

MEASURING THE SUCCESS OF LEAN AND AGILE PROJECTS:

*Are cost, time, scope and quality equally
important?*

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Abstract: This study presents the results of a survey conducted among managers from organizations that use Agile/Lean methodology for new product development. The study focused on the way these organizations measure the success of their projects. We found that most of the Agile/Lean projects failed to achieve the top criterion their organizations selected to evaluate the project's success. We propose some tools designed to increase the probability of success based on the criteria selected by Lean and Agile project managers.

Keywords: Agile, Lean, Project Management, New Product Development, Success Criteria

1. Introduction

While its origins are unclear, the “Iron Triangle” of project success criteria—Time, Cost, Quality (Atkinson, 1999)—has been used since then. A lot has changed in the project management area since the 1950s; two of the newest widely adopted methods are Agile (“Agile Manifesto”, 2011) and Lean product development (Ward, Shook, & Sobek, 2009). Agile and Lean product development methods are challenging the traditional ones, aiming to convert the product development projects into more elastic, efficient and cost-effective projects. While methods are changing, the success criteria seem to stand still (Drury-Grogan, 2014; Ika, 2009; Atkinson, 1999). The fact that organizations are evolving, realizing that a change needs to be done and willing to adopt new methods, raises the following question: Are the organizations which adopt these new innovative methods still trying to achieve the traditional success criteria of Time, Cost, Quality and Scope? This is the main question on which the study is focused. There are some studies that had challenged the traditional “Iron Triangle” (e.g. Serrador & Turner, 2015; Drury-Grogan, 2014; Turner & Zolin, 2012; Atkinson, 1999; Lim & Mohamed, 1999). Moreover, the PMBOK, in its 6th edition, had updated the definition of project success from: “The success of the project should be measured in terms of completing the project within the constraints of scope, time, cost, quality, resources, and risk” (Project Management Institute, 2012), to: “Traditionally, the project management metrics of time, cost, scope, and quality have been the most important factors in defining the success of a project. More recently, practitioners and scholars have determined that project success should also be measured with consideration toward achievement of the project objectives” (Project Management Institute, 2017).

Much research has been done on Agile and Lean for product development—Agile is frequently adopted in Software development (Conforto et al., 2014; Lima et al., 2015); Lean is frequently adopted in the manufacturing industry. In general, more and more methods of product development are based on the Lean approach (Poppendieck, M. & Poppendieck, T., 2013; Larman & Vodde, 2008). Some believe that the Agile method is based on the Lean philosophy and some see it as a separate method. This study focuses on both approaches—Agile and Lean—as both methodologies share the same principles of: creating more value for customers with fewer resources, continuous reduction of waste and achieving improvements by focusing on process improvement.

The purpose of this study is to understand how organizations measure the success of Lean and Agile product development projects and to understand how these success criteria are different from the traditional project success criteria of: Time, Cost, Scope and Quality. Some related studies have performed an adaptation survey of Lean and Agile (Azizyan, Magarian, & Kajko-Matsson, 2011; Pilar Rodríguez, Markkula, Oivo, & Turula, 2012), but the question of how organizations measure success of a project is yet to be answered. The uniqueness of this study is that it combines Lean and Agile and covers not only software product development, but also hardware and multidisciplinary projects. Another characteristic of this study, which distinguishes it from other Agile-Lean survey studies, is that this study refers to managers only and not to the project team members; the study focuses on management-related issues and not on the engineering/technical issues of the project.

2. Research Method

This study is based on direct contact with leading organizations from the technology industry who are using Agile or Lean methodology for product development; managers from these companies anonymously answered a web questionnaire-based survey.

Questionnaire design

The web-based questionnaire included 3 types of questions: Demographic—respondent's demographic information as well as organization information. Organization usage of Agile/Lean—Agile maturity level, success criteria, project types, etc. Respondent's Agile/Lean Project Experience—planning, controlling, monitoring and success factors. To avoid ambiguity in terms of perception on the part of the respondent in the project, the questions focused on the last Agile/Lean projects in which the respondents were involved. The majority of the questions were of the close type. However, almost all questions allowed the respondents to add their own answers if none of the options fit his/her opinion. In addition, there was a section of general comments at the end of the survey, to allow the respondents to express their opinions more freely.

