IMPORTANCE of KAIZEN CONCEPT IN MEDIUM MANUFACTURING ENTERPRISES

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ABSTRACT

Kaizen means a constant effort not only to maintain but also to upgrade standards. KAIZEN pronounces perpetual development in all walks of our life. This is an inborn instinct present in every human being. Japanese are very diligent by nature though they sometimes are not even cognizant of kaizen concept. The rate of kaizen development is very slow but it gradually brings about a great development during the course of time, which is very much helpful for the companies to sustain.

KEYWORDS: *Change, Customer, Improvement, Kaizen, Teamwork*

1. INTRODUCTION

Increased international competition has forced the multinational companies to seek new ways to develop a competitive edge. In many developing countries (like INDIA, KOREA, JAPAN etc), they have a large part of national income from medium enterprises exports and thus providing employment to many people. Therefore, governments have used various strategies and policy instruments to develop the human resources of medium enterprises and improve their productivity and national welfare.

Kaizen is a Japanese term which means a change of wisdom for continuous betterment. This reformation cannot happen abruptly. Only daily incremental modification based on scientific method can bring about a great success in every sphere of workplace.

KAIZEN Fundamentals:

- Employee empowerment
- Self discipline
- Recognition

An organization should participate in kaizen practice from its managerial level to the working level. In addition, the external stakeholders may take part when applicable. As related to the work-place, kaizen means continuous improvement involving managers and workers, customers and suppliers alike. All these terms i.e, productivity improvement, TQC activities, QC(quality control) circles, ZD(zero defects), kanban and suggestion system etc. can be reduced to one word: KAIZEN, Many companies have realized their validity after applying kaizen process. Illustratively TOYOTA Company can be mentioned. This company has reached its zenith of success on applying kaizen process and now enjoying the harvest.

2. LITERATURE REVIEW

The philosophy of Kaizen has kindled considerable interest among researchers because it increases productivity of the company and helps to produce high-quality products with minimum efforts. Several authors have discussed the concept of Kaizen including Deniels(1996).

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 people and their culture, all driven by the customer.

Watson(1986) says that the origin of Plan-Do-Check-Act (PDCA) cycle or Deming cycle can be traced back to the eminent statistics expert Shewart in the 1920s. Shewart introduced the concept of PDCA. The Total Quality Management (TQM) guru Deming modified the Shewart 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 changes and predict 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.

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 by involving the representatives of employees, but from direct contact and communication between the individual and his boss.

Teian(1992) describes that Kaizen is more than just a means of improvement because it represents 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.

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 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.

Bassant and Caffyn(1994) define the CI 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 philosophy and CI tools and techniques. As an organization wide process, CI requires the efforts of all employees at every level.

Williams(2001) highlights that CI techniques are the recognized way of making significant reduction to production costs. Quality Function Deployment (QFD) is a well-known technique of translating customer requirements for a product into functional specification. Data suggest 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.

Chen and Wu (2004) explain that CI can be generated and sustained through the promotion of good improvement model and management support. In fact, it is not easy in reality. The improvement case may fail without carefully examining the problem in the activity.

Abdolshah and Jahan (2006) describe how to use CI tools in different life periods of the organization. Organizations are facing the problem of which CI 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.

3. METHODOLOGY

The KAIZEN methodology has been used extensively for improving the organizational work in factories and actual methods used to manufacture products. The results obtained are real-time with implementation occurring within one week. Not only immediate improvements are seen in the process but it will also develop a list of the improvement opportunities that the staff can investigate and implement after the Kaizen. Kaizen will provide the company with immediate tangible results, motivation and ongoing continuous improvement within the company.

The data have been collected by interviews, study of the previous records and observations. Those relevant information have been taken into account and analysed by inspecting the pitfalls of the existing system of the concerned SME. In addition to that, special focus has been made over the inventory that is the area of our concern.

