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Project success in Agile –driven software delivery projects

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ABSTRACT:
Agile project methodology is adopted by large in software industry all over the world. The methodology is based on Agile Manifesto that was announced by a group of software developers in 2001. Since then, a number of Agile methodologies and methods including their own processes, were created. Along Agile, the concept of project success changed from project management success to project success, latter highlighting especially client satisfaction. The purpose of this study was to clarify what are the perceptions on project success in the Agile –driven commercial software delivery projects, examined from client´s and supplier´s perspective, and whether those expectations are fulfilled. The backbone of the study was the Agile research in which the concepts of project success, success factors and risks were presented. Based on study findings, the project success is perceived differently by project stakeholders, depending on the role of the stakeholder and his/her level of understanding Agile. The perceptions are different not only between the stakeholders but inside the client and supplier organizations themselves. The study proposes that the project methodology as well as objectives of the projects are discussed with the actual project stakeholders already during the contract phase so that both sides can commit and have joint understanding of the goals before the actual project starts. The study also recommends that the outcomes are measured against the agreed objectives upon project completion.

KEYWORDS: Agile, success, risk, debt, satisfaction

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1 Introduction

71% of organizations around the world have adopted Agile project management methods (Project Management Institute, 2017). Strong signals indicate that the trend will continue (Goyena & Fallis, 2019; Project Management Institute, 2017). By adopting the methodology, organizations aim to accelerate product delivery, enhance the ability to manage priorities and increase productivity (Goyena & Fallis, 2019). Expectations are ambitious, because in 2018, seventeen years after Agile official discovery, only 42% of the Agile projects were successful (Standish Group, 2018).

Traditionally, a project was considered successful when the three constraints: time, budget and initially defined scope were reached (Standish Group, 2015). These three are called an iron triangle, and formed a backbone for the traditional Waterfall project management methodology. In Waterfall, the scope was defined in the beginning of a project after which changes were not allowed. Although the approach worked well in, say, construction projects, it was heavily criticized of its rigidity and slowness regarding software delivery projects because in such projects the requirements were under constant change. Waterfall was too slow to respond to the fast-paced requirements set by clients and/or technology. A new methodology, Agile, was discovered by a group of software developers in 2001. Agile framework differed from Waterfall in many ways. Its initial objective was to improve software quality (Agile Manifesto, 2001) by fixing the recognized problems, such as siloed thinking and rigid contractual processes of Waterfall. Agile put its trust to a capable Agile team (developers) that works in daily interaction with client throughout a project. Since clients are engaged to the development process, and have opportunity to change the requirements even late in development, their satisfaction increases.

Along Agile, the conception of project success changed. Client satisfaction became more important (Goyena & Fallis, 2019; Siddique, 2016), surpassing the traditional perception of project success tied to the iron triangle. A modern definition of project success in-

cludes dimensions of quality, time, cost and client satisfaction, yet the overall understanding of success criteria is not established. For instance, in 2015, Standish Group characterized a project successful when it was delivered on time and in budget, including must-to-have features only. The attributes used in the Chaos Report, were: OnTime, OnBudget, OnTarget, OnGoal, value and satisfaction (Standish Group, 2015). In 2018, the definition changed to a "pure" project success that was "a combination of high *customer satisfaction* with high return on value to the organization". The definition was outlined by Siddique and Rathod (2016) that observed that the success criteria between Agile and Waterfall projects does not significantly differ, but the way *how* the success is measured, differs. They divided the success into two categories: project management category (time, cost, initial specifications) and project success category (client satisfaction). An Agile project is incremental, thus the success should be measured incrementally on regular basis. The quicker business value is achieved, the more successful the project is (Siddique, 2016).

Despite the many benefits of Agile, it has its downsides that are not widely recognized. In many studies (Chow & Cao, 2008; Ghobadi & Mathiassen, 2017; Nordic, 2015), the failures of Agile were explained as consequences of non-supportive Agile environment, and the focus on risk mitigation models (Miller, 2019; Walczak & Kuchta, 2013) seemed to force the project "to the Agile track", i.e. stakeholders to adopt Agile methodology and methods. Most of such issues were related to organization´s priorities, inaccurate requirements and communication (Project Management Institute, 2017). While majority of the studies examine the problems, failures and risks from non-supportive Agile environment perspective, another view is that the downsides are caused by Agile methodology and methods themselves. For instance, the belief of saving time by speeding up development "may increase the likelihood of intuitive thinking, which may lead to decisions that are more biased" (Fink & Pinchovski, 2020). Speeded development increases also the risk of technical debt. (Rios, Mendonça, Seaman, & Spínola, 2019). The debt originates typically from software architecture (Holvitie et al., 2018), and can lead to maintenance difficulties, poor reliability and restricted reusability (Besker, Martini, & Bosch,

2017). Further, a characteristic problem of Agile is its difficulty to predict costs due to "unknown" result (6POINT6 Technology Services, 2017). In Agile, prioritization issues with security and performance are common (Technology Services, 2017), resulting to non-sustainable, unsecure and non-enterprise –grade software.

1.1 Purpose of the study

Agile principle says "Our highest priority is to satisfy the customer through early and continuous delivery of valuable software". This principle is often behind commercial justifications of selecting Agile as a project management methodology. Quick return on money is expected along speeded, incremental development that is characteristic to Agile development.

Agile methodology fits especially well to projects in which the outcome is not clear, as often is the case, for instance, in research projects that may last for years or even decades. The expectations for commercial projects are different. Typically those projects are restricted by budget and schedule, and thus may be unfavorable when looked at from Agile methodology point of view.

This study contributes to the existing Agile research by identifying and analyzing the perceived project success, and the success factors as well as the downsides of Agile methodology from client´s and supplier´s perspectives, in the context of a software delivery project.

