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A qualitative study of success criteria in Norwegian agile software projects from suppliers' perspective

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Abstract:
This paper provides practical insights into the success criteria in agile projects in the Norwegian software industry. We conducted 32 interviews with practitioners working with agile projects. The findings revealed two fundamental differences that distinguish the perception of success in agile projects from that in projects that are based on the waterfall approach. Firstly, the evaluation is carried out on a regular basis after each increment. This regular and continuous measurement of success contributes several advantages, including greater commitment and involvement from the customer and a higher level of mutual trust between the supplier and the customer; and thus leads to better knowledge sharing and reduced task uncertainty. The reduction of task uncertainty provides more predictability about the direction of the project and better grounds for change control; not least, it allows room to consider multiple and subjective assessments by various stakeholders. Secondly, there is a stronger emphasis on customer satisfaction. Customer satisfaction is measured in terms of how quickly the customer obtains value from the project. The continuous assessment of success at the end of each iteration also has a significant, positive impact on the customer's evaluation of the project outcome.

Keywords:
success criteria; agile projects; suppliers; qualitative study.

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1. Introduction

It is important to emphasize that the importance of project success criteria extends beyond the final evaluation of the project outcome [1]. Jugdev and Müller [1] emphasized the importance of defining project success criteria up front to align stakeholders and to create a common vision about the project's outcome and how it will be evaluated. Although much research has been carried out on project success criteria for projects that mainly follow the traditional waterfall model, it does not take into account the emergent characteristics of agile software projects. Software projects based on agile projects have some features that distinguish them from projects following the traditional waterfall approach [2].

The waterfall approach follows an engineering discipline in which the development is predictive and repeatable; therefore, the final evaluation is performed once a phase or the final deliverables are complete. On the other hand, agile methods are lightweight processes that employ short iterative cycles, actively involve users to establish, prioritize and verify requirements and rely on a team's tacit knowledge as opposed to documentation. A truly agile method must be iterative (take several cycles to complete), incremental (not deliver the entire product at once), self-organizing (the teams determine the best way to handle the work) and emergent (processes, principles and work structures are recognized during the project rather than predetermined) [3]. Software systems are so complex that full specifications cannot be given at the start of the project; therefore, agile methods (XP, Scrum, Kanban, etc.) help to deliver projects associated with uncertainties [4].

Project success criteria include several dimensions spanning from criteria concerning the efficiency of the project management effort (project management success) to criteria that reflect the impact of the project on end-users, on business, on societies (project success) and on creating opportunities for the future [5]-[8]. The main purposes of these criteria are to define a clear rationale for deciding whether the project was a success/failure and, to some extent, the degree of success/failure. There is also increasing recognition of the need to consider the dynamic nature of projects and look at success from a subjectivist viewpoint as well [9]. De Wit first suggested a distinction between project success and project management success. Project success embodies the perceived value of a project when the result or product is in operation [10]. Focusing on project success may lead to the consideration of criteria such as product use, user or client satisfaction and benefits to users or clients [11]. On the other hand, meeting the requirements concerning time to deliver, specifications and budget embodies project management success.

This paper is exploratory and seeks to investigate the categories of success criteria used in agile projects and the conditions that must be met to achieve project management success as well as project success. The similarities and dissimilarities between agile-based projects and projects based on the waterfall approach concerning how success is perceived and managed will be analyzed and presented. The findings and analysis are based on interviews with 32 agile practitioners from 25 different software development organizations in Norway. Of the 32 participants, 26 were project managers (19 project managers were from the supplier side, 4 were project managers from the customer side and 3 were project managers of companies performing in-house development), 4 were developers and 2 were solution architects. Their organizations varied from consulting organizations to in-house development organizations.

This paper is structured as follows. First, we will review the literature to determine how success criteria are defined in general. Then, we will investigate how the success criteria in software projects differ from those in other types of projects. Next, the interview findings will be presented, followed by a discussion and conclusion.

2. Literature review

According to Wateridge [12], success for software projects is not a "black and white" concept. Unlike construction projects in which project success is easier to measure [12], software projects are more visible when they become operational; therefore, at this stage, there are more chances for the product to be evaluated regarding its use and business value. During the operation phase, different stakeholders' perceptions of success are easy to measure [13]-[15].

