Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 6, Issue 05, May -2019

Work study At A Central Products Diary

Akhil S Babu[1], Prof R Rajesh[2]

[1]*Industrial Engineering and management, RIT College, Pampady,*
[2]*Dept. of Mechanical Engineering, RIT College, Pampady,*

Abstract — *Alappuzha Dairy is directly managed by the Kerala Co-operative Milk Marketing Federation. In Alappuzha district, dairy constructed under OF II with a capacity of 60,000 LPD was later expanded to 1 lakh LPD. The current problem faced by Alappuzha Milma is the lack of standards at production department. Also, there is a need for assessing the current manpower strength in the production department. For solving the problems mentioned above there is a need for conducting a work study. Work measurement technique which is going to be used is time study. Work sampling will be applied for computing work standards. Appropriate relaxation allowances will be incorporated. The manpower required for each of the processes per shift will be found out from the standard time obtained i.e. the total work volume per shift is found out using the standard time and using the time available for each worker per shift the manpower required per shift will be found.*

Keywords- *work study, Time study, standard time, manpower.*

I. INTRODUCTION

Work study is generic term for those techniques which are used in the examination of human effort in its entire context and which lead to systematic investigation of all the factors affecting the efficiency and economy of a situation under review in order to effect improvement. There is a lack of standardization for assembly workers at production department at Milma, Punnapra and there is a need for assessing the current manpower at the production department as it hasn't been checked for a long period of time The scope of the study is to set standards for workers at production department, asses the current manpower requirement at production department and thereby increase the productivity and profit. To the academia, this study will form the basis for future studies related to central product diaries. There are limited investigations on central product diaries and how work study should be conducted at a central products diary. This provides a good ground for the academicians to perform a work study at a central products diary.

II. METHODOLOGY

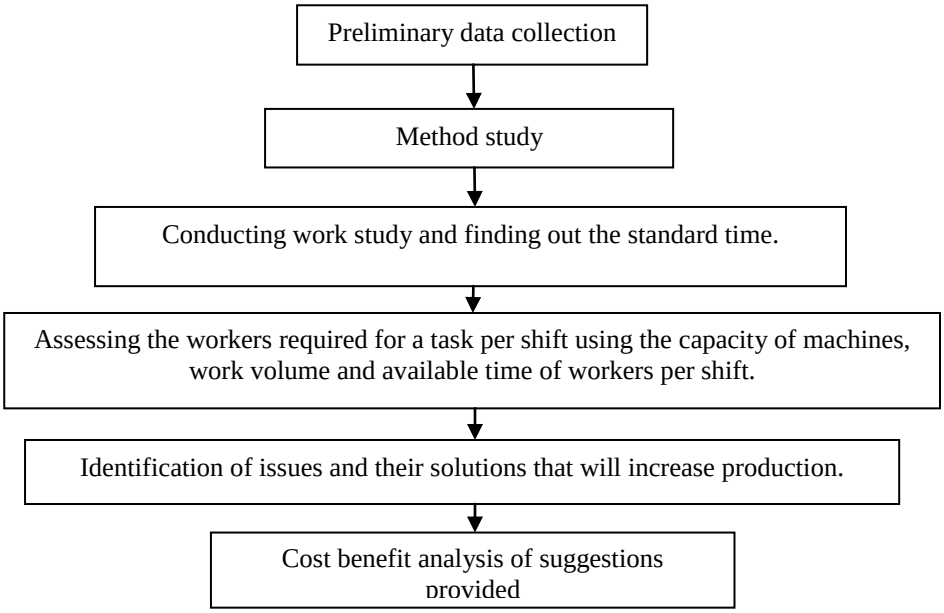

Figure 1. Methodology

III. DATA COLLECTION

The secondary data were collected through time study for the purpose of standardizing the work at production department. For this, the ten tasks selected were divided into elements. The time study sheet used is shown in Annexure. The time study sheet consist of spaces for 10 samples. The data collected was subsequently used for finding out manpower requirement for different tasks. The number of samples required for each task to be taken was found out using the following equation:

$$\sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(Xi-\bar{x})^2}$$

S = Sample Standard Deviation
N = sample size
$\bar{x}$ = sample mean
Xi = individual x values

3.1. Time study

Time study is also called work measurement. It is essential for both planning and control of operations. Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out specified jobs at a defined level of performance or at a defined rate of working qualified worker is one who has acquired the skill, knowledge and other attributes to carry out the work in hand to satisfactory standards of quantity, quality and safety. The materials required are:

- Time study form
- Timing device
- Pen /pencil
- Safety equipment
- Clipboard

3.1.1 Allowances

Relaxation allowance is an addition to the basic time intended to provide the worker with the opportunity to recover from the physiological and psychological effects of carrying out specified work under specified conditions and to allow attention to personal needs. The amount of allowance will depend on the nature of the job. A contingency allowance is a small allowance of time which may be included in a standard time to meet legitimate and expected items of work or delays, the precise measurement of which is uneconomical because of their infrequent or irregular occurrence. In this case the allowances for study was taken based on the allowances provide by the company. Allowances used were taken from the work study conducted by KSPC (Kerala State Productivity Council) at Milma, Punnapra.

