

Possibility of Using Function Point Analysis in Project Evaluation

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Abstract. Function Point Analysis (FPA) is primarily used in size, complexity and cost (monetary or time-based) estimation of software projects. The overall objective of this paper is to present advantages and disadvantages of applying this method in the evaluation of various projects. The study and discussion results prove that there is a need and opportunity to search new evaluation models based on FPA. Considering this study, the Modified FPA Model is proposed.

1 Introduction

The growing role of project evaluation in management science is the consequence of implementing new solutions in the social, economic and environmental fields. The need to implement unique projects under uncertainty results in, in fact, theoretical research and practice continually striving for increasingly better methods to evaluate them. These needs are related to, among others: estimating the resources needed to implement projects and reducing the risk of achieving the assessed goals.

It is therefore necessary to improve the methods of evaluating various types of projects implemented in business and non-commercial organizations. There is insufficient support for decision-making using currently available evaluation methods. Hence, it is possible to observe the existence of a research gap concerning the need and the potential for scientific solutions to the problem of evaluation using increasingly improved methods of project evaluation. Research related to this area designate new and exciting directions for research development, and the resulting conclusions and recommendations can be valuable sources of information to be used in the practice of managing various projects in different types of organizations. Thus, there is a justification for searching for new evaluation methods and one of the possible research directions may be to study methods based on Function Point Analysis (FPA).

Subject of this research is therefore a variety of projects, and object of research is the problem of exploring the possibility of using FPA in project evaluation. The overall objective of this paper is to present advantages and disadvantages of applying FPA-based methods in the evaluation of various projects. On the basis of such considerations the Modified FPA Model is proposed.

2 Project Evaluation Methods

Evaluation methods can generally be classified as fragmentary (for an aspect of evaluation) as well as comprehensive and multifaceted, which take into account the broad spectrum of assessment issues on various levels. Set of comprehensive methods includes: cost benefit analysis, feasibility study, business case and own methods developed by various organizations thanks to long-term practice. Both in the context of fragmentary methods as well as multifaceted, it is worthwhile to use the scientific acquis concerning the field of evaluation of different kinds of usually multifaceted assessed projects: European, public and development [1]. This acquis is worth generalizing, because significant theoretical and cognitive achievements as well as practical experiences are usually useful also for other types of projects which are realized in contemporary reality.

Project evaluation is a multi-stage process in which may be distinguished, for example, the four stages, i.e.: structuring, data collection, gathered data analysis, the research process summary and evaluation results formulation. Various fragmentary evaluation methods can be assigned to different stages of this process.

Among the methods of the first stage of the evaluation process structuring are, for example, SWOT analysis, LFM (Logical Framework Matrix) based methods, project logic model, Metaplan (shared understanding) and others. Data collection methods include, for example, survey research, personal interview, drop and collect survey, qualitative research, secondary data based methods, and others. Data analysis uses, among others various statistical analyzes, econometric models, geographic information systems, shift analysis, comparative groups and others. Research related to knowledge engineering and artificial intelligence approaches, based for example on rule based systems and rough set theory, can lead to important advances in evaluation methods development [2].

The most popular method to help formulate evaluation results is multi-criteria expert based analysis. Other methods include statistical multi-criteria analysis, fragmentary cost-benefit analysis, fragmentary cost-effectiveness analysis, benchmarking and others. Modified FPA could be an important complement to these methods.

Interesting research streams first are determined on the PCM (Project Cycle Management), the LFA (Logical Framework Approach) which is based on the LFM (Logical Framework Matrix), and second comprehensive solutions stream - named as the Evalsed (Evaluation of Socio-Economic Development). Both trends work independently in evaluation research and provide evaluators with rather different guidelines intended for different audiences.

The PCM / LFA research stream provides a methodological basis for institutions responsible primarily for the planning and implementation of individual projects. The Evalsed stream is a source of knowledge designed for majority of organizations undertaking a comprehensive evaluation process of relatively large projects and programs that are a collection of projects.

3 Function Point Analysis

The FPA, which is developed by the International Function Point Group (IFPUG) and the Common Software Measurement International Consortium (COSMIC), with the intention of planning and implementing complex IT projects is an example of a comparative method based on some measurement units and supports decisions in software production. There are also well-known methods for evaluating the quality of software projects based on software units, eg. using little objective evaluation of source code taking into account the number of lines of computer program code. Applying this type of quantitative criterion creates an impression of objective evaluation. However, this method is strongly dependent on used tools (eg. the selected programming language) and takes into account only the amount of work without considering the elements related to the quality of the implemented IT project. For this reason, it is rarely used.

Interest in evaluating design and operation of implemented IT projects with FPA primarily results from the need to improve the evaluation of IT projects' efficiency, to rationally manage more important aspects of their implementation and searching for instruments to support decision-making in this area. Methods of conducting such analyzes are improved by a number of local and global organizations.

Alan Albrecht is the author of a relatively new method based on some measurement units [3], that IFPUG has further refined. In turn, COSMIC is developing a second research stream on FPA-based methods known as second-generation methods, which include real-time data processing, the use of hybrid systems, and the functional analysis of individual parts of the project [4]. First-generation methods, however, are more effective in evaluating data processing in business applications.

