WORK MEASUREMENT AND MANPOWER PLANNING IN PROCESSED BIRD PACKING

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Abstract: The aim of this project is to study the work measurement and manpower planning in processed bird packing unit in an industry for food processing, where poultry is the main business. In this study, it was found the marinating unit in the company was facing problems with production delays due to poor manpower arrangement. In order to overcome these problems, the workforce productivity was measured using work measurement method. The objective of this research is to study the manpower efficiency at marinating unit. Time study was used as the method for work measurement. New manpower planning schedule was designed to increase the daily production in line with the company Key Performance Index for the marinating unit.

Keywords: *Work Measurement, Time Study, Manpower Planning*

1. Introduction

Company wants to increase output as the management is targeting on achieving its goal of generating 240,000 birds per day. However, the company faces delays in certain section making it difficult for the company to reach its daily target. One of these sections is the marinating unit. Workers are not able to achieve the target which is 8 packs per minute in order to meet the desired level of production daily. On a daily basis there has been an increase in overtime to unsure targeted daily production is achieved. Due to these scenarios the production team decided to study on arrangement of manpower in marinating unit as the current one is inefficient. Work measurement is one of effective tool to increase productivity of a company which is the aim of company after moving to a new production plant. Work measurement is a technique that measures the time of a qualified worker with necessary skills, knowledge and physical strength to perform a specific task or job (Abdul and Daiyanni, 2010). Time study is one of the work measurement technique where time taken for worker to finish a particular task under certain condition is recorded (Duran et al., 2015). The objectives of this study were to study the manpower efficiency at marinating unit of DPP, to design a new manpower planning schedule and to analyse productivity data before and after implementation of the new manpower planning schedule.

2. Methodology

2.1 Time Study

Time study is useful for determination of time required for skilled worker to perform a task while working at an average pace (Lusia, 2016). International Labour Organization describes time study is one of the work measurement technique where time taken for worker to finish a particular task under certain condition is recorded. Time study is useful technique to increase

the productivity by determining standard time (Lusia, 2016). Time study is used to dissect a procedure by competent workers with the aim of locating the most time-consuming productive routes. The time is usually estimated using snapback stopwatch technology because information collection is simpler, faster and used to generate accurate information (Wajiga and Ndaghu 2017). It allows the time of the part to be recorded conveniently on the timesheet without subtraction. This stopwatch method is using the speed rating. Speed rating is a tool to determine the fast and slow worker. Each worker will be given the same task for processed bird packing. The number of pieces packed by a worker in one minute will be recorded for every worker. From this, the speed of performing the task and performance level of each worker will be known. There will be four workers performing packing task positioned in a row to ease the process and make the flow of task smoother. The four packers will be arranged according to their performance level following a decreasing trend. Time study was conducted three times a day.

2.2 P-D-C-A Cycle

The problem-solving method used in this study is PDCA. First, the Plan is to discuss the objectives of this project and the ways to achieve the objectives. Time study was used for work measurement and productivity data was created for data collection and new manpower planning schedule was designed. The second is Do which is implementation of new manpower planning design. The third is Check which is set the time for data analysis and results obtained from after the implementation of new manpower planning design. Lastly is Act where some changes were made to the new manpower planning until the new manpower planning design has successfully increased the number of packs packed by each worker in a minute and able to reach the target which was 8 packs per minute (Mindtools, 2020).

2.3 Processed Bird Packing Layout and Manpower Planning

Figure 1 shows the current layout of processed bird packing group has total of seven workers doing several different tasks. Firstly, the task of a grader is to sort and grade the chicken parts where chicken parts will be sorted into 4 different parts and damaged parts will be rejected. Next task is done by packer where the sorted chicken parts will be packed inside a food packet. Moving on to the next task will be done by the sealer where the food packet will be sealed using a hot temperature sealing machine. Two graders are positioned at two corners of the tote bin facing each other. Three packers are positioned at one side of tote bin (P1, P2 and P3) and another packer (P4) is positioned next to one of the graders on the left side. The sealer is positioned next to the packer and grader on the left side. The problem with this layout is the position of the packer stationed next to the grader on the left side. The flow of the packing task takes more time due to the position of P4. The time to pass on the packet between P3 and P4 takes longer time because P4 is stationed far from P3. The distance between P3 and P4 is longer than the distance between P2 and P1, P2 and P3.