The research problem is identified as

> *Does Agile fulfill the perceived project success expectations on commercial software deliveries?*

The question is approached by identifying the expected value of Agile –driven project, after which the reasons of success and/or failure are analyzed. The research questions are following:

1. *What is the value clients and suppliers expect to get by using Agile project management methods?*
2. *Why the value is or is not realized?*

The first research question identifies whether the expectations are in line with Agile framework whereby the second question pursues to find and analyze the positive effects as well as downsides in Agile –driven projects.

1.2 Structure of the study

The study begins with Agile research (Chapter 2) that introduces the previous research on Agile success and the success factors, as well as risks and risk management in Agile projects. After the Agile research review, the selected methodology (Chapter 3), including research strategy and method are explained, followed by data collection and analysis. The Chapter 4, Findings, is divided into several subchapters. First, the perceptions of a successful project and the differences between examined stakeholder groups are described, followed by discovered downsides. The conclusions of the study are presented in Chapter 5, Conclusions, and the managerial recommendations in the Chapter 6, Managerial recommendations.

2 Agile research

Initially, Agile referred to a “system development approach” (Cram, 2019) that had its focus in software development, appearing first in 1996 - 1997 in the Chrysler Comprehensive Compensation System (C3) payroll project. An Extreme Programming process was developed, and later explained by Kent Beck, the leader of the C3 project. In 2001, Beck was one of the discoverers of Agile Manifesto that started the Agile era.

In 2001 – 2010, the interest of Agile was in system development, and the various different development methodologies, like the Extreme Programming (XP) and Scrum, each having their own (best) practices that were taught to managers (Dybå & Dingsøyr, 2008; Meso, 2006). Such practices included, for instance, daily standups, pair-programming, on-site client participation and self-directed, autonomous Agile teams (Cram, 2019). During the time, Agile was often contrasted with Waterfall, and the differences between the two frameworks were frequently brought up. Agile methodologies were taught by consultants and early practitioners of the field, and its promises, such as adapting changing requirements during the software development and early software delivery, were of temptation of more and more companies. Along Agile popularity, scientific interest rose up. Agile project success and success factors were widely reported (Chow & Cao, 2008; Serrador & Pinto, 2015). Later, the research was extended also to Agile downsides, such as risks (Fink & Pinchovski, 2020; S. V. Shrivastava & Rathod, 2017).

While in the early years the study focus was in the Agile methodologies and processes, after 2010, it changed, as described by Alec Cram (2019), to “methodology tailoring (Conboy & Fitzgerald, 2010), agile-traditional hybridization (Cram & Newell, 2016), and the institutionalization of agile (Senapathi & Srinivasan, 2012; Wang, Conboy, & Pikkarainen, 2012)”. The Agile concept was also, along the years, disseminated from software development to business, adopting the principles of flexibility, collaboration, and leanness (Cram, 2019).

2.1 Success story – or not?

Agile methodology has its roots in Agile Manifesto published in 2001. The values and principles stated in the Manifesto are adapted in various Agile methods, that in turn, are taught by consultants and practitioners. The most comprehensive, scientific definition, accepted by large, is written by Conboy (2009):

> *"the continual readiness of an information systems development (ISD) method to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment" (Conboy, 2009, p. 340)*

Today, there are still several Agile methods (Scrum, Kanban, Lean, Extreme Programming, Feature Driven Development, Crystal, SaFe, DevOps) that have their own frameworks and processes. Thousands of organizations are using them (Miller, 2019). An entire industry is built around Agile, including e.g. Agile certification programs, and new professions such as Scrum Master, Product Owner and Agile coach.

In the light of literature, there is no definite proof that Agile methods lead to a successful project. While multiple studies conclude that Agile improves the success of a project (Chow & Cao, 2008; Fernandes et al., 2018; Serrador & Pinto, 2015, Standish Group International, 2015), others claim that it can even lead to a disaster (6POINT6 Technology Services, 2017).

Many of the characteristics of Agile that are generally recognized as strengths of Agile, have their other side that is often weak. For instance, Agile seems to suit best to projects in which the product (scope) cannot be defined or agreed in advance (Miller, 2019). In such projects, however, return on investment is not ensured. For instance, when a project scope is not defined, the timescale typically is uncertain causing unexpected costs. A survey conducted by 6POINT6 Technology Services (2018) reveals that in 63% of the

cases, CIO´s were prepared to provide a “blank cheque” for an Agile project due to unknown schedules (6POINT6 Technology Services, 2017). 15% of them did not know how much the project would cost.

2.1.1 Previous studies of Agile success factors

Traditionally, a project was found successful when it had met its targets in terms of budget, schedule and scope. This “mechanical” approach was criticized by not measuring the satisfaction of project stakeholders (Cooke-Davies, 2002), and by measuring only the success of project management (Slinger, M., 2006), and not the success of the project (Standish Group International, 2015; Turner, J., Cochrane, R., 1993). It is probably due to the criticism that Standish Group International (2015) changed the success criteria in its Chaos Report (2015). The criteria was changed from traditional to “modern” in which the success was measured by “combining the project management process and the end results of a project”. According to the results announced in the Chaos Report, the client´s satisfaction level is higher when they actually get less features and functions than initially planned, as the “additional features increase cost, risk and quality but do not necessarily provide value”. The modern success criteria follows Agile principles as it is based on following attributes: “OnTime, OnBudget, with a satisfactory result” (Standish Group International, 2015).

Standish Group discovered that in 2015 only 29% of the overall number of software projects (including both Agile and Waterfall managed projects) were successful. Their study, the Chaos Report, included in average 5 000 software projects in a year that were managed by both Agile and Waterfall management methodologies. When comparing the success between Agile and Waterfall projects during 2011 – 2015, Agile was clearly more successful with the 39% success rate comparing to Waterfall that succeeded only in 11% of the cases. Although the study has scientific disputes, such as lack of proper definition of success criteria and a lack of scientific data (for instance, the number of Agile projects vs Waterfall projects is not announced), it is in line with Agile practitioners by stating that Agile methodology is a key factor that effects positively to the success of a project.

