

Comprehensive Study and Investigation on Success of Lean Manufacturing System in Production Departments in Apparel Industry

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ABSTRACT

Lean manufacturing system is the one of the common productivity technique in today's industries. Few garment factories in Sri Lanka are practicing this concept. Investigation of the adequacy of lean manufacturing system is the major objective of this research. A reputed garment factory which the lean system has implemented is taken as the sample of this research. Also the problems and weaknesses in the selected organization which affect to the successful system running are identified. Also the obstacles for successful lean implementation in a garment factory were identified.

KEY WORDS: Defect Rates, Efficiency, Garment Industry, Lean Manufacturing System

INTRODUCTION

Apparel industry is one of the major contributors to the Sri Lankan economy. After the economic crisis which Sri Lankan apparel industry was faced as to the loosing of quota, apparel industry has faced huge problem of reducing their demand. To survive in this crisis situation any garment factory needs to keep their production quality in high standard as well as they need to produce their products at a lowest cost (Kelegama, 2005). Hence some methods that the cost can be reduced are searched and practiced by most of garment factories. Productivity is the major point that highly affected to the cost of the production. By keeping the productivity in a high level, the cost of the production can be kept in lowest.

Lean manufacturing technique is one of the production techniques that mostly

The main purpose of this research is, investigate the adequacy of the lean concept in apparel industry in Sri Lanka. Furthermore the problems and weaknesses of the system running in a garment factory will be identified. To check the success or the failure of the lean concept in garment factory, the data on efficiencies and defect rates in a lean implemented garment factory are analyzed. The selected garment factory was started in August 1975 with 95 workers. Now it has grown up to 1300 workers. The particular organization operates only knitted fabric only for exporting purpose. Nike, Edi Bauer, Tommy Hilfiger are major buyers of the company. This factory operates under a reputed business group. Eighteen departments are operated under this company.

LITERATURE REVIEW

Lean manufacturing system is used in different names in different countries as well as in the same country. Lean is called as 'Just in time', 'Toyota production system', 'Kaizen', 'Kaikaku' (Goforth, 2007). The meaning of all these terms are same but sometimes little different can be seen. Simply the mean of the term "Lean" is 'transformation of mind', 'working with others to achieve radical change', 'to bring new and vital change to your organization'

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concern about the reducing cost (Goforth, 2007). Few garment factories in Sri Lanka are practicing this technique with the purpose of reducing production cost.

(Abdullah, 2003). Also lean can be defined as an all-out war against waste that results from inefficiency, as well as the waste that is brought about by the underutilization of people. Furthermore this is a fresh perspective with respect to keeping only value-adding processes and optimizing the creative capacity of man power (Abdullah, 2003).

The implementation of Lean manufacturing like any other productivity improvement initiative is believed to harbour enormous difficulties (Denton and Hodgson, 1997). For example, Safayeni (1991) highlighted the difficulties and controversies in implementing one of the many lean manufacturing techniques known as just-in-time. This problem may further be compounded by a lack of standardized mechanism of analysis and measure of value-adding capabilities within organizations, such as the lean concept (Baker, 1996; Iyer and Jha, 2004). As to the literature reviews, critical success factors for the implementation of lean are leadership and management, financial capabilities, skills and expertise and organizational culture. Thus, in order to succinctly implement the concept of Lean manufacturing successfully within organization, the recipient companies should arbor strong leadership traits capable of exhibiting excellent project management styles. In essence, these qualities would facilitate the integration of all infrastructures within an organization, since strong leadership and management permeates a vision and strategy for generating, while permitting a flexible organizational structure. Good leadership ultimately fosters effective skills and knowledge enhancement amongst its workforce.

Hayes (2000) discussed that successful corporate initiatives like lean manufacturing, should be properly planned prior to implementation. Management involvement and commitment are perhaps the most essential prerequisites in aiding any

of the desired productivity improvement initiatives.

The creation of a supportive organizational culture is an essential platform for the implementation of lean manufacturing. High-performing companies are those with a culture of sustainable and proactive improvement. Manufacturing, almost more than any other sector, is a global industry. The study further confers that the ability to operate in diverse environments is a pre-requisite for managers. The investigation has clearly indicated that it is highly desirable to have some degree of communication skills, long-term focus and strategic team while intending to implement any new initiative.

