overall goals and objectives for which the process improvement or Quality Improvement is needed.

Usually, this step is the phase when organizations recognize the need for Quality Improvement and determine the parameters or the measurements that are required to achieve the objectives.



The next step is the Doing phase where the planned improvements are put in place, and the process for the manufacture of the product or the service is modified and enhanced according to the desired goals.

For instance, if the purpose of the Quality Improvement initiative is to decrease the number of defects as measured by percentages to less than 3%, the planning phase determines this measure as well as formulates the needed improvements to the process to ensure that defects are kept within the range.

The Do step is the phase when the manufacturing process is enhanced by actualizing the process improvements that are needed to keep the defects within the range. This step is the meat of the PDCA cycle wherein it is the phase where the actual work to enhance quality is done. This is followed by the Study step wherein the results from the QI are measured to determine whether the process improvement yielded the necessary results.

#### Taking a Real World Example and Applying Theory to Practice

For instance, in our example, once the process improvement has been put in place, the Study Phase reviews the feedback in terms of whether the goals of keeping the percentage of defects to less than 3% have been met. In case such measures are found to have not been met, then the possible reasons for failure as well as the corrective steps and measures needed to achieve the goals in the next step are determined.

This can take the form of studying the process to see how it can be improved the next time. The Study step is also the step where the entire cycle is matched from beginning to end and the determination of success or failure are done accordingly. Indeed, if the QI meets its objectives, then there is no need to repeat the cycle and the final step, which is the Act Phase, can then close out the changes and make them permanent.

However, in case it is found that the QI did not meet its objectives, the "Act" step provides the opportunity to put corrective measures in place by studying the feedback about what went wrong and then acting upon the feedback by starting the next iteration again from the Planning Step all the way to the end step which is the Acting on the feedback step.

#### Conclusion: How Implementing the PDCA Technique can help Organizations

In this way, the PDCA technique is an iterative or cyclical process that repeats itself until the desired results are actualized. Since each iteration improves upon the previous cycle, the end result of successive iterations is that the Quality of the Product or Service is significantly enhanced to the point where more enhancements are not needed and the process for making the product or service is deemed to be of the highest quality.

In this way, the PDCA technique offers a good way to put in place quality improvement initiatives that yield the desired results and ensure that the process is free from defects.

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## **KANBAN SYSTEM: Maximize Time and Improve Efficiency**

The term Kanban system refers to using Kanban boards and cards to manage work, improve workflow, and practice continuous improvement. Kanban systems harness the power of visual management to help teams maximize time and efficiency.

A team can use a Kanban system to identify opportunities and implement their own unique solutions.

A team can use a Kanban system to identify opportunities and implement their own unique solutions.

Here's why you should consider implementing a Kanban system with your team.

### **Why Use a Kanban System?**

When it comes to identifying opportunities for improvement like using a Kanban system, your busy team members are among the people who can provide the most insight.

However, pulling these people off task and facilitating their input may not seem possible. After all, who will get the work done while the team is brainstorming and implementing improvements?

This is the unfortunate catch-22 that many teams find themselves in: Because they're too busy to make improvements, things that could alleviate some of their busyness don't get finished. So, the cycle of inefficiency continues.

To overcome the challenges of having too much work and not enough time to take a step back, many teams have found a Kanban system to be a good starting point.

A Kanban system offers a systematic approach to identifying opportunities for improving efficiency by tracking and managing work in a visual way.

Kanban isn't a separate improvement-focused initiative that pulls people away from their "actual" work. It's a systematic approach to tracking and managing a team's work that, when used correctly, will naturally highlight opportunities for improvement. When teams identify those opportunities, they can implement solutions and track their progress on the same Kanban board.

With a Kanban system, "doing the work" and "improving the way we work" can be performed simultaneously – helping teams truly embrace the continuous part of continuous improvement.

### **The Roots of the Kanban System: The Kanban Ordering System**

You might be surprised to learn that Kanban didn't always involve virtual boards and cards. Kanban originated on the shop floors of Japanese automotive manufacturer Toyota.

Toyota engineers were looking for ways to reduce waste and increase the efficiency of their manufacturing processes. They looked to an unlikely source of inspiration: The local grocery store.

Grocery stores use visual cues to guide their inventory management — they order more products only when inventory drops below a certain threshold. The stores used physical cards to indicate when levels were low.

Imagine a row of a certain type of crackers on a grocery store shelf. A card would be placed a few boxes from the end of the row, signaling that it was time to order more of those crackers.

Toyota engineers took this concept of ordering materials “just in time,” and developed what became known as Kanban, or the Kanban ordering system.

A card would be attached to completed products. When those products (in this case, vehicles) were sold, the cards would be taken to the front of the line, signaling to produce more products.

Cards were also attached to the raw materials being used for production; when materials were used, their cards would be sent to the front of the line, signaling for more materials to be ordered.

Using this Kanban system helped Toyota drastically reduce waste by streamlining their inventory management. Just-in-time (JIT) manufacturing, and other Kanban principles and practices that came from it, spread throughout automotive manufacturing and into other industries.

The Kanban system, as we know it today, emerged as a highly flexible, visual tool that enabled software development teams to manage their work in a way that made sense for their workflows.

Since then, Kanban has been used by virtually every type of team in every industry.

What is a Kanban System?

A Kanban system is a workflow management structure that encourages visibility, transparency, and accountability across teams. Using a Kanban system can help teams get a clearer sense of:

- The specific steps in their process
- How work flows (or stumbles) through that process
- How workloads are balanced (or not) across the team
- Where waste exists in the process
- Where opportunities to streamline processes might exist
- How work items are related or connected
- Performance metrics, such as lead time, cycle time, and more

For most teams, the increased visibility, transparency, and accountability enable greater levels of productivity and efficiency than they ever thought possible.

## Elements of a Kanban System

You might be familiar with Kanban boards and cards: But what exactly do we mean by a Kanban system?

The phrase refers to how Kanban boards and cards are used by a team or organization to visualize and manage their work. A Kanban system includes:

Using Kanban boards to reflect existing workflows

Using Kanban cards to represent work items

A single team using a single board to manage its work can make up a Kanban system. But part of the power of Kanban lies in its scalability; many organizations scale Kanban across teams and departments, creating hierarchies of connected boards and cards. This is also a Kanban system.

In summary, when Kanban boards and cards are used to manage work by any group of individuals, it is a Kanban system.

## Benefits of a Kanban System

A good Kanban system goes a long way in helping teams understand how their time is being spent. Most online Kanban tools provide tracking and productivity data that helps people easily identify problem areas.

Once they have a better idea of where the problems lie, teams can begin to develop solutions to those problems. Maybe one team member is severely overworked, while another doesn't have enough work to fill his or her day. In this instance, a manager would help to delegate tasks to team members who have more bandwidth, alleviating the pressure from the overworked individual and removing the impediment for the entire team.

Another way in which a Kanban system helps to maximize resources lies in the ability to efficiently deliver products while continuously improving the process required to get there. Software development teams, accounting teams, finance teams and even creative agencies have adopted the use of the Kanban system, despite its lack of emphasis on due dates.

By delivering products continuously, customers gain the benefits of using those products sooner and the ability to make modifications based on new information that has become available since the start of the last project phase.

Not only is visual data easier to understand, it allows for a certain amount of creativity and innovation necessary for so much of the knowledge work being done today.

## Advantages of Using the Kanban System

There are many advantages to using the Kanban system as a way to manage work, including:

- Flexibility
- Focus on continuous delivery
- Reduction of wasted work / wasted time

- Increased productivity
- Increased efficiency
- Team members' ability to focus

First, Kanban is flexible. There are no prescribed phase durations, and priorities are constantly reassessed based on the most recent information.

Another advantage to using Kanban is the focus on continuous delivery. By delivering small portions of a project continuously to the customer, teams have multiple opportunities to synchronize future iterations with the updated business requirements. In this way, teams can ensure they are delivering exactly what the customer wants.

A Kanban system allows teams to deliver incrementally and use the lessons learned to improve delivery of future iterations of work.

A Kanban system allows teams to deliver incrementally and use the lessons learned to improve delivery of future iterations of work.

Other advantages to using Kanban revolve around productivity and efficiency, two concepts that also tie back to the reduction of waste. A well-designed Kanban system helps teams to identify and reduce process waste in all of its forms.

You can think of process waste as anything that does not add value to the customer. It can come in the form of:

- Work that is not needed (excess inventory)
- Work that does not meet success criteria
- Duplicated effort
- Over-processing
- Idle time
- Unnecessary motion
- Administrative overhead that does not add value to the process
- Time spent doing the wrong work (work that has less value), rather than focusing on the work with more value

When waste is eliminated from a process, project or workflow, productivity goes up, people are able to focus more on the work that matters, and efficiency is improved in the way people manage their time and in the way they do their work.

Finally, when work is properly re-prioritized as needed and communicated visually using a Kanban system or task board, an individual doesn't have to question what to work on next. Instead, the team member pulls the next Kanban card from the top of the queue without spending any time considering which task to pull next.

The Kanban Pull System

Using Kanban helps teams switch from “push” to “pull” systems. A push system is what happens naturally in teams: One person completes their part of a piece of work, and then “pushes” it to the next person without regard for their capacity. You might have heard this referred to as “throwing (a piece of work) over a wall.”

The problem with operating in a push system is that it doesn’t encourage teams to actually operate as a system. Instead, individuals operate in functional silos – performing their functions as opposed to collaborating cross-functionally, leading to miscommunications, frustration, and resentment. It’s especially easy to operate in a push system when work is not visualized, because issues like bottlenecks aren’t easily recognized.

When teams visualize their work in a Kanban system, they can begin to see the entire team’s work as a system.