Data Collection

The criteria for participating in the study was being part of an organization that had used any Agile or Lean methodology for product development and the respondent is holding a management position, senior or junior, such as, Project manager, Product leader and Technical leader. Although the software industry is leading in Agile/Lean for product development, the study has not been limited to one kind of industry or project type and includes Software, Hardware, and Multidisciplinary projects. The study tried to capture the issues which are common to the majority of Agile/Lean projects at the project level from a management point of view and not from an implementation level point of view. The objective is to get a wide perspective on the project success not only from the engineering/technical side, but also from other disciplines' point of view, in order to consider other effects on the product design.

The majority of the organizations that had participated in the survey are well-known leaders in industry, international organizations which have rich product portfolios and large teams that are handling Agile/Lean projects.

The survey is a descriptive survey and thus provides a descriptive analysis.

Descriptive surveys are not intended to explain or to show causal relationships between variables; they focus on describing a certain opinion that a proportion of a sample has, how often certain events occur and/or are associated with each other (Oppenheim, 1996).

The survey was conducted during March–July 2018; before this survey, an exploratory pilot survey had been conducted among 68 Project/Product managers to explore and test some of the study ideas.

3. Results

This section presents the results of the survey. The total number of respondents to the survey was 102; most of the participants answered all the survey questions, but some respondents (8) had skipped certain parts.

Respondents' profile

The respondents had been asked to indicate the role which best describes their current position; the respondents had been divided into five categories to allow easy presentation and clear understanding of the roles and the management attributes. As can be seen in **Table 1**, most of the respondents are Project/Program Managers (33) and R&D Direct Managers (27).

The industry to which most of the respondents belong is Technology (81%); other industries are: IT (12%), Industrial/Manufacturing (3%), Media (2%) and Automotive (2%). The respondents had been asked to indicate the location where they work (not the organization location); the majority (70%) of the respondents are located in Israel; the other locations are: USA (8%), Germany (8%), Malaysia (6%), China (2%), Peru (2%), India (2%), Bangladesh (1%) and Singapore (1%). Most of the companies are medium size (100–1000 employees) and big size (above 1000 employees), but also managers from bigger and smaller organizations had participated in the survey, as shown in **Table 2**.

Agile/Lean Projects

The respondents had been asked to indicate which Lean or Agile development methodology they follow most closely (more than one answer was allowed to be marked). The results on **Table 3** show that Scrum is the most popular method; these results are aligned with most of the Lean/Agile surveys and studies which had been conducted lately (e.g., "VersionOne", 2017; Lindsjörn et al., 2016).

The respondents had been asked to indicate which kind of projects their organization handles according to Lean or Agile methodology. The results on **Table 4** show that, as expected, most of the projects (63) are software projects. Multidisciplinary projects (28) refer to a project which contains more than one field of development (e.g., software and hardware).

Role	No. of Respondents
Project/Program Manager	33
R&D Direct Manager: Team leader/Group Leader	27
R&D Leadership: VP/Director	22
R&D Team Member: Architect/Scrum Master	13
Product Manager/Product Owner	7
Total	102

Table 1: Respondents' Roles

Organization Size (No. of Employees)	No. of Respondents
Above 5000	9
1001–5000	26
101–1000	46
10–100	14
1–10	7
Total	102

Table 2: Respondent's Organization Size

Method	Count
Scrum	88
Kanban	20
Lean Development (LD)	12
Extreme Programming (XP)	4
LPPD	4
Lean Startup	3
SAFe	3
Don't know	2
Scrumban	2

Table 3: Agile/Lean Used Methods

Project Type	No. of Respondents
Software	63
Hardware	10
Multidisciplinary development	28
Other	1
Total	102

Table 4: Agile/Lean project type

The respondents had been asked to indicate the top 3 criteria which their organization is using to measure Agile/Lean project success; the respondents had to choose exactly 3 criteria from a given list or to add their own criteria. The results, as can be seen in **Figure 1**, show that 83% of the respondents chose “Planned vs. actual release dates” as one of the top success criteria and 57% chose “Product Quality”. These two criteria are the only ones which had been chosen by the majority of the respondents (more than 50%); next on the list are: Business value (35%) and Customer satisfaction (33%). Budget vs. actual Cost had been marked only by 28% of the respondents. Figure 1 illustrates the Agile/Lean project success criteria according to the survey respondents.

