JOB SATISFACTION AND 5´S KAIZEN – A GOOD WAY TO GET BETTER PRODUCTIVITY, EFFICIENCY AND UNIFORMITY IN MANUFACTURING AND INDUSTRIAL SECTORS

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ABSTRACT

5´s Kaizen is a tool oriented to total quality. Its forerunner was introduced in Japan by Deming about 60 years ago. Nowadays its practice is very useful to a business' successful implementation of any other operations improvement methodology. The 5´s Kaizen methodology leads to the creation and maintenance of cleaner, better organized, standardized and safer working areas, trying to highlight a "better quality of life" in every operation. 5S Kaizen is a very useful concept in both manufacturing and service industries. This concept has been applied in various ways and has proven its worth in making businesses more productive and efficient over time. This paper presents the implementation of 5´s in Fender Corporation, Mexico, a manufacturer of musical instruments in Ensenada, Baja California. The implementation was done in the guitar string manufacturing department. To the department, this was a challenge for leaner thinking; thus, the main objective was to achieve a change of culture in this department. A likert scale questionnaire was applied to measure the perceptions of the employees about job satisfaction after the 5S implementation.

KEY WORDS: 5'S, Quality Management, Lean Manufacturing, , Job satisfaction, Productivity, Efficiency

RESUMEN

5´s Kaizen es una herramienta orientada a la calidad total. Su precursor fue presentado en Japón por Deming hace aproximadamente 60 años atrás. Hoy en día, su práctica es muy usual como "un negocio exitoso" que cualquier otra operación de mejora metodológica. La metodología de las 5´s Kaizen contribuye a la creación y mantenimiento de limpieza, mejor organizada, estandarizada y de seguridad en las áreas de trabajo, tratando de obtener "una mejor calidad de vida" en cada operación. Las 5´s Kaizen es un concepto muy útil aplicado a la manufactura y a los servicios industriales. Este concepto ha sido aplicado de muchas maneras y ha provisto su valor en hacer negocios mas productivos y eficientes. Este artículo presenta la implementación de las 5´s Kaizen en la empresa Fender, México, una corporación manufacturera de instrumentos musicales en Ensenada, Baja California. La implementación fue elaborada en el departamento de manufactura de las cuerdas para guitarra. Para el departamento, el desafío fue aprender a usar el sistema; sin embargo, el mayor objetivo fue lograr un cambio en la cultura de este departamento. Un cuestionario en la escala de Likert fue aplicado para medir las percepciones de los empleados acerca de la satisfacción laboral después de la implementación de las 5´s.

PALABRAS CLAVE: 5´s, Administración de calidad, Manufactura de apoyo, Satisfacción laboral, Productividad, Eficiencia.

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INTRODUCTION

The notion of *kaizen*–improvement that is life-long and continuous–was introduced to American educators through the work of W. Edwards Deming (1986) and advocates of Total Quality Management (e.g., Bonstingl, 1993; Glasser, 1990; Schmoker & Wilson, 1993). Over the past quarter century, due to increasing global competition, firms have radically changed their manufacturing practices to improve their competitiveness through the use of a plethora of tools. (Babson, 1995; Berggren, 1992.)

The stuff of modern manufacturing: a lean manufacturing philosophy, the focused-factory concept, cellular manufacturing, JIT, kanban signals, kaizen events, value-stream mapping, 5S and Six Sigma" (McClenahen, 2006), as well as process improvement and design for manufacturability. The objectives of all these programs have been to reduce costs, improve quality, reduce cycle time, increase flexibility on the factory floor and reduce inventories and raw materials. "Kaizen, or continuous improvement, is the hallmark of the Toyota Production System. The primary objectives are to identify and eliminate "Muda," or waste in all areas, including the production process. "Kaizen" also strives to ensure quality and safety. Its key elements emphasize making a task simpler and easier to perform, re-engineering processes to accommodate the physical demands on team members, increasing the speed and efficiency of the work process, maintaining a safe work environment, and constantly improving the product quality." (Imai, 1989) Employees, however, whether due to inertia in the productive system, lack of appropriate training, or for other reasons, have generally not kept pace with the level and speed of corresponding operational changes being implemented. This paper presents a case study of Kaizen-5S implementation at Fender Corporation, Mexico, and is based on the information gathered from the Fender Corporation Mexico, Strings Division.

Studies on Lean Manufacturing in Mexico are scarce. Maquiladoras in the northern part of the border show the same concern about their production systems. In this paper, we intend to analyze the application of 5S linked to employee motivation and productivity increase in this plant. (Carrillo y Santibanez, 1993).