They can see where work piles up, where it gets stuck, and where the system is overwhelmed. They are armed with the visibility and insight to begin to practice a pull system – where work items are pulled into the queue by the people doing the work as they complete tasks, in order of priority.

Instead of person A pushing work over a wall to person B, person A and person B work together to decide when to start that work. When the system has capacity for that project to begin, person A performs their part, then when they are ready, person B pulls it onto their plate.

Using Kanban to implement a pull system helps to increase accountability, transparency, and collaboration across teams – leading to better collaboration, less waste, and more predictable delivery.

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## Principles of Lean Management

Ryan E. B. Heri, PMP, PSM, PSPORyan E. B. Heri, PMP, PSM, PSPO

Lean was born out of manufacturing practices but has transformed the world of knowledge, business, and management in recent times. It encourages the practice of continuous improvement and is based on the fundamental idea of **respect for people**. Womack and Jones defined the five principles of Lean manufacturing in their book “The Machine That Changed the World”. The five principles are considered a recipe for improving workplace efficiency and include: 1) Defining Value, 2) Mapping the Value Stream, 3) Creating Flow, 4) Using a Pull System, and 5) Pursuing Perfection. The ensuing section provides a detailed overview of each principle.

### *5 Lean Principles Explained*

#### 1. Define Value

To better understand the first principle of defining customer value, it is important to understand what value is. Value is what the customer is willing to pay for. It is paramount to discover the actual or latent needs of the customer. Sometimes customers may not know what they want or are unable to articulate it. This is especially common when it

comes to novel products or technologies. There are many techniques such as interviews, surveys, demographic information, and web analytics that can help you decipher and discover what customers find valuable. By using these qualitative and quantitative techniques you can uncover what customers want, how they want the product or service to be delivered, and the price that they afford.

## 2. Map the Value Stream

This second Lean principle is where you identify and map the value stream by literally mapping the workflow of your company. In this step, the goal is to use the customer's value as a reference point and identify all the activities that contribute to these values. Activities that do not add value to the end customer are considered waste. The waste can be broken into two categories: non-valued added but necessary and non-value & unnecessary. The latter is pure waste and should be eliminated while the former should be reduced as much as possible.

When you have your value stream mapped, it will be much easier for you to see which processes are owned by what teams and who is responsible for measuring, evaluating, and improving that process. By reducing and eliminating unnecessary processes or steps, you can ensure that customers are getting exactly what they want while at the same time reducing the cost of producing that product or service.

## 3. Create Continuous Workflow

After removing the waste from the value stream, the subsequent action is to ensure that the remaining steps' flow runs smoothly without interruptions or delays. Some strategies for ensuring that value-adding activities flow smoothly include breaking down steps, reconfiguring the production steps, leveling out the workload, creating cross-functional departments, and training employees to be multi-skilled and adaptive.

## 4. Establish Pull

Inventory is considered one of the biggest wastes in any production system. A pull-based system's goal is to limit inventory and work in process (WIP) items while ensuring that the requisite materials and information are available for a smooth flow of work. In other words, a pull-based system allows for Just-in-time delivery and manufacturing where products are created at the time that they are needed and in just the quantities needed. Pull-based systems are always created from the needs of the end customers. By following the value stream and working backward through the production system, you can ensure that the products produced will be able to satisfy the needs of customers.

## 5. Pursue Perfection (Continuous Improvement)

After going through all previous steps, you already built your Lean management system. However, don't forget to pay attention to this last step, probably the most important one. Remember, your system is not isolated and static. Problems may occur at any of the previous steps. Therefore, you need to make sure that employees on every level are involved in continuously improving the process. The company should be a learning organization and always find ways to get a little better with each day.

*Applying the Lean Principles*

The five Lean principles provide a framework for creating an efficient and effective organization. Lean allows managers to discover inefficiencies in their organization and deliver better value to customers. The principles encourage creating better flow in work processes and developing a continuous improvement culture. By practicing all 5 principles, an organization can remain competitive, increase the value delivered to the customers, decrease the cost of doing business, and increase its profitability.

Lean is a way of thinking about creating needed value with fewer resources and less waste. And lean is a practice consisting of continuous experimentation to achieve perfect value with zero waste. Lean thinking and practice occur together.

Lean thinking always starts with the customer. What does the customer value? Or, stated differently and in a way that invites concrete action, what problem does the customer need to solve?

Lean practice begins with the work — the actions that directly and indirectly create value for the customer — and the people doing that work. Through ongoing experimentation, workers and managers learn by innovating in their work — be it physical or knowledge work — for increasingly better quality and flow, less time and effort, and lower cost. Therefore, an organization characterized by lean practice is highly adaptive to its ever-changing environment when compared to its peers because of the systematic and continuous learning engendered by lean thinking and practice.

A lean enterprise is organized to keep understanding the customer and their context, i.e., specifying value and looking for better ways to provide it:

- through product and process development,
- during fulfillment from order through production to delivery, and
- through the product's and/or service's use cycle from delivery through maintenance and upgrades to recycling.

#### *Lean Transformation Framework*

Lean enterprises, both ongoing firms and startups, endlessly address fundamental questions of purpose, process, and people:

- What is the value-driven purpose? Or what is the problem to solve?
- What is the work to be done (to solve the problem)?
- What capabilities are required (to do the work to solve the problem)?
- What management system — operating system and leadership behaviors — is required?
- What basic thinking, including mindsets and assumptions, are required by the organization as a purpose-driven socio-technical system?

Lean thinking has a moral compass: respect for the humanity of customers, employees, suppliers, investors, and our communities with the belief that all can and will be better off through lean practices. Lean is not dogmatic. It's not a rigid, unchanging set of beliefs and



methods. Instead, it progresses in the context of specific situations. There is no endpoint as long as value is imperfectly created, and waste exists. Learn about the brief history of lean thinking and practice. "Let's elevate the work. Celebrate it. And, with that, let's treat it—the work—with the deep respect it deserves." – *John Shook*

### *What is Lean Manufacturing?*

Lean manufacturing is a production process based on an ideology of maximizing productivity while simultaneously minimizing waste within a manufacturing operation. The lean principle sees waste as anything that doesn't add value that the customers are willing to pay for.

The benefits of lean manufacturing include reduced lead times and operating costs and improved product quality.

Also known as lean production, the methodology is based on specific manufacturing principles that have influenced production systems across the world as well as those of other industries including healthcare, software and various service industries.

### *How Does Lean Manufacturing Work?*

The core principle in implementing lean manufacturing is to eliminate waste to continually improve a process. By reducing waste to deliver process improvements, lean manufacturing sustainably delivers value to the customer.

The types of waste include processes, activities, products or services that require time, money or skills but do not create value for the customer. These can cover underused talent, excess inventories or ineffective or wasteful processes and procedures.

Removing these inefficiencies should streamline services, reduce costs and ultimately provide savings for a specific product or service through the supply chain to the customer.

### *Why is Lean Manufacturing Important and How Can it Help?*

Waste in industry, whether that is idle workers, poor processes or unused materials are a drain on productivity, and lean manufacturing aims to eliminate these. The motives behind this vary depending on opinion, from increasing profits to providing benefits to customers. However, whatever the overarching motives, there are four key benefits to lean manufacture:

**Eliminate Waste:** Waste is a negative factor for cost, deadlines and resources. It provides no value to products or services

**Improve Quality:** Improved quality allows companies to stay competitive and meet the changing needs and wants of customers. Designing processes to meet these expectations and desires keep you ahead of the competition, keeping quality improvement at the forefront

**Reducing Costs:** Overproduction or having more materials than is required creates storage costs, which can be reduced through better processes and materials management

**Reducing Time:** Wasting time with inefficient working practices is a waste of money too, while more efficient practices create shorter lead times and allow for goods and services to be delivered faster

### *When and Who Invented Lean Manufacturing?*

The basic ideals of lean manufacturing have arguably existed for centuries, but really became solidified with Benjamin Franklin's writing on reducing waste in his 'Poor Richard's Almanack,' where he wrote that avoiding unnecessary costs could provide more profit than increasing sales.

Franklin put down this idea and other concepts in his essay, 'The Way to Wealth,' which was then expanded upon by mechanical engineer Frederick Winslow Taylor in his 1911 book, 'Principles of Scientific Management.' Taylor codified the process, calling it scientific management and writing, "whenever a workman proposes an improvement, it should be the policy of the management to make a careful analysis of the new method, and if necessary conduct a series of experiments to determine accurately the relative merit of the new suggestion and of the old standard. And whenever the new method is found to be markedly superior to the old, it should be adopted as the standard for the whole establishment."

However, it was Shigeo Shingo and Taiichi Ohno of the Toyota Motor Corporation who really progressed these views to become what was later dubbed lean manufacturing. Shingo revealed that he was "greatly impressed to make the study and practice of scientific management his life's work" after reading Frederick Taylor's 'Principles of Scientific Management' in 1931.

Having previously been a textile company, Toyota moved into producing automobiles in 1934 and won a truck contract with the Japanese government in 1936. However, as Kiichiro Toyoda, founder of Toyota Motor Corporation, directed the engine casting work he discovered problems with their manufacturing, including wasted resources on repair of poor-quality castings. Toyoda conducted a study of each stage of the production process and created 'Kaizen' improvement teams to address the problems. The findings of the Kaizen teams were brought together by Taiichi Ohno to create the Toyota Production System (TPS).

By the post-war period of the later 1940s, the levels of demand in the Japanese economy were low, so Ohno determined that work schedules should be driven by actual sales rather than sales or production targets. This meant avoiding costly over-production and led Toyota to establish 'pull' (or build-to-order) rather than target-driven 'push' production scheduling.