3.1.2 Performance rating

Rating is a technique used to assess the speed and "effectiveness" of an operator based on three things:

- Effort
- Speed of movement
- Effectiveness

Rating is subjective and relies on the skill of the observer carrying out the rating exercise and the observer's concept of the rate of working relative to a standard of 100%. In this study the rating of the workers selected are taken as 100 % as the workers are selected purposefully for setting standards for other workers to follow.

3.2. Manpower assessment

The manpower required for the production department will be calculated using the standard time calculated from time study and the work volume for the certain task for a particular shift. In case of processes where the output per shift varies the average output per shift will be used for calculating the manpower requirement for this purpose the output from the previous months will be used. Appropriate leave and off-reserve percentages will not be considered as the assembly workers are working on a daily wage basis.

IV. RESULTS

The current manpower allocation of the company was analysed from the data records in the company. There are 75 workers working in ten tasks at the production department that are being studied. Workers are distributed as follows:

Table 1. Current manpower allocation

Section	Present Allocation		
	1st Shift	2nd Shift	total
Milk packing	12	8	20
Tray washing	3	3	6
Tray stacking in cold storage and despatch	7	6	13
Ghee filling, sealing and packing (100 ml)	3	3	6
Ghee filling, sealing (1 l)	4	4	8
Milma plus (200 ml)	4	4	8
Mango Juice filling (250 ml)	3	3	6
Ghee labelling and packing (1l)	2	2	4
Milma plus labelling and packing	2	2	4
Present total			75

Time study is being used to find the standard time. Time study is also called work measurement. It is essential for both planning and control of operations. Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out specified jobs at a defined level of performance or at a defined rate of working qualified worker is one who has acquired the skill, knowledge and other attributes to carry out the work in hand to satisfactory standards of quantity, quality and safety. Defined rate of working is the amount of work that can be produced by a qualified worker/employee when working at normal space and effectively utilizing his time and where work is not restricted by process limitation. Time study is a direct and continuous observation of a task, using a timekeeping device (e.g., decimal minute stopwatch, computer-assisted electronic stopwatch, and videotape camera) to record the time taken to accomplish a task.

The manpower required for the production department will be calculated using the standard time calculated from time study and the work volume for the certain task for a particular shift. In case of processes where the output per shift varies the average output per shift will be used for calculating the manpower requirement for this purpose the output from the previous months will be used. Appropriate leave and off-reserve percentages will not be considered as the assembly workers are working on a daily wage basis. The total number of workers currently working at the production department for the ten tasks chosen are 75 workers including both the shifts.

Table 2. Standard time and manpower obtained

section	Standard time (mts)	present allocation			proposed allocation		
		1st	2nd	total	1st	2nd	total
Milk packing	0.61	12	8	20	12	8	20
Tray washing	0.12	3	3	6	2	2	4

Tray stacking in cold storage	0.223	7	6	13	5	4	9
Tray Loading For Despatch	0.12						
Ghee filling, sealing and packing (100 ml)	0.18	3	3	6	3	3	6
Ghee filling, sealing (1 l)	2.80	4	4	8	4	4	8
Milma plus (200 ml)	0.571	4	4	8	3	3	6
Juice filling (250 ml)	0.38	3	3	6	3	3	6
Ghee labelling and packing (1l)	0.895	2	2	4	2	2	4
Milma plus labelling and packing	0.552	2	2	4	2	2	4
		Present total		75	**Proposed total**		67

In this project, a work study was conducted to analyse the current manpower requirement also find standard time for tasks in the production department of central products diary, Punnapra The data collected was analysed to determine the standard time and manpower requirement for different tasks. The results of the study showed that there was an excess of 8 workers at the ten tasks selected from the production department. The workers at the production department are daily waged workers so the while implementing the new manpower which has been found either we can reduce the number of new workers being hired as this process of hiring happens after every 127 days of labour. Another method would be to conduct a work study at the other departments and check if there are any short comings in terms of workers so that the workers discharged can be placed in other places in other departments.

4.1. Suggestions and recommendations

- There is a need to change the packing roll for milk packing machine after every 3hr and 15 mints and even though the time taken for changing the roll is un avoidable the time taken for bringing roll from the store can be avoided by placing the required rolls for the day nearer to the machines
- The capping machine for ghee is having some mechanical trouble and the caps get jammed in the machine after every 22.3 minutes causing a break in the ghee filling process which can be avoided by repairing the capping machine.
- All the ghee jars are not imprinted with the labels. By using label imprinted jars the time used for labelling manually can be avoided resulting in increase in the production for ghee.
- In the tray washing section three workers are working in a single shift which can be reduced to 2 workers by removing the third activity in tray washing i.e. loading the washed trays to packing conveyor. By some mechanical adjustments the trays can be made to directly pass on to the packing conveyor without any human help.
- The number of workers currently employed for stacking and despatch activities in 1^{st} shift is 7 and second shift is 6.From studies conducted the required number is found to be 5 in 1^{st} shift and 4 in second shift. There is an excess of 4 workers
- The number of workers currently employed for Milma plus activities in 1^{st} shift is 4 and second shift is 4.From studies conducted the required number is found to be 3 in 1^{st} shift and 3 in second shift. There is an excess of 2 workers.
- The number of workers currently employed for tray washing activities in 1^{st} shift is 3 and second shift is 3.From studies conducted the required number is found to be 2 in 1^{st} shift and 2 in second shift. There is an excess of 2 workers.