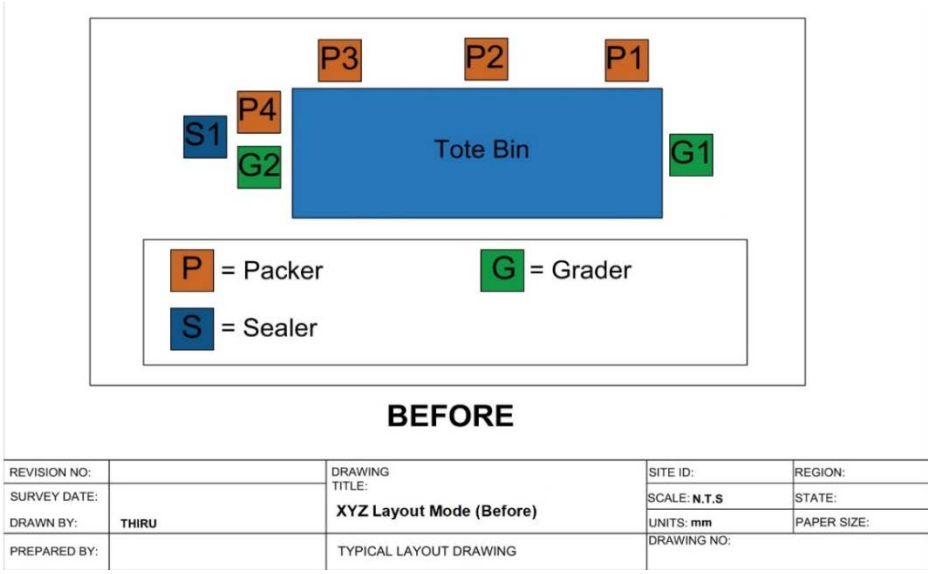

Figure 1. Processed bird packing layout before manpower planning

Figure 2 shows several changes made to the new proposed layout considering that some packers could not reaching the target number of packs. Initially, P4 was stationed next to Grader (G2) and away from other packers. To ease the flow of the packs from one packer to another, P4 was placed in the same row as the other packers. The sequence of workers was arranged in increasing order of task performance. First packer must be the fastest and with best task performance. When the first packer packs fast, it will provide more time for other packers with lower level of task performance to finish their task and the whole process will be done at faster pace. Hence, the sequence of packers in newly proposed layout was P2, P1, P3 then last worker will be P4.