According to some researchers [16]-[19], the measurement of software project success has a multidimensional perspective. Many stakeholders are involved in a project and they can have a variety of interests depending on the outcomes of the project. Contingent on the use of the project, different stakeholders (supplier company, customers, project team, end-users) can have different perspectives, interests and roles in the project [15],[19]; therefore, they have different perceptions of success [20]-[24]. These stakeholders have strong control over the project and they can exert an impact on its results [25]. For example, developers might have success criteria for software projects that consist of substantial learning and reusable codes instead of time and budget [26]. Customer satisfaction, process efficiency and functional requirements might be the most important success criteria for suppliers [27].

According to Christenson and Walker [28], establishing an agreement on how and when a project will be evaluated helps in creating a common vision about the outcome, which is in itself a significant driver of project management success. Hussein [29] supported this view and recommended defining a project's success criteria at the start as good project management practice.

Creating a common reference point at the start of the project to define how projects will be evaluated is an important factor in aligning the project team and establishing commitment to the project objectives. Korzaan [30] showed that commitment to project objectives has a positive influence on the perceptions of project performance, both directly and indirectly, through individual propensities to report project status information. Hussein [29] showed that failing to use project success criteria actively in the management of projects can lead to numerous and frequent changes to these criteria, which in turn result in poor project performance, frustration and even losses. Poor management leads to poor intermediate results. Poor intermediate results lead to changing project priorities and these cause a project to lose focus, according to Dvir and Lechler [31].

The importance of measuring success while keeping different stakeholders' perspectives in view was introduced by De Wit [10]. A framework was presented by McLeod et al. [11] to measure success based on the different perspectives of stakeholders. Although a project can involve a number of stakeholders, there are two main stakeholders: one is the customer and the other is the supplier. Both of these stakeholder types can have different expectations of the project; therefore, according to Jugdev and Müller [1], all the stakeholders need to be involved in defining the success criteria. Customer companies want the maximum functionality delivered within a limited budget and time span, while supplier companies exist to make profits along with delivering successful projects.

Therefore, it is very important for project success to be measured by taking into consideration the perceptions or business values of the project from the viewpoint of those stakeholders who are possible beneficiaries of the project. Some studies have suggested the same [32],[33]. Some researchers have argued that practitioners should avoid measuring the success of software projects in terms of triple constraints, and practitioners should measure projects' success depending on the project type and stakeholders' interests [27]. Different studies have attempted to investigate the effects of stakeholder perspectives [11] at different points of the project life cycle [34]. Wateridge [12] suggested "meeting user requirements" as the most important success criterion, but this could vary from stakeholder to stakeholder. End-users consider success criteria from their perspective (for example, the ease of use of the system). Project managers consider a project to be successful if it has been delivered within the available time and budget [35].

Procaccino and Verner [36] presented a study about the stakeholders' different perceptions of success. They found that the ease of using a system and meeting customer needs are considered to be important success criteria by software practitioners. The perceptions of stakeholders can vary to the extent that a project that is considered to be successful by the client may be considered a complete failure by the end-users or contractors (suppliers) [37],[38]. According to some researchers, customer satisfaction is one of the most important criteria for a project [39],[40]. Meeting the budget, schedule and requirements targets are not enough for project evaluation; therefore, success criteria like process efficiency and stakeholder satisfaction must also be included in project evaluation [41].

Agarwal and Rathod [42] defined success from the perspectives of the internal stakeholders of an organization. In their opinion, delivering the full scope of a project is the most important success criterion. Shenhar et al. [8] found that success has different meanings for different stakeholders and depends on the circumstances and the type of the project.

Müller and Turner [43] suggested that project success criteria vary depending on the project manager's influence on the project. According to them, success criteria depend on many factors, including the age and nationality of the project manager [43].

Taking into consideration the supplier's perspective, Savolainen et al. [44] presented a framework for measuring the success of software projects. From the very start of software development, success is measured based on triple constraints, but can a project be called successful if it meets the triple constraints but does not produce customer satisfaction? Conversely, if a project fails to meet the triple constraints criteria but the customers are highly satisfied with the end product, can it be called a successful project?

