Does Agile work? — A quantitative analysis of agile project success

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Abstract

The Agile project management methodology has been widely used in recent years as a means to counter the dangers of traditional, front-end planning methods that often lead to downstream development pathologies. Although numerous authors have pointed to the advantages of Agile, with its emphasis on individuals and interactions over processes, customer collaboration over contracts and formal negotiations, and responsiveness over rigid planning, there are, to date, very few large-scale, empirical studies to support the contention that Agile methods can improve the likelihood of project success. Developed originally for software development, it is still predominantly an IT phenomenon. But due to its success it has now spread to non-IT projects. Using a data sample of 1002 projects across multiple industries and countries, we tested the effect of Agile use in organizations on two dimensions of project success: efficiency and overall stakeholder satisfaction against organizational goals. We further examined the moderating effects of variables such as perceived quality of the vision/goals of the project, project complexity, and project team experience. Our findings suggest that Agile methods do have a positive impact on both dimensions of project success. Further, the quality of the vision/goals is a marginally significant moderator of this effect. Implications of these findings and directions for future research are discussed.
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1. Introduction

Projects continue to proliferate in society today, in both the public and private sectors of the economy. Investments in projects number in the trillions of dollars annually. Just as ubiquitous as these projects, unfortunately, are their significant failure rates. The CHAOS reports have identified the current state of project success rates across organizations, noting that in spite of much higher visibility and importance placed on project performance, failure rates have remained high and relatively stable across over a decade of research (The Standish Group, 2011). Further, specific examples of project failures shed light on the impact they have on organizations. Consider, for example, the following:

- Joe Harley, then-CIO at the Department of Work and Pensions for the UK government, stated that only 30% of technology-based projects and programs are a success — at a time when taxes are funding an annual budget of £14 billion (about $22 billion USD) on public sector IT, equivalent to building 7000 new primary schools or 75 hospitals a year (Ritter, 2007).
- "Motorola's multibillion-dollar Iridium project … could be considered a success on the basis it was 'on time' and 'on budget' from an engineering point of view, but was a catastrophic commercial failure because it did not adjust to what was being learned about the changing business environment." (Collyer et al., 2010, p. 358). The project

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team and management at Motorola failed to see that during the course of the project, quickly expanding cell phone networks would undercut Iridium's satellite phone business model.

It is with this setting in mind that researchers and practitioners began seeking alternative methods for project implementation, recognizing that traditional models for planning and execution may not be optimal or tuned for the specific challenges that projects face. Indeed, it is due to these challenges that "light weight" project management techniques such as Agile have been gaining popularity since first developed (Dybå and Dingsøyr, 2008).

Part of the ethos of Agile methods is that less initial planning is better and an evolutionary process is more efficient (Dybå and Dingsøyr, 2008). Agile methodologies contrast with traditional project management approaches (such as waterfall) by emphasizing continuous design, flexible scope, freezing design features as late as possible, embracing uncertainty and customer interaction, and a modified project team organization. Further, Agile is described as iterative and incremental, seeking to avoid the standard approaches that emphasize early design and specification freeze, a fixed project scope, and low customer interaction.

These more traditional project development approaches pursued a goal of logical sequencing that required deliverables to be set in advance and project development evaluated based on performance at a series of capabilities gated reviews. Unfortunately, evidence continues to accumulate suggesting that a rigid development process can result in significant downstream pathologies, including excessive rework, lack of flexibility, customer dissatisfaction, and the potential for a project to be fully developed, only to discover that technological advances have eclipsed the need for it. So, for example, to revisit the post-mortem analysis of Motorola's Iridium project, it became clear that in dynamic environments, projects need to cope with changes in technology during the course of their development both for technology and other projects. If assumptions fail, unsuccessful projects can often result. "While useful as a guide, excessive detail in the early stages of a project may be problematic and misleading in a dynamic environment" (Collyer et al., 2010, p. 109).

Though Agile methods are continuing to gain in popularity and are spreading beyond their original birthplace among software development projects (Dybå and Dingsøyr, 2008), little research has been done as to whether Agile projects truly are more successful. To date, the majority of research examining the methodology's usefulness has been anecdotal, based on small-sample case studies, or research limited by sample size, industry or geography. Further research in this area will help inform both practitioners and researchers to the value of agile methods.

The purpose of this paper is to investigate, through a large-scale quantitative study, the evidence that Agile methods work better than traditional approaches for achieving project success. As we have noted, Agile has become a widely used and generally-accepted approach for planning and executing projects in IT settings. There is a wealth of anecdotal and case-study information pointing to the utility of the Agile process; however, to date, what has been lacking are more comprehensive quantitative studies of projects in Agile settings, testing the efficacy of the Agile philosophy as it directly relates to project success. This paper reports on the results of a recently completed study of Agile projects and their success rate. We sought to investigate the efficacy of Agile on different dimensions of project success, across multiple industries, in order to identify the degree to which Agile can be directly linked to project success, its viability across multiple project environments, and the potential for intervening (moderator) variables to affect this relationship.

2. Literature review

2.1. Agile/iterative methods

As early as 1958, Koontz noted that "no effective manager makes a plan and then proceeds to put it into effect regardless of what events occur" (Koontz, 1958, p. 54). Deviations commonly found in the management of projects typify this perspective. After Hällgren and Maaninen-Olsson. (2005), we define "deviation" as "a situation, regardless of consequence – positive or negative, large or small – that deviates from any plan in the project." (p. 18). They further note the inevitability of deviation in project plans, suggesting the solution lies not in more sophisticated initial plans but in methodologies that can facilitate actions to resolve deviations. In the IT project environment, this need for improving the planning process has increasingly led companies away from the traditional, front-end planning process to one that revolves around multiple iterations through the development cycle.

Iterative methodologies, such as rolling wave, have been in use for years and can be thought of as predecessors to Agile methods. As part of their rationale for the use of rolling wave planning techniques, Turner and Cochrane (1993) noted that "frozen objectives become part of the definition of the quality of the project, and project managers are said to be successful if they deliver them on time and within budget, regardless of whether or not the product is useful or beneficial to the owners and users." (p. 94) This highlights the benefits of iterative methods, which formalize replanning of a project during execution. For example, in his review of software development methodology, Fitzgerald (1996) also reported that 50% of design activities occurred in phases other than design. Thus, the critical issue confronting managers lies in the mismatch between the desire for early specification freeze and fixed plans with the concomitant need to maintain sufficient flexibility to modify and alter project plans to address critical business needs.

As we noted, the Agile movement was intended to address some of these challenges. In 2001, the "Agile Manifesto" was written by practitioners who proposed many of the Agile development methods. The manifesto states that Agile development should focus on four core values (Dybå and Dingsøyr, 2008; www.agilemanifesto.org):

- Individuals and interactions over processes and tools.
- Working software over comprehensive documentation.