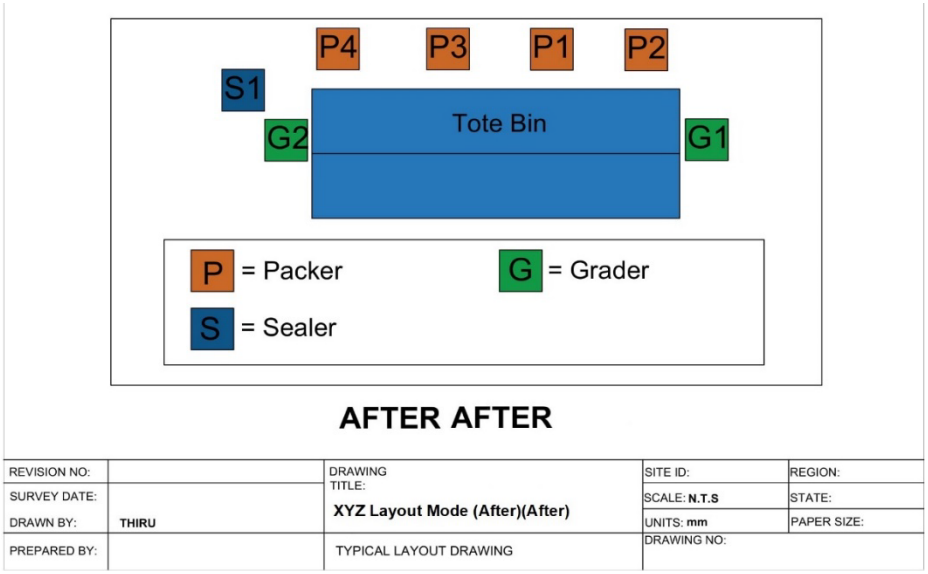

Figure 2. Processed bird packing layout after manpower planning

2.4 Data Collection

The data on efficiency were determined by the work. The data collected 3 times per day are performance results. Data sheet was used to record the number of packs packed in one minute by P1, P2, P3 and P4. Three readings were taken to get average per session. Three session were included in the data sheet together with number of manpower. Data was collected at different timing as the work performance differs throughout the day. It took nearly five weeks to collect the data. Test data was collected for 1 week and exact data was collected for 4 weeks. First 2 weeks of data collection was done before the implementation of manpower planning. The data were then analysed to design a new manpower planning schedule. The next 2 weeks of data collection was done after the implementation of new manpower planning. Test data was taken to verify that data is collected in the correct way and at the right time. The stopwatch was used for data collection in this project.

3. Results and Discussion

The percentage was calculated to find the difference between the average number of packs packed by each worker in week 1 before manpower planning and after manpower planning. Percentage difference will show the outcome trend of the manpower planning to find out the effectiveness of implementation of manpower planning as refer to Equation 1 (Yusoff et al., 2012).

$$Percentage\ difference = \frac{Difference\ (week\ 1\ after - \ week\ 1\ before)}{week\ 1\ before} \times 100\ \% \quad (1)$$

Table 1 tabulates the percentage differences of effectiveness in week 1 after manpower planning implementation.

Table 1. Difference between average of week 1 before manpower planning and after manpower planning and percentage increase.

Descriptions	P1	P2	P3	P4
Average for Week 1 before manpower planning	7	8	7	6
Average for Week 1 after manpower planning	11	12	11	10
Difference (week 1 after - week 1 before)	4	4	4	4
Percentage (%)	**57.14**	**50.00**	**57.14**	**66.67**

