
UNIT – 15 KAIZEN – CHANGE FOR BETTER (THE CONTINUOUS IMPROVEMENT)

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15.1 INTRODUCTION

Kaizen, the Japanese word for "improvement", is a concept referring to business activities that continual improvement process of all functions and involve all employees from the CEO to the lowest workman. Kaizen also applies to processes, such as purchasing and logistics that cross organizational boundaries into the supply chain. It has been applied in healthcare, psychotherapy, life coaching, government, and banking.

Objective

After studying this unit you should be able to

- Understand the meaning and concept of Kaizen
- Understand the Kaizen approaches and underlying principles
- Discuss and conduct 5S Kaizen
- Understand the Kaizen implementation and organization structure
- Importance and benefits of Kaizen in materials management

15.2 KAIZEN – THE MEANING AND CONCEPT

The Japanese word *kaizen* means "change for better", inherent meaning of either "continuous" or "philosophy" in Japanese everyday use.

The word refers to any improvement, in the same sense as the English word "improvement" means -

- May it be one-time or continuous, or
- May it be large or small or
- May it be at purchase or storage or sales
- May it be short term or long term or
- May it be in shop floor operations or a corporate office
- May it be anywhere, anyhow, any time or anything, it is a better one than earlier

However, given the common practice in Japan's industrial environment, the industrial or business improvement techniques under the term "kaizen", particularly the practices spearheaded by Toyota, the equivalently in English is typically applied to the techniques and measures for implementing *continuous improvement*, especially those with a "Japanese philosophy". The discussion below focuses on such interpretations of the word, as frequently used in the context of modern management discussions.

15.3 HISTORY AND BACKGROUND

By improving standardized programmes and processes, kaizen aims to eliminate waste and redundancies (lean manufacturing). Kaizen was first practiced in Japanese businesses post Second World War (WW-II), influenced in part by American industry and quality gurus, and most notably as part of The Toyota techniques. It spread throughout the world and has been applied to environments outside business and productivity, one such is inventory and materials management.

The small-step work improvement approach was developed in the USA under Training Within Industry (TWI Job Methods). Instead of encouraging large, radical changes to achieve desired goals, these methods recommended that organizations introduce small improvements, preferably ones that could be implemented on the same day. The major reason was that during WWII there was neither time nor resources for large and innovative changes in the production of war equipment. The essence of the approach came down to improving the use of the scarce materials with existing workforce and technologies.

After WW-II, the Economic and Scientific Section (ESS) was tasked to improve Japanese management skills and Edgar McVoy was instrumental in bringing Lowell Mellen to Japan to properly install the TWI programs in 1951. The ESS group as a part of TWI developed the "3J" programs: Job Instruction, Job Methods and Job Relations. Titled "Improvement in Four Steps" (*Kaizen eno Yon Dankai*) it thus introduced kaizen to Japan.

For the pioneering, introduction, and implementation of kaizen in Japan, the Emperor of Japan awarded the 'Order of the Sacred Treasure' to Dr. Deming in 1960. Subsequently, the JUSE instituted the annual Deming Prizes for achievement in quality and dependability of products.

Kaoru Ishikawa took up this concept to define how continuous improvement or kaizen can be applied to processes, as long as all the variables of the process are known.

15.4 KAIZEN APPROACHES

In the *Toyota Way Field book*, Liker and Meier discuss the kaizen blitz and kaizen burst (or kaizen event) approaches to continuous improvement.

There are two kaizen approaches in practice

1. Kaizen Blitz or Point Kaizen approach
2. Kaizen Burst or System Kaizen approach

15.4.1 Kaizen Blitz or Point Kaizen

One of the most commonly implemented types of kaizen that happens very quickly and usually without much planning is Point Kaizen or Kaizen Blitz. A kaizen blitz, or rapid improvement, is a focused activity on a particular process or activity. The basic concept is to identify and quickly remove waste.

Thus this is the kaizen 'on the spot' i.e. as soon as something is found uneven or incorrect, quick and immediate remedial measures are taken.

These measures are usually small, isolated and easy to implement. But the beauty of this kaizen is that, it can have a huge impact.

For example, during a shop inspection by a supervisor, when he finds broken materials or other small issues, and then asks the owner of the shop to perform a quick kaizen (5S) to rectify those issues.

The compressive force applied on a body along X-direction, can cause tensile force in Y-direction on the same body. So also, possibly the positive effects of point kaizen in one area may curb the benefits of some other area.

For example, a line worker notices a potential improvement of efficiency by placing the materials needed in another order or closer to the production line in order to minimize downtime, but it could give rise to a shortage at that place.

15.4.2 Kaizen Burst or System Kaizen

Another approach is that of the Kaizen Burst or System Kaizen, a specific kaizen activity on a particular process in the value stream. Kaizen facilitators generally go through training and certification before attempting a Kaizen project.

