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A Review: Literature Survey for the Implementation of Kaizen

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Abstract— Producing high quality of products and services is one of the key concerns in order to keep up with the competition in the global markets. The main objective of manufacturing industries today is to increase productivity through system simplification and incremental improvements by using modern available techniques .One of the most recognized technique is Kaizen. By using technique of kaizen such as Poka-Yoke, 5 'S' Concept , 7 Kind of Productive Loss etc. we can increase the productivity of the process in the form of continuous improvement. The effective implementation of kaizen methodology will lead to the success of the organization. This paper discusses different literatures that have been published in this field and presents a review of literature which will be helpful to new research in this field. Besides this while going through the literature it is observed that there is no standard sheet for poka-yoke. In view of this we specially designed a template sheet for poka-yoke users and research.

***Keyword*- Continuous Improvement, Implementation, Kaizen concept, Kiazen Techniques.**

I. INTRODUCTION

Kaizen is a Japanese word which is become common in many western companies. The word indicates a process of continuous improvement of the standard way of work (Chen, 2000). It is a compound word involving two concepts: Kai (change) and Zen (for the better) (Palmer, 2001). The term comes from *Gemba. The* Kaizen means 'Continuous Improvement' (CI). Continuous Improvement is one of the core strategies for excellence in production, and is considered vital in today's competitive environment (Dean and Robinson, 1991). [1, 2, 3] Kaizen originated in Japan in 1950 when the management and government acknowledge that there was a problem in the current confrontational management system and a pending labor shortage. Japan sought to resolve this problem in cooperation with the workforce. The groundwork had been laid in the labor contracts championed by the government and was taken up by most major companies, which introduced lifetime employment and guidelines for distribution of benefits for the development of the company. This contract remains the background for all Kaizen activities providing the necessary security to ensure confidence in the workforce (Brunet, 2000). [4] First, it was introduced and applied by Imai in 1986 to improve efficiency, productivity and competitiveness in Toyota, a Japanese carmaker company in the wake of increasing competition and the pressure of globalization. Since then, Kaizen has become a part of the Japanese Manufacturing system and has contributed enormously to the manufacturing success (Ashmore, 2001). [5] Kaizen forms an umbrella that covers many techniques including *Kanban*, total productive maintenance, six sigma, automation, just-in-time, suggestion system and productivity improvement, etc. (Imai, 1986) as shown in Figure 1. [6]

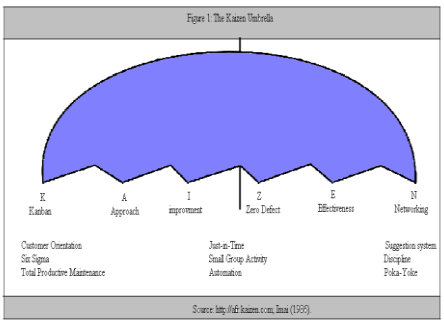

FIG 1: REVIEW OF LITERATURE RELATED TO KAIZEN CONCEPT

According to Imai (1986), Kaizen is a continuous improvement process involving everyone, managers and workers alike. Broadly defined, Kaizen is a strategy to include concepts, systems and tools within the bigger picture of leadership involving and people culture, all driven by the customer.[6] Watson (1986) said that the origin of Plan-Do-Check-Act (PDCA) cycle or Deming cycle can be traced back to the eminent statistics expert Shewhart in the 1920s. Shewhart introduced the concept of PDCA. The Total Quality Management (TQM) guru Deming modified the Shewhart cycle as: Plan, Do, Study and Act. The Deming cycle is a continuous quality improvement model consisting of a logical sequence of these four repetitive steps for Continuous Improvement (CI) and learning. The PDCA cycle is also known as Deming Cycle, the Deming wheel of CI spiral. In 'Plan phase', the objective is to plan for change predicts the results. In 'do phase', the plan is executed by taking small steps in controlled circumstances. In 'study/check phase' the results are studied. Finally in 'act phase', the organization takes action to improve the process. [7] Wickens (1990) describes the contribution of teamwork to make the concept of Kaizen. The key role and authority of each supervisor as a leader of his team has been described by taking an example of Nissan Motor Plant in the UK. Emphasis is placed on teamwork, flexibility and quality. Teamwork and commitment do not come from involving the representatives of employees, but from direct contact and

