Work Sampling

Sections:

1. How Work Sampling Works – **part 1**
2. Statistical Basis of Work Sampling – **part 2**
3. Application Issues in Work Sampling – **part 3**

Work Sampling Defined

Statistical technique for determining the proportions of time spent by subjects in various defined categories of activity

- Subjects = workers, machines
- Categories of activity = setting up a machine, producing parts, idle, etc.
- Work sampling study involves:
  - large number of **observations** for subjects
  - extended period of **time**
  - finding **proportion of time** in each activity category based on proportion of observations in that category

Work Sampling Defined

- For statistical accuracy:
  - Observations must be taken at **random times**
  - Period of the study must be **representative of** types of **activities** performed by subjects
- Work situations well-suited for work sampling:
  - Sufficient time available to perform study (usually several weeks)
  - Multiple subjects
  - Long cycle times
  - Non-repetitive work cycles
    - i.e. various tasks (not just one task)
    - work activities divided into categories

Work Sampling Defined

- When *not* to use Work Sampling
  - highly repetitive jobs
    - with short cycle times
    - performed by one worker
  - jobs requiring immediate measurement of task
  - in such cases use other techniques (DTS, SDS, PMTS)
- Other names used for work sampling:
  - activity sampling
  - occurrence sampling
  - ratio delay study
  - snap reading method* (*reading assignment 1*)

Work Sampling

1. How Work Sampling Works

Work Sampling Applications

- **Machine utilization**
  - how much time is spent by machines in various categories of activity (e.g. 1)
  - e.g. setup, production, downtime, etc.
- **Worker utilization**
  - how workers spend their time in various activities
- **Allowances for time standards**
  - assessment of delay components in PFD allowance factor
  - e.g. delay components*: machine malfunctions, downtime, other interruptions

Work Sampling Applications

- **Average unit time**
  - determining the average time on each work unit
  - given: number of units produced during work sampling study
- **Time standards**
  - used in certain work situations (e.g. office work)
  - note, work sampling provides limited statistical accuracy
    - $\Rightarrow$ standards set by WS should not be used for incentive pay work

Example 1: How Work Sampling Works

- A total of 500 observations were taken at random times during a one-week period (40 hours) on 10 machines with results shown below.

Category	No. of observations
(1) Being set up	75
(2) Running production	300
(3) Machine idle	125
	500

- How many hours per week did an average machine spend in each category?

Example 1: Solution

- Proportions of time determined as number of observations in each category divided by 500
- Time in each category determined by multiplying proportion by total hours (40 hr)

Category	Proportion	Hrs per category
(1) Being set up	75/500 = 0.15	0.15 x 40 = 6
(2) Running production	300/500 = 0.60	0.60 x 40 = 24
(3) Machine idle	125/500 = 0.25	0.25 x 40 = 10
	1.00	40