A number of scientists (Chow & Cao, 2008; Fernandes et al., 2018; Serrador & Pinto, 2015, Standish Group International, 2015) have investigated the dimensions and success factors of Agile projects. While majority of the results indicate that Agile adaptation effects positively to the project success, the results are shadowed by not sharing a coherent view of the success factors, and thus the creditability of such research is weak. Even more, there are contradictory results on the field. An interesting observation made by Estler, Nordio, Furia, Meyer & Schneider (2014), claims that the project methodology has no impact to project success in terms of team satisfaction, but it can hinder the project economical success. Cohen, Lindvall & Costa (2004) observed that Agile methodology is suitable in small projects only.

The practitioners and researchers have tested theories that support their own views and hypotheses of Agile success dimensions and criteria. The emphasis has, especially in the first years of Agile, been to justify the Agile superiority over Waterfall, and thus the research focus has been more in the weaknesses of Waterfall than in the actual benefits provided by Agile project methods. The coherent agreement on Agile superiority over Waterfall has overpowered the fact that no-one, except for consultants, actually seems to know what Agile project management really means and how does the business value it provides, differ from past. In other terms: what are the success factors unique in Agile project management methodology?

In recent studies, the focus has moved from project based view to a project portfolio view and a continuous business value (Dingsøyr & Lassenius, 2016).

Main success factors in Agile projects

In general, there is no consensus of the success factors in Agile projects. The factors listed in this chapter are selected based on if they are frequently repeated in the examined literature. Notably, in literature the word “Agile” was used as if Agile as such was already conceptualized, and used as one of the factors explaining project success.

Chow and Cao (2008) tested 48 hypotheses against four success factors (quality, scope, timeliness and cost), and made an interesting observation that only 10 of the claimed hypotheses, based on existing literature, were supported. According to their survey, the most important success factors in an Agile project are the "**Agile software engineering techniques**" and the "**Delivery strategy**", referring to the Agile principles stated in the Agile Manifesto. An "Agile software engineering techniques" refers to the coding that has simple design engaged with correct integration testing and "right amount" of documentation whereby "Delivery strategy" points to the software that is delivered in small iterations including most important features first. The factors were judged to be most critical because they affect to all the four success dimensions (quality, scope, time and cost).

Table 1. Success dimensions of an Agile project (Chow, T. & Cao, D., 2008)

		Success dimensions in an Agile project			
Rank	Factor	Quality	Scope	Time	Cost
1	Delivery strategy	✓	✓	✓	✓
2	Agile software engineering techniques	✓	✓	✓	✓
3	Team capability			✓	✓
4	Project management process	✓			
5	Team environment	✓			
6	Customer involvement		✓		

The creditability of the research may be questionable due to limitations stated by Chow and Cao (2008) themselves "Agile proponents trying to claim Agile success in introductory projects (in order to promote the adoption of their methodology), and the lack of independent, non-Agile advocates in the survey". The "Delivery Strategy" and "Agile software engineering techniques" were not presented elsewhere in the literature. Vague conclusion can, however, be drawn from the results provided by multiple studies (Standish Group, 2015; Serrador, P., Pinto, P., 2014; Dingsøyr, T., Lassenius, C., 2016) in which *Agile way of working* is stated successful.

Chow and Cao continue to support Agile Manifesto by ranking the **Team capability** (team members are able to practice the Agile software engineering techniques), as third key success factor, affecting to two of the dimensions: time and cost of a project. Standish Group International (2015) agrees with Chow and Cao declaring that "competent staff is one of the key project success factors", but on their list the factor is not the first important but ranked as 5th. Quite an opposite view is provided by Serrador and Pinto (2014) who did not value the project team experience critical to Agile project success. They tested two dimensions: efficiency (meeting the project goals of cost, time and scope, from which scope was valued the highest) and overall stakeholders´ satisfaction against project team experience and project complexity. According to the researchers, "Agile methods allow superior success regardless of ´seasoned´ staff". This is an interesting finding as it actually contradicts with Agile principles in which the team is expected to be built around motivated individuals, and retrospectively learning from past. A team in which the members are changing all the time, cannot motivate individuals. 'Seasoned' staff also implies that some, if not all, work could be done offshore. That in turn would require a lot of supervising, which in turn is again against Agile principles.

In multiple reviews (Hidalgo, E., 2018; Lei et al., 2017; Serrador & Pinto, 2015) the **size of the project team** predicts its success. An ideal Scrum team consists of seven members (Lei et al., 2017) because "smaller team would not necessarily have the required skills whereby the larger team would probably suffer from the development complexity". It is true that the less there are members, the more effective the team is. It is, however, also a limitation factor unless the team members are multitalented and skillful persons that can cope in all kind of software projects. The team size ultimately effects to the project type, size and complexity. In case of multiple teams, where there are, for instance, many Product Owners, there are even risks because of the contradicting objectives between the teams (S. V. Shrivastava & Rathod, 2017).

The results regarding the impact of **project complexity** are contradicting. Serrador and Pinto concluded that the project complexity was no danger to the project success.

Main finding in their research was that adoption of Agile will inevitably affect positively to a project´s success, despite the project complexity. Quite opposite results are provided by Standish Group International (2015) saying that "project complexity is one of the main reasons for project failure". Standish Group claims that from all the studied large and complex software projects, only 2% of the projects were successful while 56% of them failed.

Standish Group highlights the relationship of **project size** and its success. Small size projects were found more successful than medium or big size projects. The message from Flyvjberg and Budzier (2015) is referring the same by saying "break it down while you can". This factor, though, applies in all projects, not only those managed by Agile methodology.