HISTORICAL UNDERPINNINGS

As the world has grown inexorably smaller in relative size, with distance becoming essentially transparent, the apparent workplace has become global. With older countries' productive areas increasingly seen as under attack, by workers and output from hungrier and less expensive geographical locations, the search for improvement tools has grown apace. More developed countries desperately try to preserve domestic jobs and trade balances, while lesser developed countries try to claw their way upward in the productive hierarchy to the good of their citizens. There has been a seeming ramping-up of effort over the last sixty or so years.

In the mid to late-1940s, a spate of quality-related publicity, tools, and techniques saw their emergence during and after the visits to Japan after the Second World War by Americans W. Edwards Deming, Peter Drucker, Walter Shewhart, Joseph Juran, and others. While all the aforementioned people were American, and their work was lauded in Japan (Deming most of all), it enjoyed little attention in their home country. Popularization of such tools in the U.S., in general, followed the showing of the white paper broadcast by NBC in 1980, "If Japan Can, Why Can't We?" As a result, in the1980s, Japanese management was seen almost as The Gospel, as pertains to quality and management. Japanese managers adopted and improved upon the tools and philosophy taught by Deming and others, and their successes provided the impetus for American managers to carry out additional development. While Japanese management, in general, no longer enjoys the be-all, end-all status it had through the 1980s, the fact remains it has fostered some excellent tools, techniques, and philosophies suitable for emulation globally.

The 5 S philosophy is usually considered to be part of overall Kaizen, which is a natural follow-on, and in some regards an integrator, of the work in Japan more than a half century ago. The maturation, popularity, and applicability of these tools are perhaps exemplified by the fact there have been developed a number of software packages dedicated specifically to the [primarily] Japanese tools and philosophy, as well as systems of signage and other markings complementary to 5 S, and training packages for 5 S. For example, for the signage, see Visual Workplace (www.visual-work-place.com).

For the training games, see (for example), leangames.co.uk. An example of supportive software may be found at systems2win.com. Again, in each case, these are examples. There are numerous companies offering like products.

The 5 S philosophy has many strengths, not the least of which is its broad applicability across industries, be they manufacturing or service. While 5 S and other quality/productivity tools are most often seen presented in a manufacturing area, they are all also useful in a service industry or environment. Inside an industry or company, 5 S sees strong application across application type; i.e., it is appropriate for use within a company for its service or staff component as well as its chip-making component.

According to **Flinchbaugh** (1998), very basically, the 5 S philosophy entails a structured, step-wise approach to cleaning up the clutter in the productive system. The guideposts are five Japanese words that begin with S. These are **Seiri**, **Seiton**, **Seiso**, **Seiketsu**, and **Shitsuke**. In the U.S., to perhaps make them more easily memorizable, these words have been adapted to the Americanized Five S of **Sort, Set in Order, Shine, Standardize,** and **Sustain**. While the verbatim descriptions, translated, may be slightly different between the two sets of Japanese and American Ss, workable versions of each of the five are as follows.

Sort – The items in the work area are sorted into those necessary and those unnecessary. Items deemed unnecessary are removed from view by moving them to a central storage location.

Set in Order – Those items deemed necessary to the job are then ordered/arranged so they are available as needed, without wasting time looking for/going for them so they can be used.

Shine – A shined shoe makes a good impression on the attitude of the wearer and of an observer. By contrast, a dented fender that is unfixed on a vehicle makes it seem not so bad if one puts in another dent.

The same is true of the workplace. Keeping the area clean and properly arranged not only lets observers know the worker takes pride in and owns the workplace, but also makes it easier to spot potential problems.

Standardize – Once the first three Ss have been accomplished, it is easier to home in on those workers who are using practices that need to be implemented across like workers, and on those workers who are in most need of training and assistance. And, since they "own" their work areas, it is the workers who should select, develop, and disseminate the best practices.

Sustain – Without continual focus, humans tend to regress, whether the example used concerns one's health/weight/exercise regimen, or 5 S improvements. The tendency will be to implement a 5 S philosophy, mentally make a tic mark that it has been done, then lose focus and gradually regress to the previous method of doing things. Thus, the "Sustain" S is likely to be the one that requires the most effort on the part of management and of the workers. **(1)**

METHODS:

The application of the 5 S philosophy chronicled in this paper involves its attempted implementation in the guitar string manufacturing department of the Fender Corporation plant located in Ensenada, Baja California. Since the use of the 5 S was new to the plant, it was decided to use one department as the guinea pig for the implementation, then let the (hoped for) good publicity on the positive outcomes be a marketing tool for 5 S implementation throughout the plant.