The Standish Group's report published in 2015 [45] introduced a major change in terms of accessing project success. The success criteria were revised to include six factors, namely on time, on budget, on target, on goal, value and satisfaction. The reason for including these criteria is that, according to the report, there are "many projects that have met the Triple Constraints and did not return value to the organization or the users and executive sponsors were unsatisfied." According to the Standish Group, "changes in this criteria was not done quickly or lightly"; they were made after careful consideration and a survey.

3. Methodology

We conducted interviews with 32 agile practitioners from 25 different software development organizations in Norway. Of the 32 participant interviewees, 26 were project managers (19 project managers were from the supplier side, 4 project managers were from the customer side and 3 project managers were from companies performing in-house development), 4 were developers and 2 were solution architects. Their organizations varied from consulting organizations to in-house development organizations. The practitioners had considerable experience with IT, ranging from 3 to 40 years. Most of the practitioners had been using the agile method since its inception or had started working with the methodology before it was named "agile". The products and services offered by the practitioners' organizations included web-based applications, front- and back-office applications and software development services. The practitioners interviewed were scrum masters, project managers, system developers and product owners, enabling us to view problems from multiple perspectives. We conducted semi-structured interviews through various media, including face to face, email and Skype. To take multiple issues into consideration, we developed a research instrument consisting of six open-ended questions to conduct the interviews:

- How often do you evaluate the project?
- What are the success criteria for your company?
- Do you think that different stakeholders have different perceptions of success?
- How are success criteria in agile software projects different from those of other types of projects?
- In your opinion, how can project success be achieved?

We then asked the follow-up question:

- How can customer satisfaction be achieved?

We used a non-probability sampling technique for our research [45], specifically purposive sampling. This technique was selected bearing in mind the purpose of the research. We deliberately contacted participants who had relevant experience related to the research questions. We searched for participants on the Internet, and after looking into their profiles we sent them an invitation to take part in the study. The participants who were interested in participating in the research replied and accepted. After agreeing on the time and place of the interviews, we conducted interviews of 20-25 minutes' duration. Data were collected from 2011 to 2014.

Our priority throughout this research was to ensure the anonymity of our interviewees and their organizations. Thus, we refer to the interviewees throughout this paper as respondents AP1 to AP32.

We used a thematic analysis method for data analysis [47]. First, we transcribed the interviews. Second, we read the transcripts several times to familiarize ourselves with the information. Third, we identified patterns in the informants' answers. Fourth, we labeled sections according to those patterns. After clustering the information, we were able to organize, compare and analyze it. This study presents limitations that affect its generalizability, because it is strongly context-specific, as it was mostly performed within the Norwegian context. Furthermore, we collected the data not with specific project cases in mind but rather based on the collective experiences of the informants.

Validity measures the accuracy of research findings [59]. This research was conducted in 21 different organizations. We chose practitioners by considering their experience and suitability for the study. We also ensured that the practitioners had enough experience and knowledge of the subject under study. We interviewed a large number of practitioners (32) to reduce the bias in the study [59].

Reliability measures the consistency of the research. We guaranteed this reliability in our study by cross-checking the results of different practitioners. The transcripts of the interviews were sent to the concerned practitioner so that he/she could check for any omissions or errors.

4. Interview findings

In this section, interview data are presented. Due to space constraints it is not possible to present all interview data. We have presented selected quotes in Table 1.

Table 1. Interview data

Questions	Respondents response
How often you judge the success of the project?	*"That's up to the customer how they judge success. As a supplier, we judge success after each iteration.".__AP1*
	"It depends on the role, hitting financial targets, customer satisfaction. Meeting financial targets determines the health of the current business. Providing customer satisfaction ensures the continued existence of the business. A degree of increased organizational learning and expertise is also a factor, but again depends on the point of view of who makes the evaluation."__AP4
	"Success in agile projects is measured how quickly you can deliver business value. Since you are delivering in iterations it is easy to get feedback from the customer and you can analyze where are you heading."_AP30
	"We have check after getting delivery of the product pieces. If we feel that the project is heading towards wrong, we can take measures to get it fixed."__ AP3
	"We have extensive routines and methods to follow up and evaluate projects. This is done at a continuous basis and at project close-up."__AP11

Table 1. Interview data (cont.)

