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Research Article

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Measuring Workforce Quantity by using Workload Analysis and Full Time Equivalent Method

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Abstract The purpose of this research is to identify workload and effective working time at development department particularly Junior Research Assistance division in a footwear company. Thus, be able to know workload distribution between each employee, influencing factors, and to identify whether the operator at development department has been complied to proceed an order to production side based on marketing confirmation. The research used FTE (Full Time Equivalent) method to identify workload index of development department, by comparing effective working time used to accomplish sort of works and available ineffective working time. Measuring working time by using work sampling means to have direct observation and measuring productive time and unproductive time used within working hours. Defining allowances value and adjustment factor then recapping FTE index result. According to the research result applied to 5 employees, FTE value was more than 1.28. This means that the applied workload has exceeded the limit. Therefore, new 5 of Junior Research Assistance employees need to be added to comply with existing workload.

Keywords Full Time Equivalent, workload, workload analysis, work sampling

Introduction

A company strategy in establishing its competitive advantage has become key factor to survive in global competition. In relation to company strategy, it deals with company capability in developing and in managing owned resources (assets). To ensure human resources empowerment as competent, effective and efficient task force, it is needed to set up proper quantity in each division and organization structure. There are two purposes to achieve effective and efficient resources management, to achieve company's goal and to fulfil manpower objective. Company's goal consists of high productivity level and output which comply with organization objective. Meanwhile, to fulfil manpower objective can be represented by compensation, working satisfaction and personal workload. When both of purposes achieved by a company, it means that human resource management has run in effective way [1].

Workload which can be applied to employee may vary in three different situation, they are normal workload (fit), overload and underload. Too high or too low workload may lead to work inefficiency. The overload indicates that workforce quantity is not match with applied workload which may turn to physical or psychological fatigue and later will cause productivity declining. Meanwhile, the underload may indicate too many assigned workforce so that company has to allocate additional cost to pay employee salary at the same level of productivity. This situation will create cost inefficiency [2]. There was a phenomena at development department which has unbalanced workload which forced an employee to resign every month. That huge workload has also made an employee failed to take a break on time. According to explained phenomena, workload measurement is needed to identify the optimum level of employee quantity, yet to optimize employee working performance. In order to ensure each work responsibility can be accomplished completely and successfully, employee workload and work efficiency need to be optimized. An approach which can be used is

to conduct workload analysis and related affecting factor. Sastrohadiwiryo shares the purpose of workload analysis is to (1) acquire the right man on the right place, (2) acquire employee self-esteem (3) establish productive working environment. According to Sastrohadiwiryo, the common method usually used to do work analysis is questionnaire method, interview method, routine recording and observation method. [3]. During April 2018 to March 2019,employee resignation was usually happened. In August 2018, there was 4 employee resigned, the highest level thus far.

Survey Literature

Workload

According to [4], workload analysis is carried out to identify required time for employee to accomplish particular work. By doing this analysis, it is expected that workforce needed to accomplish particular work whether in a working unit or department or division or even in a company can be defined accordingly.

Full Time Equivalent Method

Full Time Equivalent (FTE) method is a method to measure workload by comparing the required time to accomplish particular work and effective work time [5]. Basically, FTE deal with required workforce to accomplish all transaction from a process in certain period of time. FTE is a ratio which describe as total working hours during 40 working hours. In other words, employee's 40 working hours is assumed for a week.

Table 1: Workload Criteria Index

No	Index	Criteria	Remark
1	0-0,999	Underload	Workload is smaller than capability of at least an employee or workload is at minimum level
2	1-1,280	Inload	Workload is equal to an employee capability
3	> 1,280	Overload	Workload is greater than capability of at least an employee or its workload can be actually carried out by more than one employee

FTE value of working process can be measured by this following equation:

$$FTE = \frac{\text{total working time}}{\text{Annyal effective working time}}$$

To proceed operator workload analysis, these are several stages of workload measurement by using

Full Time Equivalent method according to Physiology and Work Measurement Module2016 / 2017 [6] :

a. Define annual employee working time
b. Define daily employee working time, such as 8 working hours per day
c. Define weekly employee working time
d. Define annual employee leave time and national holiday
e. Define employee status (Daily, Sub-contract or Training)
f. Define work element
g. Measure standard time, cycle time and normal time

Research Methodology

Research methodology was needed to measure FTE index and to identify ideal workload by applying several stages as shown in the following flow chart:

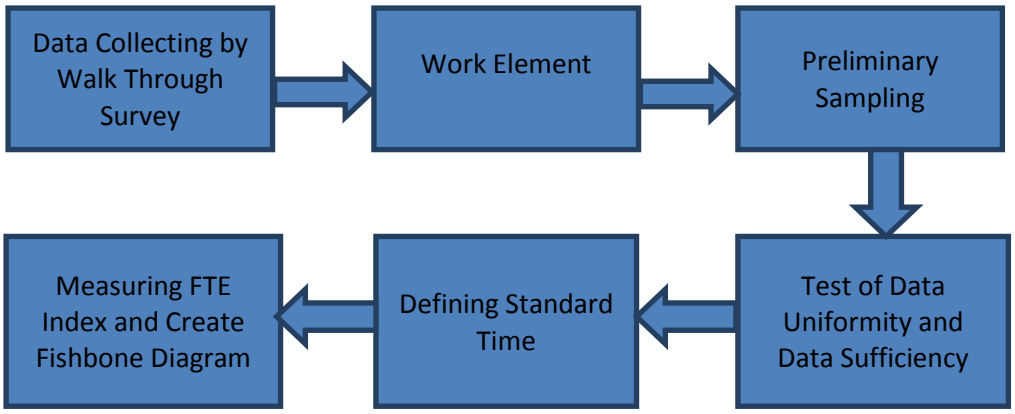

Figure 1: Research Steps Using the FTE Methodology

Result and Discussion

Work Element

The research consisted of productive work element, productivity, effective working time and workload for research subject complied with FTE index. For Junior Research Assistance work element, it is divided into 2 main activity, they are productive and non-productive activity. Work element separation may identify the distribution of each respected activities.