RESEARCH APPROACH AND METHODOLOGY

This research is carried out to evaluate the success of lean implementation in apparel industry. A garment factory which has implemented lean manufacturing system was selected for doing this research. Basically lean manufacturing system is a technique for improve the productivity while reducing the wastes of the production (Abdullah, 2003). So this research mainly concern about the productivity and the defect rates of the selected company to measure the improvement of the lean manufacturing system. This research can be identified as constructive research as it is going to identify the problems of implementation of lean manufacturing system and try to build solutions for those identified problems (Hussey & Hussey, 1997). Two research techniques are carried out for conduct this research effectively and efficiently

Survey is a method that analyzes the data by using all relevant facts as evidences (Sekaran, 2009). Collected data are used to prove or disprove the theories. Observation is used to have correct understanding of the real situation. Three data collection methods are used. Those are Refer secondary data,

observation, Questionnaires (Sekaran, 2009). Referring the secondary data, details on efficiencies and defect rates could be collected. Continuous and regular survey secondary data are used as the main data collection method. Continuous and regular surveys are those surveys excluding censuses that are repeated over time. They include surveys where data are collected throughout the year. Continuous and regular survey data provide a useful resource with which to compare or set in context research findings (Sekaran, 2009). Observation as participant is used as data collection method. In this technique researcher will be a spectator. Researcher might adopt the role of observer as participant in an outward bound course to assist team building if the researcher was attending to observe without taking part in the activities in the same way as the real candidates. The identity as a researcher would be clear to all concerned. Develop own questionnaire is most suitable than adopt or adapt questions. Trend analysis, Hypothesis testing, Pattern matching, Explanation building are used as data analyzing methods.

DATA COLLECTION AND ANALYSIS

Kaizen is a technique which considers the continuous improvement in each and every part in the organization. Since the selected garment factory has implemented lean system only in the production section, this research will evaluate the performance in the production department. Efficiencies and defect rates in production lines are the measurements which are used in this research. Kaizen means continuous improvement in all aspects in the organization. According to that definition, an increasing trend in efficiency analysis and decreasing trend in defect rates analysis are expected to see.

Some production lines are shown an improvement in efficiencies. According to the analysis, production lines 1, 2, 4, 5 and 10 are shown an improvement in

efficiencies. Others have shown a decline trend in efficiencies. None of the production lines have shown improvement in defect rates. Successful lean implementation is expecting a declining trend in defect rates