Table 2. Success of Agile projects in 2015 (Standish Group International, 2015)

	Successful	Challenged	Failed
All size projects	**39%**	**52%**	**9%**
Large size projects	18%	59%	23%
Medium size projects	27%	62%	11%
Small size projects	58%	38%	4%

Strong executive sponsorship was one of the hypothetic success factors in the research conducted by Chow and Cao (2008), but dropped out from the final results. Surprisingly, the same was among top four (4) critical success factors published by Standish Group International in 2015. Notable difference was also in **User/Customer involvement** which was ranked on top level by Standish Group but had no impact to project success according to Chow and Cao, contradicting with the Agile Manifesto in which the customer involvement is highlighted. Today´s problem is that in Agile model customer´s presence is mandatory, yet in practice the representatives are part of matrix organization having many other obligations in parallel of the project.

The results concerning **industry** are ambiguous. While Standish Group reveals that the success rate in retail industry is highest by having 35% share of all industries (measuring the success by attributes of OnTime, OnBudget with a satisfactory result), Serrador and Pinto (2014) claim there is no relationship between Agile management and retail industry. Both researches, however, agree that the government industry that has the lowest success rate in Agile projects. The latter can be understood by the fact that government has laws and regulations that do not stretch the way Agile requests for.

Table 3. Success rate per industry (Standish Group International, 2015)

Industry	**Success (satisfaction) rate**
Retail	35%
Banking	30%
Financial	29%
Healthcare	29%
Services	29%
Manufacturing	28%
Telecom	24%
Government	21%
Other	29%

As the results are diverse and contradicting, it is difficult to draw a coherent conclusion of the success factors in Agile projects. For instance, the success dimensions were different, and a joint understanding of the factors was missing. Further, the disputes in the researches, such as the small size of sample data and the lack of objectivity in some of the cases, may even hinder the research credibility. The disputes make the analysis quite difficult. In the Table 4 below, the more up the researcher name is, the more important the appropriate factor is concluded in his/her study.

Table 4. Positioning the success factors based on literature

Most important	Chow & Cao 2008	Chow & Cao 2008	Standish Group 2015	Standish Group 2015 Lei et al 2017 Hidalgo, E. 2018	Standish Group 2015 Lei et al 2017	Standish Group 2015	Standish Group 2015	Standish Group 2015	
			Chow & Cao 2008						Standish Group 2015
			Serrador & Pinto 2014		Serrador & Pinto 2014			Chow & Cao 2008	
Less important									
Factor	Agile Software Engineering Techniques	Delivery strategy	Team capability	Size of project team	Project complexity	Project size	Strong executive sponsorship	User/Client involvement	Industry

Although the overruling assumption seems to be that Agile methodology is, in many ways, better than Waterfall, a quite different view is provided in the Agile vs. structured distributed software case study (Estler, H., Nordio, M., Furia, C., Meyer, B. & Schneider, J., 2013). According to the quantative and qualitative study results, there was no significant difference between the outcome of Agile or Waterfall projects. The researchers´ most interesting findings were that the team satisfaction was quite the same in both project models whereby “economic savings were less in Agile projects”. The qualitative part of the study highlights following aspects: “onshore/offshore costs in projects, project success, project quality, personnel skills, communication patterns, personnel fluctuation, intellectual property, onshoring vs. offshoring in different development phases and team size”. The main problems were engaged to the constant changes during a project, mainly related to resources or the scope of a project. Surprisingly, the study reveals that the costs in onshore projects are not necessarily higher than in offshore projects although the salary level is different due to factors such as productivity, communication and management overhead and costs for setting up and maintaining offices.

The researches have disputes that need to be acknowledged when analyzing the results. The main contributors in this literature review as well as the findings and disputes recognized by the researcher of this study, are listed in the Table 5 below.

Table 5. Main success dimensions/factors in Agile projects

Source	Survey method	Dimensions/Factors	Findings	Disputes
Chow, T., & Cao, D. B. (2008). A survey study of critical success factors in Agile software projects. Journal of Systems and Software, 81(6), 961–971. https://doi.org/10.1016/j.jss.2007.08.020	A web-based survey/109 Agile software projects from 25 countries around the world XP 53,2% Scrum 21,1% Other 25,7%	Quality Scope Time Cost	Agile methodology has a big impact to the project´s success	Agile –driven approach diminishes creditability "Agile proponents trying to claim Agile success (in order to promote the adoption of their methodology), and the lack of independent, non-Agile advocates in the survey"
Dingsøyr, T., & Lassenius, C. (2016). Emerging themes in Agile software development: Introduction to the special section on continuous value delivery. Information and Software Technology, 77, 56–60. https://doi.org/10.1016/j.infsof.2016.04.018	Three articles chosen from XP2014 conference.	Continuos value delivery	Benefit points	Lack of empirical research
Estler, H. C., Nordio, M., Furia, C. A., Meyer, B., & Schneider, J. (2014). Agile vs. structured distributed software development: A case study. *Empirical Software Engineering*, *19*(5), 1197–1224. https://doi.org/10.1007/s10664-013-9271-y	Questionnaires and interviews/31 companies/66 projects in Europe, Asia and Americas	Overall success, importance for the customer, cost-effectiveness, developer motivation, amount of personal communication, several problematic aspects	No impact to the team satisfaction. Agile effects negatively to the economic savings.	Small sample size Development driven approach
Fernandes, G., Moreira, S., Araújo, M., Pinto, E. B., & Machado, R. J. (2018). Project management practices for collaborative university-industry R&D: A hybrid approach. *Procedia Computer Science*, *138*, 805–814. https://doi.org/10.1016/j.procs.2018.10.105	Case study (30 projects part of university-industry R&D program in US)	Analysis of the most useful PM practices (tools and techniques), taking into account	Promising results of a hybrid approach	Limited to one industry

