



Evaluating performance in the development of software-intensive products



Stefan Cedergren*, Stig Larsson

Mälardalen University, School of Innovation, Design and Engineering, P.O. Box 883, SE-72123 Västerås, Sweden

ARTICLE INFO

Article history:
Available online 1 December 2013

Keywords:
Performance measurements
Performance management
Efficiency
Effectiveness
Software-intensive products

ABSTRACT

Context: Organizational performance measurements in software product development have received a lot of attention in the literature. Still, there is a general discontent regarding the way performance is evaluated in practice, with few studies really focusing on why this is the case. In this paper research focusing on the context of developing software-intensive products in large established multi-national organizations is reported on.

Objective: The purpose of this research is to investigate performance measurement practices related to software product development activities. More specifically, focus is on exploring how managers engaged in software product development activities perceive and evaluate performance in large organizations from a managerial perspective.

Method: The research approach pursued in this research consist of exploratory multiple case studies. Data is collected mainly through 54 interviews in five case studies in large international organizations developing software-intensive products in Sweden. Focused group interviews with senior managers from eight companies have also been used in the data collection.

Results: The results of this research indicate that managers within software product development in general are dissatisfied with their current way of evaluating performance. Performance measurements and the perception of performance are today focused on cost, time, and quality, i.e. what is easily measurable and not necessarily what is important. The dimensions of value creation and learning are missing. Moreover, measurements tend to be result oriented, rather than process oriented, making it difficult to integrate these measurements in the management practices.

Conclusion: Managers that are dissatisfied with their performance measurement system and want to improve the current situation should not start by focusing on the current measurements directly; instead they should focus on how the organization perceives performance and how important performance criteria are being developed. By developing relevant performance criteria the first step in developing an effective performance measurement system is made. Moreover, it is concluded that manager's perception of performance is affected by the currently used measurements, hence limiting the scope of the performance criteria. Thus, a change in the way managers perceive performance is necessary before there can be any changes in the way performance is evaluated.

© 2014 Published by Elsevier B.V.

1. Introduction

Performance measurements related to the efficiency and effectiveness of the organization have received a lot of research attention and are generally considered to be an important part of any high performing organization. Although many organizations are successful in developing, selling, and delivering products, we also observe that a substantial part of the software product development projects fail. Failure can be in delivering late, or with

insufficient quality, or not delivering at all. To improve the success rate of software product development projects, the connection between success/failure and the performance of the organization needs to be understood, and used for decisions.

There are several well-known statements related to performance measurements in the literature. *What gets measured gets done* [1] and *You are what you measure* [2] are two classical examples of quotations related to the use of performance measurements. The paramount importance of evaluating the product development process in particular is generally acknowledged both in the literature and in practice [3]. Sink and Tuttle [4] argue that the main focus of the performance measurement system is to provide managers with the needed information to be able to make

* Corresponding author. Tel.: +46 (0) 21 107017.

E-mail addresses: stefan.cedergren@mdh.se (S. Cedergren), stig.larsson@mdh.se (S. Larsson).

decisions about what actions to take in order to improve the performance of the organization. Lynch and Cross [5] are more specific by arguing that the purpose of performance measurements is to motivate behavior leading to continuous improvement in customer satisfaction, flexibility, and productivity. Tatikonda [6] develops this further by arguing that without performance measurements in product development, fundamental managerial questions such as “how well are we doing”, “what have we learned”, and “what should we do in the future” cannot be answered. The ability to evaluate performance is thus vital for several different reasons.

The results from a survey among managers involved in developing new products, performed in the US [7], indicate that only 35% of executives are satisfied with their current measurement system. A similar study performed in Sweden [8] confirms this finding, with one third of the respondents indicating that they are satisfied with their current performance measurement system. Hence, it is concluded that there is a general discontent regarding how development activities are currently being measured. The scholarly activities within the field is intense, between the years 1995 and 2005, 1136 papers were published related to performance measurement in the ISI *Web of Science* database [9]. We repeated the search covering the years between 2006 and 2013, and it returned 3221 papers indicating that research activities are increasing in the field of performance measurements. However, it is concluded by Rubinstein [10], after reviewing the literature in engineering and technology management, that the methods used for evaluating development projects have not been improved much during the last 50 years. Moreover, Adams et al. [11] argue that the literature contains a diversity of approaches, prescriptions, and practices that can be confusing and even contradictory. Hence, it is not surprising that practitioners in product development cannot distinguish any best practice associated with performance measurement [12]. Our conclusion is that this might explain the current discontent by managers and decision-makers regarding performance measurements in product development.

