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A Comparative Study of Software Development Size Estimation Method: UCPabc vs Function Points

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Abstract

One of the stages in planning software development projects is to estimate the effort and cost. The good news is, there are already studies related to the estimated cost of software development projects whose results are close to the real cost. In this study, we compared two cost estimation methods which have quite small deviations, such Use Case Points - Activity Based Costing models (then namely UCPabc) and Function Points (FP). Some aspects that were compared are process and parameters, complexity factors, and deviation. The results of this research are, first, the difference of process algorithm and parameters. Secondly, there were differences in complexity factors, 21 factors on UCPabc model and 14 factors on FP method. So, the deviation between two methods of effort estimation toward actual effort was 11.9 percent using UCPabc and 27.8 percent using FP. Therefore, the UCPabc method is the closest method of effort estimation toward actual effort.

Keywords: Software Cost Estimation; Cost Estimation; Function Points; Use Case Points, Activitity Based Costing

1. Introduction

Currently, the activity stage of project planning on software development is increasingly diverse. One way is to estimate the cost of software development projects. Along with the development of science, currently many studies have discussed about the accuracy of some cost estimation methods. Therefore, we compared the results of previous research which is now booming.

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The Use Case Points method (UCP) since its introduction in 1993 by Karner [1], has been tested by several researchers. The resulting deviation between cost estimates uses UCP and the actual cost of 'only' 6.89 percent in small and medium software [2]. Meanwhile, according to Dewi [3], his research resulted in a smaller deviation of 2.16 percent when UCP method was integrated with Activity Based Costing (ABC) technique (then known as UCPabc model) to estimate the cost of 5 software development projects.

In the Function Points (FP) method, Albrecht introduced this method first in IBM company case study [4]. According to Aguiar [5], the International Function Points User Group (IFPUG) has officially declared that FP methods are suitable for any software genre. Interestingly, in research which we have done that the result of cost estimation using FP method gives a small deviation of 3.26 percent [6]. This means, FP methods are almost close to the actual cost in software development projects.

From the above explanation, there are some previous studies on some comparisons of software development project cost estimates by Usharani et al [7]. But from the results obtained, has not yet concluded which method closes to the actual cost of the project. Therefore, this study aims to compare two methods of estimating the cost of which software development projects are closest to the actual cost. In the future, business software developers are able to independently decide which method is appropriate and close to the actual cost of a software development project.

2. Related research

Several previous studies that examine cost estimations in software development projects have been summarized as presented in Table 1.

Table 1. Related research

No	Author, Year	Result	Research connectivity	Research gap
1	Albrecht, 1983 [4]	Predicted effort using Function Points (FP) based on software function and number of lines of code in IBM company.	As the main literature about feasibility of the FP method to estimate the software development project effort.	FP methods have been tested but have never been compared with other methods.
2	Aguiar, 2009 [5]	FP which has been recommended by the International Function Points User Group (IFPUG) as a successful method implemented in government and industry was compared to Use Case Points based on surveys conducted.	As the main reason why we chose FP compared to UCP.	IFPUG only compares FP with the original UCP method (not yet integrated with other methods).
3	Arnuphaptrairong, 2013 [8]	Implementation of FP method with Cocomo method on 15 software development project that produces parameter model based on language programming.	FP method has been collaborated with other methods to find optimal effort estimates	The modification of FP method with Cocomo resulted in an average deviation of 1,624.31%.
4	Dewi et al, 2014 [3]	The Use Case Points method that was integrated with Activity Based Costing (or UCPabc model) was able to estimate the cost of developing 5 public service applications	The similarity of case studies taken by the author, namely the application of public services.	-
5	Dewi et al, 2016 [9]	The level of accuracy of the estimated cost model using UCP abc compared to actual cost has a low deviation of 2.16 percent.	The case studies used have similarities that there are 4 applications of public services.	The deviation between the estimated cost of the UCPabc model and the actual cost has never been compared with other estimation methods.
6	Usharani et al, 2016 [7]	Critical review on algorithms of some estimation methods such as Analogy Based Estimation and Artificial Neural Network (ANN).	Comparison can be done to find out which one best suits the existing problem.	The comparison of the estimation method focuses only on the algorithmic level of detail.