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| --- | --- |
| Ex. No: 8 | **ESTIMATION OF PROJECT SIZE USING FUNCTION POINT ANALYSIS & COCOMO MODEL** |
| Date: 27/09/2021 |
| Video Link: | <https://drive.google.com/file/d/1TmRDZgnvQTdGU1oxYWlq5R8TtY2eXoVz/view?usp=sharing> |

**OBJECTIVE**

The objective is to calculate the estimation of project size using function analysis & COCOMO mode.

This document will clearly explain the Function point analysis and COCOMO model for the project E-Learning platform.

**METHODOLOGY**

A project would be fall in one of the scenarios.

1. Much relevant project data is available for the current project but not much information about previous projects.
2. Previous project data ae available for the project but not much information about the current project.
3. Project data are available for the current project as well as that of the previous projects.
4. Some project data are available for the current projects.
5. No project data are available for both current as well as previous projects.

**Estimation Technique Selection Based on Project Information Availability:**

|  |  |  |
| --- | --- | --- |
|  | **Project Details** | **Estimation Technique** |
| 01 | Historical project data & current project data | Function Point Analysis |
| 02 | Current project data | COCOMO, Wide Band, Delphi |
| 03 | No data | No Technique |

**DESCRIPTION**

**(i)Function point analysis**

The function point is a “unit of measurement” to express the amount of business functionality an information system (as a product) provides to a user. Function points are used to compute a functional size measurement (FSM) of a software. The cost (in dollars or hours) of a single unit is calculated from past projects.

**Step-1:** Calculate F where

Scale varies from 0 to 5 according to character of Complexity Adjustment Factor (CAF). Below is the scale:

0 – No Influence

1 – Incidental

2 – Moderate

3 – Average

4 – Significant

5 – Essential

**Step – 2:** Calculate Complexity Adjustment Factor (CAF):

**Step – 3:** Calculate Unadjusted Function Point (UFP) by multiplying each individual function point to corresponding values in the table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Measurement Parameter** | **Weighting factor** | | |
| **Simple** | **Average** | **Complex** |
| No. of user inputs | 3 | 4 | 6 |
| No. of user outputs | 4 | 5 | 7 |
| No. of user inquiries | 3 | 4 | 6 |
| No. of files | 7 | 10 | 15 |
| No. of external interfaces | 5 | 7 | 10 |

**Step – 4:** Calculate Function Point (FP)

FP = UFP \* CAF

Upon Calculating FP, it is used to calculate productivity and cost.

(ii) Basic COCOMO model

The COnstructive COst Estimation MOdel (COCOMO) model gets the number of estimated

lines of code for the project and calculates the overall time and people required for project. The

output differs based on the different project type and the different types of projects are as

follows.

(a) Organic: Relatively small, simple software projects in which small teams with good

application experience work to a set of less than rigid requirements.

(b) Semi-detached: An intermediate, (in size and complexity), software project in which

teams with mixed experience levels must meet a mix of rigid and less than rigid

requirements.

(c) Embedded: A software project that must be developed within a set of tight hardware,

software and operation constraints

The COCOMO models calculates the no of person (effort) and duration using the equations 6 &

7.

where

• KLOC is the estimated size of the software product expressed in Kilo Lines of Code

• a, b, c, d are constants for each category of software products and their values are as follows.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Project type | a | b | c | d |
| Organic | 2.4 | 1.05 | 2.5 | 0.38 |
| Semi-detached | 3 | 1.12 | 2.5 | 0.35 |
| Embedded | 3.6 | 1.2 | 2.5 | 0.32 |

• Tdev is the estimated time to develop the software, expressed in months

• Effort is the total effort required to develop the software product, expressed in person months (PMs)

**OUTPUT (Manual Calculation):**

**Step 1 & 2: CAF Calculation**

|  |  |  |
| --- | --- | --- |
|  |  | **Weightages** |
| **1.** | Does the system require reliable backup and recovery? | **2** |
| **2.** | Are data communications required? | **3** |
| **3.** | Are there distributed processing functions? | **0** |
| **4.** | Is performance critical? | **0** |
| **5.** | Will the system run in an existing, heavily utilized operational environment? | **0** |
| **6.** | Does the system require on-line data entry? | **5** |
| **7.** | Does the on-line data entry require the input transaction to be built over multiple screens or operations? | **5** |
| **8.** | Are the master files updated on-line? | **5** |
| **9.** | Are the inputs, outputs, files, or inquiries complex? | **3** |
| **10.** | Is the internal processing complex? | **3** |
| **11.** | Is the code to be designed reusable? | **5** |
| **12.** | Are the conversion and installation included in the design? | **4** |
| **13.** | Is the system designed for multiple installations as different organizations? | **0** |
| **14.** | Is the application designed to facilitate change and ease of use by the user? | **0** |
|  | **Total(F)** | **35** |

CAF = 0.65 + (0.01 \* F)

CAF = 0.65 + (0.01 \* 35)

CAF = 1

**Step 3: UFP Calculation**

|  |  |  |  |
| --- | --- | --- | --- |
| Measurement Parameter | Count | Weighing Factor (WF) | Count x WF |
| No. of User Input | 10 | 6 | 60 |
| No. of user output | 10 | 7 | 70 |
| No. of user inquires | 25 | 6 | 150 |
| No. of files | 50 | 15 | 750 |
| No. of external interfaces | 3 | 10 | 30 |
| UFP | | | 1060 |

**Step 4: FP, Productivity & Cost calculation.**

FP = UFP \* CAF = 1060 \* 1

FP = 1060

**OUTPUT (Verification):**

**Table

Description automatically generated**

**Table

Description automatically generated**

**Graphical user interface, text, application, email

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**Output (Calculation-Organic mode):**

KLOC = 5

Effort = a\*KLOCb = 2.4 \* 51.05 = 2.4 \* 5.42

**Effort** = 13.01

Duration = c \* effortd = 2.5 \* 13.010.38 = 2.5 \* 2.65

**Duration** = 6.63 months

Staffing = effort/duration = 13.01/6.63

**Staffing** = 1.96 persons

A screenshot of a computer

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**Output (Calculation Semi-detached mode):**

KLOC = 5

Effort = a \* KLOCb = 3 \* 51.12 = 3 \* 6.07

**Effort =** 18.21

Duration = c\*Effortd = 2.5 \* 18.210.35 = 2.5 \* 2.76

**Duration =** 6.9 months

Staffing = Effort/duration = 18.21/6.9

**Staffing =** 2.64 persons

Graphical user interface, text, application, email

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**Output (Calculation Embedded mode):**

KLOC = 5

Effort = a\*KLOCb =3.6 \* 51.2 = 3.6 \* 6.9

**Effort =** 24.84

Duration = c\*effortd = 2.5 \* 24.840.32 = 2.5 \* 2.8

**Duration = 7** months

Staffing = Effort/duration = 24.84/7

**Staffing =** 3.55 persons

Graphical user interface, text, application, email

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According to the Domain characteristic table, Complexity adjustment table, and the COCOMO model, This E-Learning system has achieved the Functional point result of 1060.

And by using the Cocomo model this E-Learning platform achieved the organic values, semi detached values and the Embedded values successfully and got the required results.

**RESULT:**

The estimation of project was performed using function point analysis and COCOMO model.