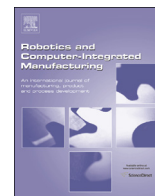




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Full length Article

A statistical analysis of the effects of Scrum and Kanban on software development projects

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ABSTRACT

Traditionally, software development processes have relied on the use of the “Waterfall” and “Vee” models. Later, Agile methodologies were used to handle the challenges of managing complex projects during the development phase. Agile methodologies are a group of incremental and iterative methods that are more effective, and have been used in project management. Kanban and Scrum are two powerful Agile project management approaches in software development. The objective of Scrum and Kanban is achieved by optimizing the development process by identifying the tasks, managing time more effectively, and setting-up teams. A review of the literature reveals that there is a lack of statistical evidence to conclude which methodology is more effective in dealing with the traditional project management factors of budget handling, risk control, quality of the project, available resources, having clear project scope, and schedule handling. This research statistically compares the effectiveness of the Scrum and Kanban methods in terms of their effects on the project management factors for software development projects. Numerical analysis is performed based on survey responses from those with experience in the Scrum and Kanban methods. Results suggest that both Scrum and Kanban lead to the development of successful projects, and that the Kanban method can be better than the Scrum method in terms of managing project schedule.

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1. Introduction

While project management methodologies have been used for a very long time and date back to the Egyptian era, organizations adopted the methods only half a century ago. During the mid 1900s, the defense, navy, and space research industries were the first to adopt effective project management methodologies to achieve organizational goals. By the early 1990s, with the boom in hardware and software engineering industries, project management methodologies found many takers and have proved effective in helping organizations achieve tremendous results in its products. Adopting one of the project management methodologies made organizations more efficient in terms of planning, setting timelines and budgets, and improving quality of the products that were produced.

By the late 1950s, there have been many trial-and-error methods in managing software development projects. The early methods were used to find better ways of gathering and defining project requirements, analyzing problems, and conducting systematic implementations of problems. Some of the methods were

incremental and iterative in nature [1] and others were linear and sequential, known as “Waterfall Model” [2]. The Waterfall model assumes that the team has nearly perfect information about the project requirements, the solutions, and ultimately the goal. Hence, changes in requirements were not encouraged, and became an expensive affair. Nevertheless, the sequence of steps in the Waterfall model is rarely followed in the actual system design [3], and it had become evident that the approach lacked effectiveness in addressing the needs of customers, managing rapidly changing scope, delivery time, and cost of the project [4]. The Vee Process model is yet another system process model that starts with a user need and ends with a completed system [3]. In this model, testing and verification are performed at each stage of the system development, starting with the low-level components and ending with the higher-level components until the entire system has been verified. In the mid-1990s, other software development methods evolved due to problems of these so-called “heavyweight software methodologies,” which are complex and require detailed documentation and expensive design [5].

In 2001, the Agile movement was introduced in response to the failures of the Waterfall software development methodology [6]. One of the models based on the Agile movement, known as Scrum, is based on principles of lean manufacturing [6]. A different methodology based on the Agile movement is called Kanban,

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