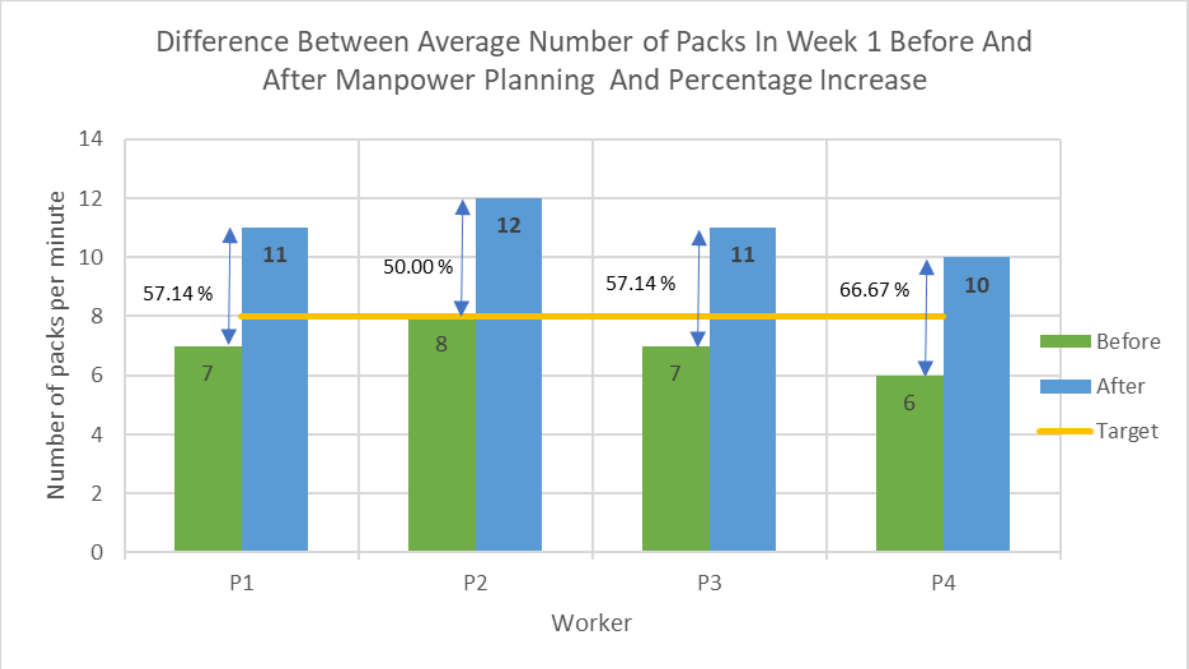

Figure 3. Average number of packs per minute in week 1 before and after manpower planning for P1, P2, P3 and P4 with percentage difference

Figure 3 illustrates the graph of average number of packs per minute in week 1 before and after manpower planning for P1, P2, P3 and P4 with percentage difference. The average packs per minute in week 1 for P1 has increased by 4 packs after manpower planning. It has increased 57.14 % compared to week 1 before manpower planning. The average number of packs for P2 has gone up to 12 packs per minute and has increased 50 % compared to week 1 before manpower planning. As for P3, the average number of packs has elevated from 7 packs per minute to 11 packs per minute by 4 packs after manpower planning which increased 57.14% compared to before manpower planning. Average number of packs for P4 has increased dramatically by 66.67% after manpower planning. The average increased form 6 packs per minute to 10 packs per minute, considered as the evidence for success of manpower planning.

Table 2 tabulates the percentage differences of effectiveness in week 2 after manpower planning implementation.

Table 2. Difference between average of week 2 before manpower planning and after manpower planning and percentage increase.

Descriptions	P1	P2	P3	P4
Average for Week 2 before manpower planning	8	9	8	6
Average for Week 2 after manpower planning	11	12	10	10
Difference (week 2 after - week 2 before)	3	3	2	4
Percentage (%)	**37.50**	**33.33**	**25**	**66.67**