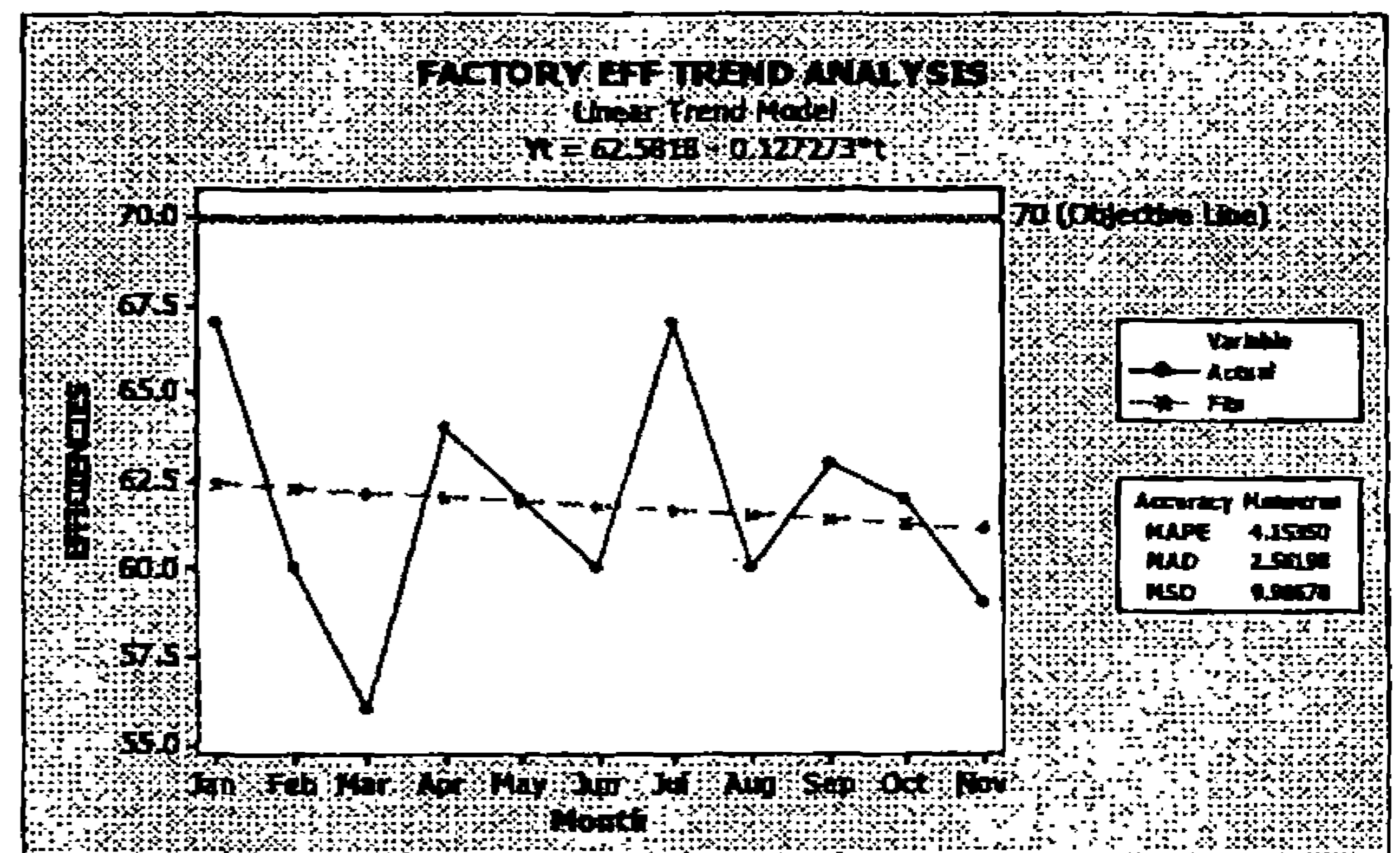


Figure 1- Factory Efficiency Analysis Considering Production department

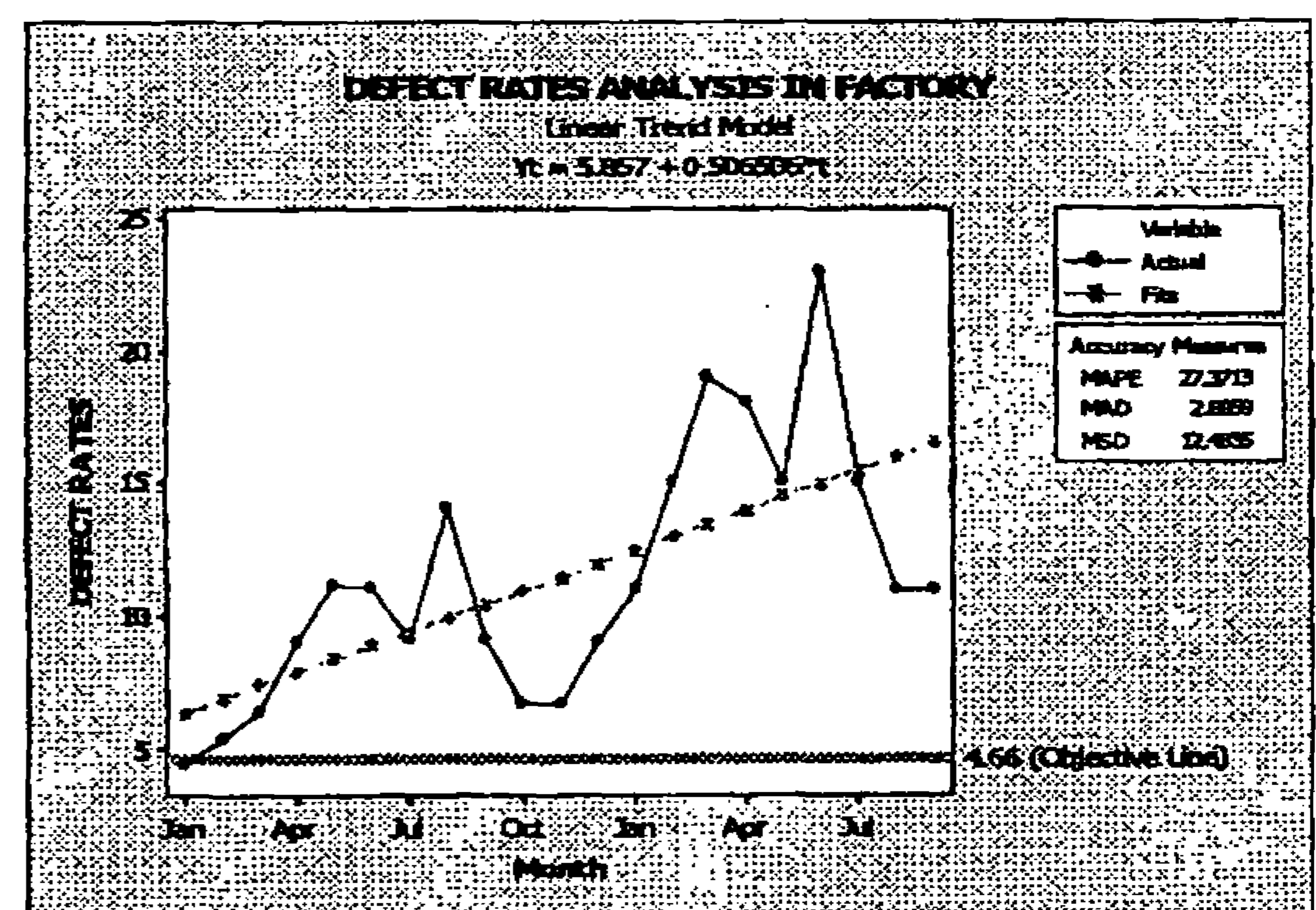


Figure 2- Factory Defect Rate Analysis Considering Production Department

Figure 1 shows the efficiency analysis of factory considering only the production department. According to that figure, a decline trend can be seen. An increasing trend in efficiencies is expected to see under lean manufacturing concept. Figure 2 shows the defect rate analysis in factory considering production department. The trend analysis in defect rates shows an increasing trend. But a declining trend in defect rates is expected to see under lean manufacturing concept.