		two different management approaches: predictive (Waterfall) and adaptive (Agile)		
Lei, H., Ganjeizadeh, F., Jayachandran, P. K., & Ozcan, P. (2017). A statistical analysis of the effects of Scrum and Kanban on software development projects. *Robotics and Computer-Integrated Manufacturing*, *43*, 59–67. https://doi.org/10.1016/j.rcim.2015.12.001	Web based survey among people using Scrum (21) or Kanban (14).	Schedule Scope Budget Risk Resources Quality	Kanban more effective than Scrum in all other dimensions than budget.	Small sample size Interviewed people's experiences and opinions might effect to the results.
Serrador, P., & Pinto, J. K. (2015). Does Agile work? - A quantitative analysis of Agile project success. *International Journal of Project Management*, *33*(5), 1040–1051. https://doi.org/10.1016/j.ijproman.2015.01.006	1002 projects globally	Efficiency Overall stakeholder satisfaction	Agile effects positively to project success. In Agile, the amount of planning exceeds Waterfall.	Query inputs were based to the subjective opinions of Agile practitioners.
Standish Group International (2015) Chaos Report. The Standish Group International, Inc.	5000 projects in average/year between 2011 - 2015	1994-2005: OnTime, OnBudget and OnTarget. 2005-2019: OnTime, OnBudget and OnTarget, OnGoal, Value and Satisfaction 2019 -> Focus in the value of project portfolio, not in individual projects	Success factors in an Agile project: Project size Project complexity Team capability Industry Geographical area	Lack of selection criteria of the projects included to the research Lack of proper definition of success criteria The number of Agile and Waterfall projects missing.

As mentioned earlier, the current trend is to move from individual projects to project portfolio and business value. In 2019, Standish Group recommended that the focus should be in the value of project portfolio, not in the success of individual projects. An

interesting view of calculating business value was presented by Dingsøyr and Lassenius (2016), known as SaFe model. The suggestion is based on a large development project in Norway, proposing that similarly to the value of an epic in terms of "story points", the value of an epic would be estimated as "benefit points". The "benefit points" would describe the value an epic has to the customer organization, and would help to prioritize the user stories in product backlog. Even more, by the technique the supplier would get early feedback from users and customers (Dingsøyr & Lassenius, 2016). As the relationship between customer and supplier in Agile project is challenging, and the prioritization of user stories in many cases difficult, this approach is more than welcome, especially in big size and complex Agile projects. The theory is presented in the current models of SaFe (Scaled Agile Framework).

2.1.2 Risks of Agile –driven projects

Unlike in case of Agile success factors, there seems to be a consensus of the failure and risk factors. However, this area has been researched less than the success of Agile. From the literature, the risks related to knowledge (communication) sharing, time-saving bias, technical debt and distributed Agile projects, came up as dominating risk areas.

Like mentioned in the Chapter 1, Introduction, quite often, failures and/or risks in Agile projects refer to a non-supportive Agile environment (Chow & Cao, 2008; Ghobadi & Mathiassen, 2017; Nordic, 2015). In 2008, Chow and Cao observed that "Agile project could be done in a timely manner and within cost despite the lack of agile-friendly organizational environment factors, which include cooperative culture, oral culture, universal acceptance of Agile, appropriate reward system, etc." (Chow & Cao, 2008). "As long as the team is capable and has a correct delivery strategy, a widely-accepted agile environment" has no impact to the two dimensions used in the research: Timeliness and Cost (Chow & Cao, 2008). During the time Agile was relatively new phenomenon. Chow and Cao acknowledged that the factors could change within coming years. Indeed, later the understanding Agile processes became as an important factor (Ghobadi & Mathiassen, 2017; Miller, 2019; Nordic, 2015) in the Agile research. Unlike Chow and

Cao (2008) stated, lack of understanding Agile processes and methods became one of the most important failure factors in Agile projects. For instance, in their State of Agile review, VersionOne (2015 and 2019) listed “lack of experience with agile methods” as second key failure reason whereby “company philosophy or culture at odds with core agile values” was positioned as first. The knowledge of Agile methodology, methods and process formed a backbone that was, in many of the studies, used as baseline for analyzing failures and risks against.

2.1.2.1 Risk management research

Although the software risk management has been discussed in the appropriate literature (Kwak & Stoddard, 2004; Wallace, Keil, & Rai, 2004), the risks that were caused or appeared by Agile methodology, were segregated from general software risk management only recently. In such research, very often the risks are explained by non-familiarity of Agile processes and methods. A few scientists have, however, discovered problems like technical debt and time-boxing bias, that are caused by the nature of Agile methodology itself.

Walczak and Kuchta (2013), Ghobaldi and Mathiassen (2016), Shrivastava and Rathod (2017) and Miller (2019) have developed risk mitigation models that are based on their argumentations. Although their models are different, the risks found in their research were alike. Most interesting risk model, from this study perspective, is the one presented by Walczak and Kuchta (2013) that pursues to identify risks caused by Agile methodology. In their study, six projects operating in different locations (and countries) using mainly Scrum methodology, were investigated. The risk mitigation included three groups : Development Cycle Risks, Development Environment Risks and Programmatic Risks. Although Walczak and Kuchta (2013) remark that the results of their survey should not be generalized because all the investigated projects were carried out in the same company and all of the projects involved customization of the same product, their observations are in line with other research. Main contributions on their survey were that the interaction between client and supplier is a major risk for a project, and that when a project is

treated like Waterfall, the main benefits of Agile are lost. Their resolutions provide means to return a project back to “Agile track”. A particularly interesting note was made regarding Contract risks. A fixed price project was considered a major risk, therefore Walczak and Kuchta stated that “it is recommended to introduce flexibility in the scope of a project by making appropriate adaptations to the contractual terms (freezing the definition of the scope, especially at a detailed level, should be avoided) or breaking down the contract into several smaller ones (e.g. ordering groups of product features, instead of a single order for the whole product)”.

