

Title: *The Cost Estimator DOCU: An Empirical and Theoretical Study*

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Abstract: In addition to the fine-tuning equations and the research in news and better calibration methods, one of the main factors involved in the operation improvement of parametric models dealing with effort estimation, is the continuous revision of the cost estimators. This revision will imply not only add or remove cost estimators to reflect the changes that will be coming in the technology and in the methods used to produce software, but also to go deeply into the knowledge of the selected ones.

These conclusions have already been tested in the more commonly-used, modern effort estimation models. For example, the COCOMO II model banned some of the cost estimators used in COCOMO 81 but some other ones were introduced. One of these new cost drivers is the documentation match to life-cycle needs (DOCU).

From the beginning of the software engineering, one of the most important practices to be done during the software development has been to generate a good documentation. From then up to now it has been more and more important in the overall process of software production for any company, specially for those that have or are trying to achieve higher maturity levels. So for those organisations with a maturity level higher than CMM level 2, or those that have to comply with the ISO 9000-3 standard, the elaboration and revision of all the components included in the project documentation needs an appreciable effort from the development teams.

This means that the effort estimation models will adjust this effort driver, to the most accurate precision, in order to obtain correct estimates, which will be used both in a generic way as in local environments.

Keeping this in mind, the work that has been carried out has been focused in two parallel and complementary ways. On the one hand, an experiment by a group of development teams working simultaneously in the development of the same software product and using the same standard writing documentation was carried out. At the beginning of the experiment, function points estimations, using IFPUG v4, and effort estimations, using COCOMO II, were made for each project. During the projects development they were obtained the real values of the estimated measures as well as the actual effort devoted in each one of the projects to generate the documentation. The estimated and real measures were analysed and compared, and the final results showed that the DOCU cost driver has a very similar values to those offered by the one gauged with COCOMO II.1999.0

On the other hand we carry out a theoretical study paying special attention on those factors that could have influence in the effort dedicated to the documentation. In this way, two projects with the same number of generated documents could have a different percentage of

the total effort dedicated to documentation, depending on the quality applied in the generation of the documents or the accuracy with which the standards have been followed. These factors, as well as many others, were analysed.

As conclusion, several questions relating to the Multiplicative Cost Driver DOCU in the COCOMO II Cost Estimation Questionnaire were studied. In order to simplify the selection of the most accurate range for each project, a set of questions to complete those already presents in the questionnaire has been proposed, keeping in mind the previously deduced most important factors that influence on the effort dedicated to the documentation.

Keywords: COCOMO II, Function Points, cost estimation models, effort, cost drivers, metrics, software documentation.

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