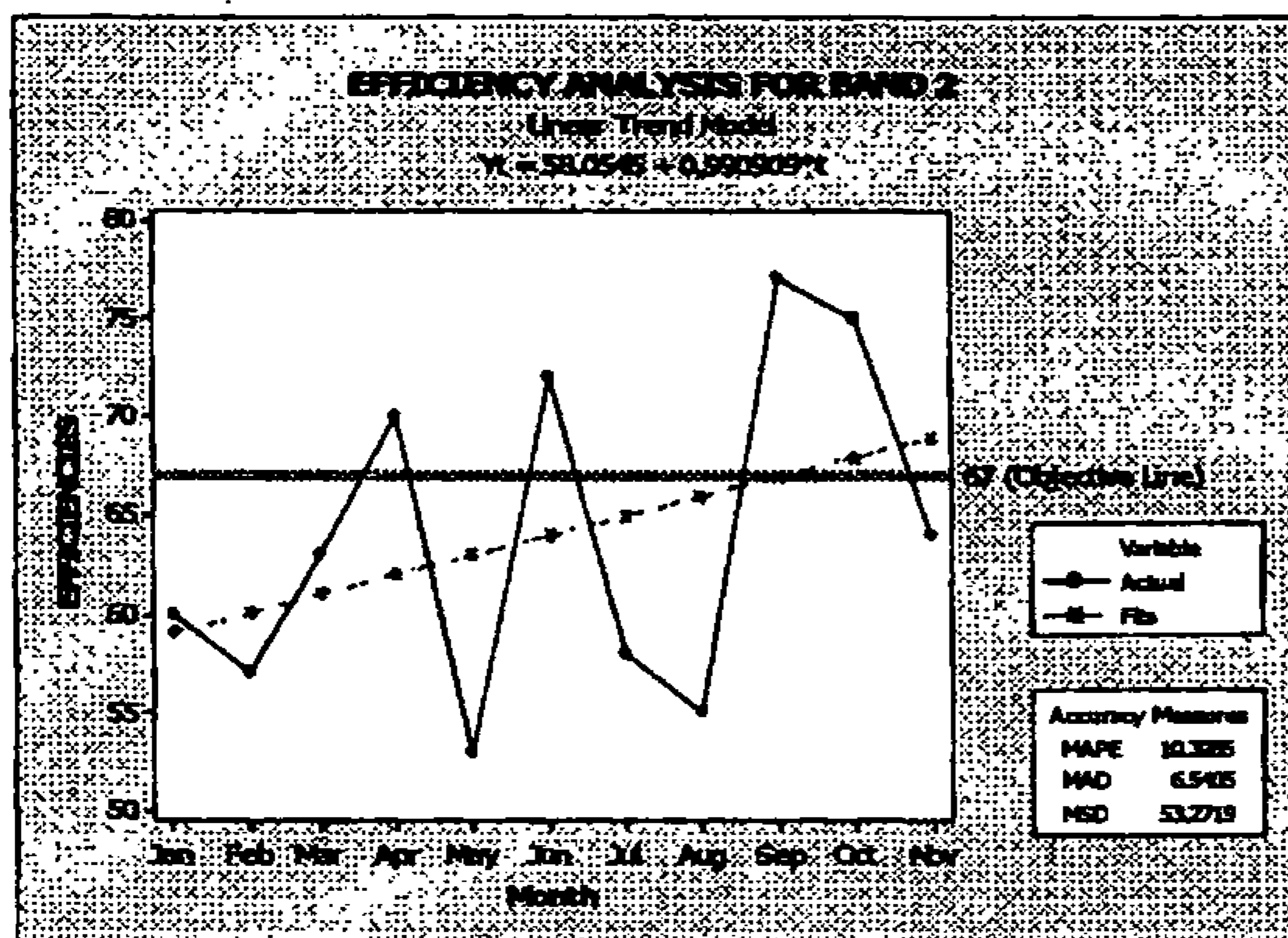


Figure 3- Trend Analysis for the Efficiency in Production Line 2

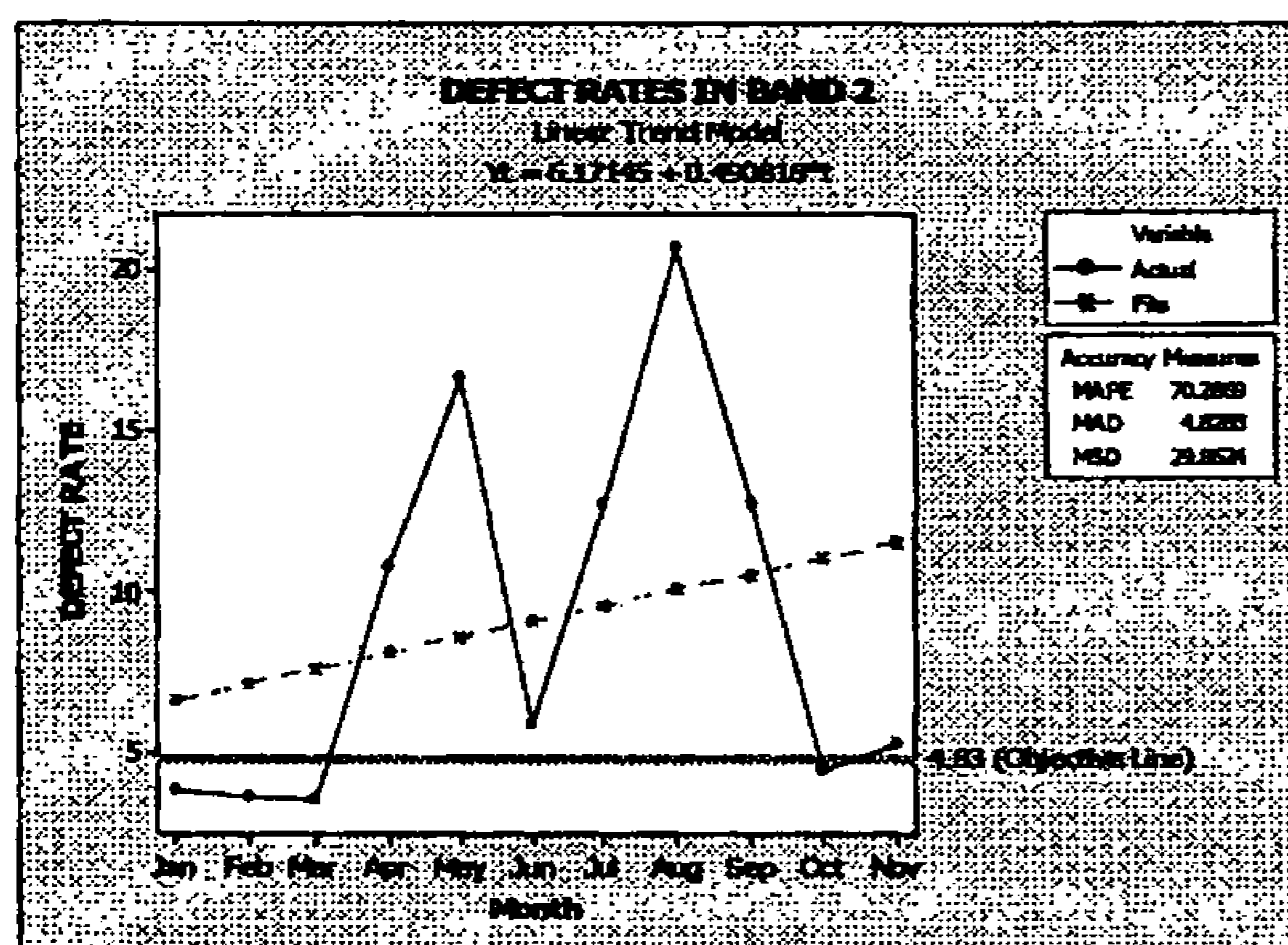


Figure 4 – Trend Analysis for Defect Rates in Production Line 2

Production line 2 has monitored fulltime to ensure the perfect system running within the line, starting from month of August. Hence analyzing of the performance of production line 2 is very important for accurate evaluation of the lean implementation.

Figure 3 shows the trend analysis for efficiencies in production line 2. An improvement in efficiencies can be seen in production line 2 after the month of August. This improvement can be seen after the starting of fulltime monitoring. Also defect rates analysis is shown some improvement after the month of August.

RESULTS AND DISCUSSION

According to the analysis, few production lines have shown an

improvement in efficiencies and none of the production lines have shown any improvement in defect rates. Overall factory performance is also not in an expected level. Root causes for the failure of the lean implementation, identified by observing the production process and delivering questionnaires.

ROOT CAUSES AND ALTERNATIVE SOLUTIONS

1) Low Awareness of employees about system

Informal questionnaires were useful to have understanding regarding the knowledge of employees regarding lean system. As to the answers given by employees, most of employees know theories regarding lean system. For example they know what takt time is, what one piece flow is, what pull system is. But they don't have clear idea about the purpose behind this words or elements. For example one piece flow means sending one garment to the next operation at a time and keeping only one garment closer to the operator at a time. But the benefits can be gained by following one piece flow are not much considered by them. Hence they do not much response to the system as they think there is no difference in following system.