Questions	Respondents response
What are the success criteria in your company?	*"The only criteria for us is customer satisfaction."__AP20* *"On time and budget and finishing the user stories/features (providing required functionality)."__AP13* *"Delivering on time is more important than finishing within budget."__AP5* *"Only criterion to judge success is to know if the customer is happy, and he buy more services."__AP8* *"To us happy customer is the only success criteria."__Ap14* *"To my knowledge, the only criterion is money".__AP10* *"Meeting end user requirements is most important success criteria."__AP17* *"Customers got value of money only that way they will be happy and bring more business."__AP27* *"Criteria is happy customer and amount of money we got from the project."__AP18* *"The only criteria for us is that we get value of money, we invested."__AP31* *"The only criteria is money."__AP16* *"There are two aspects that need to be evaluated to judge project success or failure:* *"Customer satisfaction is judged by evaluation of forms and interviews. Interviews with the customer are done to judge, whether the delivered project has added the promised value and whether the customer would recommend us to someone else.* *If the company has made money.* *Both of the above, mentioned criteria, need to have answer in yes. If either of the criteria is not fulfilled the project is a failure from our perspective."__AP7*
Do you think that different stakeholders have different perceptions of the success?	"*Every stakeholder has different perspective of success and it depends on whom you ask. The technical staff is happy if everything worked nicely, no serious bugs, and we learnt something new. Management is happy if we get more customers or keep the existing one and ultimately advertisers money."__AP29* *"Developer´s perspective of success criteria is to deliver complete stories within time. They care less about other success criteria."__AP6* *"Evaluation meetings with customers and end users are held to judge customer satisfaction. Success criteria is different for every stakeholder involved in the project. We as supplier judge success of the project if customer is happy and we made some money."__AP3* *"It depends on the point of view. The customer decides if the software is functionally sound and generates business value. The development team/maintenance team decides if the software is technically sound and is cost effective to maintain and add more features to."__AP16*

Table 1. Interview data (cont.)

How success criteria in agile software projects is different from other type of projects?	*"Customers are more involved in agile projects Whereas in waterfall suppliers and customers work at distant."__AP5*
	"In agile project, it is very easy for us to have a check on project. With every piece we deliver, we can assess the performance. With every delivery, we have a check with the customer that whether we are heading towards right direction. In waterfall, project delivery is done once it is fully developed therefore it is not possible to have insight whats going on during the course of the project."__AP27
	"We have check after getting delivery of the product pieces. If we feel that the project is heading towards wrong, we can take measures to get it fixed. In worst scenario we can also stop it. In that case too we have certain working parts of the project. In waterfall this type of supervision is not possible."__AP28
	"The main advantage of using agile method is communicative – the communication between supplier and customer is so much higher than with traditional methods that whatever is the outcome of the project, it's hardly a surprise for either. So it's usually a joint evaluation. Besides, projects which follow agile management approaches do require agreement under way, so they tend to be seen as successful (so long they are properly executed)."__AP2
In your opinion, how project success can be achieved?	*"Project manger needs to be so skillful that he should take into account perspectives of different stakeholders."__AP31*
	"Continuous feedback from customers will make sure that how they perceive success."__AP24
	"Getting continuous feedback from customer helps to get customer satisfaction at the end of the project."__AP19
	"Customer involvement is very important in agile projects. When they are involved at every step of the project it is more easy to judge that whether they are happy with the product or not."__AP21
Follow up question	
How customer satisfaction can be achieved?	*"In agile, customer is involved in the development process therefore they can provide valuable feedback. We can use this feedback to improve the product and ultimately product delivered according to the specification of the customer which makes them more happy with supplier. Whereas in waterfall suppliers and customers work at distant."__AP5*
	"Customer can only be happy if they get more value for their money. Sometimes they are very unclear about what they want so we have to invest more time in understanding the requirements of the project. Once we understand and deliver the product."__ AP22
	"We need return on the investment we made. Since we are investing in the software project. We have to get maximum return on it. Once we are sure we are getting it this make us as customer more satisfied than anything else."__ AP25

4.1 Summary of the findings

The findings suggested that the success criteria in agile projects are not very different from the success criteria identified for projects that follow a waterfall model. They typically include criteria that fall within the *project management success* category, such as delivering on time, on budget and according to the specifications. They also include criteria that fall into the *project success* category, such as customer satisfaction, providing value to the

customer, having an impact on business in the supplier organization, creating new opportunities in terms of new contracts, learning and sustaining the supplier business.