The method consisted of a comparison between the situation of the manufacturing floor before and after the implementation, using the indicators of productivity and efficiency. It quickly became obvious that the major problem of the area was the high proportion of rejected strings. During the month of August, 2007, when the 5 S study and implementation began, of some 1,000,000 strings manufactured, 6,316 string assemblies were rejected due to different faults.

We measured the actual situation using the variables of the 5 S: Sort, Set in order, Shine, Standardize and Sustain, accordingly to the following graphics:

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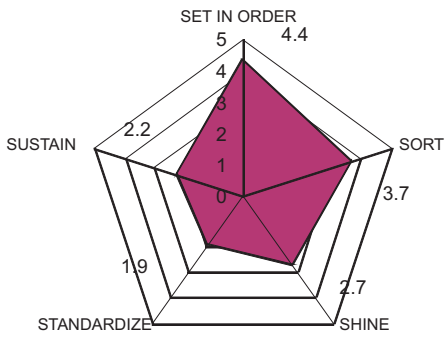
(1) See "Using Integrated Management Systems to Design a Lean Factory by Thomas H. Lee and David Walden, Journal of Center for Quality of Management, V1, 1996.

Figure 1



Source: (Fender Ingeniería, August 2006)

In general, the evaluation gave a result of 61%. Figure 2 shows a high level of set in order, although there is no standardization regarding procedures, clearing roles, labels, formats. Also, the activities haven't been monitored. Sometimes, improvement is done but there is no sustainability, and the result is a low level at the end.

The first step of the implementation was done thru a meeting with the team members, where there was exposed in a generic way the concepts, objectives, and benefits of this project. In this meeting also, some of them offered to be volunteers to support the implementation. These persons were called "Team 5S coordinators" .

The String Area was divided in 3 sections identified by colors: orange, blue and green. There were two coordinators by team, to help each other. This sections appeared in the map of the area distribution, in a way to limit the spaces that each team has.

The second step was a training session to have the team understand deeply what the benefits of 5S are as well as the implementation methodology and steps.

The third step was to set in order, using the red cards and answering the questions : is this part needed? If so, is it needed in this amount? If needed, should it be located here? By the end of the day, the red color was all over the area, several parts not needed were labeled by the team. Unuseful seats, inactive pedals, personal staff within the working station, security equipment, magazines, wire, messed drawers, etc. pictures were taken to document the process. By the following morning, a meeting was held by teams to know the proposals of each member about improving their working areas. Pictures of the red cards corresponding their areas taken the day before were delivered to them and observations of each picture were made by the members. At the end, a brain storm had place with all the members to give solution to each problem presented. Mechanisms of improvement were proposed that helped them to perform their jobs in a more efficient way.

Later, most of the objects were organized in the place where they should go. The team members started to dump papers and staff they did not need, to clean their working station, to empty the drawers and shelves of their personal belongings.

All the things were evaluated. Parts unuseful were drawn out of the working area. Needed parts were classified accordingly to their frequency of use. The parts used daily as security equipment, pliers, sanding paper, rags, etc. were assigned within a specific place inside of the working area. The seldom needed things were set apart, but inside of a shelf cabinet.

Cabinets and shelves were surrounded by yellow tape and labeled according to the shape of the corresponding element. Objects obstructing the way were set in a established area of the floor and marked with yellow tape too. Articles that need to go on top of desks were marked too.

There were ideas that could not be applied right away, but were written to work on them progressively.

The third step was to apply a general clean up. Every team were organized to help with the cleaning of their areas, including areas under furniture, dusting lamps, and blinds too. Machines were clean and spots and oil were removed from them. By the end of the day, the working stations had changed drastically. Floors were completely clean, blinds and windows with no dirt, machines without spots and oil. Pictures were taken to sustain this change.

The forth step was to standardize. One of the main tools that was used for this job was called "the 5 minutes of the 5 S", this tool is a daily routine of the general worker, where it shows that only 5 minutes are needed to set in order, sort,

shine and sustain the changes done. Then a timetable is arranged were activities are shown regarding 5 S. a calendar with the months of the year was delivered to the members to standardize in a formal way each day that a different member has an special activity assigned. With this calendar help, it was determined the frecuency of the cleaning activities in the floor, when the machines should be cleaned from inside, the roof lamps dusted, blinds, etc. besides, auditing configurations were given to the teams: for the following weeks of the year: week 1: green team audits blue team, blue team audits green team, green team audits orange team etc.

Auditing formats in a check list way was delivered too to quicken up the process of auditing.