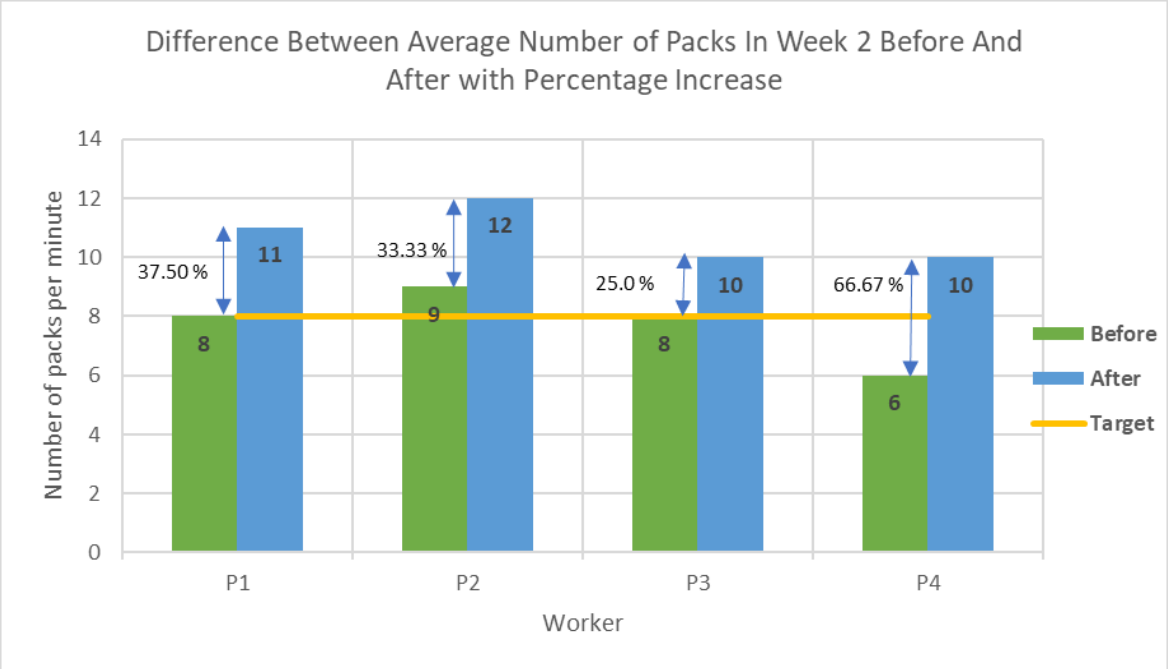

Figure 4. Average number of packs per minute in week 2 before and after manpower planning for P1, P2, P3 and P4 with percentage difference.

Figure 4 illustrates the graph of average number of packs per minute in week 2 before and after manpower planning for P1, P2, P3 and P4 with percentage difference. The average number of packs in week 2 for P1 has increased from 8 packs per minute to 11 packs per minute which has increased by 3 packs and 37.50% after manpower planning. As for P2, the average has increased by 3 packs, 33.33% from 9 packs per minute to 12 packs per minute after manpower planning. Moving on to P3, the average has increased by 25% from 8 packs per minute to 10 packs per minute in week 2 after manpower planning. P4 has shown dramatic increase in average number of packs from 6 packs per minute to 10 packs per minute equivalent to 66.67%.

4. Discussions

In week 1 after implementation of manpower planning, percentage increase is more than 50% for all 4 workers. The difference between number of packs packed in a minute in week 1 before and after implementation of manpower planning is 4 packs per minute for all 4 workers. As for week 2 after manpower planning, the percentage increase is between 25% to 38% for 3 workers compared to week 2 before manpower planning. Difference in number of packs packed per minute in week 2 after manpower planning is 2 to 3 packs per minute for 3 workers. P4 has shown highest increase in average number of packs from 6 packs per minute to 10 packs per minute equivalent to 66.67% in week 1 and week 2 after manpower planning. As a result, productivity has increased and issue with overtime has been solved with reduced overtime among workers.

5. Conclusion

All the objectives of this project had been successfully achieved. Time study as work measurement was suitable method to observe workers activity and performance. The productivity data obtained from time study was useful to clearly point out the problems which

was the manpower arrangement. Manpower planning is important in an organization where it helps in optimize the use of human resources available. In this project, new manpower planning design was a success. It successfully helped in making a massive change in productivity data after the implementation of new manpower planning schedule. The new manpower planning design has successfully increased the number of packs packed by each worker in a minute and able to reach the target which was 8 packs per minute which solved the problem faced by the company.

References

Abdul, T B., and Daiyanni D. (2010). Time motion study in determination of time standard in manpower process. *3rd Engineering Conference on Advancement in Mechanical and Manufacturing for Sustainable Environment*. 1-6.

Duran, C., Cetindere A. and Aksu, Y. E. (2015). Productivity Improvement by Work and Time Study Technique for Earth Energy-glass Manufacturing Company. Procedia Economics and Finance. 26: 109–113.

Lusia P. S. H. (2016). Work Measurement Approach to Determine Standard Time in Assembly Line. International Journal of Management and Applied Science (IJMAS). 2(10): 192-195.

Mindtools. (2020). Plan-Do-Check-Act (PDCA): Continually Improving, in a Methodical Way. Retrieved at https://www.mindtools.com/pages/article/newPPM_89.htm on 10 December 2019.

Wajiga, H. and Ndaghu J. T. (2017). Significance of manpower planning for effective utilisation of human resources in an organisation: A conceptual approach. International Journal of Business and Management Invention. 6(8):16-22.

Yusoff, N., Jaffar A., Abbas N. M. and Saad N. H. (2012). Work Measurement for Process Improvement in the Car Seat Polyurethane Injection Manufacturing Line. Procedia Engineering. 41:1800–1805.