TPS, which was known as 'just-in-time' manufacturing or JIT in the 1980s, developed into lean manufacturing in the later 1980s and into the 1990s. A quality engineer called John Krafcik first coined the term lean manufacturing in his 1988 article 'Triumph of the Lean Production System' after working on a joint venture between Toyota and General Motors in California.

Krafcik stated that lean manufacturing plants have higher levels of productivity/quality than non-Lean and, "the level of plant technology seems to have little effect on operating performance." He continued by adding that the risks of implementing lean processes can

be lessened by "developing a well-trained, flexible workforce, product designs that are easy to build with high quality, and a supportive, high-performance supplier network."

The term, lean manufacturing was detailed further by James Womack, Daniel T. Jones and Daniel Roos in the 1990 book 'The Machine that Changed the World.' Womack and Jones further defined this in their 1996 book, 'Lean Thinking: Banish Waste and Create Wealth in Your Corporation,' where five key principles were laid out, "Precisely specify value by specific product, identify the value stream for each product, make value flow without interruptions, let customer pull value from the producer, and pursue perfection."

#### *What is the Meaning of Lean Manufacturing?*

Lean manufacturing entails streamlining processes and procedures to eliminate waste and thereby maximize productivity. Womack and Jones (see above) defined lean as, "a way to do more and more with less and less – less human effort, less equipment, less time, and less space – while coming closer and closer to providing customers exactly what they want."

*The basis of lean is often translated into five core principles.*

What are the 5 Principles?

The five core principles of lean manufacturing are defined as value, the value stream, flow, pull and perfection. These are now used as the basis to implement lean.

1. **Value:** Value is determined from the perspective of the customer and relates to how much they are willing to pay for products or services. This value is then created by the manufacturer or service provider who should seek to eliminate waste and costs to meet the optimal price for the customer while also maximizing profits.

2. **Map the Value Stream:** This principle involves analysing the materials and other resources required to produce a product or service with the aim of identifying waste and improvements. The value stream covers the entire lifecycle of a product, from raw materials to disposal. Each stage of the production cycle needs to be examined for waste and anything that doesn't add value should be removed. Chain alignment is often recommended as a means to achieve this step.

Modern manufacturing streams are often complex, requiring the combined efforts of engineers, scientists, designers and more, with the actual manufacturing of a physical product being just one part of a wider stream of work.

3. **Create Flow:** Creating flow is about removing functional barriers to improve lead times. This ensures that processes flow smoothly and can be undertaken with minimal delay or other waste. Interrupted and disharmonious production processes incur costs and creating flow means ensuring a constant stream for the production or service delivery.

4. **Establish a Pull System:** A pull system works by only commencing work when there is demand. This is the opposite of push systems, which are used in manufacturing resource planning (MRP) systems. Push systems determine inventories in advance with production set to meet these sales or production forecasts. However, due to the inaccuracy of many forecasts, this can result in either too much or not enough of a product being produced to meet demand. This can lead to additional warehousing costs, disrupted schedules or poor

customer satisfaction. A pull system only acts when there is demand and relies on flexibility, communication and efficient processes to be successfully achieved.

The pull system can involve teams only moving onto new tasks as the previous steps have been completed, allowing the team to adapt to challenges as they arise in the knowledge that the prior work is mostly still applicable to delivering the product or service.

5. **Perfection:** The pursuit of perfection via continued process improvements is also known as 'Kaizen' as created by Toyota Motor Corporation founder Kiichiro Toyoda (see 'When and Who Invented Lean Manufacturing?' above). Lean manufacturing requires ongoing assessment and improvement of processes and procedures to continually eliminate waste in an effort to find the perfect system for the value stream. To make a meaningful and lasting difference, the notion of continuous improvement should be integrated through the culture of an organisation and requires the measurement of metrics such as lead-times, production cycles, throughput and cumulative flow.

It is important for the culture of continuous improvement to filter through all levels of an organization, from team members and project managers right up to the executive level, to create a collective responsibility for improvement and value creation.

#### *The 8 Wastes of Lean Manufacturing*

The Toyota Production System originally detailed seven wastes that don't provide value to the customer. These wastes were:

- Unnecessary transportation
- Excess inventory
- Unnecessary movement of people, equipment or machinery
- Waiting – either people or idle equipment
- Over-production of a product
- Over processing or adding unnecessary features to a product
- Defects that require costly correction
- An eighth waste has since been highlighted by many lean practitioners:
- Unused talent and ingenuity

These types of waste can be broadly split into three specific types:

- **Mura:** Unevenness or waste as a result of fluctuating demand, whether from customer requests or new services (and thereby additional work) being added by an organization.
- **Muri:** Overburden or waste due to trying to do too much. This relates to resource allocation and involves people being asked to do too much. Time can be wasted as people switch tasks or even lose motivation due to being overburdened.

· **Muda:** This is process-related waste and work that adds no value. If an activity doesn't add value, or directly support one that adds value, then it is unnecessary and should be eliminated.

## Advantages and Disadvantages

Lean manufacturing carries several advantages and disadvantages depending on how and where it is implemented.

### Advantages:

#### 1. Saves Time and Money

Cost-saving is the most obvious advantage of lean manufacture. More efficient workflows, resource allocation, production and storage can benefit businesses regardless of size or output. Time saving allows for reduced lead times and better service in providing products quickly to customers, but can also help save money through allowing for a more streamlined workforce.

#### 2. Environmentally Friendly

Reducing waste in time and resources and removing unnecessary processes can save the costs in energy and fuel use. This has an obvious environmental benefit, as does the use of more energy efficient equipment, which can also offer cost savings.

#### 3. Improved Customer Satisfaction

Improving the delivery of a product or service, at the right cost, to a customer improves customer satisfaction. This is essential to business success as happy customers are more likely to return or recommend your product or service to others.

### Disadvantages:

#### 1. Employee Safety and Wellbeing

Critics of lean argue that it can ignore employee safety and wellbeing. By focussing on removing waste and streamlining procedures it is possible to overlook the stresses placed on employees who are given little margin for error in the workplace. Lean has been compared to 19th Century scientific management techniques that were fought against by labour reforms and believed obsolete by the 1930s.

#### 2. Hinders Future Development

Lean manufacturing's inherent focus on cutting waste can lead management to cut areas of a company that are not deemed essential to current strategy. However, these may be important to a company's legacy and future development. Lean can create an over-focus on the present and disregard the future.

#### 3. Difficult to Standardize

Some critics point out that lean manufacturing is a culture rather than a set method, meaning that it is impossible to create a standard lean production model. This can create a perception that lean is a loose and vague technique rather than a robust one.

### *What is an Example of Lean Manufacturing?*

Lean manufacturing is used across industry for a variety of production processes, although notably, it was first seen within the automotive industry.

Creating efficient workflows and processes is important to maximizing output on a production line, which in itself harks back to Adam Smith's 1776 'Division of Labor,' where he noted how the efficiency of production was vastly improved if workers were split up and given different roles in the making of pins. This was because workers could be tasked with work that suited their skills or temperament, there was no need to move them from their stations or for them to learn different skills or swap tools.

Lean manufacturing has drawn on these ideas and extended them to include removing waste from multiple processes and procedures. Lean methods can also be seen outside of production with the provision of services too.

### *How Can Lean Manufacturing be implemented?*

The general meaning of lean is to identify and eliminate waste, from which quality and production times can be improved and costs reduced. This is one method of approaching lean manufacturing, but it can also be approached using the 'Toyota Way,' which is to focus on improving workflows rather than waste.

Both methods have the same goals, but with the Toyota Way the waste is eliminated naturally rather than being sought out as the focus. Followers of this method of implementation say it is a system-wide perspective that can benefit an entire business rather than just removing particular wastes. The Toyota Way seeks to simplify the operational structure of an organization in order to be able to understand and manage the work environment. This method also uses mentoring known as 'Senpai and Kohai' (Senior and Junior) to help foster lean thinking right through an organizational structure.

However, despite the different approaches both methods share a number of principles, including:

- Automation
- Continuous Improvement
- Flexibility
- Load Leveling
- Perfect First-Time Production or Service Quality
- Production Flow and Visual Control
- Pull Processing
- Supplier Relationships
- Waste Removal

Tips to Implement Lean Processes

As they introduced the concepts of lean manufacturing in their writing, Womack and Jones also explained why some lean organizations succeeded while others failed. The main difference was that those who failed copied specific practices while the successful organizations sought to understand the underlying principles required to make the whole lean system work.

Becoming lean is a continuous process of change that need to be assessed and monitored. It will require frequent changes and adjustments in your working practices to maintain.

Creating a lean toolbox of methods can help simplify your lean management systems, but you should remember that lean is more of a philosophy than a standardized set of procedures.

Despite this, there are four steps that you can take to help create your own lean project management system:

#### 1. Design a Simple Manufacturing System

The more you break down your systems into their simple, composite parts, the easier each will be to monitor and improve through eliminating waste.

#### 2. Keep Searching for Ways to Improve

Staff at all levels should be encouraged and supported in finding ways to improve processes and procedures. It is important to have an honest overview of procedures in order to find areas for improvement. The more specific these improvements are to your particular company and processes, the more effective they will be.

#### 3. Continuously Implement Design Improvements

It is not enough to seek out improvements. These need to be implemented through your designs, procedures and processes. It is not enough to just seek improvements, they need to be put into practice on a practical level too. Any improvements should also be backed up by improvement metrics and it is often best to make small incremental changes rather than large sweeping ones.

#### 4. Seek Staff Buy-In

In order to effectively achieve the first three steps you need to gain the support of your staff. The whole methodology can suffer if management decides to implement it without gaining the buy-in of employees. Since waste, and therefore lean, is an overall concept across the entire business, it requires management to identify and understand the true problems that need to be solved.