4. CASE STUDY

The XYZ Company (for some obvious reason) has been selected for case study, located in Jamshedpur, Bihar in India. This company came into existence in March 2007. The major product of the company is Front Axle and Rear Axle. This company is mainly focused on manufacturing as per customer's design. The company currently has a capacity of about 3, 24,000 axles per annum (inclusive of all varieties), total annual sales volume is 5crores-10crores(in Indian rupees) and total employees are 1154, out of which 846 persons work in Axle division where the case study was taken up. In this division 510 employees are permanent as operator and 336 as supervisors. In Rear Axle (Assembly Line 1) of XYZ company, the current production is 210 Axles per shift (8 Hours) against the target of 300 Axles per 8 hrs shift. This is due to lack of multi skilled development, lack of training to operators, no proper utilization of resources, and Non involvement of staff in Kaizen Program etc. Our main motto was to achieve the target production and find the factors which are responsible for lack of the production in the company. For completing a Rear Axle assemblies there are 35 work-stations corresponding to 56 operators.'

PROBLEMS FACED IN COMPANY:

- Number of operators likely to be superfluous in assembly line.
- Production efficiency
- Product cost
- Turnover of company
- Quality maintaining problem
- System for simplification

IMPLEMENTATION PROCESS:

Problems regarding different factors were discussed with the managerial personnel, engineers and operators levels and the same was found to be improved by using Kaizen. One of the major objectives in implementing Kaizen System is to achieve a common goal of the whole company. The main thing to implement kaizen is to improve the level of training, continuous improvement programs and to provide them incentive schemes (that is additional value by giving canteen coupons, Dairy, pens or cash according to savings in product manufacturing)

for encouraging the employees. Thus planned programs were run by the Human Resource department to improve skill of the employees. Also training by Internal/external faculties was carried out to create awareness and to improve communication plus operating skills of the employees. There was involvement of employees through group activities like Quality circles, suggestion Schemes and Kaizen.

JIT was already successfully implemented in that existing company. Electronic Data Interchange Technique was used to Link between Company and its suppliers through monitoring system. This system had achieved quick response in production line and close relationship between company and its supplier. The Production planning and material preparation were stable with respect to end consumption. This leads to maintain inventory at a reasonably low cost. For quality, quality indicators had been employed to examine the achievement of suppliers in quality, on time delivery etc. For encouraging the suppliers, JIT programs were organized and suppliers were invited for participation in JIT program. Mostly supplier companies are in vicinity near to the concerned company. Thus supplier can reduce the time spent in distribution and coordinate suitably with the company.

Kanban was used for transforming the information throughout the production process hence more visibility is seen in production process. By using Kanban, waste during Production process can be eliminated which would result in achievement of balanced production.

Kaizen shows a lead role for improving the productivity and quality of the products. To meet the target/Productivity from 200 axles per shift (8 hours) to 210 axles per shift, the cycle time should be equal to the Takt Time and hence meeting customer requirement. The company receives the raw material in the form of cast iron beam, then various operations are carried out on this beam like clamping, putting dowel pins, shellac and gasket, fixing and tightening of stud, picking and tightening of anchor plate, placing Z bracket, putting bush and grease filling, placing oil seal, placing hub and brake drum etc to obtain the final product. Table 1 shows detail of station wise operator's function and time taken for completion of job at their station. Let T1 and T2 are time taken by the operator in completion of job in two iterations. Mean time is calculated for getting the average time for completing a job at different work stations.