Finally, a personalized label ID was made for each member of the team, with the title working with 5 S , it included the name of the member, and the text: *with my commitment, perseverance and participation…we will have a better area of work* .

Audits were made every week in a regular basis starting from that day on, made by the team members, but also by external auditors to sustain the changes done.

Sample and Data Collection Procedures:

After all the above mentioned steps and the 5 S evaluation were completed, a questionnaire using a Likert scale was applied to measure the perceptions of the employees of the impact of the 5S implementation. Our data were collected from 112 of the 363 (30.8%) general workers at the Fender Corporation, Mexico, String area. The questionnaire contained twenty items and gathered information on the attitudes and perceptions of the department's workers

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The questionnaire was designed to elicit information on the workers' views of the three areas below.

Attitude and perception areas

The questions in the 20 item questionnaire were designed to gather information in the areas of perceived job satisfaction, adaptability, and efficiency, with five questions devoted to each area. The employees showed in their answers that they felt the implementation made their work more efficient and they experienced a feeling of happiness and freedom. For the actual questions, please contact the first author of the paper.

RESULTS:

The purpose of this study was to test the impact of a limited (departmental) 5 S implementation of Sort, Set in Order, Shine, Standardize, and Sustain to help implement a leaner manufacturing system in the Cord Department at Fender Corporation, Mexico. This project and study were useful for two major reasons; i.e., (1)it measured the impact of the 5 S way of thinking on production and on the manufacturing area, and (2) it explored both the practical and the analytical aspects of the production employees' reactions, behavior and perceptions regarding this method of improving their working areas.

Results from this study were positive, since they showed not only an improved production area, but also an improved employee attitude. As an aside, these feelings also show the 5 S philosophy transcends management's usual financial methods of justification of an improvement project. Indeed, . . .5 S is an investment, not an expense. A few reflections on the Fender string area plant changes: This project required a great deal of exploration, experimentation, and learning. The potential consequences of failure were huge. Between the people, processes and functional areas, so much needed to be pulled together. There is still work to be done, sustainability will be the key in this project, and the employees involved in the project need to believe that their key work and consistency will make the changes permanent. It is hoped the cord manufacturing department will shine as . . . an island of excellence, serve . . .as an example throughout the company, and encourage management and workers to implement 5 S in remaining departments.

Within the Fender plant, the level of turnover was high also, with an accompanying low organizational attachment and low job satisfaction. Within this Mexican study, a number of issues came into play. These included, but were not limited to, the following.

Gender The workers in the plant were predominately female.

Educational Level The average educational level within the workforce was well below college level.

Marital Status – Overall, the percent of the workers who were married was close to 50%.

Age – The average age of the workers in the plant was 23 years old.

Children – A large percentage of the workers had children, and a large percentage of these were sole support providers.

An issue exacerbating all the others was the following.

Other Job Opportunities – The study plant is located in an area of many maquiladora plants, and most of the plants and jobs require low levels of skill, short training times, and low levels of formal education. All of the maquiladora plants share the problem of maintaining a labor force, and most have high turnover due to the prevailing "grass is greener" mentality among the workers. Accompanying this, of course, is the fact of fairly limited opportunities to move upward in any given plant's hierarchy.

All of the above, plus other factors, mitigate for a [relatively] low level of job satisfaction and accompanying low level of organizational attachment/commitment. From the management and human resources side, no progress is made if 50 newly-hired workers come in the front door, but 50 workers leave through the back door to an easily obtainable job at another company. Such a revolving door HR experience is very costly, since costs include not only those of recruiting, but also of added training, plus plant issues of lower production and quality due to a continuing stream of workers with little or no experience.

Figure 2 shows results from the "before and after" results. The second evaluation gave a result of 82%. Figure 2 shows a higher level of standardization regarding procedures, clearing roles, labels, formats, going from 1.9 to 3.7. Also, the activities are now been monitored. there is sustainability, going from 2.2 to 4. Shine went from 2.7 to 4.7, which was the highest. Sort went from 3.7 to 4.

Figure 2

Source: (Fender Ingeniería, August 2006)

Results provided on Table 1 show correlations for the variables of job satisfaction, adaptability and efficiency. As we can see, Job satisfaction has a significant correlation with adaptability and efficiency, showing a coefficient of .575 and .510 for the mentioned variables.