Table 3: Work Element

No	Main Work Element
1	Analysis Method Briefing
2	Prepare required equipment and reagent
3	Prepare needed laboratory instrument
4	Prepare moving phase / dissolution and diluent media
5	Prepare standard checking
6	Prepare sample
7	Proceed analysis result and set the report
8	Place the used equipment on a sink

Sampling and Standard Time

According to observation, the research subject has frequently found difficulties in preparing lots of required equipment, it is because of limited equipment available currently and have to share to each other who need the same equipment. There are several calculation steps needed prior to defining standard time such as productive percentage, data uniformity test and data sufficiency test. This following figure is the observation result for 5 research subject.

Table 4: Employee Productive Percentage

Initial	% Productive
X1	85.93
X2	92.18
X3	93.75
X4	93.75
X5	84.37

FTE Index

FTE may simplify work measurement by converting workload to required workforce to accomplish particular job. As discussed previously, FTE index were consisted of 3 level :0 - 0.99 for underload, 1 - 1,28 for in-load, and greater than 1,28 for overload. According to data processing, all subject has got FTE index greater than 1,28. It is indicated that workload has exceeded the limit.

Table 5: FTE Index Summary

Initial	FTE Index	Remark
X1	1.86264165	Overload
X2	1.90491749	Overload
X3	1.92121875	Overload
X4	1.69738083	Overload
X5	1.60104438	Overload

Refer to the table above, X3 has the biggest FTE index at 1.921. According to observation project parameter which has been done by AUA for two days consecutively, this parameter required longer stages yet longer process. High level of index indicated an overloaded work. During observation, there were several things which caused additional workload for *Junior Research Assistance* such as too many sample with longer preparation stages, limited equipment and reagent needed for analysis process and troublesome laboratory instrument during analysis process.

Fishbone Diagram

To have further analysis of the subject, the researcher used Fishbone Diagram to analyze potential reason which causing work overloading, as explain in this following figure :

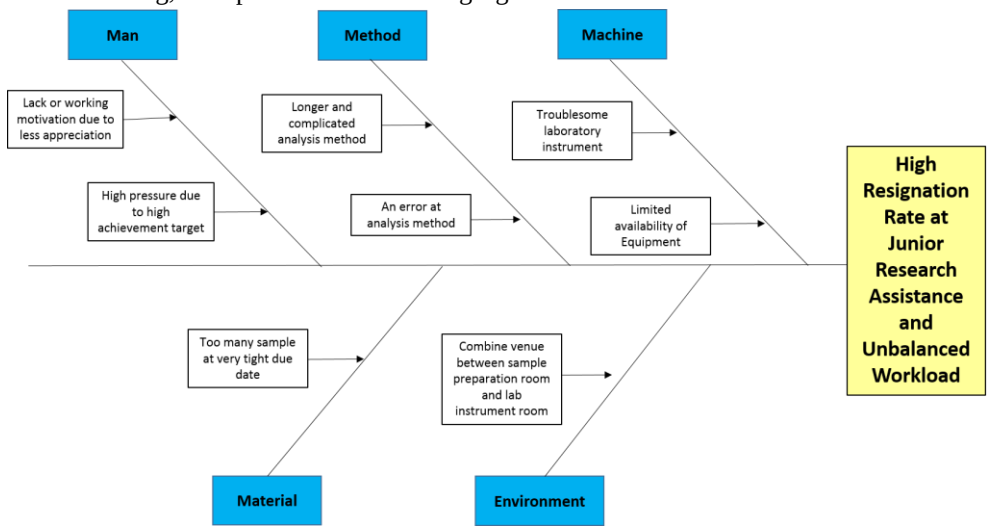

Figure 2: Fishbone Diagram

According to analysis method, some mistyping occurred which caused longer analysis stages due to un-match and invalid result, thus repeated analysis had been applied. The improvement for analysis method was needed to avoid similar mistakes. Insufficient laboratory equipment, a huge of sample to be analyzed required more equipment in hand. However, it can't be fulfilled accordingly which made the research subject had to find and borrow from other laboratory. It took several time yet longer analysis duration. The company should have fulfilled those required equipment. There were troublesome laboratory instrument due to lack of maintenance treatment.

Conclusion

a. According to accomplished research at development department in a footwear company in West Java said that workload for 5 research subject was overload. The FTE indexareX1 1.86 , X2 1.91 , X3 1.92 , X4 1.69 , X5 1.60. It showed that the work load has been given was exceeded the limit. The highest workload index was on X3 at 1.92.It caused by analysis parameter which had been done at the observation was at the solution which had a long step analysis parameter.

b. It is also obtained the working time which has been used by research subject within one year to deal with their work. The working time was the measurement result of productive time calculation, cycle time calculation, normal time calculation and standard time calculation which had been accumulated for one

year. The value is as follow X1 3546.47 hours, X2 3641.34 hours, X3 3658 hours, X4 3231.56 hours, X5 3048.39 hours.

c. According to workload measurement by using Full Time Equivalent method, all of research subject index was greater than 1,28 which meant overload. Thus, to accomplish working target which has been given by the company, it becomes a mandatory task to add other 5 employees for *Junior Research Assistance* to become 10 employees.

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