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communication between the individual and his boss. [8] Teian (1992) describes that Kaizen is more than just a means of improvement because it represent the daily struggles occurring in the workplace and the manner in which these struggles are overcome. Kaizen can be applied to any area in need of improvement. [9] Hammer et al. (1993) explain that Kaizen generates process-oriented thinking since processes must be improved before better results are obtained. Improvement can be divided into CI (continuous Improvement) and innovation. Kaizen signifies small improvements that have been made in the status quo as a result of ongoing efforts. On the other hand innovation involves a step—improvements in the status quo as a result of large investments in new technology and equipments or a radical change in process design using Business Process Re-engineering (BPR) concept.[10] Bassant and Caffyn (1994) define the CI (continuous Improvement) concept as 'an organization-wide process of focused and sustained incremental innovation'. Many tools and techniques are developed to support these processes of incremental innovation. The difficulty is the consistent application of CI (continuous Improvement) philosophy and CI tools and techniques. As an organization wide process, CI (continuous Improvement) requires the efforts of all employees at every level. [11] Deming (1995) highlights that organizations are evolved at a greater rate than at any time in recorded history. Since organizations are dynamic entities and since they reside in an ever-changing environment, most of them are in a constant state of flux. This highly competitive and constantly changing environment offers significant managerial opportunities as well as challenges. To effectively address this situation, many managers have embraced the management philosophy of Kaizen. [12] Yeo (1995) describe the viewpoints of various traditional quality management gurus on the concept of 'zero defects' and 'do it better each time' that these strategies are the important ways to improve quality continuously. 'Zero defects' represents CI (continuous Improvement) over quality by detection of defects. A phrase 'do it better each time' (DIBET) strategy is associated with constant, conscious and committed efforts to reduce process variation. They conclude that CI is the most important way to manage business through these strategies. [13] Newitt (1996) has given a new insight into the old thinking. The author has suggested the key factors to determine the business process management requirements. The author also has stated that Kaizen philosophy in the business process management will liberate the thinking of both management and employees at all levels and will provide the climate in which creativity and value addition can flourish. [14] Imai (1997) describes that the improvement can be divided into Kaizen and innovation. Kaizen signifies small improvements as a result of ongoing efforts. Innovation involves a drastic improvement as a result of large investment of resources in new technology or equipment. The author also explains that in the context of Kaizen, management has two major functions: maintenance and improvement. Maintenance refers to activities directed towards maintaining current technologies, managerial and operating standards, and upholding such standards through training and discipline. Under its maintenance function, management performs its assigned tasks so that everybody can follow standard operating procedure. Improvement, meanwhile, refers to activities directed towards elevating current standards (Figure 2). [15]

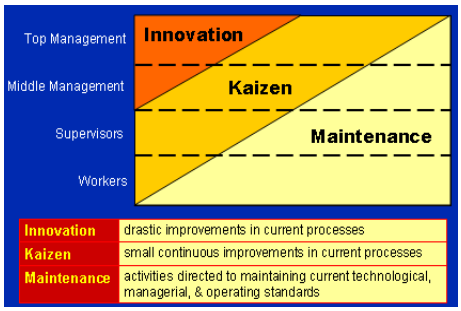

Fig.2 Source: Imai (1997) [15]

Williams (2001) highlighted that CI (continuous Improvement) techniques are the recognized way of making significant reduction to production costs. Quality Function Deployment (QFD) is a well-known technique for translating customer requirements for a product into functional specification. Data suggests that the best opportunity for significant reduction in the overall cost of manufacturing a product is at the design stage of the new product development program. [16] Doolen et al. (2003) describe the variables that are used to measure the impact of Kaizen activities on human resource. These variables include attitude toward Kaizen events, skills gained from event participation, understanding the need for Kaizen, impact of these events on employee, impact of these events on the work area, and the overall impression of the relative successfulness of these events. [17] Hyland et al. (2004) highlight the major potential benefits of CI (continuous Improvement). These benefits are: increased business performance (in terms of reduced waste, setup time, breakdowns, and lead time) and increased 'people performance' in the form of improved development, empowerment, participation, and quality of work life of employees; all of which address contemporary societal needs. [18] Abdolshah and Jahan (2006) describe how to use CI (continuous Improvement) tools in different life periods of the organization. Organizations are facing the problem of which CI (continuous Improvement) tool should be used during different stages and life periods of organization. Methodologies of applying both quantitative and qualitative tools in different life periods of an organization have been discussed. [19]

III. SOME TECHNIQUE RELATED WITH THE KAIZEN

Kaizen is the Japanese word. The meaning of this word is continuous improvement.

- KAIZEN = CONTINUOUS IMPROVEMENT

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- KAI = CHANGE
- ZEN = GOOD (to better)

There are some techniques of kaizen that have been widely used in the industry.
These are

➢ **Poka-Yoke (error proof)** – system of means eliminating defects being the results of inaccuracy; poka-yoke solutions find application in stable processes and enable to drop of frequency of defects for six sigma level.