Employees can block the success of lean management by pushing back, especially if the burden of managing and implementing lean is placed upon their shoulders. A good solution to this is to create a 'lean plan' where teams can provide feedback and suggestions to management, who then make the final decision on any changes. Coaching is also important to explain concepts and impart knowledge to employees at all levels.

Lean Manufacturing Tools Used

There are a variety of tools that can be used to help implement a lean management system, these include:

- Control Charts – to check workflows
- Kanban Boards – to visualize the workflows
- 5S – a methodology for organizing the workplace
- Multi-Process Handling
- Error Proofing (also known as 'Poka-Yoke')
- Rank Order Clustering – to aid production flow analysis
- Single-Point Scheduling
- Single-Minute Exchange of Die (SMED) – a fast method to move between manufacturing processes
- Total Productive Maintenance – to improve manufacturing integrity and quality
- Value Stream Mapping
- Work Cell Redesign

#### *Lean vs Six Sigma*

Six Sigma is a method of data-driven management that is similar to lean in that it also seeks to assess and eliminate process defects to improve quality. However, while both processes seek to eliminate waste, they use different approaches to do so.

While lean contends that waste is a product of additional steps, processes and features that a customer doesn't believe add value, Six Sigma sees waste as a product of process variation.

Despite the differences, Six Sigma and lean can be combined to create a data-driven approach called 'Lean Six Sigma.'

#### *Conclusion*

Lean manufacturing is a methodology that can help streamline and improve manufacturing processes or other services in order to provide enhanced benefits for customers, while saving time and money through the elimination of waste.

As a methodology, lean is best applied across the entirety of an organization with continual monitoring and improvements being applied with the support of employees at all levels.

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#### *Purpose of the Lean Operating System*



The purpose of the Lean Operating System is to develop a way of working throughout the enterprise to satisfy the customer and enable growth by eliminating waste and improving margin.

Organizations embrace Lean for the following reasons

- Lean is a bottom up approach of engagement. It looks to involve every colleague in waste elimination to drive value and margin.
- It is inclusive as a philosophy towards improvement where everyday ideas are valued for their incremental contribution to the margin.
- Lean follows certain principles that have been distilled over 100 years into an operating system that thrives across all industries.

#### Definition

Lean is an operating system that can be distilled into 6 Key Principles:

- Just In Time – velocity of product to conserve cash, improve delivery and volumes and process lead time
- Stability – driving capacity to harness the excess and standardize for improvement
- Build In Quality – zero defects forward, protect the customer, protect the brand
- Continuous Improvement – everyone, everyday providing year on year improvement
- Policy Deployment – drive strategy into execution
- Future Design – design cost out of operations

Building the Operating System takes time as it is a cultural transformation that requires leadership to play a vital role in embedding Lean as a way of working.

#### Lean Leadership

##### Goal

A PDCA improvement culture being coached by leadership to ensure the Lean thinking way is embedded.

##### Purpose

Lean is an operating system adopted by industries across the globe. In the past 20 years it has been poorly implemented as it is seen as a set of tools to be used as and when. Best in Class realise this is a cultural transformation, a bottom up enablement of first-line leaders that requires leadership to support, coach, sponsor and lead its introduction and sustainment. The role of the leader, therefore, is to be the leader of the transformation.

#### Benefits

- Sustained improvement in performance
- Leaders engaged with first-line in improvements
- Learning organisation

#### Sustainability

##### Goal

For the organisation to be self-sustaining through its programme of capability development

##### Purpose

The purpose of sustainability is to build a cultural transformation process to build the DNA thinking for the organisation and to transfer the capability and ownership of Lean as quickly as possible in order for it to become part of the 'thinking way'.

#### Benefits

Sustain the new culture and improve margins independently.

#### Leadership and Systems Integration

To ensure the transformation moves from change to business as usual, it is essential to integrate Lean systems and behaviours into the organisational design, competencies framework and development processes.

#### The Wide and Deep Strategy

To make sure that results are identified and realised from the start, the Wide and Deep deployment method provides demonstrable change and benefits through the Value Stream Mapping activities and 90 Day planning. This will rely on Lean Leadership Behaviours in the workplace. A compliance approach to Lean will lead to its demise faster than it can be deployed. It requires leaders to lead with conviction, from the front, with a coaching and development style.

#### The Wide Strategy

## Goals

- To operate in value streams, aligning all key steps in the value chain and marketing to a common system in order to maximise margin.
- To drive flow of product end to end
- Engage all levels in performance improvement through Info Centres
- Operating to 90 Day Plans - a drumbeat for Hoshin

## Purpose

Rapidly engage and align staff to a common approach to:

- Continuous improvement and identification of benefits
- Introduce Information Centres to provide a framework of sustainability for change and shift in behaviours
- Identify and realise benefits rapidly

The Wide strategy is looking to drive the Principle of Flow through the value streams which will then prioritise the need for the principles of BIQ and Stability.

## The Deep Strategy

### Goal

Develop a sustainable operating system for the organisation

### Purpose

The purpose of the Deep strategy is to build a Lean operating system that covers the key principles identified as critical for the organisation to continue to reduce cost, increase revenues and improve margin. The Deep strategy takes longer to embed as it covers the more demanding aspects of the principles. As the principles are interdependent and challenge current paradigms in the operations and service functions they are, by default more difficult to sustain. The Principles are:

1. JIT - (Continuous Flow) – velocity of product to conserve cash, improve delivery and volumes and process lead time
2. Stability – driving capacity to harness excess capacity and standardise for improvement
3. Build In Quality – zero defect forward, protect the customer, protect the brand
4. Continuous Improvement – everyone, everyday providing year on year improvement
5. Policy Deployment – Drive strategy into execution

## 6. Future Design – future proofing the business

### Lean Principle 1 – JIT Continuous Flow

JIT is one of the primary principles of Lean. It forces organisations to address shortcomings in its capacity management, quality and delivery performance. It looks for velocity of product across the value stream to improve margins and revenue.

#### Benefits

- Manage fluctuations in operational variation
- Maintain constant flow by de-coupling and optimise bottle-necks
- Increase margins

### Pull Systems – controlling WIP and Inventory

#### Purpose

The purpose is to build a no consumption, no replenishment principle that applies to product as well as discrete parts being consumed in maintenance and operations.

#### Benefits

- Minimise inventory
- Right product, right time, right quality, right place, right quantity
- Improve cash flow

#### Takt Time

#### Purpose

The purpose of Takt Time is to pace production to the customer demand and prevent over-production.

#### Benefits

- Improved cash flow
- Aligned value stream
- Eliminate variation
- Prevents subordinate wastes (motion, transport, over-processing) from occurring

#### Levelled Production

#### Purpose

The purpose is to even output flow of product to enable inventory reduction and balancing of resource

#### Benefits

- Eliminates poor batching
- Brings agility to the operation in meeting market changes
- Exposes poorly balanced resource

#### Lean Principle 2 - Stability

provide a stable platform for the pillars of Lean: Just In Time and Building in Quality.

Stability, when in place, will provide the organisation with the ability to absorb shocks in the marketplace and enable future strategies as it provides excess capacity to the organisation.

#### Benefits

- Provide a fact-based understanding of the issues facing the organisation
- Provide the systems, processes and tools to the first line to eliminate waste
- Enable product to flow through the process as efficiently as possible
- Provide visual management for root cause analysis

#### Quick Change Over

## Purpose

The purpose of QCO is to reduce downtime, either planned or unplanned, to a minimum in order to maximise flow and reduce inventories.

## Benefits

- Increase stock turns
- Improve availability
- Generating excess capacity
- Improved process lead time and ability to react to market changes

## Standardised Work

### Purpose

The purpose of Standardised Work is to define the 'One Best Way' for performing a task, whether in maintenance, production or service function to ensure Safety, Quality, Delivery and Cost.

It is the basis for Continuous Improvement, the knowledge management system for problems and ideas.

### Benefits

- Improved safety following the Step, Key Point, Reason Why process
- Measurable, auditable, observable processes
- Engaged operators in Continuous Improvement
- Multi skilled workforce
- Robust planning ability through consistency in operating
- Transparency of work against demand and ability to rebalance

## Total Productive Maintenance (TPM)

### Purpose

The purpose of TPM is to increase the Overall Equipment Effectiveness of the mining and processing equipment and assets.

TPM sets the correct environment for the ownership of maintenance activities between operations and maintenance.

#### Benefits

- Full utilisation of the relevant skill sets
- Bottleneck optimisation to improve capacity, revenues and margin
- Enabler for future improvements to assets – Early Equipment Management and feeder for NPI – to reduce OEM costs and reduce operating costs
- Engagement of operators in problem solving, productive maintenance, and continuous improvement

#### 5S and Visual Control

##### Purpose

The purpose of 5S and Visual control is to provide the organisation with the ability to understand the status of operations immediately and identify deviations from standard 'at a glance' without the need for investigation.

5S provides the operations with a simple method of ensuring effective processes by minimising the wastes of waiting, over-processing, motion and transport.

5S is not to be confused with house-keeping. It is a method for enabling value add in the workplace.

#### Benefits

- Minimises lost time in wasteful activities
- Supports the CI thinking way
- Gives visibility of potential problems before they become critical problems
- Improves safety in operations with workplace organisation
- Pride and ownership in the workplace
- Builds trust with the customer and shareholders

#### Lean Principle 3 – Build In Quality

to:

- Focus on customers' needs and the constant pursuit of improving quality to reduce cost.
- Protect our brand in the marketplace.
- Support flow of product by fixing problems at their source.

Benefits

- Customer protected
- Improve cost of non-quality
- Flow of product Escalation (Andon)

Purpose

Provide a system to alert operations and maintenance to stop the process, escalate the problem and fix it at source with the support of leadership.