TAKT TIME CALCULATION BEFORE KAIZEN:

Requirement: 200 axles per shift (8 hours)
Available time: 480 minutes (8 hours)
Lunch break: 40 minutes
Tea break: 15 minutes
Net available time: (480-40-15) =425 minutes/shift
Takt Time= Net available time/customer requirement = (425/200)
= 2.12 minutes=127.5 seconds
Thus Takt Time for each operator is 127.5 seconds at every station

TABLE 1: STATION WISE DETAILS AND TIME TAKEN TO COMPLETE THE JOB BEFORE KAIZEN

Operator number	**Component task**	**Time (in sec.)**		**Mean time**
		T_1	**T_2**	
1,2,3	Loading beam, clamping. fixing etc.	**120**	**130**	**125**
4,5,6	Picking and placing of shafts, shaft cover, bolts and tightening	**135**	**138**	**137**
7,8,9	Set anchor plate and tightened/placing of hub	**130**	**134**	**132**
10,11,12	Hammering, placing oil seals	**150**	**155**	**153**
13,14,15	Placing brake drum, shaft cover	**100**	**103**	**102**
16,17,18	Applying shampoo, fitting of oil spanner, flushing m/c, labeling	**170**	**175**	**173**
19,20	Removing clamp, lifting axle, attaching hooks	**125**	**130**	**127**
Total **949**		**mean**		**time**

THEORETICAL CALCULATION OF NUMBER OF OPERATORS:

Sum of mean time =949 seconds
Takt Time = 127.5 seconds
Number of operators required
= (Cycle Time) / Takt Time = 949/127.5
= 7.5
Hence 8 operators are required to meet the current customer demand.

Thus from this total number of operators required for that assembly line is 8 but actual number of done theoretically by taking all parameters as standardized. i.e. workers are not able to move from their workstation in any difficulty and they have to stay on their line in any condition (to satisfy their personal needs). Here machine

fault time, material delay due to any difficulty etc are not considered. operators working are 20. Hence 12 operators are in excess as per calculation.

5. DISCUSSION ON RESULTS OF THE IMPLEMENTATION

Now after applying KAIZEN concept we found 15 operators instead of 20 operators can assemble the same number of axles. From the calculation, it is clear that using kaizen techniques number of operators remain 15. i.e. 15 numbers of operators are required for performing the same operation, meeting the customer demand. This was only possible by multi-skilled and well trained operators for performing the different task at different work stations and major success was reduced Work In Progress (WIP) at the work stations. In this study operator number 5 was assigned some relevant task along with his work as the mean time for performing his job was very less. Thus at the same time he would perform these task on the same station. Similarly operator number 7, 9, 11 had to be assigned some relevant task at their stations in order to meet Takt time. Thus after kaizen they would meet the required production and target with the adequate quality. Hence, the production was improved from 200 Axle per shift to 210 Axle per shift by less number (15) of operators. One more interested thing was observed from the study that not a single operator after Kaizen reaches to 90% of the Takt time. These would result in minimum cost and increase in productivity. This kind of cooperation would strengthen the organization and spirit of the XY Axle Ltd so that it can be more competitive in the long run.

6. FINDINGS AND ANALYSIS

An overall view of the kaizen concept implementation issues and future research directions concerning medium manufacturing enterprises is presented below-

- Continuous improvement is a key goal of a company.
- The implementation of kaizen concept in manufacturing enterprise should start with schedule stability and the development of long-term supplier customer relationships.

- A new purchasing philosophy supporting frequently of small lot sizes may help manufacturing enterprise in implementing a kaizen concept system.
- In order to implement kaizen concept in manufacturing enterprise workers must be cross-trained, highly skilled and much disciplined.
- Identifying the value-added and non value-added items in shop floor activities.
- Top management commitment is necessary to ensure the effectiveness and success of implementing kaizen concept in medium manufacturing enterprises.