“Lack of familiarity with Agile values and principles” was also highlighted by Ghobaldi and Mathiassen (2016) in their cross-case risk analysis of effective knowledge sharing in Agile teams. They integrated the issue to 37 risk items that were divided into seven areas: team diversity, team capabilities, team perceptions, project communication, project organization, project technology and project setting. Based on their findings, they developed a risk mitigation model that aims to identify resolution strategies based on a project´s risk profile. The model starts by analyzing project risk profile and continues, through the observations, to the defined risk areas and their resolution strategies. The model does not, however, stress the risks by any means (high-low risks) or take into account their impressiveness, which can be seen as dispute of the research. Further, the researchers acknowledged that the findings were limited to four Agile projects across two software companies, so the sample data was quite narrow. Nevertheless, the findings were, to a large extent, supported by Miller (2019) and Shrivastava and Rathod (2017). The research of Miller (2019) was also a resolution-orientated research in which she identified Agile problems and challenges, and looked for mitigation actions to prevent failures, without weighing the risks. Her study was based on the ~50 problems and challenges discovered from Internet. Shrivastava and Rathod (2017) on the other hand, conducted a risk analysis of distributed Agile projects, including 65 interviewees in several countries, each interviewee having minimum three years´ experience on the field. The findings were divided into five risk categories: Group Awareness, External Share-

holder Collaboration, Software Development Life Cycle, Project Management and Technology Setup. In each category, they defined a risk area, and risks either statistically significant or not significant.

In the Table 6 below, the statistically significant risks identified by Shrivastava and Rathod (2017) are listed and compared to the other research results in order to see if they are repeated in other research more than once.

Table 6. Comparison of risk factors

Shrivastava and Rathod (2017)	Ghobaldi and Mathiassen (2016)	Miller, G. (2019)
Lack of Communication between Team and the Client Lack of Communication between the Team Members Uncommon Language Underinvestment on Travel by the Management Unsuitability of Agile approach for Large Organization Lack of Documentation	Lack of communication of agile time requirements with client front up Different speaking languages among members Different time zones and physical distance between members Inadequate planning and insufficient documentation (related to communicate face-to-face principle)*	Communication problems Too narrow communication bandwidth Communication between development and product owner Communication between development and quality assurance Company culture Lack of culture transition Organization change Mindset
Poor Collaboration between Different Sites Lack of Collaboration between developers and quality assurance members Poor Coordination between Multiple Teams		
Poor Coordination between Multiple Vendors Risk in Code Integration with Multiple Vendors Inappropriate User Story Estimates by Multiple Vendors Dependency on Third Party		
Requirements Unclear to the Team Requirements conflicts among multiple Product Owners Inadequate communication about End User Requirements Unclear Objectives of Project	Insufficient and ambiguous requirements Lack of communication of agile time requirements with client up front Inappropriate assumptions about project scope made by client (due to the development team's flexible agile-related Stakeholder neglect of non-functional requirement	No single Product Owner authority
Loosing on Time on End-to-End extensively interdependent Transaction Rich Test Cycle across distributed teams Unavailability of Requirements Documents for Testing	Tight sprints schedule with little time for interaction Inadequate planning and insufficient documentation (related to communicate face-to-face principle)*	Large projects Project complexity Lack of time to fix failed tests

Cross Functional Teams Insufficient for testing of Large Projects Test Data Management		
Poor Technical Debt Management Code Integration across Multiple Sites Issues with Pair Programming		Too big backlog Too old backlog Lack of time to fix failed tests
Inadequate Prioritization of Requirements	Prioritization of requirements based on one-dimensional thinking (related to working software principle)	
No common Definition of Done Ineffective Standup Meetings Differences in Agile Practices and Standard of Processes followed by Multiple teams		Large projects Project complexity Too many meetings

The comparison reveals that most of the problems are related to communication and large, complex projects.

2.1.2.2 Technical debt

Another focus risk area in Agile development is related to technical debt, conceptualized by Ward Cunningham (1992). The debt brings benefits on short term, e.g. it speeds up time to market, but may cause severe problems on longer run, such as cost overruns, inadequate software quality and inability of the software to adapt new features (Rios et al., 2019). Due to its objective to create early business value by delivering fast, Agile software development is vulnerable to technical debt (Holvitie et al., 2018). Usually the problems come from software architecture (Holvitie et. al, 2018), and show up as e.g. as lack of code refactoring and/or outdated documentation. Technical debt is a high concern in Agile, as it leads to low maintainability, delivery delay and rework (Rios et al., 2019).

2.1.2.3 Time-saving bias

Time estimation is a common problem in software development, regardless of methodology. Fink and Pinchovski (2020) observed that the bias of time saving by speeding up development existed more likely in Agile projects in which the project size is usually measured in story points, compared to Waterfall where it is calculated by lines of code

or function points. They concluded that the “advantages of simplicity and intuitiveness associated with the agile approach may have a downside – they may increase the likelihood of intuitive thinking, which may lead to decisions that are more biased”. In Agile projects, the time-saving accuracy was 33% whereby in Waterfall it was 50%. The researachers recommended that “managers should insist on using formal methods of time estimation even when relevant heuristics come readily in mind” (Fink & Pinchovski, 2020).

2.2 Summary

The research on Agile project success and the success factors is scattered. The perception of success has not only changed during the years, but it is also defined differently by the researchers. An illustrative example of this is provided by Standish Group that first changed the project success attributes from traditional to “modern”, reflecting the values of Agile Manifesto, and again in 2019, when stating that instead of one project the project success should be regarded from a project portfolio point of view. Recently, “benefit points” are proposed for measuring the success of Agile project (Dingsøyr & Lassenius, 2016). By benefit points it is evaluated how much value an individual epic has to the client organization. The benefit points help to prioritize the user stories in the product backlog. The concept of benefit points is adapted in SaFe (Scaled Agile Framework) that is used when scaling to bigger projects using Agile methodologies.