Benefits

- Drives a rapid response approach to problem solving

Error Proofing

Purpose

The purpose of Error Proofing is to eliminate product defects by eliminating errors that can potentially lead to poor quality reaching the customer.

Benefits

- Improvement in Right First Time
- Reduce cost on non-quality
- Reduce re-work and over-processing

Managed Buffers



## Purpose

The purpose of managed buffers is to control the risk of poor quality in the operation and the potential of passing it on to the customer by limiting the Work In Progress. Managed Buffers support the concept of flow.

## Benefits

- Address problems at point of cause
- Drives a rapid response approach to problem solving
- Minimises operational exposure to poor quality
- New Product, Process or Service (NPI) Introduction Zero Defects
- Supports the 'No Defects Forward'

## Quality Loops

### Purpose

The purpose of Quality Loops is to generate a gateway system (a customer quality filter) within the critical path of the product to ensure the organisation meets its customer SLA requirements. It is the quality conscience of the organisation.

### Benefits

- Protect the customer
- Control in real-time through line feedback loop
- Immediate feedback from customer to the operation

## Lean Principle 4 - Continuous Improvement and Problem Solving

The purpose of Continuous Improvement is to improve the margin and reduce cost by involving everyone in a structured process of problem solving and idea resolution. It's intent is to provide the organisation with a benchmark model for transformation to win market share through year on year productivity and performance improvements.

## Benefits

## CI Strips

### Purpose

Provide all staff with a simple, user-friendly system to capture and evaluate ideas to eliminate waste and improve margin.

### Benefits

- Common currency for continuous improvement
- Engaging front-line staff in contributing ideas to improve the business
- Humanises the workplace as peoples contributions are valued
- 5-10% productivity and performance improvement year on year
- Throughput of ideas leading to a transformational organisation

## Breakthrough Workshops

### Purpose

The purpose of the breakthrough workshop is to address issues affecting the performance of the area that requires leader led problem solving to resolve critical issues affecting core KPIs.

### Benefits

- Leaders seen as coaches and leading by example in the workplace
- Promoting the continuous improvement culture (PDCA)
- Developing team members in resolving complex issues
- Learning organisation
- No blame culture

## Radical Change and Re-Design

## Purpose

The purpose of Radical Change is to:

- Realise multiple, cross-functional contributions to the bottom line of the organisation.
- Strategic re-design of Value Streams to deal with chronic problems or market shocks

## Benefits

- Agile thinking towards organisation set-up
- Challenges current paradigms to ensure early adoption or become market leaders
- Realise Ideal Future States in a tighter time frame

## 3C Strips

### Purpose

The purpose of 3C Strips is to provide:

- A framework for the organisation to escalate problems quickly to the appropriate owner
- To visualise the volume of problems and the capability to control them at the different levels of the business

### Benefits

- A common language for problem solving
- A visual process for leaders to understand and coach team members in first defence problem solving
- Early prioritisation of problems and the allocation of resource
- Understanding of organisation capability to problem solve
- Learning organisation
- Engagement and inclusivity

## A3 PPS

### Purpose

- The purpose of PPS is to provide a second line defence for the organisation in resolving more complex issues where the Direct Cause is not obvious and stretches beyond the boundaries of 3Cs. Repeat concerns fall into the PPS category.

### Benefits

- Resolves repeat concerns
- An inclusive process for all
- A coaching tool for leaders with the problem owners
- Learning organisation in PDCA – a sharing of knowledge

### Six Sigma

#### Goal

Zero defects or failures of the products or processes

#### Purpose

To improve process output by minimising variability of processes in the value chain through the use of statistical methods.

#### Benefits

- Increases customer satisfaction and loyalty
- Greater productivity
- Develops staff skills and raises morale
- Creates a common language across the business

### Lean Principle 5 – Policy Deployment (Hoshin)

The purpose of Policy Deployment is to align the organisation to its mission and goals using transparent methods of communication and planning.

#### Benefits

- Aligned organisation, one vision, shared goals
- Improvement is aligned to the overall strategy
- Everyone engaged in the process of achieving the goals

#### Lean Principle 6 – Future Design

##### Goal

Design a process that is easily executed and economical across the value stream.

##### Purpose

The purpose is to align the process design programme into one activity.

##### Benefits

- Reduce operating cost by 30%

#### Modular Design

##### Goal

Simplify production through adding modular design

##### Purpose

The purpose of Modular Design is to future proof additional cost of re-design to cope with production changes in volumes, specification or quality.

##### Benefits

- Minimise cost of: o Maintenance o Operation
- Future asset modifications
- Minimise risk and encourage innovation

#### Failure Mode Effect Analysis

##### Goal

Zero defects or failures of the Products, Processes or Services offered to customers from the point of introduction

##### Purpose

To design quality into a process by a disciplined Critical to Quality (CTQ) flow-down of customer requirements ensuring that each and every one are statistically capable of being produced

##### Benefits

- Increases customer satisfaction and loyalty
- Effectively translates the Voice of the Customer into design
- Highly optimised solution
- Quantifies design risk regarding delivery, quality and reliability
- No start-up surprises or unexpected costs

#### New Product Introduction – Design For Six Sigma

##### Goal

To ensure a new product, process or service is 100% correct from the point of handover to operations.

##### Purpose

Utilise existing knowledge to identify, quantify and subsequently create a prioritised plan of actions to eliminate or reduce the likelihood of errors and/or failures.

#### Benefits

- Increases customer satisfaction as a result of improved reliability and quality
- Ensures that known errors or failures are not repeated
- Proactively seeks to eliminate the root cause of both known and potential errors
- Creates a record of errors, their risks and root causes, that contributes to a learning organisation

#### Summary

Lean is a carefully constructed set of operating principles underpinned with systems designed to improve all aspects of the business. As such, it is heavily dependent upon leadership to play an active part in the transformation from what is considered a transactional environment to one that is transformational.

The success and failure of Lean lies in the appetite and conviction of leaders from the CEO to the supervisor to make the transformation.

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## STRATEGIC SUPPLIER PARTNERSHIP

### ***What does the term strategic supplier really mean?***

How do you define a strategic supplier? A strategic supplier could be a supplier who is strategic (i.e., they perform a strategic function) or a supplier you have deemed valuable to your strategy.

That's great in theory. In reality, though, the strategic nature of supplier partnership varies significantly.

- A strategic supplier could be someone who delivers critical goods, materials, or services on which an organization depends.
- A strategic supplier could also be essential to strategic growth, regardless of how often they are used or engaged with.
- Strategic suppliers can also be treated more like partners. In this strategic supplier relationship, collaboration is king.

Regardless of how you define a strategic supplier, they are core to a company's business success.

### ***What is a strategic supplier partnership?***

When does “the connection existing between an organization and its suppliers,” as one academic source calls it, become strategic? The Cambridge dictionary says a strategic supplier partnership is “an arrangement between two companies or organizations to help each other or work together, to make it easier for each of them to achieve the things they want to achieve.”

Yet another, possibly more helpful, way of thinking about supplier relationships is to divide them into categories. In his book, *Slow Down, Sell Faster!* Kevin Davis suggests we consider suppliers in one of three ways: As an approved vendor, a valued consultant, or a strategic partner.

Approved vendors provide acceptable prices and service levels. Valued consultants go further: Exchanging information and sharing knowledge. Strategic partners, however, don’t just deliver a product or service. Davis says they can help your company “see the future faster and in a new and different way.”

McKinsey’s research shows that companies with advanced supplier collaboration capabilities tend to outperform their peers. So, what’s stopping you from taking supplier collaboration to the next level? And what happens if you don’t form strategic partnerships?

### ***What happens if you don’t form strategic supplier partnerships?***

Strategy is important, critical to any organization looking for long-term survival or growth. But any strategy is only as strong as its execution. In *The Strategy Book*, the author, Max McKeown, says strategy enables a business to answer these questions:

- What do we want to do?
- What do we think is possible?
- What do we need to do to achieve our goals?
- When should we react to new opportunities and adapt plans?

When you and your suppliers are part of a strategic partnership, these questions become easier to answer.

However, if you don’t form strategic partnerships, the relationship is more likely to be transactional than value-adding. That’s not good for anyone in the supply chain.

Without strategic partnerships, any vision or strategy becomes nice-to-have rather than essential. When strategies are not shared, parties tend to work in opposition rather than in collaboration. Communication suffers. Planning efficiency reduces. Partners tend to invest less time, effort, and money. As a result, risk increases for both parties, and reward diminishes accordingly.

### ***Partnerships for mutually-beneficial growth***

There is an alternative: Seeing supplier partnerships as a source of mutually-beneficial growth.



In an article in SDC Executive, strong supplier partnerships are key to sustainable procurement. "By clearly communicating to suppliers what your goals are, and what you need from them in order to achieve these goals, you will set them up for success."

Maureen Barsema agrees. Goals that work for both parties are key, as is communication. Writing in Global Trade Mag, she says, "One of the most critical elements of any healthy relationship between supply chain partners is alignment on goals, delivery schedules, volumes, operations, and a range of other issues."

However, to truly put suppliers at the heart of your business, it's necessary to think of both parties as equal and equally important in the relationship. Removing friction by having reliable data goes a long way toward improving communication, trust, and effectiveness. Safely stored, easily-accessible supplier agreements go a step further. Being able to negotiate deals more smoothly and, as a result, more regularly further strengthens relationships. None of this is possible without the right tools.

### ***Identifying strategic suppliers and managing strategic supplier partnerships***

Not every supplier will be considered strategic. To identify your strategic suppliers, it's helpful to start with supplier segmentation, then ask if they help you provide a competitive advantage in the marketplace. If the answer is yes, they are strategic suppliers.