Awareness programs about lean system should be planned for make aware of employees. This awareness programs should be prepared with the purpose of giving knowledge on not only the theories but also the practical benefits of following lean and how those benefits come as a result of lean. Also the benefit for employees by following these systems should be informed by these awareness programs. Awareness programs can be arranged in several ways. Refresh trainings can be done to refresh the mind of employees regarding lean system. This awareness can be done also by holding quiz competition through the employees. This kind of events influences the employee to search knowledge on lean system. Then

production process can be run effectively with knowledgeable workers.

2) Low Response of Workers for Andon Lights

Not proper activation of andon lights (Light system which is used to visualize problems) is major cause for increase defect rates in the organization. Operators are reluctant to use andon lights as they do not like to stop lines. They use andon lights only for machine breakdowns. They have low practice for using lights for work in process. Also operators are not interesting to stop work even the andon lights are switched on. They afraid of lost their own hourly target. As a result of this, more and more WIP will be created during processes. Because of the problem for creating WIP in particular operations has not solved. This will cause to make more and more damages as more input has done to the line before the defect is identified. Band supervisors also do not motivate operators to follow or use andon lights. Team work is most important for successful implementation of lean. Each and every person in the team (production line) should know about points of success in their team as well as weaknesses of the team. This feeling of team work is also important for use of andon lights. When a team member switched on the andon light, other members should get to know the reason for use light. If andon light used for needle breakdown then all the other members should help to find the pieces of the needle. If andon lights have used for WIP then other members should help relevant operator to improve his/her skills by avoiding unnecessary movements. This can be done specially by experienced workers. This research specially investigates the important of team work practices. So it would be better to arrange games which improve the skills of team work. These games can be arranged after working hours. Also it would be a good experience for employees and also it will change the tired working life of employees.