The respondents had been asked to estimate, according to their last Agile/Lean project, the difference between the planned timeline and the actual timeline. A seven-grade scale was used to describe Actual vs. Planned timeline; both delays and advances in schedule were divided according to the following categories: minor change, significant change and extreme change. Delay in schedule had been described by: “up to 10% longer” (minor change), “10%–40% longer” (significant change) and “more than 40% longer” (extreme change). Early completion of the project had been described by: “up to 10% shorter” (minor change), “10%–40% shorter” (significant change) and “more than 40% shorter” (extreme change). Keeping the schedule was described as “On time”. Ninety-seven (97) participants had replied to this question; 67 (69%) of them had indicated that the project was late; 25% of these late projects had extreme delays (the project delayed by more than 40% vs. the planned timeline). Only 11% of the projects were ahead of schedule and no extreme shorter timeline had been reported. **Table 5** shows the entire results.

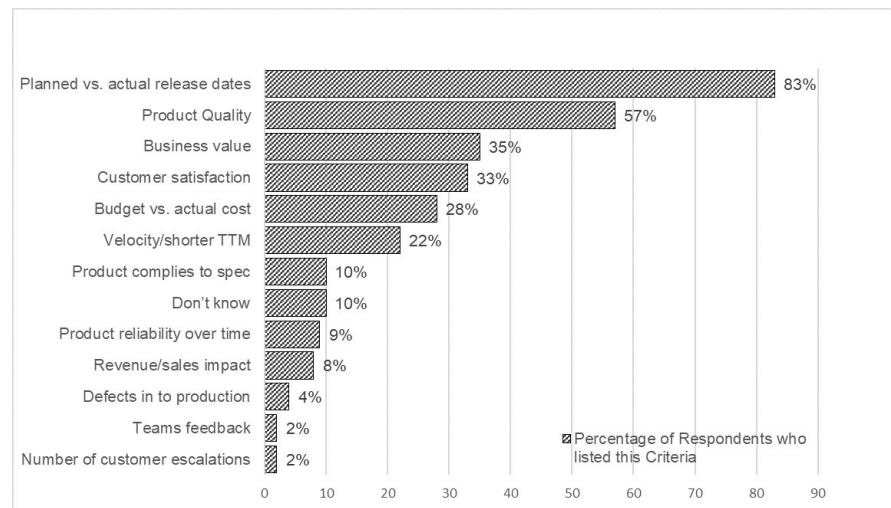


Figure 1: Leading Criteria for Agile/Lean Project Success

The respondents had been asked to indicate the average Agile/Lean project length in their organization. The respondents, as described in **Table 6**, showed that there is no typical Agile/Lean project length and beside a few indications of very long projects (more than 4 years), it seems that a project may last between several months to 4 years. The respondents had been asked to indicate the main field according to the track of the project’s progress. **Table 7** shows that 52% of the respondents track the progress of Agile/Lean projects according to schedule and 38% according to project content.

McCoy, Pinto and Slevin, Saarinen and Ballantine all agree cost, time and quality should be used as success criteria, but not exclusively (Atkinson, 1999). In the PMBOK 6th edition, the definition of project success had been extended and more project objectives were added. This is a significant update compared to the earlier PMBOK edition view of project success (Project Management Institute, 2017). The PMBOK also indicates that the success of a project is usually measured by combining many criteria; in addition there are different success criteria and factors for each project, depending on the project type and stakeholders. The results of this survey show that when examining Agile/Lean projects, organizations see the top success criteria different than the traditional model.

Table 5 shows that 69% of the respondents reported that their last Agile/Lean project was behind schedule vs. the planned; 17% of the projects had exceeded in more than 40% of the planned schedule.

Combining the results of **Figure 1** and **Table 5** presents an interesting view of Agile/Lean projects in these organizations: Despite the fact that 83% of the respondents had mentioned that sticking to the planned release dates is one of the top 3 success criteria for Agile/Lean projects, the majority of the projects (69%) had failed to achieve this top criterion. **Table 7** shows that the majority of managers track the project according to schedule, but still it seems that it is not good enough to prevent the project from being late.