After that, these steps (as recommended by TechTarget) will help you manage strategic supplier partnerships.

1. Be sure the supplier knows you consider them a strategic partner
2. Define the objectives of the relationship, collaboratively
3. Align the needs of internal and external stakeholders
4. Seek first to understand before wanting to be understood
5. Get feedback from your suppliers
6. Build trust between all partners
7. Consider further investment for mutual benefit and
8. Do your due diligence.

It's also vital to monitor supplier performance and step in as soon as discrepancies are noted, to resolve challenges before they become significant issues.

### ***Benefits of a strategic partnership***

Incredible things happen when companies' and suppliers' relationships shift from transactional to strategic. Amongst other benefits such as improved communication, trust, resilience, collaboration, efficiency, and profitability, parties start to think creatively and leverage innovative deals, such as rebates, more frequently.

When rebates move from an afterthought to a strategic business tool, previously discordant relationships start to mend. The solid, trustworthy data from a strategic rebate

management solution creates a foundation to evolve business strategy. As a result, the potential of strategic supplier partnerships can be explored more fully.

This shift in mindset may not happen overnight, but organizations that begin seeing their suppliers as strategic partners start to realize the us-them mentality is a useless construct. The only way forward is a collaborative, mutually-beneficial effort to serve customers. In doing so, organizations and their suppliers see the world differently – one in which their joint effort creates more meaningful contributions and, potentially, better results for all.

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## Supplier Partnership

### What is Supplier Partnering?

**Partnering** is defined as a continuing relationship, between a buying firm and supplying firm, involving a commitment over an extended time period, an exchange of information, and acknowledgement of the risks and rewards of the relationship. The relationship between customer and supplier should be based upon trust, dedication to common goals and objectives, and an understanding of each party's expectations and values.

### Benefits of Partnering

The benefits of partnering include:

- Improved quality;
- Reduced cost;
- Increased productivity;
- Increased efficiency;
- Increased market share;
- Increased opportunity for innovation; and
- Continuous improvement of products / services.

### Key Elements to Partnering

The three important elements to achieve the customer / supplier partnering relationship are :

**1. Long-term commitment:** Long-term commitment provides both customer and supplier the much needed environment to achieve the planned objectives. Because to set up and solve the problem of continuous improvement, both parties may require the sufficient time.

**2. Trust :** Mutual trust between two parties forms the basis for a strong working relationship. Trust enables the partners to effectively combine their resources and knowledge. It results in a 'win-win' situation for both partners.

**3. Shared vision :** Both the customers and suppliers have the common goal i.e., to satisfy the end user. In order to ensure this goal, both parties should share and understand their goals and objectives.

Three types of supplier sourcing are:

- Sole sourcing;
- Multiple sourcing, and
- Single sourcing.

### **1. Sole Sourcing**

Sole sourcing is the use of only one supplier for the organization. The organization does not have any choice. It is forced to use only one supplier. This forced situation is because of the following factors: patents, technical specifications, raw material location, only one organization producing the item, etc.

### **2. Multiple Sourcing**

Multiple sourcing is the use of two or more suppliers for an item. The basic concept of multiple sourcing is that competition will result in better quality, lower costs, and better

service. (The selection of suppliers from various alternatives is based on their performance in terms of prices, quality and delivery.

### **3. Single Sourcing**

Single sourcing is the use of one supplier for an item when several sources are available. It leads to long-term partnering relationship.

### **CUSTOMER – SUPPLIER RELATIONS**

Dr. Kaoru Ishikawa has given ten principles of customer-supplier relations. They are

1. Both the customer and supplier are fully responsible for the control of quality.
2. Both the customer and supplier should be independent of each other.
3. The customer is responsible for providing the supplier with clear and sufficient requirements so that the customer can know precisely what to produce.
4. Both the customer and supplier should enter into a non-adversarial contract.
5. The supplier is responsible for providing the quality that will satisfy the customer.
6. Both the customer and supplier should decide the method to evaluate the quality of the product or services.
7. Both the customer and supplier should establish in the contract the method by which they can reach an amicable settlement in case of any dispute.
8. Both the customers and supplier should continually exchange information.
9. Both the customer and supplier should perform business activities.
10. Both the customer and supplier should have the best interest of the end user in mind.

- Partnering or Strategic Alliances
- Innovative Alliances and Partnerships
- Internal Partnering
- Partnering with Suppliers
- Partnering with Customers
- Partnering with Potential Competitors
- Global Partnering
- Education and Business Partnerships

Partnering means working together for mutual benefit. It involves pooling resources, sharing costs, and cooperating in ways that mutually benefit all parties involved in the partnership. Partnerships may be formed internally (among employees) and externally with suppliers, customers, and potential competitors.

The purpose of partnering is to enhance competitiveness. The formation of partnerships should be a systematic process involving such steps as development of a partnering briefing, identification of potential partners, identification of key decision makers, implementation of the partnership.

Internal partnering operates on three levels:

1. Management-to-employees
2. Team-to-team partnerships,
3. Employee-to-employee partnerships

- The purpose of internal partnering is to harness the full potential of the workforce and focus it on the continuous improvement of quality.
- Internal partnering is also called employee involvement and employee empowerment.
- Successful internal partnering requires a supportive environment, structured mechanisms, and mutually supportive alliances.
- The goal of a supplier partnership is to create and maintain loyal, trusting relationships that will allow both partners to win while promoting the continuous improvement of quality, productivity, and competitiveness
- The requirements for success in supplier partnerships include the following:
- Supplier personnel should interact with employees who actually use their products, the price-only criteria in the buyer-supplier relationship should be eliminated, the quality of products delivered should be guaranteed by the supplier, supplier should be proficient in JIT, and both parties should be capable of sharing information electronically.
- Supplier partnerships typically develop in the following stages: uncertainty and tentativeness, short-term pressure, realization of the need for new approaches, adoption of new paradigms, awareness of potential, adoption of new values, and mature partnering.
- The rationale for forming customer partnerships is customer satisfaction. The best way to ensure customer satisfaction is to involve customers as partners in the product development process. Doing so is, in turn, the best way to ensure competitiveness. Customer-defined quality is a fundamental aspect of total quality.
- Small- and medium-sized enterprises or SMEs, even those that compete in the same markets, can benefit from partnering. The most widely practiced form of

partnership among SMEs is the manufacturing network. A manufacturing network is a group of SMEs that cooperate in ways that enhance their quality, productivity, and competitiveness.

- Mutual need and interdependence are the characteristics that make manufacturing networks succeed. Widely practiced network activities include joint production, education and training, marketing, product development, technology transfer, and purchasing.
  - Education and business partnerships are formed to help organizations continually improve their people and how well they interact with process technologies. Services provided include on-site customized training, workshops, seminars, technical assistance, and consulting.
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### **Basic Principles of GMP Good Manufacturing Practices System**

Quality management system constitutes the basic structure of the GMP system, which adopts the establishment of quality management, quality control and qualification tests as the first principle.

Since the subject is human health, the second basic principle of the system is to eliminate or minimize the contamination of internal and external factors in the products produced by companies operating in food, pharmaceutical, cosmetic and medical devices.

In the application of the GMP Good Manufacturing Practices System to companies engaged in production in these sectors, some basic principles are followed. For example, the organizational structure of the company and its employees will be overhauled and an organizational structure will be established to ensure the highest level of hygiene and employees will be trained in this direction.

The principles of the system can be listed as follows:

- Quality management
- Staff and organization
- Building, hardware, equipment and materials
- Documentation
- Raw product entry, product processing, storage and distribution
- Quality control and proficiency tests
- Approval and authorization of all transactions
- Complaints and recall
- Investigation of errors, clinical follow-up of the products produced after use

- Storing samples, destroying problematic, returned products
- Internal and external control.

What is the Standard Scope of the GMP Good Manufacturing Practice System?

The GMP Good Manufacturing Practices System treats the enterprise in all its aspects, namely the basic characteristics it has to possess and with different criteria for each production process. Defines and controls the quality and reliability of production site, environment, tool - equipment and production process, personnel and raw material. GMP, which covers the pharmaceutical, cosmetic and food sectors, also covers this sector with the adoption of the Cosmetics law, which provides the acceptance of detergents and cleaning products in the "cosmetic" class.

The main headings of the scope of the system are as follows;

- Organization
- Risk assessment of processes
- Infrastructure and equipment
- Training and competence
- Good manufacturing practices
- Hygiene, cleaning and sanitation
- Maintenance and calibration
- Recall

Requirements of the system;

1. Facilities: principles, area types, area, flow, floors, walls, ceilings, washing and toilets, lighting, ventilation, work channels, cleaning and sanitation, maintenance, consumables and pest control.
2. Equipment: equipment design, installation, calibration, cleaning and sanitation, maintenance, consumables, authorizations, responsibilities and backup system.
3. Raw materials and packaging materials: basic principles, procurement, critical and non-critical raw materials.
4. Production: guidance principle, manufacturing operations (relevant document status, initial production control, batch assignment number,

identification and process operation, process controls, bulk product storage, stock and raw materials), packaging operations (the presence of relevant documents, batch number assignment, packaging line identification, control equipment, process input, stocking and identifying packaging materials).

5. Finished products: Guiding principle, version, storage, shipping and return.
6. Quality control calibrations: guiding principle, test methods, acceptance criteria, results, specification results out, reagents, solutions, reference standards, culture, media, sampling and sample storage.
7. Processing of non-technical products: finished products, bulk products, raw materials and packaging rejection.
8. Waste management: guiding principle, types of waste, food, containers and disposal.
9. Subcontracting: subcontract, types (production, packaging, analysis, equipment, pest control), given contract, contract acceptance and written contract agreement.
10. Deviations.
11. Complaints and recalls: product complaints and product reminder.
12. Change Control.
13. Inner control.
14. Documentation: documentation and document types.