The success factors that are mentioned in the appropriate literature, seem to be many, depending on the success dimensions in question. A few of the factors are repeated several times, but even so, the interpretations of their significance differ. A high level conclusion can, however, be drawn, stating that size of the project team is the most important success factor. An ideal Agile team does not consist more than seven (7) members. The researchers were not unanimous of other success factors, such as project complexity, client involvement or even project size.

In the context of risk management research, the risks characteristic to Agile, are not widely researched. Typically, the risks are looked at from Agile perspective i.e. as if they

are risks for Agile adaptation, not as a risk caused by Agile methodology or method(s). Therefore, many risks are mitigated by, for instance, by Agile adoption. A few of the risks are, however, seen as consequences of Agile methodology or methods themselves. Examples of such risks are i.e. technical debt and time-saving bias.

The current research has clear disputes. A lack of unanimous success criteria makes it difficult to compare the results in current research, and the discrepancies between the researches diminishes the creditability of the data results. Further, it some of the research it is stated that the results may be biased due to the practitioners´ desire to proof Agile successful.

For this thesis, it is important to select the success and failure concepts that are most relevant, in order to compare the theoretical concepts to the empirical findings.

3 Methodology

The objective of the research is to clarify the expectations on project success as well as the perceptions on success factors and failures in Agile –driven projects when examined through the lenses of client and supplier. By analyzing the perceptions of successful projects, and comparing those to the Agile theoretical framework, the study pursues to clarify whether the concepts of success are consistent between practice and theory. Similarly, the identified success and failure factors are compared to the previous Agile research in order to clarify whether they are compatible.

3.1 Research strategy and method

In this thesis, it is important to understand the beliefs and motives of individuals when they express their opinions of project success and success factors. It is equally important to understand whether or not they are familiar with Agile project management methodology and how does that influence to their answers. The answers were collected by semi-structured interviews and researcher´s observations during the study. Therefore, the philosophy selected for the thesis, is interpretivism. The research strategy is built upon a qualitative (empirical) study methodology, since it was not sure whether the answers would reflect the theoretical values of Agile. The research questions start by What and Why that are typically answered by qualitative methods (Long, 2000). By using theory driven approach, the study aims to validate the identified perceptions of project success as well as the success factors and downsides against Agile framework. The qualitative methods include semi-structured, theme-based interviews with participants and the observations made during the study. The cross-sectional study takes place only during master thesis, and it provides a snapshot that can be examined against prevailing theories of the same.

3.2 Data collection

For this thesis, fourteen stakeholders in seven companies were interviewed. Nine interviewees were working for the same project throughout the study, five of them on client side and four on supplier side. The aim of the particular setup was to analyze whether the views of client and supplier, working for the same project, differed and if yes, how. The sample data was then enlarged by interview data from 3rd party representatives. The 3rd party was not involved to the ongoing project. The reason for collecting such data was to analyze whether the results were confirmed by 3rd group, in other words, when examined apart from the core project environment. For validity and reliability reasons, the findings were compared to previous research.

The observed companies were selected based on their reputation and long-term experience on software delivery projects using Agile and/or Waterfall. All of them operate in insurance industry in metropolitan area in Finland. Four of the companies have operations only in Finland whereas three of them are global. Size of the companies varied from small (50 employees) to giant size companies (14 900 employees). For five of the companies, insurance business is their main branch, whereby for two it is a major branch among other important branches.

The interviewees were classified to three groups: client, supplier and 3rd party (including both client and supplier representatives). The interviewees were selected based on their long experience in the project management and/or their experience on the insurance business. Client project team consisted of system specialists and IT manager whereby in supplier project team the roles consisted of developer, designer and tester. Other stakeholders, including 3rd party, included mainly higher management representatives, such as CIO, EVP and several types of directors.

The interviewee data is introduced in the Table 7 below.

Table 7. Interviewee data

	Client/Supplier	Firm	Role	Pseudonym
Client	Client	Firm A	Management (project) CIO, EVP	A1, A2
	Client	Firm A	Project team member System Specialists (2) IT Manager	A3, A4, A5
Supplier	Supplier	Firm B	Director (project) Director	B1
	Supplier	Firm B	Project team member Developer Designer Tester	B1, B2, B3
3rd Party Client	Client, 3rd party	Firm C	Management IT Development Manager	C1
	Client, 3rd party	Firm D	Management Development Manager	D1
	Client, 3rd party	Firm E	Management Director	E1
3rd Party Supplier	Supplier, 3rd party	Firm F	Project Management Product Owner	F1
	Supplier, 3rd party	Firm G	Management Account Manager	G1

During the study Finnish government restricted physical contacts due to COVID 19 virus. The data was collected as semi-structured, theme-based interviews that were conducted via phone calls during 29.4. – 28.5.2020. The duration of the calls was 10 – 40 minutes. The calls were recorded via communication tool Teams, and the relevant and appropriate data was transcribed during 19.5. – 30.6.2020.

Interview questions

The open questions, to which interviewees could freely answer, were decided before the interviews. The intention of the first two interview questions was to build a foundation for the study by identifying the interviewees´ perceptions of project success and the success factors. The questions were:

- What is your perception of a successful project?
- What do you think is required that a project can success?

The third question reflects interviewees´ view on Agile´s relevance in the context of project success.

- What is your understanding of Agile project management or Agile in general?

The purpose of asking open questions referred to project success, was to find both the perceptions on success and success factors, but also the other side of the coin, the downsides.

3.3 Data analysis

The analysis started by examining the perceptions on project success, followed by analysis of the perceived reasons for project success and/or failure factors. During the analysis, the empirical data was validated against existing research.