System kaizen is accomplished in an organized manner and is devised to address system level problems in an organization. It is an upper level strategic planning method with a specific period of time.

The system kaizen can be approached in the following three ways

- (i) Line Kaizen
- (ii) Plane Kaizen and
- (iii) Cube Kaizen.

Line Kaizen

This is the upper level of point kaizen, in that several points are connected together. It can be visualized as changes or improvements made to one line or process being implemented.

Plane Kaizen

This is the next advanced level of line kaizen, in which several lines are connected together. In modern terminologies, this can also be described as a value stream, where instead of traditional departments, the organization is structured into product lines or families and value streams. It can be visualized

as changes or improvements made to one line being implemented to multiple other lines or processes.

Cube Kaizen

Cube kaizen describes the situation where all the points of the different planes are connected to one another and no point is disjointed from any other. This resembles a situation where Lean has spread across the entire organization. Improvements are made up and down through the plane, or upstream or downstream, including the complete organization, suppliers and customers. This might require some changes in the standard business processes as well.

15.4.3 Kaizen - Zenkai

After understanding the approaches of the kaizen, it is important to align these depending on the activities and systems of the organization. For this alignment, we should first establish the link between the two approaches.

While Blitz Kaizen delivers small improvements, the culture of continuous and regular practice of aligned by Burst Kaizen in cubic dimensions, these small improvements and standardization yields huge results in terms of overall improvement in productivity.

The Kaizen methodology also includes making changes and monitoring results, and adjusting. Further, the beauty of kaizen is that large-scale pre-planning and extensive project scheduling are replaced by smaller experiments, and simple amendments, which can be rapidly adapted.

ZENKAI

In modern days, it is designed to address a particular issue over the course of a week and is referred to as a "kaizen blitz" or "kaizen event" These are limited in scope, and issues that arise from them are typically used in later blitzes. A person who makes a large contribution in the successful implementation of kaizen during kaizen events is awarded the title of "ZENKAI". In the 21st century, business consultants in various countries have engaged in widespread adoption and sharing of the kaizen framework as a way to help their clients restructure and refocus their business processes.

SAQ-15.1

- a) What is Kaizen? Explain Kaizen approaches.
- b) Explain Kaizen Blitz or Point Kaizen approach.
- c) Explain Kaizen Burst or System Kaizen approach.
- d) What is Kaizen Alignment? What do you understand by Zenkai?

ACTIVITY-15.1

Spend some time on identifying the areas where there is 'waste' in you or your team for once in a month. List out them. Work out on each waste listed above. How Kaizen is useful to eliminate the 'waste'? How could things be improved by using Kaizen techniques?

15.5 INTEGRATED KAIZEN

Kaizen is a continuous process, the purpose of which is more than simple productivity improvement. The Kaizen implemented in Toyota resulted in a great success because the concept of kaizen is supported by its various contemporary productive and developmental features embedded into it inherently. Thus the term KAIZEN has been worldwide adapted to various fields such as production, materials, marketing, finance, quality assurance, what not! Wherever there is a scope for improvement, Kaizen is integrated with it whatsoever the other modern management technique is.

The contemporarily developed concepts and techniques, those are integrated with Kaizen include Taaichi Ohno's TPS, Lean Manufacturing, Kanban, JIT, MUDA, MURA, MURI, Lean inventory, Root cause Analysis, Kaoru Ishikawa's Fishbone diagrams, Shigeo Shingo's Single Minute Exchange of Die (SMED), POKAYOKE, Andrew Shewart's P-D-S-A, Edward Deming's P-D-C-A quality cycle and so forth.

Taiichi Ohno's Muda-Mura-Muri in Kaizen

We have already understood the 7-wastes (described under Muda viz. Defects, Overproduction, Inventory, Transport, Over processing, Waiting and Motion) result in improvement of productivity. The kaizen process backs up muda process while the core concept for waste elimination (muda) is essential feature of 5S-Kaizen. Further, we understood it from the concept of kaizen can eliminate excessive hard work (*muri*). It brings out the method to ease how experiments can be performed at their work spots using the scientific procedures. Further, it gives fair scope to learn, to identify and to eliminate waste in business processes. In all, the process suggests a humanized approach to workers and to increasing productivity:

Total Employee Involvement (TEI) in Kaizen

"The idea is to nurture the company's people as much as it is to appraise and encourage participation in kaizen activities."

The success of implementation depends on "the wholehearted participation of workers in the improvement." People at all levels of an organization participate in kaizen, from the General Manager to janitorial staff, as well as external stakeholders when applicable. Kaizen is the most commonly related to manufacturing operations, as at Toyota, but has also been used in supporting activities such as purchase, stores, materials management, plant maintenance, quality etc. and even non-manufacturing environments such as personnel management. The format for kaizen can be individual, suggestion system, small group, or large group. At Toyota, it is an improvement within a workstation or local area and involves a small group for bettering their own work environment and productivity. This group is generally guided through the kaizen process by a line supervisor; and at times the line supervisor may play key role. Kaizen on a broad, cross-departmental scale in companies, approaching total quality management, and reduces human efforts through enhancement of productivity using machines and computers.