3) Low Concern on Damages

Damages are one kind of wastages in production and it will be tried to avoid by lean manufacturing system. For this purpose some awareness has done for machine operators as they are the responsible people who can avoid damages. Checks each operation at the source, correct damages at its occurrences, and avoid passing damages to next operation are the main responsibilities that machine operators have. But according to the analysis of defect rates the system cannot be considered as success. Because of machine operators are not much practiced for doing above mentioned activities. To avoid this kind of wastages, quality circle is one of the best methods. A quality circle is a volunteer group composed of workers usually under the leadership of their supervisor (but they can elect a team leader), who are trained to identify, analyze and solve work-related problems and present their solutions to management in order to improve the performance of the organization, and motivate and enrich the work of employees. When matured, true quality circles become self-managing having gained the confidence of management. Quality circles are an alternative to the dehumanizing concept of the division of labor, where workers or individuals are treated like robots. They bring back the concept of craftsmanship, which when operated on an individual basis is uneconomic, but when used in group form (as is the case with quality circles), it can be devastatingly powerful and enables the enrichment of the lives of the workers or students and creates harmony and high performance in the workplace. They are formal groups. They meet at least once a week on company time and are trained by competent persons (usually designated as facilitators) who may be personnel and industrial relations specialists trained in human factors and the basic skills of problem identification, information gathering and analysis, basic statistics, and solution generation.

4) Cultural Change Failure

The major change should be done when implementing lean manufacturing system is cultural change. Cultural change means totally changing mind of people. Changing people's mind is the difficult part in this process. Human beings do not prefer to change their practiced way of doing things. The cultural change should be done throughout the whole organization. It should be done top to the bottom of the company. Changing the mind of machine operators is the most useful part in this cultural change. They are the people who really make this system run. But according to the observation it was realized that the most difficult part in cultural change is change the mind of machine operators. Some actions have to be taken to influence machine operators to follow the system. Hence motivation programs should be developed to make aware of machine operators and supervisors. Some video clips can be prepared to motivate working employees to change their mind. An incentive system can be introduced to motivate employees to follow up the system and record keeping part correctly. Also there are many ways to advertise about the lean system among employees. Arranging competitions among employees, make announcements regarding lean in attractive way are some possible solutions for above problem.

5) High Labor Turn Over

High labor turnover is an obstacle for success lean implementation. Skillful employees are essential for system running. When operations are going as to the one piece flow, all workers in production line should be in the same level in their skills. Otherwise a bottle neck will be created in operations where operators are in below level in their skills. Because of the high labor turn over, company lost skilled labor force. Company needs to hire new employees to fill those vacancies. Those new employees take few days to train. Till

then it is very difficult to maintain one piece flow in the production line. Also this problem continues for every day as the labor turn over as well as the absenteeism is high in the organization. The labor turnover is highly affected to the efficiencies.

6) Poor Criteria Consideration for Selecting Best Production Line

When selecting a best production line using only the efficiency as the measurement is not a successful measurement. A best production line is chosen by comparing all production lines each other. But considering the style changes, high variations in style changes can be seen. Some production lines have large number of style changes while other production lines have small number of style changes. Hence the number of style changes and also their SMV s should be taken in to consideration when company selects a best production line. Also some other criteria such as number of needle breakdowns, marks for 5S maintaining ability, marks for one piece flow maintaining ability can be considered in selecting best production line.

CONCLUSION

Overall analysis does not prove that lean is best productivity technique in apparel industry. Although the analysis is showing that lean has not successfully implemented, the reasons for that failure has identified. Furthermore analysis of production line 2 has provide facts to prove that improvement in performance in garment factories can be gained by running the system properly in production lines. Hence this research conclude that lean manufacturing system is suitable even for garment factories but the identified weaknesses should be avoided by providing better solutions and obstacles for success lean implementation should be overcome.

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