Based on information collected from the informants, we identified two fundamental differences that distinguish the perception of success in agile projects from that in waterfall projects:

Firstly, in agile projects, the evaluation is carried out on a regular basis after each increment. This regular and continuous measurement of success offers several advantages over projects that use the waterfall approach. These advantages, according to the informants, are as follows:

1- Continuous measurement of the project status brings the customer closer to the project and thus increases the level of commitment to the project. Commitment is important for providing feedback about the product;

2- Continuous measurement helps in detecting deviations and not least the causes of these deviations; this in turn reduces the level of uncertainty about how the project will evolve, particularly in terms of the remaining tasks and functionalities. The scope of the work in each increment is limited and therefore the achievement of results after each increment can be easily measured; this facilities decision making on whether the project is heading in the right direction or not. In extreme cases, the customer will still have certain working functionalities even if the decision to halt the project is taken;

3- Continuous measurement allows for better knowledge sharing and a better trust level between the parties;

4- Perhaps more significantly, the measurement of success is performed jointly. That is, achieving a consensus about whether an iteration or a delivery is a success or a failure is based on a negotiated argument. This facilitates the consideration of a subjectivist view for the measurement of success.

Secondly, in agile projects, there is a stronger focus and greater emphasis on ensuring customer satisfaction. This customer satisfaction is measured in terms of how quickly the project delivered value. Delivering within the budget seems to be a less significant criterion in measuring success. Customer satisfaction is a broad term. From the interview results, we believe that the following conditions should be met to achieve this level of satisfaction:

1- Customers feel themselves to be involved in the process through continuous feedback and prioritization of features;

2- The customer has control over the project;

3- The customer obtains value for money and is able to see that each iteration is a step towards value creation.

The other findings are also in line with the project management body of knowledge. For instance, in agile projects as well, every stakeholder has a different perspective of success. From the customer's viewpoint, the success criterion is the value received for the money invested. The technical staff is happy if everything works nicely, there are no serious bugs and they learnt something new. The management is happy if the company gains more customers or keeps its existing ones. The developer's perspective of success is to deliver the complete features within the time and less emphasis is placed other success criteria. Some respondents believe that success criteria are about finishing user stories/features within the time and budget, while others think that delivering on time is more important than finishing within the budget. These findings suggest that it is important to clarify and define the project success criteria as a joint effort between supplier and customer organizations before start-up. Therefore, it is a recommended practice to define the expected success criteria up front. To deliver business value to the customer, it is very important for the supplier and the customer to define the criteria for success at the start of the project. These criteria should be realistic, meaning that they need to be achievable and measureable. Different stakeholders should be asked to define clearly what, in their opinion, the end result of the project should be. Hussein [29] conducted an empirical study on 145 participants from different industries and pointed out the causes of changes in success criteria in Norway. Among other reasons, he pointed out the "lack of alignment of success criteria during the initiation phase" as an important reason for ultimately

failing to achieve success. He suggested that project success criteria should be defined during the initiation phase and used as a reference frame for the life cycle of the development [29].

5. Discussion and analysis

In this section, we intend to discuss the findings outlined in the previous chapter. As the findings suggest, there are two interrelated differences between the way in which success or failure is measured in agile projects and the way in which it is measured in waterfall-based projects. One of the differences is related to the frequency of measurement and the other is related to the focus of this measurement. It is also observed that a higher frequency of assessment influences customer satisfaction positively.

1) Continuous assessment of status. This is perhaps the most fundamental difference that we observed in the findings. Continuous assessment and evaluation of the project status jointly with the client offer several advantages. We shall present the significance of these findings in light of the project management literature on related topics.