Deming's P-D-C-A: Kaizen P-D-C-A

The Toyota Production System is known for kaizen, where all line personnel are expected to stop their moving production line in case of any abnormality and along with their supervisor, suggest an improvement to resolve the abnormality which may initiate a kaizen.

The cycle of kaizen activity can be defined as:

"Plan → Do → Check → Act".

This is also known as the Shewhart cycle P-D-S-A, Deming cycle, or PDCA.

The Kaizen also works on the same and similar lines where the Deming's P-D-C-A cycle. The Kaizen P-D-C-A indicate

P for Problem finding

D for Display

C for Clear

A – Acknowledgement

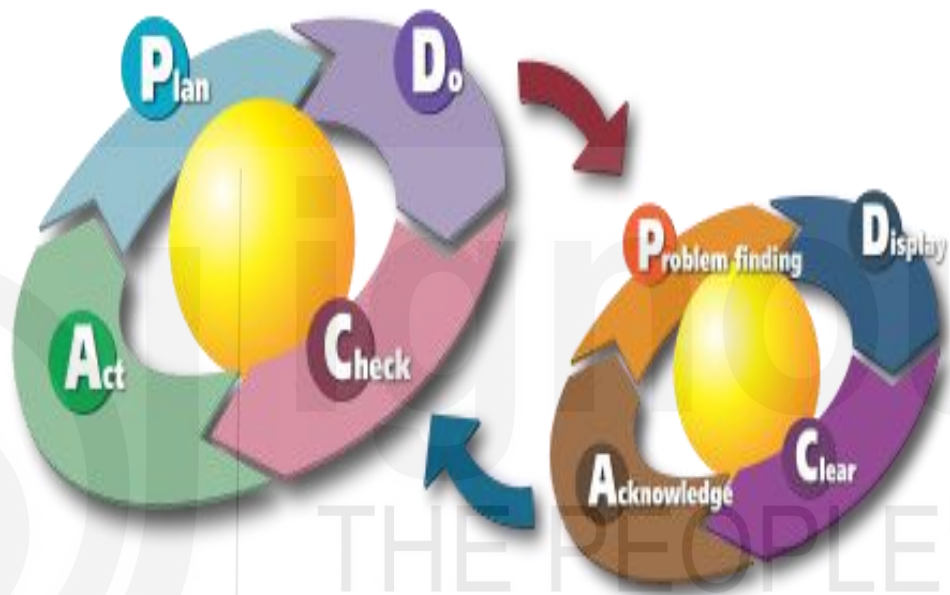


Fig: The Quality PDCA cycle Vs KAIZEN PDCA cycle

Taiichi Ohno's Root Cause Analysis and Ishikawa's Cause & Effect Fishbone diagrams in 5S Kaizen

Another technique used in conjunction with PDCA is the 5 Whys as suggested by Taiichi Ohno, popularly known as Y-Y analysis or Root Cause Analysis.

A Kaizen is Opportunity in Disguise

Taiichi Ohno says "Having No Problems Is the Biggest Problem of All." Taiichi Ohno (29th February 1912–28th May 1990), a prominent Japanese businessman and the father of the Toyota Production System (TPS), called lean manufacturing in the U.S., devised the seven (7) wastes (or muda in Japanese) as a part of TPS (Refer Unit 14, Section 14.14). Of his several books, the popular are *Toyota Production System: Beyond Large-Scale Production*; and *Workplace Management*. Ohno is the single person most responsible for the Toyota Production System (the roots of lean manufacturing, lean thinking, Kaizen, JIT, kanban, and muda). Perhaps, the supermarket concept provided the basis for JIT and muda. Ohno never saw a problem as negative, but in fact as "*a kaizen opportunity in disguise*." He used to encourage his staff to explore problems first-hand until their root causes were found. "Observe the production floor without preconceptions or prejudice," he suggested, "Ask why five times about every matter."

It is the base for the root cause analysis in which the user asks a series of five "why" questions about a failure that has occurred, basing each subsequent question on the answer to the previous. There are normally a series of causes stemming from one root cause, and they can be visualized using fishbone (propounded by Kaoru Ishikawa) diagrams or tables. The Five Whys can be used as a foundational tool in personal improvement, or as a means to create wealth.

Masaaki Imai's Four Foundation Keys of Kaizen

Masaaki Imai made this term popular with his book "*Kaizen: The Key to Japan's Competitive Success.*" In the 1990s, Professor Iwao Kobayashi published his book "*20 Keys to Workplace Improvement*" and created a practical, step-by-step improvement framework called "the 20 Keys". He identified 20 operations in focus areas which should be improved to attain sustainable change. Further he identified the 5 levels of implementation for each of these 20 focus areas. Four (4) of the focus areas are called Foundation Keys. According to the 20 Keys, these foundation keys should be launched ahead of the others in order to form a strong constitution in the company.

