WORK DESIGN AND ANALYSIS
IE 441
LABORATORY MANUAL

LAB – 6

WORK SAMPLING

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Objectives:

The objective of this assignment is to give you some practice with work sampling.

Introduction:

Work sampling is based upon the laws of probability. A sample taken at random from a large group tends to have the same pattern of distribution as the large group or universe. If the sample is large enough, the characteristics of the sample will differ but little from the characteristics of the group. Sample is the term used for the large group. Obtaining and analyzing only a part of the universe is known as sampling.

Methodology:

The bars on sheet 2 represents to scale the 240 minutes of the forenoon and the afternoon for five working days (Monday through Friday) a full 40-hour (2400-minutes) week. The results of a continuous time study of one operator for one week are shown. White = working time; Black = idle time

The total actual working time for the week from time study = 2035 minute.
The total idle time for the week from time study = 365 minute
Percentage working time = 2035/2400 X 100 = 84.8%
Percentage idle time = 365/2400 X 100 = 15.2%

Now see how you can obtain similar information by the use of random sampling. You can make your own random observations by following the instructions.

1. Draw at random 20 vertical marks across each of ten Bars shown on given sheet. Do not space the marks at regular intervals-space them randomly along the entire length of the line.
2. These marks represent 20 random observations made of the operator during the forenoon and the afternoon.
3. Now count the number of times your marks intersects black portion of the bars and post this number in the box at the end of the line.
4. Then add the number of idle observations and divide this total by 200. This gives you the percentage of the week that the operator was idle by the random sampling procedure.
5. Now compare your answer with the actual idle percentage of 15.2 percent, which was originally obtained by time study.

Calculations:

1. Determination of Accuracy for given no. of observation.
1. After the study is completed, a calculation is made to determine whether the results are within the desired accuracy. This can be done by calculating S in the following formula.

$$Sp = 2\sqrt{\frac{p(1-p)}{N}}$$

S = desired relative accuracy
p = percentage expressed as a decimal
N = number of random observations (sample size)

2. Assume that a confidence level of 95 percent and an accuracy of ±5 percent. Calculate the No. of sample size required.

2. Determining time standards by work sampling

$$\text{Standard time per piece} = \frac{\left(\begin{array}{c}\text{Total time}\\\text{in minutes}\end{array}\right) \times \left(\begin{array}{c}\text{Working time}\\\text{in per cent}\end{array}\right) \times \left(\begin{array}{c}\text{Performance index}\\\text{in per cent}\end{array}\right)}{\text{Total number of pieces produced}} \times \frac{100}{100 - \text{Allowances}}$$

Assume: -
  Total time = 2400 min. per week
  Number of part produced = 330 parts per day
  Working time in percent = from sampling sheet
  Average performance index = 110%
  Total Allowances = 15%

Format for Lab Report:

Cover Page is Title page as your choice.
2nd page
  - Introduction – 5 to 7 lines.
  - Methodology – 10 to 15 lines
3rd page
  - Calculations.
4th Page
  - Results
  - Conclusion

Attach Sampling sheet