Methods from both generations lack universality, but IFPUG and COSMIC work together to improve and achieve this goal. The collaboration between these two organizations in 2015 resulted

in the publication of a common, unified dictionary of terms, including the IT projects effectiveness measurement, evaluation of performance tests of ICT projects as well as forecasting expenditures for new IT projects on the basis of measurements and comparative data [5].

In addition to the mentioned two-generation methods, other methods have been developed independently, eg.: Mark II represents some extension of the FPA with richer internal data structures, Evolved Function Points (Simplified IFPUG Galorath Inc. method), Feature Points (developed by Caper Jones as an extension of Alan Albrecht's work on scientific models) and others [6].

FPA-based methods allow one to forecast the amount of resources needed to implement projects, track their progress and measure quality. After completion of the project, its final effectiveness evaluation can be carried out. Measurement using function points usually involves the following stages: specifying project elements, clarifying data types and tasks, estimating the complexity of a project, assigning weights to individual data types, evaluating impact parameters and calculating the final number of function points. After determining the final number of function points, it is also possible to determine the workload and productivity.

FPA-based methods are used by organizations that build IT solutions in accordance with external procurement specifications, as well as implement them in their own organizations. For a recipient of an IT solution, its value depends on the level of user satisfaction, quality of implementing the organization's strategy and achieving its intended economic goals. This method allows to evaluate the project not only in the preparation phase of the concept but also after its implementation, in order to improve the estimation of the resources needed for the introduction of subsequent projects. Researchers attempt to further develop this method [7].

4 Advantages and Disadvantages of FPA

So far, FPA based methods undoubtedly have several advantages. The most important ones are as follows:

- in many aspects, FPA methods are universal and independent of programming language, chosen IT technology - used for a variety of tools, databases and different evaluation scopes (individual modules, entire systems, new software estimating and modernization of already functioning) [8],
- FPA methods have the ability to define the size of the software project basing on the functional requirements specified by the client [9],
- the size determined on the basis of requirements is presented as a dimensionless number which is a relative measure of value of the functions used,
- benchmarking plays an important role in evaluation process, which allows assessing in relation to other projects, making comparisons between projects and building rankings,
- consideration of aspects related to the factors of project impact, which are not included in the initial phase of the function points number calculation,
- problems of assessment using the Lines and Code method can be avoided, the size of the project is determined without the need for an analysis that takes into account the technology used [10],
- involvement of the project recipient in the initial phase of defining functional requirements minimizes the risk of misinterpreting the client's expectations.

In addition to the significant advantages of using such methods, they also have significant limitations, i.e.:

- the way of correction factor determination on the basis of technical and qualitative parameters raises objection,
- taking into consideration the individual functionalities of aggregate elements does not allow for a complete reflection of the whole project complexity,
- failure to include expenditure on IT security, training IT systems users, documentation preparation and other factors affecting overall project evaluation,

- calculations using a low number of function points are imprecise,
- full application of this method involves the need to participate in dedicated training in the use of this method (certified training is expensive) and one should have relevant experience and knowledge in the field of project evaluation.

Therefore, there is a basis for research on modified methods and models.

5 Modified FPA Model

There is a need to propose the Modified FPA Model, which, as a result of appropriate selection of measured input values concerning the project and by adjusting socio-economic and environmental impact factors, would enable evaluation of other projects than software – computer programming ventures.

The proposed model outline is illustrated in figure 1. After initial processing of the model input data, it is necessary to analyze the project environment and its stakeholders. The model should take into account socio-economic and environmental effects in a multifaceted manner. Such data and information should be further analyzed using a modified FPA. At the output of the model, one can get results in terms of parameters that relate to the basic values which characterize the project: performance, scope, cost and time.

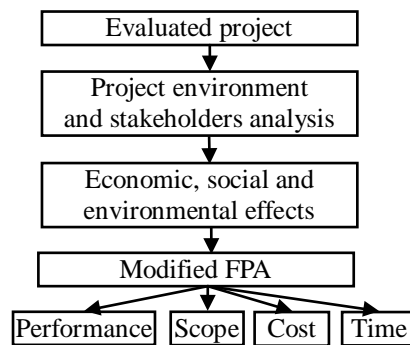


Fig.1. Application of modified FPA

Further work on the improvement and implementation of the proposed model is planned.

6 Conclusions

The study and discussion results prove that there is a need and opportunity to search for new evaluation models based on FPA, which are primarily used only in cost estimation of software projects. There is therefore insufficient knowledge about the possibility of applying such models to evaluate different types of projects. This kind of extension of the scope of FPA based methods usage can lead to obtaining new tools that take into account the multifaceted economic, social and environmental effects. This will be possible when using a modified FPA. One of the potentially available directions for research in this field are determined considerations in this paper devoted to the Modified FPA Model.

Further research in this area may be a source of theoretical and practical knowledge. By undertaking these further studies, it will be possible to reach following theoretical-cognitive effects: organizing evaluation concepts concerning using new evaluation models based on modified FPA, developing a universal model of multifaceted project evaluation and analysis of its relevance in evaluating various types of projects. Expected application effects include the development of a new collection of FPA-based evaluation methods.

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