The Kaizen's success can be attributed to the following Four Foundation Keys

- **Key 1** – Clean and Organize to ease the work through 5S Kaizen
- **Key 2** – Goal Alignment/Rationalizing the System
- **Key 3** – Small Group Activities
- **Key 4** – Leading and Site Technology

Masaaki Imai's Three Pillars for Implementation of Kaizen

Masaaki Imai also refers three major pillars for effective implementation of kaizen

- 1. Overall Equipment Effectiveness (OEE)** – A lean tool used to measure production performance.
- 2. Single-Minute Exchange of Die (SMED)** – A lean production method of reducing waste devised by Shigeo Shingo.
- 3. Gemba** – Real place such as the production floor.

Depending upon an organization's needs, there are different kaizen organizational hierarchies that can be used, but the kaizen functional structure is the most popular.

SAQ-15.2

- a) Write some concepts and techniques, those are integrated with Kaizen.
- b) Discuss the significance of Taiichi Ohno's Muda-Mura-Muri in Kaizen.
- c) Explain Total Employee Involvement (TEI) in Kaizen.
- d) What is Deming's P-D-C-A?
- e) What is Kaizen P-D-C-A?
- f) Compare Deming's P-D-C-A and Kaizen P-D-C-A.
- g) What is Y-Y analysis or Root Cause Analysis?
- h) Describe Masaaki Imai's Four Foundation Keys of Kaizen?
- i) Brief out Masaaki Imai's Three Pillars for Implementation of Kaizen.

ACTIVITY-15.2

Apply Y-Y analysis or Root Cause Analysis to a problem in your project or job which you are dealing with. Summarize your observations.

15.6 ORGANIZATION STRUCTURE AND HIERARCHY OF KAIZEN

A Kaizen organizational structure or hierarchy is the foundation on which kaizen is implemented in a firm. A kaizen hierarchy is a set of rules and policies that determine:

- How a firm delegates tasks and controls responsibilities.
- How decisions are passed and adopted throughout the firm.
- How information flows within a firm.

15.6.1 Functional Kaizen Organizational Structure

1. Kaizen Steering Committee (KSC)

The first and the most important prerequisite for implementation of kaizen is Management understanding as well as commitment. Anything you don't believe, you cannot achieve. Therefore, the managements must thoroughly understand the nature of the entire process and then be committed to it.

Then, few committed employees within the organization have to be chosen and committee is formed. This committee is often named as "Kaizen Steering Committee (KSC)". The members of the Kaizen Steering Committee, could be at least one from each category of the following

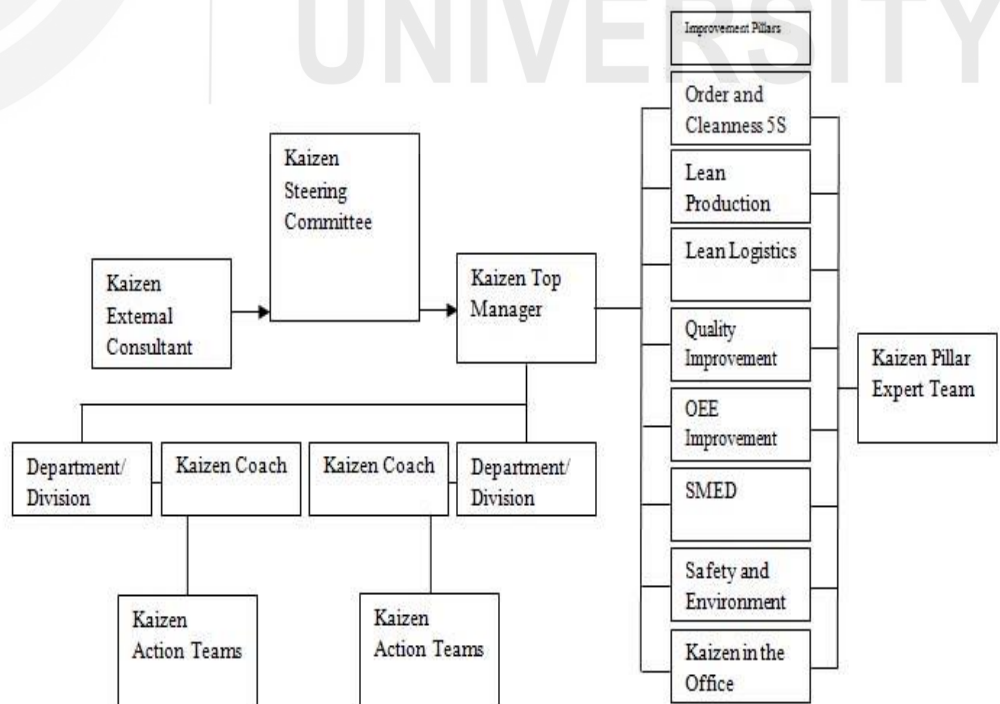


Fig 15.2: Kaizen Hierarchy – The organization Structure of Kaizen

Kaizen Steering Committee Members

Level of member	No. of members
• Top Management	1
• External consultants	1
• Kaizen manager (usually Production Dept)	1 or 2
• Unions council	1 or 2
• Team leader (experts)	1