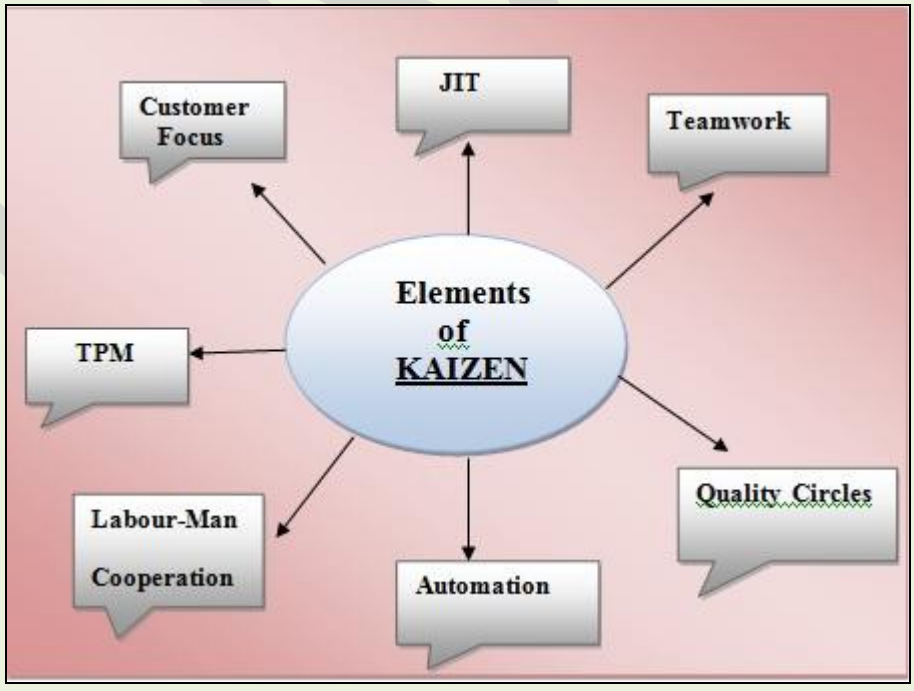

Fig.1 Elements of Kaizen

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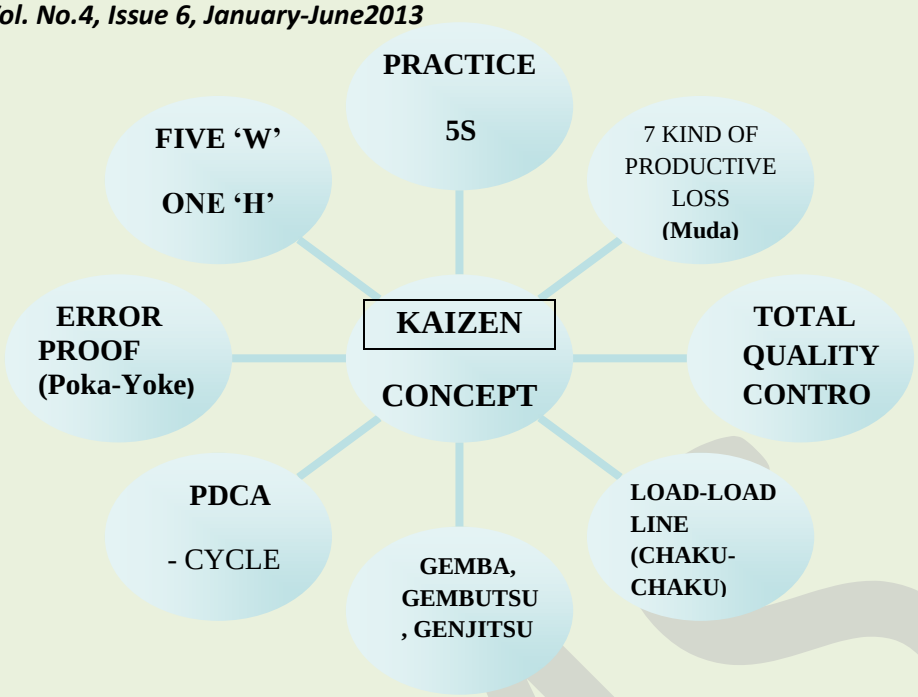

