Project Estimation Techniques.

The most commonly used 2 matrices that are used for estimating the,

1) Lines of Code (LOC)
2) Functional Point (FP)

In case of LOC, the project size is estimated by counting the no. of source instructions in the program. While counting this no., comment line & header lines are ignored. Calculating LOC is easier at the end of the project but estimation process are carried out during the initial phase of the project that makes this process a challenging one. In order to estimate the LOC in the beginning of the project, the project is divided modules, modules are divided into sub-modules & & this process of dividing is followed until the leaf-level module is obtained.

Estimating the size of leaf-level module is easier since such a module works for a specific task. From Summation of LOC

of such leaf-level modules together provides us an estimated LOC of the software.

Calculating the estimation through LOC needs modularisation upto unit level & then make an estimation. This process is not accurate & is consisting of few shortcomings. These short-coming can be overcome through functional point estimation.

Here, the no. of functions are counted and size of the S/w can be calculated with the help of problems specification.

* techniques —

Diff. project estimation are classified into:

a) EMPIRICAL ESTIMATION TECHNIQUE   Experience, Judgemental

b) HEURISTIC   → Mathematical

c) ANALYTICAL   → Logical

→ Empirical Estimation Techniques.

These techniques are based on making an educated guess of the project parameters. An earlier experience or exposure in handling similar type of projects is helpful in providing estimations under this category. The 2 approaches carried out for this is —

i) expert judgement technique.
ii) delphi cost estimation

→ **HEURISTIC Estimation Technique** —

• COCOMO → Costructive Cost Estimation Model proposed by Boehm in 1981. This model categorise a project into either organic or semi detached or embedded for carrying out the categorization process.

⟹ **ORGANIC:** A development project can be considered organic if the project deals with developing a well understood application program. The size of the dev. team is reasonably small & team members are experienced in dev. similar types of projects.

⟶ SEMI DETACHED : A dev. project is considered semi-detached if the dev. consist of a mixture of experienced & inexperienced staff. Team members may have limited experience on the project & may be unfamiliar with some aspects of the project.

⟶ EMBEDDED: A dev. project is considered to be an embedded type if the S/w being developed is strongly coupled to complex hardware or if specific regulations need to be followed for operational procedures.

Basic cocomo model can be expressed as

$$EFFORT = a_1 \times (KLOC)^{a_2} \ PM$$

$$Tdev = b_1 \times (Effort)^{b_2} \ Months$$

Effort = total effort req. to dev. the S/w expressed in person month.

KLOC = kilo lines of code

a_1, a_2, b_1, b_2 are constants having diff. values for diff. projects

Tdev = Estimated time to develop S/w to expressed in months.

for organic → $a_1 = 2.4$ $a_2 = 1.05$
$\quad\quad\quad\quad\quad b_1 = 2.5$ $b_2 = 0.38$

Semi detached → $a_1 = 3.0$ $a_2 = 1.12$
$\quad\quad\quad\quad\quad\quad b_1 = 2.5$ $b_2 = 0.35$

Embedded → $a_1 = 3.6$ $a_2 = 1.20$
$\quad\quad\quad\quad\quad b_1 = 2.5$ $b_2 = 0.32$

Example: You need to develop which has been estimated to be 32000 LOC. Assuming that average salary of software engineer is Rs 15000 per month. calculate the effort req. and the development time. Assume the s/w is reasonably small and experienced team members are handling it.

Solution: Since the project is well defined and also handled by experienced members, this is an organic project.
∴ $a_1 = 32.4$ $a_2 = 1.05$ $b_1 = 2.5$ $b_2 = 0.38$

$\underline{Effort} = 2.4 \times (32)^{1.05} = 91\ PM$
$\underline{Tdev} = 2.5 \times (91)^{0.38} = 14\ months$
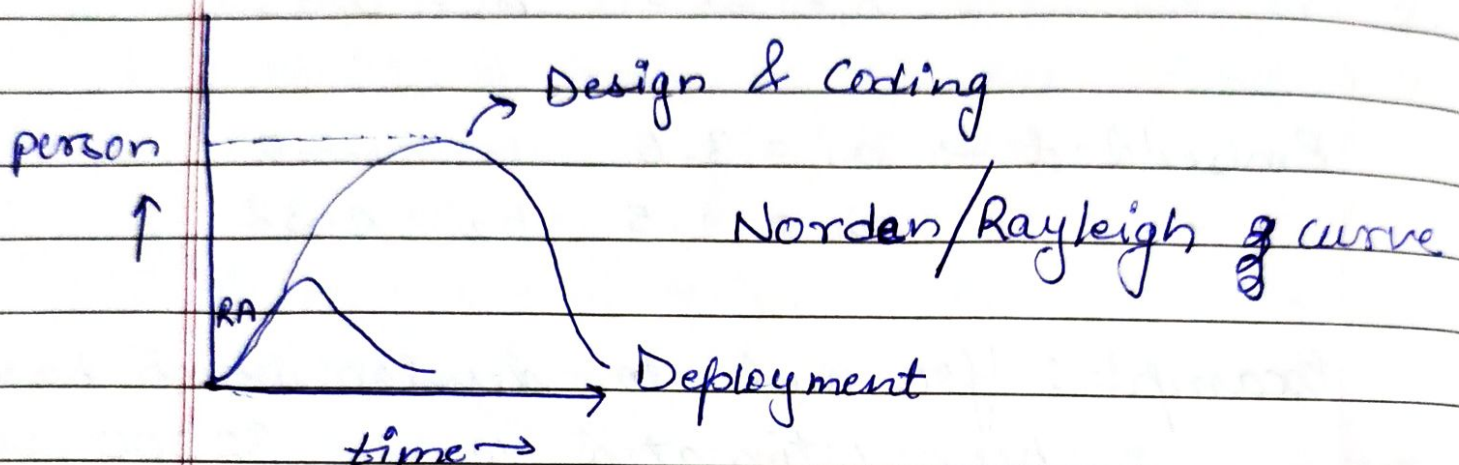
cost req. to dev. the s/w is
$$14 \times 15000 = 2,10,000 \text{ Rs.}$$

* PUTNAM RESOURCE ALLOCATION MODEL

This is used to estimate project, effort &
schedule.
$$L = C_k \, K^{1/3} \, t_d^{4/3}$$

The above expression is used to calculate
productivity level in Putnam resource
allocation model.

K = total effort expended in product
t_d = time required for dev. of project
C_k = constant whose values are 2 for
poor development environment, 8 for
good " " and 11 for excellent

L = product size in KLOC. L is also known for project estimation having the same unit.