Tasks of Kaizen Steering Committee

The Kaizen Steering Committee performs the following tasks:

- to determine the scope of activities.
- to set the direction of the process
- to ensure that the necessary resources are available.
- to provide support and knowledge in difficult situations.
- to carry our audit regularly and ensure the corrections are made whenever necessary.

Activities of Kaizen Steering Committee

A Kaizen Steering Committee performs the following activities:

- Hold regular meetings
- Frequency of meetings 4 to 6 weeks.
- The meetings duration for about 90 minutes.
- Prepare a defined structure for holding meetings.
- Results and decisions are visualized and communicated to the entire organization.

2. Kaizen External Consultants (KEC)

External consultants have wider consultation training than managers. They are highly qualified and experienced (subject experts). They spend most of their time advising people.

Employees should feel free to discuss problems with an external consultant than they would with a line manager. In fact, these issues might become vital in the process of improvement. Perhaps! This is because external consultants are not influenced by the firm's internal politics and thence, there will be no prejudices and are more likely to offer even sensitive feedback. The maintain confidentiality and objectivity too. Owing to these benefits, external consultants (subject experts) are at times incorporated into the organization's kaizen coaching team. For example, a consultant inventory management or finance management could be hired to support improvement of the stores management team during a kaizen event.

Tasks of Kaizen External Consultant

The Kaizen External Consultant (KEC) performs the following tasks:

- To suggest and offer support in entire process of change.

- To train and educate the relevant employees.
- To assist in difficult tasks and processes.
- To implement a system of result control and visualization.
- To facilitate implementation immediately.
- To secure the Kaizen process via regular audits.

Activities of Kaizen External Consultant

The Activities of Kaizen External Consultant are as follows:

- To conduct GEMBA workshops according to standards.
- To help in the creation of a roadmap of implementing Kaizen.
- To conduct regular audits.
- To help to build-up a continuous improvement organization.

3. Kaizen Manager and Coordination Team

The natural types of organizations such as self-organizing organizations, network organizations, self-managed teams, are permitting firms to be more adaptable and responsive in today's rapidly changing world. Further, these organizations empower the employees more than the strictly structured firms of the past.

The nature of organizations has drastically changed in the recent past and thence the nature of managerial control also. Strictly speaking, management is there to help workers to be totally productive to communities as well as to organizations but should not to control the employees. Kaizen structure materializes this fact and this is set as the primary role of the Kaizen Manager and Coordination Team.

Tasks of Kaizen Manager and Coordination Team

The Kaizen Manager and Coordination Team perform the following tasks:

- To serve as the link among the affected departments, the teams of experts, and the steering committee.
- To organize the workshops – documents, invitations, etc.
- To verify the implementation steps and actions.
- To review the qualification of staff.
- To coordinate meetings, workshops, training, etc.

Functions of Kaizen Manager and Coordination Team

The Kaizen Manager and Coordination Team functions in the following way:

- create and control standards for codes
- determine the qualification measures for employees
- design the roadmap and even coordinate the action plans
- organize training methods as well as techniques
- present and visualize the success

4. Kaizen Coaches

Every kaizen organization needs a good guidance and coaching because it is always a good idea to learn a process from a person who has been successful in one before. The coach can do well as this individual has already tested and

proven that the kaizen works. Of course, on the other side of the coin, the employees must also absorb all the information they require from the coach – a kaizen coach is like a captain of the ship in an ocean like organization. This concept, in Japanese organization culture is often referred to as HOSHIN KANRI.

Usually, every individual wants to change for better and wants to be successful but most unfortunate is that they fail to invest in themselves and thus miserably fail. They presume that they can teach themselves or they can learn themselves. Never this is a right path to follow. We all need coaches.

Tasks of Kaizen Coach

The Kaizen coaches perform the following tasks:

- educate and train employees.
- coordinate and implement Kaizen activities in the department.
- help the adoption of Kaizen actions.
- help in maintenance of Kaizen board for their team.

The Activities of Kaizen Coach

The Kaizen Coaches activities are as follows:

- take part in the development of standard codes.
- organize the adoption of standards.
- document and monitor different actions.
- plan for audit in their own department.
- visualize the success of their team or department.

5. Kaizen Pillar Expert Teams

The kaizen expert team is but a group of co-dependent professional team members with high level task expertise and also mastery in the improvement process. A kaizen team member needs to have task-related job skills for job performance as well as teamwork skills to function efficiently as part of a co-dependent team.

