

Optimization and Enhancement of Productivity by Improving and Modifying storage Facility: A Case Study at VECV, Pithampur

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Abstract— Since the beginning of industrial era, the concept of productivity plays an important role in the development of the industry. The concept of the productivity arises from the production system. When the system was at growing stage, the emphasis was not on the efficiency of the system. Neither employer nor employees had idea about the effectiveness of productivity improvement. As the need was felt after II world war because of the constraint resources, output was not in accordance with inputs which results in increasing the cost and decreasing the profits and the need was felt for improving the productivity by scientific management concepts. In this paper we are modifying storage facility at VECV(Volvo Eicher Commercial Vehicle) Pithampur by introducing Norane display card instead of single display board. In a company, the main responsibility for increasing productivity rests with its management. It must help to create a favourable climate for a productivity programme and seek the co-operation of the workers.

Keywords— Productivity Enhancement, Kanban, Norane card, Time study

I. INTRODUCTION

Basically productivity is the term which represents the degree of effectiveness of industrial management in utilizing facilities for production. It can also be considered as a measure of what output of goods or services is produced for a given amount of input resources (manpower, money, material, machines and methods). Productivity is an indicator reflecting the changes in the performances of the enterprises and having some sort of input-output comparison relating to various activities of an organization. It also facilitates the management to control and plan its future operations of the enterprises. To achieve higher productivity contributions by all sections of the community, i.e., by workers, employers, and government are necessary.

DEFINITION

“Productivity implies development of an attitude of mind and a constant urge to find better, cheaper, quicker, easier and safer ways of doing a job, manufacturing an item and providing a service”

In a broader way we can say that “Productivity is the ratio of maximum output obtained by giving minimum input”.

$$P=O/I$$

Where, P = productivity, O = output

I = input

METHODS OF IMPROVING PRODUCTIVITY

It is very essential to know that specific productivity of a process, plant or a country so that it can be compared to other process, plant or a country. But the major emphasis in productivity is on its improvement. Industrial experts are mostly concerned with improving the productivity of the organization in which they work. The aim is to raise it relative to the organization own performance in a previous period. The improvement in the productivity in latter case is determined by dividing the current productivity by the productivity in previous period (base period) and expressing it as a percentage.

Every Industry tries to improve the productivity and it can be improved broadly by following two ways:-

- i) Increase the resources hence production, and
- ii) Effective utilization of resources.

In the first method for increasing resources we have required capital investment but in second method very little capital investment required.

II. LITERATURE REVIEW

The concept of the productivity arises from the production system. When the system was at growing stage, the emphasis was not on the efficiency of the system. Productivity is generally regarded as efficiency as “efficiency in industrial production” to be measured by some relationship between outputs and input. The increase in productivity is looked upon as the key to prosperity at all levels.

In industrial term, it refers to the relationship between the results and the means employed or to be more specific between the product and factors used for obtaining it. Generally in any industry, productivity is analogous to the efficiency of a machine. It can also be explained as human efforts to produce more and more with less and less efforts and input resources as a result of which benefits of production are distributed among maximum number of people. Basically, it is an attitude of mind. It reflects the mentality of progress, and constant improvement of that which exists. It is the certainty of beings able to do better than yesterday and continuously. It is regular adaptation of technical, economical and social life to changing conditions.

The following are some of the example which illustrate productivity in an industry-

A machinist is able to produce 35 jobs per day on two machines instead of 25 jobs per day by attending to one machine only. Secondly, a machine tool produces 150 jobs per day instead of 90 jobs through the use of improved cutting method, in

place of the usual 15 inputs he used to take previously.

One common thing that we find in above mentioned examples is the increase in output i.e. productivity. Thus, we can say that without any change in inputs, the output is increase. So the efficiency or ratio of output and input is called productivity. This productivity in industry is increased by either utilizing the resources optimally.

WHAT IS KANBAN?

Kanban (*kahn-bahn*) is Japanese word that when translated literally means “visible record” or “visible part”. In general context, it refers to a signal of some kind. Thus, in the manufacturing environment, kanbans are signals used to replenish the inventory of items used repetitively within a facility. The kanban system is based on a customer of a part pulling the part from the supplier of that part. The customer of the part can be an actual consumer of a finished product (external) or the production personnel at the succeeding station in a manufacturing facility (internal). Likewise, the supplier could be the person at the preceding station in a manufacturing facility. The premise of kanbans is that material will not be produced or moved until a customer sends the signal to do so.

TYPES OF KANBAN

Dual-Card Kanban

This kanban system is more commonly referred to as the Toyota kanban system as Toyota was the first

to employ this system in full scale use. It is a more useful kanban technique in large-scale, high variety manufacturing facilities. In this system, each part has its own special container designed to hold a precise quantity of that part. Two cards are used: the production kanban which serves the supplier workstation and the conveyance kanban, which serves the customer workstation. Each container cycles from the supplier workstation to its stock point to the customer workstation and its stock point, and back while one kanban is exchanged for another.