- Greater commitment. The importance of commitment (organizational commitment and commitment of the project organization) to project success is widely considered to be an important success factor [47],[49]. Fowler and Horan identified a combination of top management commitment and project team commitment as a force driving the successful development of IS projects [50]. Pinto and Prescott identified top management support as a critical success factor and suggested its dominance in the planning phase of the project life cycle [51]. McLeod and MacDonell (2011) emphasized the importance of top management commitment in projects as it plays various roles in the organization, for example influencing attitudes, creating a positive context for change, overseeing the development of the project and ensuring the availability of resources [52];
- A higher level of trust and a better sense of control. Trust is defined as the willingness to assume [53]. It is a complex concept because it is multi-layered, multi-disciplinary and multi-dimensional and changes over time [54]. Trust has an impact on decision making because decisions are made in light of the level of trust and the perceived risk [53]. Trust and control coevolve [55]; nevertheless, the challenge is to find the right mixture of the two because total control can lead project participants to feel that they are not trusted and can have consequences of a moral hazard nature [56]. Trust is perceived as an enabler of knowledge-sharing behaviors [57]. According to Lewis, interpersonal trust enables the quality of communication. In the project performance, the impact of trust can also be observed in its role in uncertainty management [58]. According to Atkinson et al., trust generates more open communication and therefore more accurate risk assessment [56];
- Reduced task uncertainty. Task uncertainty includes several variations or forms, such as difficulty (having difficult tasks ahead), interdependence between tasks and newness of tasks (never been attempted before) [59]. According to the author, these forms of task uncertainty have a negative impact on the level of perceived success or failure of projects. Continuous measurement helps in detecting the difficult tasks lying ahead. The scope of the work in each increment is limited and therefore the achievement of results after each increment can be easily measured; this facilities decision making on whether the project is heading in the right direction or not. In extreme cases, the customer will still have certain working functionalities even if the decision to halt the project is taken;
- Considers the subjectivist view. This entails recognizing that different stakeholders in the same project might have different evaluations of the project. McLeod et al. studied several IS projects and concluded that project outcomes are interpreted differently from different stakeholder perspectives, and also potentially at different times, and are constructed through subjective processes of sense making [52]. Joint sessions of assessment therefore provide a better atmosphere for discussing these different and subjective views before reaching final conclusions about the outcome.

2) A stronger focus on the impact on the customer. This involves meeting specifications, satisfying customer needs and providing a return on investment for the customer. These are measured using a combination of objective measures, such as the number of functions delivered and time to delivery; they are also measured subjectively in terms of the sense of commitment, sense of better control, trust, sense of task certainty and ability to express subjective opinions.

6. Conclusions

The project success criteria from the supplier perspective in projects that use agile-based approaches are not significantly different from the success criteria used in projects that are based on waterfall models. The assessment of success or failure is based on criteria that typically fall into either the *project management success* category, such as delivering on time, on budget and according to specifications, or the *project success* category, such as customer satisfaction, providing value to the customer, having an impact on business in the supplier organization, creating new opportunities in terms of new contracts, learning and sustaining the supplier's business.

The paper, however, identified two fundamental differences that distinguish the perception of success in agile projects from that in waterfall projects. Firstly, in agile projects, the evaluation is carried out on a regular basis after each increment. This regular and continuous measurement of success offers several advantages, including:

1) Greater commitment and involvement from the customer;
2) A higher level of mutual trust between the supplier and the customer, which leads to better knowledge sharing;
3) Reduced task uncertainty, which provides more predictability about the direction of the project and better grounds for change control;
4) Room to consider multiple and subjective assessments by various stakeholders to achieve a consensus about the state of the project.

Secondly, there is a strong emphasis on customer satisfaction. Customer satisfaction is measured in terms of how quickly the customer obtains value from the project. The continuous assessment of success after each iteration also has a significant, positive impact on the way in which the customer evaluates the project outcome.

Our final conclusion is that this study demonstrates the importance and consequences of continuous and regular assessment of project status, regardless of the type of approach followed in the project. This continuous assessment increases the level of commitment, mutual trust, knowledge sharing and predictability and provides the stakeholders with opportunities to express their subjective and changing views on the project status. All these factors contribute positively to the overall satisfaction with the project.

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