The survey didn’t reveal the cause of the delay in these projects, but it can be concluded by reviewing some of the latest studies focusing on the cause for product development project delays in schedule: “Poor planning and controlling practices were frequently cited among the most significant causes of delays” (Ballesteros-Pérez, Larsen, & González-Cruz, 2018). “In reality, delays often occur in software development projects for various reasons such as rework, abandonment and erroneous or uncertain initial estimates” (Zhang, Liu, & Yang, 2017). “Project managers need project control parameters that look beyond completing the scope of the project on time and within budget” (Serrador & Turner, 2015). “The traditional scheduling tools have serious limitations” (Pablo Ballesteros-Pérez et al., 2018). “This evidence leads to the question of how properly project managers have been using project management tools and which actions have been taken to adapt these tools to meet project requirements” (Conforto & Amaral, 2010). When managing an Agile/Lean project, which is adaptive rather than predictive and includes the management of frequent changes in the process itself (Sillitti et al., 2005), dedicated tools are important in order to extract the most from these methods. Many of the tools for scheduling in product development projects are not realistic or consider the optimization of criteria that are not necessarily related to Agile/Lean projects, such as between time and cost (Vega-Velázquez, García-Nájera, & Cervantes, 2018). A survey study on Agile research tools show that most of the tools being used for Agile projects are standard traditional tools and while most of

4. Discussion

The traditional “Iron Triangle” model of project success usually assumes that the three criteria—Time, Cost, Scope/Quality—are equally important. It is the common model which defines the top criteria of project success. There are tools and techniques designed to help managers succeed with these criteria and to measure project success (Project Management Institute, 2017). The results in Figure 1 show that the traditional “Iron Triangle” model is not necessarily the way organizations measure Agile/Lean project success, while Time (83%) and Quality (57%) are the leading criteria, Cost and Scope are not in the top criteria of project success, as Business Value (35%) and Customer satisfaction (33%) are more common as success criteria. Studies had usually accepted the traditional success criteria, but argued that it does not always reflect the reality. Atkinson had summarized: “Olsen almost 50 years ago suggested cost, time and quality as the success criteria bundled into the description. Wright reduces that list and taking the view of a customer, suggests only two parameters are of importance—time and budget. Many other writers Turner, Morris and Hough, Wateridge, deWit,

Actual Vs. Planned Timeline	Count
More than 40% Longer	17
10% - 40% Longer	40
10% Longer or less	10
No Change	19
10% Shorter or less	4
10% - 40% Shorter	7
More than 40% Shorter	0
Total	97

Table 5: Actual vs. Planned Timeline

Average project Length	Count
Less than 1 year	33
1-2 years	35
2-4 years	31
More than 4 years	3
Total	102

Table 6: Average Agile/Lean project length

Main field for tracking project progress	Count
Tracking project schedule	53
Tracking product content	39
Tracking customer satisfaction	3
Tracking Stakeholders satisfaction	1
Do not track the project progress	6
Total	102

Table 7: Main field for tracking Agile/Lean project progress

these tools were mentioned as “easy to use”, their contribution to the project success is inconclusive (Azizya, et al., 2011).

Trying to understand the incorporation of causes for project delays according to the studies, it might be fair to say that it can be solved or improved by using the right tools that fit the project methodology and the selected success criteria. By implication, it may be assumed that using tools that are appropriate for planning, managing, monitoring and controlling Agile/Lean projects according to the success criteria as the organization sees them, will reduce the risks and the possibility for project delay.

5. Conclusion

This study shows that when organizations measure success of Lean and Agile projects, they are not necessarily using the traditional success criteria. The two criteria which are common to most of the organizations are: “Planned vs. actual release dates” and “Product Quality”; other success criteria, such as Cost and Scope, are not common for most organizations. Nevertheless, although the most important criteria are known to the respondents, the majority of the Agile/Lean projects fail to achieve the Time criterion. This means that most of the Agile/Lean projects fail to achieve the most common criterion for project success. A possible explanation is a lack of appropriate tools for planning, tracking, prioritization and controlling projects according to the Agile/Lean success criteria. Using the traditional tools designed to fit the traditional success criteria, as discussed in this study, may cause a problem in focus, translated to a failure in achieving the project targets. The right tool for an Agile/Lean product development project should be designed to balance the two common success criteria for Agile/Lean projects—Time and Quality. This allows managers to control and understand the tradeoffs between them and permits more success criteria to be added according to the unique project targets, all that with respect to the Lean-Agile methodology. Future work should be focused on the causes for Agile/Lean projects’ failure to achieve the Time criterion, understand and define the right tool for planning, tracking and

controlling Agile/Lean projects according to the success criteria of these projects.

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