Table 1. Pearson Corr elation

		Job satisfy	Adaptability	efficiency
Job satisfaction	Pearson correlation	1.000	.575**	.510**
	Sig. (2-Tailed)	170		
	N		170	170
Adaptability	Pearson correlation	.575**	1.000	.600**
	Sig. (2-Tailed)			
	N	170	170	170
efficiency	Pearson correlation	.510**	.600**	1.000
	Sig. (2-Tailed)			
	N	170	170	170

** Correlation is significant at the 0.001 level (2-tailed).

DISCUSSION:

The purpose of this study was to test the 5S model which combines the Sort, Set in Order, Shine, Standardize, and Sustain variables to help implement a leaner manufacturing system at Fender's Corporation Mexico. This approach was useful because it explored the practical and analytical aspects of the production, related to job satisfaction of the direct employees of the string area. A few reflections on the Fender string area plant changes: This project required a great deal of exploration, experimentation, and learning. The potential consequences of failure were huge. Between the people, processes and

functional areas, so much needed to be pulled together. There is still work to be done and sustainability will be the key in this project, the employees involved in the project need to believe that their key work and consistency will keep the changes to become permanent.

In explaining the significance of *job satisfaction*, Jennings (2008) refers to Leavitt's (1996) statement that there is a multitude of reasons an employee will remain within a given company. High pay, excellent benefits, job security, and a company retirement plan are among the most sought after components of the perfect job. Unfortunately, any one of these attributes alone is not enough to outweigh the problem of low perceived job satisfaction.

Job satisfaction is one of the most important attributes of the employment relationship. The most important element of job satisfaction is job security. (Khaleque & Chowdhury,1983).

The results of *job satisfaction* are extremely influential to any organization, not only to its HR function, but also to its entire operation. It alone can be a determining factor affecting employee efficiency, productivity (quality), and absenteeism, as well as turnover (Rahman, Rahman, & Khaleque,1995).

Job satisfaction has shown positive effects on both sides of the manufacturing equation. That is, job satisfaction mitigates toward employees who are not only less likely to jump to a different company, but also more likely to be attentive to product quality. If employees are satisfied in their roles it is assumed that their output quantity is greater and that their quality is higher. The employer must also be satisfied with the employee. These are accomplished by first recognizing that each side needs the other. If employers feel there are many people from which to choose to fill a particular need, they have an advantage. If, as well, workers perceive a high availability of alternative jobs, they have an advantage. Both of these conditions were found to be particularly true in the maquiladora plants, with their environment of high labor availability, high position availability, and high turnover.

The employee can assume an advantage when he or she has a particular skill that is in demand. Job satisfaction is a two way street and involves participation. For this to happen, a relationship must evolve between the employer and the employee. Job satisfaction is therefore distinct from other organizational constructs. (Hinton & Biderman, 1995).

Job satisfaction is a combination of cognitive and affective contentment for an individual within a company. Cognitive satisfaction is based on non-emotional based conditions that are evaluative of outcomes and opportunities. These include working conditions and the nature of the job. In this particular case, the 5S application had a positive outcome in Cognitive satisfaction, as the working conditions and the nature of the job were both improved after the implementation was done. (Moorman,1993)

Many authors referred to the importance of a satisfied workforce, given that they are the primary asset to the firm. (Angle and Perry 1981; Arnold and Fieldman, 1982; Brown, 2003; Bycio 1995; Cohen, 1996).

Turnover is a significant and costly problem for the maquiladora Industry (Garcia and Cox, 2007). Higher levels of job satisfaction have been strongly linked to the desire to remain in a firm in the literature (Porter and Steers, 1973; Arnold and Fieldman, 1982).

As noted earlier, job satisfaction is a two-way street requiring participation from both the employer and the employee. This is particularly true when both sides perceive advantages that can be used. In the maquiladoras in the authors' studies, the employers are in an environment where job openings can be filled, albeit with additional costs. The employees, in turn, are in a job market where jobs are easily acquired. In order for turnover percentages to decrease, with the accompanying advantages of lower HR costs, lower absenteeism, and potentially higher quality and output, one side or the other must make a move. Individual workers are essentially powerless, and union activity within the maquiladoras is not strong. Thus, it is difficult for the workers to agitate for better working conditions overall, leading to their own greater organizational commitment and attachment. In this case, it is the employing maquiladoras, themselves, who are in a position to improve conditions leading to a lower turnover rate.

Norris and Niebuhr (1983) pointed out that job satisfaction is a variable largely associated with the *current* work environment, which makes it a less stable variable than organizational

commitment which is formed over a longer period of time. The immediate work environment is changing constantly in the maquiladora industry due to high turnover even at the supervisory level, and the actions of those supervisors play a key role in shaping that environment.

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Recibido: 30/09/08
Aceptado: 15/10/08