Single-Card Kanban

The single-card kanban system is a more convenient system for manufacturing facilities requiring less variety in their parts. Essentially, the single-card kanban system is simply a dual-card kanban system with the absence of the production kanban and designated stock points.

TIME STUDY

Time study is a structured process of directly observing and measuring (using a timing device) human work in order to establish the time required for completion of the work by a qualified worker when working at a defined level of performance.

It follows the basic procedure of systematic work measurement of

- analysis (of the work into small, easily-measurable components or elements)
- measurement (of those components) and

- Synthesis (from those measured components to arrive at a time for the complete job).

The observer first undertakes preliminary observation of the work (a pilot study) to identify suitable elements, which can be clearly recognized on subsequent occasions and are convenient, in terms of their length, for measurement.

METHOD STUDY

Method study is the process of subjecting work to systematic, critical scrutiny in order to make it more effective and/or more efficient.

It was originally designed for the analysis and improvement of repetitive, manual work, but it can be used for all types of activity at all levels of an organization.

The process is often seen as a linear, described by its main steps of:

- Select (the work to be studied);
- Record (all relevant information about that work)
- Examine (the recorded information)
- Develop (an improved way of doing things)
- Install (the new method as standard practice)
- Maintain (the new standard proactive).

III. CASE STUDY AT VECV, PITHAMPUR

COMPANY PROFILE:-

VECV Group

With the never-ending urge to move faster, reach higher and emerge stronger, man has refined the

limits, time and again. He has struggled, failed, but tried again and made his dreams come true. It was his flight of fantasy that pushed him innovates and his ever-changing needs made him modify the creations of his predecessors.

This change and growth cycle has gone on for years in all the sectors, more distinctly in some, less visible in others. Automobile definitely belongs to the former.

Product Range

Royal Enfield: -Bullet 350, Bullet Electra, Bullet Machismo, Bullet 500, Thunderbird.

Classification of models-

- i) Models-10.50, 10.59, 10.60G, 10.70, 10.75, 10.90, 11.10
- ii) Drive-left hand drive (LHD) & right hand drive (RHD)
- iii) Wheel base-for LCV C-small, E-medium, and F-large, for MCV- G
- iv) Versions-Cabin & Cowl
- v) Colour-CG, PB, GB, CW.

IV. OBJECTIVE OF THE STUDY

To provide facility to line side operator and storekeeper to identify the right part at right time and to provide proper part identification sheet. (Norane display sheet)

For achieving the above objective regarding store department firstly it is to plan for proper storage facility for the whole LCV/MCV line side.

STORAGE PLANING

PLANING!! WHAT FOR.....

- Smooth running of Production.
- Timely material supply.
- Optimum Space utilization in stores.
- Deciding proper load units and storage.
- Receipt / Storage of Parts in engineered manner.
- Preservation of parts.
- Inventory accuracy.
- Logistics tie up.
- BOM verification & New NDP induction.
- Over all Stores Management.
- Improving component tracing

The above issues are being more discussed below by taking the photographs in order to defined the issues properly and also to signify to do changes and to design new storage facility.

Norane Display:-

It is known for the part identification of a particular station to easily identify by the store keeper to load the parts at their particular place without any delay or obstacle as well as by the operator to assemble it at its right place and to reduce fatigue.

After analysis it was found that the part identification sheet is essential and put at the upper side of the racks and name/numbers are too small, not seen clearly by workers.



Fig.1 Before Norane display Board

Now the above problem of part identification is on the whole LCV/MCV/HCV line as well as at air brake assembly area and sub assembly area. So the need of proper part identification arises to store the part at its proper place.

So the concept of making the norane stickers for each part used on both sides at each stands,racks,and trolleys which clearly shows about the particular part and can be easily seen by the store keeper as well as by operator.

The issue in norane display was not seen clearly, so after going to thorough analysis there were lots of issues found regarding the part name and its identification. And this issue plays a vital and very important role in production system of LCV / MCV line. Problems analysed regarding part identification are-

- a) Operator is searching for part which creates a lot of disturbance at the particular station.
- b) For storekeeper also searching of part is there, he has to identify where to put the particular part, so as it will be easier for operator.
- c) The problem of wrong fitment is increase day by day due to wrong placing of the part on the

racks / stand / trolleys. And we know that wrong fitment leads to improper functioning of the vehicles.

- d) And due to wrong placement of the parts, the problem of line stoppage is also seen, which results in delay in the assembly of the vehicle.
- e) The presently norane display board used is not properly fulfils the needs & does not indicate the proper placing of the part, because of the single board used having part name, numbers, written are smaller and will not seen properly by the operator as well as by the store keeper.
 - The line stoppage for the last two months is found to be 133, which is more and results in the less no. of vehicles roll out.
 - The wrong fitment issue of the parts is 37% for the last two month because of the improper & wrong placement of the parts at their particular station on the line side.