Mistake-proofing systems¬ It is a tool that is ′prevention of quality problems Inexpensive 'Point of Origin¬ Does not rely on operators catching mistakes ¬ This tool can be applied to any′ Quick feedback 100% of the time¬inspection' process, be it in manufacturing or the service industry [20]

5 'S' concept

- **seiri-(selection):** proper (suitable) preparation of a workplace, manner and instrument of work; with the elimination of everything useless,
- **seito-order (systemic):** tidiness in a workplace and preparation of every required tools in the manner enabling simple and quickly utilization,
- **seiso-clearness (cleaning):** order in a workplace allowing on increase of safety of workplace, control of equipment and responsibility for the means of production
- **seiketsu-consolidation (standardisation):** reminding employees about their duties in the aspect of care of used tools and equipment and about keeping the workplace order,
- **shitsuke- discipline (self-discipline):** adaptation of employees to the principles accepted by the organization, independent elimination of bad custom, training. [21]

➢ **7 kind of productive loss (Muda) –** everything, which does not bring value added; according to the basic classification of the productive loss one can differentiate losses resulting from: excessive inventories, over-production, waiting for next operation (raw materials, employee), transport, inappropriate way of processing, unnecessary un ergonomic motion, internal and external incompatibilities. [22]

➢ **7 instruments of the quality control –** practical methods of registration and analyses of data; the most popular are: check list, Pareto diagram, reasons and results diagram (so called Ishikawa diagram), histogram, scheme, punctual diagram, check card most often with X-R diagram. [23]

➢ **Andon** – signal used to show the place in the process requiring additional attention; signal is given by the employee the defect has been noticed.

➢ **PDCA cycle** – cycle of continuous improvement; plan - do - check – act.[24]

IV. IMPLEMENTATION OF KAIZEN

In order to implement the kaizen we should follow the standard methodology of kaizen. This standard methodology of kaizen can be implemented in various fields. Today, it is used to improve various kinds of processes that are involved in engineering, manufacturing, management and other supporting processes in the business. This is also known as Deming's cycle, shewhart cycle or PDCA cycle. [25]

Fig.3 Kaizen Methodology [25]

Before implementation of the kaizen methodology, we should take care of process where it is going to be implemented so following points are to be take care:

- Select a business process area in which Kaizen will be implemented.
- Create appropriate goals for the team.
- Ensure that relevant area personnel are informed of the Kaizen plans.
- Ensure availability of relevant area personnel for participation on the Kaizen team.
- Provide a suitable working area.
- Ensure timely review and approval of the Kaizen team's recommendations.
- Ensure timely implementation of approved recommendations

To implement the kaizen approach, what we need is a rapid team that has been consistent with the use of the lean systems. Typically, the people in this group will have to undergo some training so that we can start facilitating the kaizen methodology into our organization. Kaizen is actually an activity that we have to perform daily and what we should do here is to provide a purpose which should go beyond improvement. When implemented correctly, Kaizen will enable us to humanize the workplace as well as eliminate all the processes that need a lot of work from our employees which can be about mental and physical activities. Kaizen will also teach people how they can perform tasks in a rapid way through experiments and they need to apply here is a scientific method that will help them learn to eliminate waste in the process and process can be improved.[25]

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POKA YOKA SHEET

Literature survey shows that there is lack of easy poka -yoka sheet to be use during poka- yoke project. So a standard sheet which can be use as template for poka- yoka users as in below fig 4.

POKA YOKA SHEET	
PROBLEM	**POKA YOKA NO:**
	DATE :
	DD:MM:YY
	Revision No
KEY IMPROVEMENT	
SOLUTION	
PHOTOS BEFORE- AFTER 	

Fig.4 Standard developed POKA YOKA Template

VI. CONCLUSION

From the literature, it can be concluded that there is a reasonably vast literature available on Kaizen philosophy, which gives a broad view of past practices and researches carried across the globe. But as Kaizen is a widely accepted philosophy in manufacturing industries, more research work is required in this field. The authors also feel that from the different technique Kaizen, more thrust can be given on poka-yoke which will help in full proofing any deviation in system So a great scope of research is available for new researchers in this field. Success stories reveal that it requires team efforts involving every employee in the organization to fully implement the system of kaizen. . The specially design sheet by authors for poka-yoke cab be used as a standard template for poka-yoka users. As there is no standard sheet is available for the poka-yoke technique.

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