## What are the Benefits of a GMP Good Manufacturing Practice System

The manufacturing conditions of products such as medicines, cosmetics, food or medical equipment, which have significant impacts on human health, must meet GMP Good Manufacturing Practices System standards. Hygiene conditions must always be ensured in production.

In short, the GMP System is a quality approach to production and regulates the professional working conditions of its employees in the production of food, cosmetics, pharmaceuticals or medical equipment and ensures reliable and effective production. GMP standards are sought in the regulations and audits of ministries in the fields of pharmaceuticals, food, cosmetics and medical in our country.



It is a standard that includes protective measures for internal and external conditions related to the organization in order to prevent or reduce the possibility of contamination of the product from internal and external sources. This application is one of the basic approaches in the production and distribution of food products and it is a series of techniques that must be applied continuously in raw material, processing, product development, production, packaging, storage and distribution stages in order to ensure quality in products.

The benefits of GMP Good Manufacturing Practices can be listed as follows.

1. It also ensures compliance with legal requirements.
  - a. In this way, the possibility of encountering any penalty situation is reduced.
  - b. Any customer requests for today or in the future can be met more quickly.
2. Increases awareness of production safety among employees.
  - a. The products are produced in the most accurate methods and under the right conditions and delivered to the user.
  - b. This, of course, increases the image of the company's reliability in public opinion.
  - c. The company creates an advantage in international trade.
  - d. Since the system also has quality management system standards, all production stages are followed and the product is provided to reach the user in the most healthy way.
  - e. Relevant processes and employees are kept under control in order to prevent various confusion and errors during production.
3. It gains competitive advantage in the market against its competitors.
  - a. The motivation of the employees increases and the sense of commitment to the company increases.

## Overview of Total Quality Tools

- MAJOR TOPICS

- Total Quality Tools Defined
- The Pareto Chart
- Cause-and-Effect Diagrams
- Check Sheets
- Histograms
- Scatter Diagrams
- Run Charts and Control Charts
- Stratification

## Overview of Total Quality Tools

- Some Other Tools Introduced
- Management's Role in Tool Deployment
- Pareto charts are useful for separating the important from the trivial. They are named after Italian economist and sociologist Vilfredo Pareto. Pareto charts are important because they can help an organization decide where to focus limited resources.
- The Pareto Principle holds that a few significant causes lead to the majority of problems.
- The cause-and-effect diagram was developed by the late Dr. Kaoru Ishikawa, a noted Japanese quality expert; others have thus called it the Ishikawa diagram. Its purpose is to help identify and isolate the causes of problems.
- It is the only one of the seven basic quality tools that is not based on statistics.
- The check sheet is a tool that facilitates collection of relevant data, displaying it in a visual form easily understood by the brain. Check sheets make it easy to collect data for specific purposes and to present it in a way that automatically converts it into useful information.
- Histograms have to do with variability. Two kinds of data are commonly associated with processes: attributes data and variables data. An attribute is something that the output product of the process either has or does not have. Variables data are data that result when something is measured
- A histogram is a measurement scale across one axis and a frequency of like measurements on the other.

- The scatter diagram is arguably the simplest of the seven basic quality tools. It is used to determine the correlation between two variables. It can show a positive correlation, a negative correlation, or no correlation
- Stratification is a tool used to investigate the cause of a problem by grouping data into categories. Grouping of data by common element or characteristic makes it easier to understand the data and to draw insights from them.
- In the context of the seven total quality tools, run charts and control charts are typically thought of as being one tool together. The control chart is a more sophisticated version of the run chart. The run chart records the output results of a process over time. For this reason, the run chart is sometimes called a trend chart.
- The weakness of the run chart is that it does not tell whether the variation is the result of special causes or common causes. This weakness gave rise to the control chart.
- On such a chart, data are plotted just as they are on a run chart, but a lower control limit, an upper control limit, and a process average are added.
- The plotted data stays between the upper control limit and lower control limit while varying about the center line or average only so long as the variation is the result of common causes such as statistical variation.
- Other useful quality tools are five-S, flowcharts, surveys, failure mode and effects analysis (FMEA), and design of experiments (DOE).
- Five-S is used to eliminate waste and reduce errors, defects, and injuries. Flowcharts are used in a total quality setting for charting the inputs, steps, functions, and outflows of a process to understand more fully how the process works and who or what has input to and influence on the process, what its inputs and outputs are, and even its timing.
- The survey is used to obtain relevant information from sources that otherwise would not be heard from in the context of providing helpful data. Failure mode and effects analysis (FMEA) tries to identify all possible potential product or process failures and prioritize them for elimination according to their risk.
- Design of experiments (DOE) is a sophisticated method for experimenting with complex processes for the purpose of optimizing them.

## **QUALITY CONTROL TOOLS**

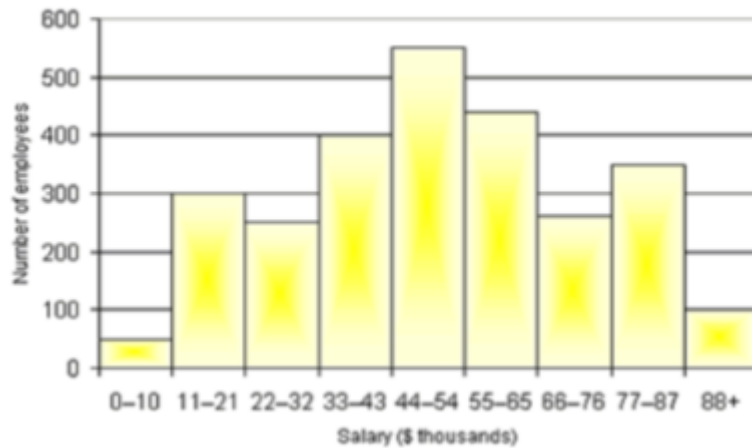
### **Seven QC Tools**

- Flow charts
- Check sheets
- Histograms
- Pareto diagrams
- Cause-and-effect diagrams
- Scatter diagrams
- Control charts

### **Check Sheets**

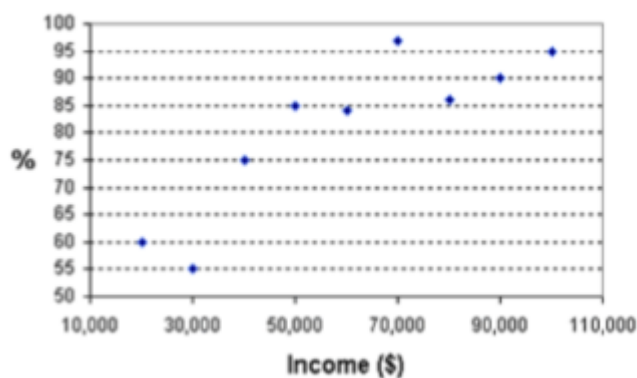
- Check Sheets are simple documents that are used for collecting data in real-time.
- A Check Sheet is typically a blank form that is designed for the quick, easy and efficient recording of the desired information, which can be either quantitative or qualitative.
- When the information is quantitative, the check sheet is called a Tally Sheet

### **Histograms**



- A histogram divides
- up the range of possible
- values in a data set into classes or
- groups.
- For each group, a
- rectangle is constructed with a base
- length equal to the range of values in that specific group,
- and an area proportional to the number of observations falling
- into that group.

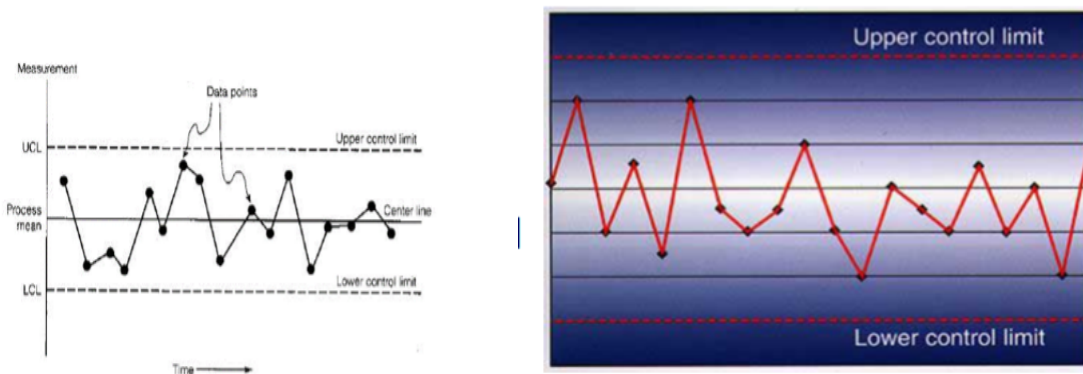
## Scatter Diagram



- Scatter Diagrams are used to present measurements of two or more related variables.

- A Scatter Diagram does not specify dependent or independent variables.
- Either type of variable can be plotted on either axis.
- Scatter Diagrams represent the association (not causation) between two variables.

## Control Charts



A control chart consists of the following:

1. A Centre Line (CL) drawn at the process mean value.
2. Lower and Upper Control Limits that indicate the threshold at which the process output is considered statistically unlikely.

## Run Charts

1. Run Charts are similar in some regards to Control Charts, but do not show the control limits of the process. They are therefore simpler to produce, but do not allow for the full range of analytic techniques supported by Control Charts.
  - a. Run chart: Measurement against progression of time.
  - b. Control chart: Add Upper Control Limit and Lower Control Limit to the run chart.