Tasks of Kaizen Pillar Experts Teams

The Kaizen Pillar Experts Teams perform the following task:

- create rules guiding the relevant knowledge pillars.
- establish organization-wide standards as well as guiding rules.
- offer one ground support for teams with know-how and technical competence.
- audit the processes regularly.

Activities of Kaizen Pillar Experts Team

Kaizen Pillar Experts Team activities are as follows:

- to provide information on factory-wide rules and standards.
- to conduct the preparatory work for the Steering Committee when making the final decisions.
- to organize frequent team meetings of the experts.

6. Kaizen Action Team

Kaizen Action Team frames the goals, missions, and vision. Action planning helps producing fast and visible results. The Kaizen Action Team strategizes, prioritizes, assigns tasks and even evaluates the progress. It takes easy, attainable steps that assist it to move forward.

The team is responsible for creating momentum through working on manageable-size kaizen projects.

Tasks of Kaizen Action Team

The Kaizen Action Team performs the following tasks:

- attend regular improvement meetings.
- participate in further training.
- help in the process of solving problems in the team.
- assume personal responsibility as well as sponsorship.
- actively participate in the adoption of ideas.

Activities of Kaizen Action Team

The Activities of Kaizen Action Team as follows:

- coordinate themselves in different shifts.
- use similar methods and even inform their colleagues about changes.
- hold meeting together and plan these meetings together.

7. Kaizen Department and Line Managers at GEMBA

A line manager, also known as direct manager, is an individual who directly manages business operations and other employees while reporting to a higher-rank manager.

The department and line managers play a significant role while the organization is operating. They are responsible for managing resources and employees in pursuit of perfection and specific organizational or functional goals.

Tasks of Kaizen Department and Line Managers

The Kaizen Department and Line Managers perform the following tasks:

- To support the process of continuous improvement.
- To participate in change workshops.
- To aid in implementation of actions.
- To take part in the shaping of reasonable and feasible processes.
- To lead to improve activities.

Activities of Kaizen Department and Line Managers

The Kaizen Department and Line Managers activities are as follows:

- To create an environment for continuous improvement.
- To organize backfill or release for staff.
- To also organize the release of facilities and machine.
- To also support visual management.
- To also maintain the qualification matrix of employees.

Kaizen Involvement and Roles

The table below shows the hierarchy of Kaizen involvement.

Top Management	Middle Management and Staff Role	Supervisors Role	Employees Role
Determined to introduce Kaizen as an organization strategy.	Deploy and adopt Kaizen objectives as directed by Top Management via policies deployment as well as cross-functional management.	Implement Kaizen in functional roles.	Participate in Kaizen via the suggestion system as well as small group activities.
Offer support and direction for Kaizen by providing resources.	Use Kaizen in functional capabilities.	Design plans for Kaizen and offer guidance to employees.	Practice discipline in the workshop.
Enacts policies for Kaizen as well as other cross functional objectives.	Design, upgrade, and maintain standards.	Improve communication with employees and maintain high morale. Support individual suggestion system and small group activities such as quality circles.	
Attain Kaizen objectives via policies deployment and audit.	Make workers Kaizen-conscious via intensive training programs.	Maintain discipline in the workshop.	Participate in continuous improvement process to become better problem solvers.
Build procedures, structures, and systems conducive to Kaizen.	Assist workers develop tools and skills for problem solving.	Offer Kaizen suggestions.	Improve skills as well as job-performance with cross-education.

SAQ-15.3

- Explain hierarchy of Kaizen in detail.
- Who are the members of Kaizen Steering Committee (KSC)? List out the tasks of Kaizen Steering Committee.
- Who are the members of Kaizen External Consultants (KEC)? List out the tasks of Kaizen External Consultants (KEC).
- List out the tasks and functions of Kaizen Manager and Coordination Team.?
- Who are the Kaizen coaches? What are their tasks and activities?
- What is Kaizen expert team? What are its tasks and activities?

- g) What is Kaizen Action Team? What are its tasks and activities?
- h) Who are the Kaizen Department and Line Managers? What are their tasks and activities?

ACTIVITY-15.3

How can Kaizen relate to daily routine jobs? How is effective time management achieved by Kaizen. How is the waste in our time eliminated? List out few more daily routine jobs where Kaizen is applicable.

15.7 5S-KAIZEN

In continuation to the discussion on kaizen, a special type called 5-S kaizen is discussed here at length. The 5S kaizen is composed of 5 terms originally framed in Japanese language. These are explained in the subsections to follow. The 5S steps of housekeeping, with Japanese titles (starting with S), their equivalent English names (starting with S), and their meanings (equivalent names starting with C) are given in the following tabular form.