Fig 2. Main Techniques Connected with KAIZEN

7. PROPOSED MODEL

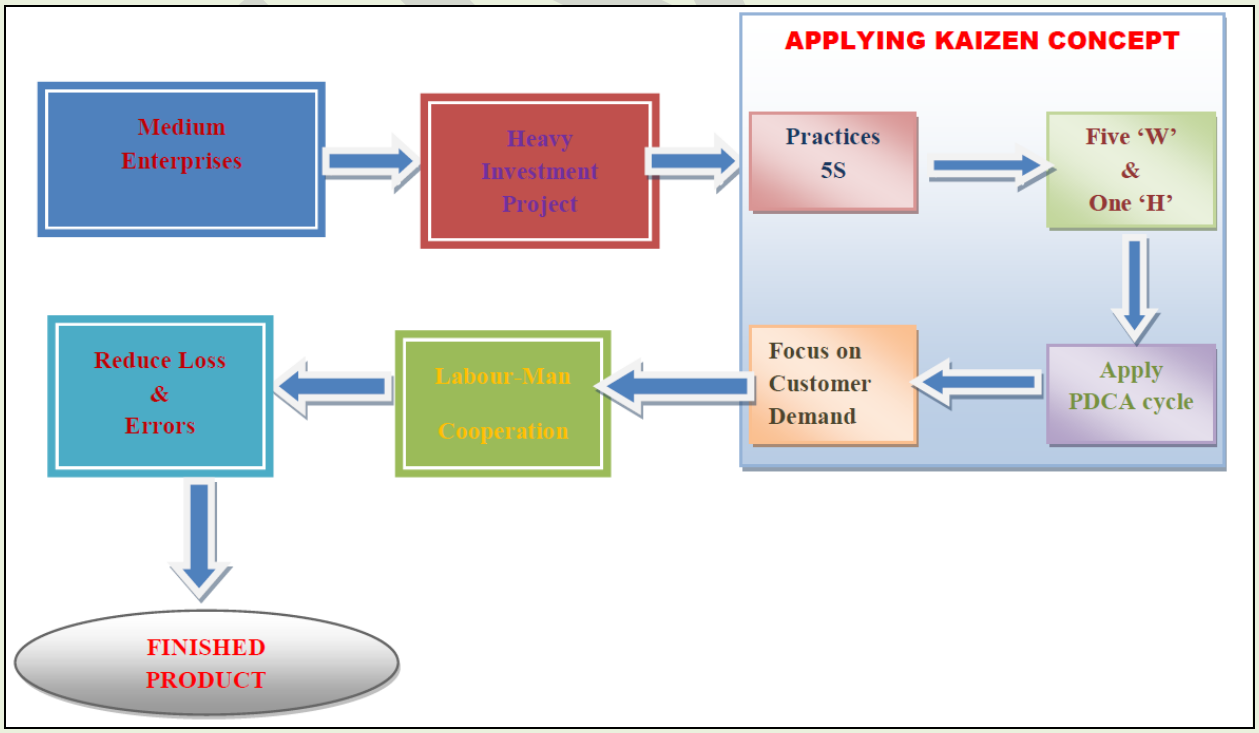

Fig. 3: Proposed Model of Kaizen for Medium Enterprises

8. CONCLUSION

Kaizen – continuous improvement by small steps – should be realised due to each employee's involvement. Kaizen improvements should proceed without any additional investment or through small investments. Kaizen has been a major factor in the TQM (Quality Management movement). Kaizen has changed the mindset of the work force. Kaizen says that quality is a system or means to economically produce goods for services, which satisfy customer requirements. The quality route is the surest way to achieve higher profits and Kaizen has helped in achieving the same. It is found from the empirical studies that customer's encouragement and support play vital role for initiating this kaizen concept in medium enterprises. Predominantly, Indian manufacturing enterprises are to implementing kaizen practices in large proportions as compared to service sector. Financial and human resources are the two major constraints in kaizen implementation in small and medium scale enterprises. The top management commitment is the most critical success factor in kaizen methodology implementation. The implementation of kaizen is going to give huge benefit to the medium enterprises by reducing the different losses, the production cycle time and less time spent on disputes. All these are going to give positive advantage to the medium enterprises by increasing the level of customer satisfaction and more benefits at various dimensions to those who are involved with the concerned enterprise.

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