Given the current discontent among R&D managers regarding performance measurements, this research sets out to investigate how performance is measured today and why managers are dissatisfied with this, in order to better understand its limitations and investigate how the situation can be improved. There are several important questions that are raised but not answered in the current literature. For example: A basic question such as why managers are not satisfied with their current measurement system is not addressed. Is it a general concern that current performance measurements are focusing on non-important factors, or is it something in particular that is missing? Is there a challenge in practice to find the right measures or are the needs different compared to the existing literature? In particular the research objective is to better understand why it is difficult to measure performance in software product development and discuss suggestions for how it can be improved based on this understanding.

The outline of the article is as follows. First is an overview of the related work given, this is followed by a presentation of the research approach used in this study. The research methodology and the findings are then presented. Reasons for, and implications of, the findings are then discussed, and the paper concludes by highlighting the implications for managers and future research.

2. Related work

This section begins with a presentation of measurements in software product development. The second aspect of this research, performance is then defined. The chapter is concluded with a description of performance measurements in general as well as

with a particular focus on performance measurements in software product development.

2.1. Measuring software product development

Software product development can be described, in line with the arguments by Hong et al. [13], as cross-functional team-intensive work that creates successful new software products by linking upstream, e.g. R&D, marketing, and design engineering including software development, and downstream activities, e.g. manufacturing engineering, operations and quality control. In this research a more process-oriented interpretation of software product development is made, in order to be able to evaluate and analyze its performance, by viewing it as *the set of activities beginning with the tools and processes used to perceive a market opportunity and ending in the production, sale, and delivery of a software product, fulfilling that market opportunity*. This view is an extension of the definition of general product development provided by Ulrich and Eppinger [14], by including the activities performed in order to identify the market opportunity. Traditionally, the software product development process is initiated when it is already decided what customer needs to fulfill, and the goal of the software product development process is to fulfill these given needs. This is of central importance, to include goal setting, etc. as well as the realization in the development. Also the types of life cycle selected for the development project is important to the performance and effectiveness as described in a study by Benediktsson et al. [15].

The ability to develop and deliver not only one but a steady stream of new products to the market is important for every product-delivering company. At the same time is the obsession with quarterly earnings, confronting managers to choose between the short-term results and the long-term health of the organization [16]. Often at the expense of more long-term results according to Cooper and Edgett [17], who argue that companies today are preoccupied with minor modifications, product tweaks, and minor responses to sales people's requests, while true product development has taken a back seat. Within the development of software products this is highly evident, since these products often are developed with new features added in new releases during its life cycle. Through the introduction of agile and lean methods in software product development, the development activities are often incremental rather than radical in character. This can lead to additional problems in decision making, coordination and communication [18], and making measurements more difficult for the total organization and need to be adapted [19].

By nature and definition, software product development has a long-term effect, is often subjective in its value to the organization and is frequently intangible. Because of these features, traditional performance-based measures are, in the main, inappropriate [20]. Existing models of performance in product development are almost exclusively focused on the artifact instead of the performance of the activities required for its development [21]. As the development of software products often need to focus on activities rather than artifacts, a different view on performance measurements is needed. Successful software development depends on a large number of factors. This has been described by e.g. Tahir and Jafar [22]. Important success factors include traceability of measurement goals with respect to business goals, and an understanding of the measurement process objectives. Also, Gopal et al. [23] have listed a large number of important factors, including the selection of metrics which need to be based on what metrics are needed for decision-making.

2.2. The notion of performance

The literature on performance is characterized by a lack of and inconsistency in definition of terms, which have hindered its

Download English Version:

<https://daneshyari.com/en/article/551672>

Download Persian Version:

<https://daneshyari.com/article/551672>

[Daneshyari.com](https://daneshyari.com)