S No	Japanese Title	Equivalent English S	Equivalent English C
1.	SEIRI	SORT	CLEAR OUT
2.	SEITON	STRAIGHTEN	CONFIGURE
3.	SEISO	SCRUB	CLEAN & CHECK
4.	SEIKETSU	SYSTEMATIZE	CONFORM & CONTINUE
5.	SHITSUKE	STANDARDIZE	CUSTOMIZE & PRACTICE

15.7.1 Seiri (Sort or Clear Out)

Under this principle, first we classify all items into two categories—in terms of necessary and unnecessary. All these will be exhibited to all employees to check if anyone requires the items categorized under ‘unnecessary’. Then this will be discarded or removed if nobody requires them.

Usually, a limit on the number of necessary items should be demarcated, otherwise everything may seem to be necessary in one way or the other. In usual situations, the department is found often with lots of unused machines, jigs, dies and tools, rejects, work in process, used/unused materials, supplies and spare parts, sleeves, containers, desks, work benches, files of documents, carts, racks, pallets, and many more other materials.

A rule of thumb can be taken as to remove anything that will not be used within the next 30 days.

Procedural steps of SEIRI

1. Seiri starts with a red tag campaign.
2. Choose an area for Seiri.
3. Designate appropriate 5S team and delegate suitable authority.
4. Team members visit the site with a handful of red tags and attach them on the items they believe are unnecessary.
5. If red tags are found on items actually required by the site managers, they must justify by demonstrating the necessity for such items.
6. The specific materials that are not required in the next thirty days but may be needed or expected to be used in the near future are moved to the appropriate place so demarcated for, such as warehouses.

15.7.2 Seiton (Straighten or Configure)

Seiton or straighten means configuring the items marked as “useful” and to arrange them so as to minimize the time and effort for search. The necessary items can be of no use if they are stored too far from the workstation or in a place where they cannot be found.

Procedural steps of SEITON

1. Each item must have a designated address, name, and volume.
2. Floor space for bins containing Work In Process (WIP) or supplies must be marked by painting.
3. Maximum allowable number is indicated clearly.
4. In a nutshell, each item should have its own address and conversely each space should have its designated wall address.
5. Each wall can be numbered.
6. The gangways should be marked clearly.

15.7.3 Seiso (Scrub or Clean and Check)

Seiso is cleaning and also checking. Clean the premises of work environment, including machines and tools, floors, walls, and other areas of the shop floor, because if the equipment is covered with oil, soot, and dirt, it is not easy to identify any problem that may be developing underneath. Most of the machines would be subjected to breakdown due to vibration or wear debris or introduction of foreign particles or due to inadequate lubrication.

Seiso would be a great learning experience for the operators of the machine, since they can make many useful innovations regarding the cleaning of the machines. Of course, naked electrical wires may be covered safely while cleaning the machines.

15.7.4 Seiketsu (Systematize or Conform and Continue)

Seiketsu is operated in two ways.

First one is to keep each individual safe, clean, neat, and tidy, wear proper and safe working dresses, use safety glasses, gloves, and maintain a clean and healthy working environment.

The second is to adhere to work on seiri, seiton, and seiso continually and every day, i.e., systematically observe the seiri, seiton, and seiso as the part and parcel of the job in the system.

15.7.5 Shitsuke (Standardize or Custom and Practice)

Plant managers must determine who should be involved and the frequency, i.e., how often the 5S team should visit the entire factory. This is so designed that the 5S program should not disturb the regular work and should not cost in terms of money and time. Thus, a standard procedure, duration, frequency, responsible and authorized persons, etc. for this job are to be determined. These people have to be trained properly about the 5S system and understand the significance of housekeeping, cleanliness, orderliness, and traceability of the items.

15.8 EXPECTED CONTRIBUTIONS OF 5S KAIZEN

Following are some ways 5S kaizen can help organizations:

Reducing work-in-process inventory:

- Optimal stock of material for the process can be identified.
- The lot size can be reduced to small.
- Reconsideration of decisions regarding the volume of the finished product is possible.
- Material handling can be reduced and hence rejections or reworking can be reduced.
- Small and frequent transport runs can be avoided. Quality can be enhanced:
- A system can be built up that makes it easy to understand the causes.
- Measures can be taken to stop the process immediately whenever defects occur. Enhancing production capacity:
- Providing simple and in-house developed machine to minimize manual work.
- Finding out bottlenecks in process or machine.

Advantages due to re-layout:

- No delays in the flow of material.
- Possibility of better working space and condition.
- Possibility of standardizing operations.
- Quality built into the process.
- Consideration on proper space for the movement of trolleys, forklifts, etc.
- Ability to realize flexible manpower line.
- Attentive maintenance.
- Safety and hygiene.

Installation visual control on line:

1. Display of standard worksheet at the stations.
2. Pre-warning to the operators on approach.
3. Provides rhythm on the line.
4. Makes line supervisor alert regarding delays in operation.