## Ishikawa Diagram

Also called fishbone diagrams (because of their shape) or Ishikawa diagrams.

Helps in identifying root causes of the quality failure. (Helps in the diagnostic journey.)

Ishikawa Diagram is also called Cause-and-Effect Diagram. Often are four generic heading used: 4 M's – Machine, Manpower, Method, Material,

### **Pareto Diagram**

- The purpose of the Pareto Diagram is to highlight the most important set of factors among a typically large number of causes for a problem.
- In order to develop the Pareto Diagram for a specific process, the knowledge of Frequency, Relative Frequency, Cumulative Frequency and Percentage Frequency is needed.

### **Optimizing and Controlling Processes through Statistical Process Control (SPC)**

#### MAJOR TOPICS

- Statistical Process Control Defined
- Rationale for SPC
- Control Chart Development
- Management's Role in SPC
- Role of the Total Quality Tools
- Authority over Processes and Production
- Implementation and Deployment of SPC
- Inhibitors of SPC

Definition: SPC is a statistical method of separating special-cause variation from natural variation to eliminate the special causes and establish and maintain consistency in the process, enabling process improvement .

The rationale for SPC includes the following:

- Enables the control of process variation.
- Makes possible continual improvement of the process.
- Results in predictability of processes.
- Results in elimination of waste.
- Makes less expensive inspection modes possible.

### **Control Chart Development:**

- There are several types of control charts, the choice of which being determined by the kind of process under consideration. Further, some control charts are designed for variables data (something measured), others are concerned with attributes data (something that can be counted).
- Different procedures are used for developing these two types of control. Both require Upper Control Limits (UCL) and Lower Control Limits (LCL) and a Process Average.
- Upper and Lower Control Limits and Process Average calculations for constructing the control chart are made from the actual process data, which must be of sufficient quantity, and taken over a relatively short period.
- After drawing the blank control chart with UCL, LCL and process average, the data from which the calculations were made are plotted on the chart. No data points can penetrate UCL or LCL, and there must be no long runs of data on one side of the process average. That will only be true if the process is free of special causes of variation. If that is the case, the chart is ready for use.
- Continual improvement of processes requires that special causes be eliminated first. Process improvement narrows the shape of the process's bell curve, resulting in less variation.
- Continual improvement is a key element of SPC and total quality. SPC enhances the predictability of processes and whole plants. Elimination of waste is another key element of SPC. SPC can help improve product quality while reducing product cost.
- SPC makes sampling inspection more reliable. SPC supports process auditing as a substitute for more expensive inspection. SPC requires a capability in statistics, either in-house or through a consultant. Process



operators should be key players in any SPC program. Understanding the process is a prerequisite to SPC implementation.

- All employees involved in SPC must be trained for their involvement. Measurement repeatability and reproducibility is essential for SPC.
- Management's role in SPC is similar to its role in total quality overall: commitment, providing training, and involvement.
- The seven tools, augmented by flowcharting, five-s, FMEA and DOE are required for SPC. SPC and the operator must have process-stop authority, SPC implementation must be carried out in an orderly, well thought-out sequence.
- SPC requires collaborative team activity.
- The quality tools are used in SPC before the control chart is developed as aids in helping to eliminate special causes of variability.
- Operators who use SPC must have the authority to stop the production process when SPC tells them something is wrong.

The three broad phases of the process for implementing/deploying SPC are preparation, planning, and execution. Each of these phases consists of several steps.

Common inhibitors of SPC include insufficient expertise/capabilities, misdirected responsibility for SPC, failure to understand the target process, failure to have processes under control, inadequate training and discipline, measurement repeatability/reproducibility, and low production rates

### ***Implementation and Deployment of SPC***

- Requires commitment and time of management and other key personnel.
- Requires some expertise in statistics.
- Must be done in a well planned, orderly process.

### ***Inhibitors of SPC***

- Lacking statistics expertise. May have to bring in outside help.
- Assigning SPC responsibility to the wrong person/group. The process operator should "own" SPC on his process.
- Failing to understand how the process really works. Imperative that the process be accurately flowcharted first.

- Trying to implement SPC while the process still has special cause variation. Process needs to be cleaned up as much as possible before trying to make control charts.
- Inadequate training and lack of discipline in process operation. Users need training, and process procedures must be followed.
- Measurement repeatability and reproducibility lacking. Instrumentation and procedures must be made repeatable and reproducible. Otherwise data is not reliable.

## Performance Measurement

Performance measurement is a fundamental building block of TQM and a total quality organization.

Historically, organizations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation. However, traditional performance measures, based on cost accounting information, provide little to support organizations on their quality journey, because they do not map process performance and improvements seen by the customer. In a successful total quality organization, performance will be measured by the improvements seen by the customer as well as by the results delivered to other stakeholders, such as the shareholders.

A simple performance measurement framework is outlined, which includes more than just measuring, but also defining and understanding metrics, collecting and analyzing data, then prioritizing and taking improvement actions.

Why measure performance?

‘When you can measure what you are speaking about and express it in numbers, you know something about it’.

Kelvin

‘You cannot manage what you cannot measure’.

Anon

These are two often-quoted statements that demonstrate why measurement is important. Yet it is surprising that organizations find the area of measurement so difficult to manage.

In the cycle of never-ending improvement, performance measurement plays an important role in:

- Identifying and tracking progress against organizational goals
- Identifying opportunities for improvement
- Comparing performance against both internal and external standards

Reviewing the performance of an organization is also an important step when formulating the direction of the strategic activities. It is important to know where the strengths and weaknesses of the organization lie, and as part of the 'Plan –Do – Check – Act' cycle, measurement plays a key role in quality and productivity improvement activities.

The main reasons it is needed are:

- To ensure customer requirements have been met
- To be able to set sensible objectives and comply with them
- To provide standards for establishing comparisons
- To provide visibility and a "scoreboard" for people to monitor their own performance level
- To highlight quality problems and determine areas for priority attention
- To provide feedback for driving the improvement effort

It is also important to understand the impact of TQM on improvements in business performance, on sustaining current performance and reducing any possible decline in performance.

A simple performance measurement framework

A good performance measurement framework will focus on the customer and measure the right things.

Performance measures must be:

- Meaningful, unambiguous and widely understood
- Owned and managed by the teams within the organization
- Based on a high level of data integrity
- Such that data collection is embedded within the normal procedures
- Able to drive improvement
- Linked to critical goals and key drivers of the organization

There are four key steps in a performance measurement framework –

- the strategic objectives of the organization are converted into desired standards of performance,
- metrics are developed to compare the desired performance with the actual achieved standards,
- gaps are identified, and
- improvement actions initiated.

These steps are continuously implemented and reviewed:

Initially, focus on a few key goals that are critical to the success of the organization or business, and ensure they are SMART, i.e:

- Specific
- Measurable
- Achievable
- Relevant
- Timely

Once the goals have been defined, the next step in developing a performance measurement framework is to define the outcome metrics – what has to be measured to determine if these goals are being achieved. If it is difficult to define outcome metrics for a particular goal, it is possible that the goal is either not “SMART” or critical to the success of the business.

For each outcome metric, brainstorm candidate drivers by answering the question, “What measurable factors influence this outcome?” Once the list is complete, select those with greatest impact, and these, the most important

drivers, should have driver metrics, and be put in place first. Driver metrics at one level will be outcome metrics at the next level down.

An organization needs to evolve its own set of metrics, using any existing metrics as a starting point in understanding current performance. To ensure they trigger the improvement cycle, they should be in three main areas:

Effectiveness =  $\text{Actual output} \times 100\% / \text{Expected output}$

This is about the process output, and doing what you said you would do. The effectiveness metrics should reflect whether the desired results are being achieved, the right things being accomplished. Metrics could include quality, e.g., grade of product or level of service, quantity, e.g., tonnes, timeliness, e.g., speed of response, and cost/price, e.g., unit cost.

Efficiency =  $\text{Resource actually used} \times 100\% / \text{Resources planned to be used}$

This is about the process input, e.g., labor, staff, equipment, materials, and measures the performance of the process system management. It is possible to use resources efficiently, but ineffectively.

Productivity =  $\text{Outputs} / \text{inputs}$

which can be quoted as:

Expected productivity =  $\text{Expected output} / \text{Resources expected to be consumed}$

Actual productivity =  $\text{Actual output} / \text{Resources actually consumed}$

Next, design a data collection/reporting process using the following steps:

- Set up a system for collecting and reporting data
- Write clear definitions
- Agree method for establishing current performance (if not already determined)
- List resources required to support the design
- Agree data formats and classifications for aggregation and consolidation

- Identify possible sources of benchmark data
- Set reporting calendar
- Establish roles and responsibilities
- Detail training requirements
- Validate with process stakeholders

The gap between current and desired performance now has to be measured. Some of the metrics already exist and their current performance data must be collected, as well as data for new metrics.

Once all the data has been collected to identify the current performance, the target level of performance for the medium- and long-term must be decided. These performance levels must be achievable, and should be broken down into targets for discrete short-term intervals, e.g, the next three quarters.

To implement the performance measurement framework, a plan with timescales and designated responsibilities is needed. Once the plan has been implemented and data collected, new baselines can be set, comparisons made and new standards/targets set.

The metrics, targets and improvement activities must be cascaded down through the organization, involving people and teamwork in the development of new metrics, data collection and improvement activities.

Improvement can be initiated by examining the gaps between current and target performance of the driver metrics at each level. A minimum, achievable set of actions is determined, with plans, assigned responsibilities and owners.

The critical elements of a good performance measurement activity are very similar to those required for a total quality improvement activity:

- Leadership and commitment
- Good planning and a sound implementation strategy
- Appropriate employee involvement
- Simple measurement and evaluation
- Control and improvement