4.2. Cost and benefits

- The roll change happens after every 3hr and 15 minutes i.e. per shift roll change happens two times for each head. In the first shift number of heads used is 12 and second shift it is 8.for every roll change it takes 5.83 minutes to transfer two new roll to the packing machine as a result there is a loss of a total of 116.6 minutes.as an alternative the rolls

required for the day's work can be placed in a small room nearer to the work place i.e. the room for the supervisors which will reduce the time to 30 sec i.e. 0.5 minutes and loss can be reduced to 10 minutes. Which will result in an increase of 360 packets of milk packed per day.

- The capping machine for capping the ghee gets jammed after every 22.3minutes and it takes 0.578 minutes to resume the operations as a result there is a loss of 10.1 minutes in every shift i.e. a total loss of 20.2 minutes per day.by eliminating the above mentioned problem 56 more jars of ghee can be produced.
- The 1litre capacity jars for ghee filling is not labelled in advanced like rest of the jars they are manually labelled later after filling which takes 0.79 minutes per bottle. Which can be avoided by switching to pre labelled jars.as a result the manpower required for labelling can be avoided i.e. two workers per day that means a profit of Rs 1300 as the assembly workers are paid 650 per shift.
- In the tray washing section currently 3 workers are working per shift from the studies conducted the number of workers required was found to be only 2 per shift the third worker who is transferring the trays from the belt conveyor of the tray washing machine to the belt conveyor of packing section can be avoided by making some mechanical adjustments. Which means 2 workers can be avoided per day i.e. a profit of Rs 1300 per day.
- From studies conducted the required number of workers is found to be 5 in 1st shift and 4 in second shift for stacking and despatch activities. There is an excess of 4 workers i.e. a profit of Rs 2600 per day
- The number of workers currently employed for Milma plus activities in 1st shift is 4 and second shift is 4.From studies conducted the required number is found to be 3 in 1st shift and 3 in second shift. There is an excess of 2 workers.ie a profit of Rs 1300 per day.
- The total savings that will be made after making the changes suggested will be Rs 6,500 per day that means a profit of 1, 95,000 in a month. Also there will be an increase of 360 packets of milk packed per day and 56 jars of 1L ghee per day.

V. CONCLUSIONS

Better productivity means an optimal use of the workforce, better estimates of costs, high morale of employees and better relationships in the enterprises. In this project, a work study was conducted to analyse the current manpower requirement also find standard time for tasks in the production department of central products diary, Punnapra. Initially a pilot study was conducted and discussions were carried out with management officials. Based on the pilot study the framework was prepared for further study. Based on a data collection plan the data were collected during a period of one month. The data collected was analysed to determine the standard time and manpower requirement for different tasks. The results of the study showed that there was an excess of 8 workers at the ten tasks selected from the production department. This frame work can be used by other diaries if necessary. It is concluded that new ideas, tools, techniques, concepts and models should be tested to improve the productivity of diaries. The use of advanced approaches in a competitive world offers significant potential for improving the productive efficiencies of diaries.

REFERENCES

[1] Mahesh Naidu., "Application Of Time Study Technique- A Case Study Of Alloy Wheel Industry," International Journal of Research In Science & Engineering, vol 4, pp. 237~240, 2018.
[2] Sujay Biswas,"Improving Productivity Using Work Study Technique," International Journal of Research in Engineering and Applied Sciences, vol. 6 , pp. 49~55, 2017.
[3] M. P. Singh, "Improvement In Process Industries By Using Work Study Methods: A Case Study," International Journal of Mechanical Engineering and Technology, vol 7, Issue 3 pp. 426~436, 2016.
[4] Satish Keru Raut, "A Case Study of Productivity Improvement by using IE Tools," International Journal Of Innovations In Engineering Research And Technology, vol 1, pp. 169~185, 2016.
[5] Gyanendra Prasad Bagri, "Productivity Improvement Of Forging Section Using Work Study And Automation In Existing Axle Manufacturing Plant," International Journal of Mechanical And Production Engineering, vol 6,pp. 523~533,2016.
[6] A. Sai Nishanth Reddy, "Productivity Improvement Using Time Study Analysis In A Small Scale Solar Appliances Industry- A Case Study" ARPN Journal of Engineering and Applied Sciences, vol 11, pp. 666~674, 2016.