5. Production control board – To display actual production figures on an hourly basis and the reason for shortfall in the planned schedule along with the counter measure taken.

Optimizing Manpower

- Systematizing can identify the the excess manpower employed can be identified
- Standardizing can optimize the manpower through proper load balance.

SAQ –15.4

1. Write a detailed note on the 5S concept.
2. Write short notes on
 - i. Seiri
 - ii. Seiton
 - iii. Seiso
 - iv. Shiketsu
 - v. Shitsuke.
3. Describe how to do (perform) each of the 5S briefly.
4. What are the expected contributions of the application of the 5S concept?
5. List out the Japanese terms of 5S and explain them. What are their equivalent S's and C's?
6. How do 5S help in improving the work environment? Discuss.

ACTIVITY 15.4

Visit an organization of your choice and observe whether 5S kaizen is being applied. If yes, Analyze and evaluate the situation. If not, how 5S kaizen is implemented. Summarize the information in the below given paragraph.

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15.9 SUMMARY

Kaizen, the Japanese word for "improvement". There are two kaizen approaches in practice Kaizen Blitz or Point Kaizen approach, Kaizen Burst or System Kaizen approach. The system kaizen can be approached in the following three ways Line Kaizen, Plane Kaizen and Cube Kaizen. Integrated Kaizen include Taaichi Ohno's TPS, Lean Manufacturing, Kanban, JIT, MUDA, MURA, MURI, Lean inventory, Root cause Analysis, Kaoru Ishikawa's Fishbone diagrams, Shigeo Shingo's Single Minute Exchange of Die (SMED), POKAYOKE, Andrew Shewart's P-D-S-A, Edward Deming's P-D-C-A quality cycle and so forth. A kaizen hierarchy is a set of rules and policies that determine how a firm delegates tasks and controls responsibilities, how decisions are passed and adopted throughout the firm and how information flows within a firm is the name of a workstation organization

technique that uses a list of 5 Japanese words (seiri, seiton, seiso, seiketsu, and shitsuke).

15.10 KEYWORDS

Kaizen: it is a Japanese word refers to "improvement".

System kaizen: It is accomplished in an organized manner and is devised to address system level problems in an organization.

Line Kaizen: This is the upper level of point kaizen, in that several points are connected together. It can be visualized as changes or improvements made to one line or process being implemented.

Plane Kaizen: This can be described as a value stream, where instead of traditional departments, the organization is structured into product lines or families and value streams.

Cube Kaizen: Cube kaizen describes the situation where all the points of the different planes are connected to one another and no point is disjointed from any other.

Kaizen Alignment: After understanding the approaches of the kaizen, it is important to align these depending on the activities and systems of the organization.

Integrated Kaizen: It includes Taaichi Ohno's TPS, Lean Manufacturing, Kanban, JIT, MUDA, MURA, MURI, Lean inventory, Root cause Analysis, Kaoru Ishikawa's Fishbone diagrams, Shigeo Shingo's Single Minute Exchange of Die (SMED), POKAYOKE, Andrew Shewart's P-D-S-A, Edward Deming's P-D-C-A quality cycle and so forth.

Total Employee Involvement (TEI) in Kaizen

"The idea is to nurture the company's people as much as it is to appraise and encourage participation in kaizen activities."

Deming's P-D-C-A: "Plan → Do → Check → Act"

Kaizen P-D-C-A: "Problem finding → Display → Clear → Acknowledgement"

Overall Equipment Effectiveness (OEE): A lean tool used to measure production performance.

Single-Minute Exchange of Die (SMED): A lean production method of reducing waste devised by Shigeo Shingo.

Gemba: Real place such as the production floor.

KSC: Kaizen Steering Committee

KEC: Kaizen External Consultants

Seiri: Sort or Clear Out

Seiton: Straighten or Configure

Seiso: Scrub or Clean and Check

Seiketsu: Systematize or Conform and Continue

Visual management: This is a lean management technique designed to help employees to easily understand a work processes.

Just in Time Inventory Management (JIT): A lean inventory management strategy that organizations use to boost efficiency of inventory management and to eradicate waste from the production process – thus minimizing the inventory costs.

5S framework: This is the name of a workstation organization technique that uses a list of 5 Japanese words (seiri, selton, seiso, seiketsu, and shitsuke).

15.11 FURTHER READINGS

- [1] N.V.S.Raju. (2018), *Operations Research, Theory and Practice*, BS Publications, Hyderabad, India, and CRC Publication (A unit of Taylor& Francis) ISBN: 978-93-5230-190-4
- [2] N.V.S.Raju. (2013), *Industrial Engineering and Management*, Cengage Learning India Pt. Ltd, New Delhi, ISBN-13: 978-81-315-1948-6
- [3] N.V.S.Raju. (2013), *Plant Maintenance and Reliability Engineering*, Cengage Learning India Pt. Ltd, New Delhi



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