Searching time of parts-

Searching time	
Store keeper, in(sec)	Line side operator, in(sec.)
34	27

Table 1: - Searching time

The searching time in above table is taken from by stopwatch of the mobile on the actual condition i.e. by standing on the field & by seeing the way storekeeper stored the part, and the way the operator picks up the particular part to assemble it on the vehicle.

Concept: -By analysis the all aspects of the norane display board it is found that there is lot of improvement to be needed to avoid the line stoppage problem, wrong fitment issues & searching of the parts.

After thorough study, it is found that instead of using Norane display board, could we use single card for the single part and instead of putting it on one side, can it be used directly where the part is to be stored. So after going through the lot of brain storming it is decided that there should be a proper placing of the part at their right place, so as it will be bit easier for the store keeper to store the particular part and also easier for the operator to find the right part from the right place and there is no searching of the part i.e. both does not have to search for the parts.

Now this problem of part identification can be solved best, when a proper & effective part identification display sheet is used, which clearly shows the part no. and part name. As there were more no. of variants used at the LCV / MCV line side, so for each & every part, its proper identification sheet should be made & place on each racks, trolleys & stands. The part identification sheet is display by using the clips, which were bolted by nuts & bolts at each rack, stands, & trolleys, so that the norane part display sheet can be hung in it. The clips were used as because it provides flexibility that when the model of vehicle is changed, the part at a particular side also changed,

so the norane display sheet should be changed & another sheet of that particular part is used. And also when the bin is placed by the storekeeper, there is no problem of damaging of the norane sheets because of the norane sheets are hanging, it bends while placing of bin.



Fig.2. Concept design of norane sheet

Norane display sheet: - The norane display sheet should be 12 X 12 cm² & should be laminated by 150-micron plastic sheet to avoid tearing of the sheets. It should contain part no., Part name, Model i.e. LD / MD and also written whether the sheet is used for LH side or for RH side so LH / RH should also be written. The letter is written on the sheet should be clearly identified & easily seen from far side.

Analysis after successful Implementation of Norane

After the successful implementation of norane sheet, continues analysis was done for 5 days. During the analysis phase it is found that the clips used to hang the norane sheet were damaged due to improper usage by the storekeeper & also by the operator, due to storing of bins by the storekeeper & at the

part picking time by the operator. So this is another problem which occurred.

Now after doing a lot of brain storming, there comes an idea that why can't we use the safety protective guard which covers the whole clips at the particular zone? So after seeing all racks, stands & trolleys three types of length for which the protective guard is to be made i.e. 890 mm, 800 mm, and 600 mm in length are found. Then one piece is ordered of each size as a sample and decided to tighten it by nuts & bolts along the three types of sizes.

Now again 5 days were taken for doing analysis to check whether the clips damaging stop or not. And it is found that clip damaging is stopped completely now. Then it is decided to implement the safety protective guards on all racks, stands and trolleys where the norane sheet is implemented. Again after 15 days an inspection on the line side held and found that no clips & norane sheet is damaged.

Then analyse on the results of this implementation is done and found that the wrong fitment of the part due to part storage is reduced and line stoppage is also reduced due to availability & wrong storage of parts.

Advantages concluded are as follows

1. Part pickings are easy for operator.
2. Part storing for storekeeper is made easy.
3. Searching time for both operator & storekeeper reduced.

4. Fatigue of part searching for both operator & storekeeper is reduced.
5. Wrong fitment of parts is avoided as parts can easily be finding from its right place at right time.
6. Line stoppage due to storage facility is reduced.



Fig.3. After implementation of norane display

The figure shows that the norane display by using stickers which clearly displays a particular part is being implemented at each stand, rack and trolley as a demo. The concept is being appreciated after taking feedback by the operator and by the store keeper.

Searching time (In sec.)			
Store Keeper		line side operator	
Before	After	Before	After
34	9	27	5

Table 2 : - Searching time for operator and storekeeper

Suggestions:-

- a) The Norane sheets should be used properly and the person should be provided by the

production department to take care of these norane sheets.

- b) The line side operator should not tear norane sheets.
- c) After every two month the cleaning of the norane sheets must be done.

The production department should always use 5’s philosophy (i.e.1.**SEIRI** – Sorting 2.**SEITON** - Setting in order, straightening, simplifying. 3.**SEISO** - Sweeping, Shining, Systematic Cleaning 4. **SEIKETSU** – Standardizing, 5.**SHITSUKE** - Sustaining) for proper usage of the norane sheets.

- d) The kaizen must be done time to time by production and the store department for protection of norane sheets.

V. CONCLUSION

During the project, it was a wonderful experience of co-relating my theoretical knowledge acquired during the post-graduation, VECV Pithampur. The main objective of the project was to improve productivity. The objective of proper part identification was fulfilled by introducing single Norane display sheet for each part and search activity time for operator and store keeper is reduced to 25 seconds and 22 seconds per rack. Due to this part picking is easy and wrong fitment of part is avoided. So after completion of project at VECV, it has made me to analyse the logic of THINK before happening and analyse the process and consequences after implementation.

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