The first and third interview questions, presented in the Chapter 3.2, Data collection, together provide an answer to the first research question that is *What is the value clients and suppliers expect to get by using Agile project management methods?* The perceptions were compared to the theoretical framework of Agile in order to find out whether the perceptions were compatible with Agile success concepts.

Similarly, second and third question together provide an answer to the second research question that is *Why the value is or is not realized?* The perceived reasons for project success and/or failure were identified, and again, compared to the theoretical framework of Agile. The failure reasons were identified by using reverse analysis that is by recognizing the oppositions of such success factors that could be interpreted as consequences of obeyed Agile methodology or methods.

The specific purpose of the third interview question was to identify any bias that could reflect in the answers.

The findings were compared and linked to the theory of Agile. The accumulated data consists of interviews with selected interviewees, and researcher´s own observations during the study.

Based on the coding of the data, two themes, Project Management Success and Project Success, were formed. For Project Management Success, the subthemes reflected the traditional approach of Waterfall: On-time delivery, On-Budget delivery and Non-stretchable Scope (the scope cannot stretch at the expense of time or budget). Notably, the answers engaged to On-Budget delivery, were always engaged with On-Time delivery whereas On-Time delivery was, by many interviewees, mentioned on its own. For Project Success, the subthemes were Satisfaction even after project delivery, Teamwork and Flexible Scope, mandated by the values of Agile.

Table 8. Data themes

Main theme	**Subtheme**	**Quotation**
Project Management Success	On-Time Delivery	*"(A successful project means that) most important tasks are done within the initially set timeframe."* *"Project is on schedule and all tasks completed."* *"In a successful project the schedule is planned so that there is no last minute panic."*
	On-Budget	*"The project is delivered to the client in an agreed time and **budget**, reaching the agreed quality level."* *"There are two controlling mechanisms in a project: **budget** (and schedule)."*
	Non-stretchable scope	*"The project tasks must be prioritized within the limits of schedule (and budget)."* *"Controlled changes are welcome, but surprises like a big change to the agreed scope just before release, are not."* *"The scope should be just enough, not too much."* *"Business requirements must be clear when the project starts."*

Project Success	Satisfaction even after project delivery	*"Project must provide value to the client. Schedule and budget are secondary."*
	Teamwork	*"Team spirit, especially in Agile teams, is extremely important so that the team members can prioritize and share tasks between each other."* *"What is important, is the feeling. The attitude should be permissive: mistakes are allowed. After a mistake, the only thing that is to be considered is: how do we move on from here?"*
	Flexible scope	*"In a successful project, it is allowed to change direction when needed, and no-one is to blame if the scope is not (end of the project) what was initially planned."* *"I think it is important that the (business) requirements are fulfilled, even if they are mandated through change requirement process."* *"Client gets what they want, not just "by-the-book" delivery."*

During the analysis, some of the data, like the data related to the internal processes within an organization, was rejected because it not relevant from the perspective of this study.

4 Findings

The purpose of the study was to analyze whether the perceived project success expectations were fulfilled in Agile –driven commercial software delivery projects. The research problem was examined through the lenses of client and supplier. First, it was approached by examining the interviewees´ perceptions of project success. At this point the aim was to find out the success criteria that mattered to the interviewees regardless of any project management methodology.

The findings were first analyzed as a whole after which the data was classified to project management success and project success, and the views of different interest groups compared between each other.

4.1 Perceptions of a successful project

In this chapter, the interviewees´ perceptions of a successful project are compared to the existing Agile concepts (Goyena & Fallis, 2019; Siddique, 2016, Standish Group 2018). The purpose is to identify whether the identified perceptions correspond with the previous research.

Majority of the interviewees (64%) highlighted that a successful project must be delivered as agreed in the contract. However, few of them also admitted that schedule overruns, as well as cost overruns, are justified at the expense of customer satisfaction and/or business value. Based on the results, it can be concluded that both *project management success* and *project success* are equally important for the stakeholders. This finding is in line with Siddique (2016) that stated “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 model. 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." Siddique (2016) also concluded that the customer satisfaction is "strongly emphasized" in Agile projects.

When the views of project interest groups (project team, management) and 3rd party (client, supplier) were compared, the most significant success dimension on client side was OnTime, differing from the perception of 3rd party (client) that emphasized Client satisfaction over other constraints whereas on supplier side, OnTime was most significant for both project interest groups and the 3rd party (supplier). The findings reveal that for both client and supplier the most important was that the project would be delivered on initial schedule. The perceived objective can be explained by the statutory characteristic of the project that did not allow timeline to be exceeded.

Table 9. Perceived success dimensions based on importance

Group	Most important	Second	Third
Client	OnTime	On Budget Client satisfaction	
Client, 3rd Party	Client satisfaction	On Budget Client satisfaction	
Supplier	OnTime	Client satisfaction	OnBudget
Supplier, 3rd Party	OnTime	Client satisfaction	OnBudget

Based on the results, most important was to keep the project on schedule. The views were, however, not unanimous. The familiarity or non-familiarity of Agile methodology was likely to impact the answers. The more the respondent was familiar with Agile, the more he/she emphasized client satisfaction at the cost of other constraints. In the study, the management on both client and supplier side emphasized that the project must be delivered on time, but at the same time they highlighted that business satisfaction was most important. Notably, *delivering on time* and *on budget* were specifically emphasized by client.

"A successful project is delivered on agreed schedule and in budget including the content that was agreed in the contract. A basic set of features fulfilling 80% of the needs is enough to have." (A2)

"A project is succesful when the client gets the Volvo they´ve expected, instead of Lada." (B1)

The perceptions on project success expressed by 3rd party, emphasized client satisfaction even at the expense on costs and schedule.

"The most important is that the end result is satisfactory from business point of view. Schedule and costs must not be exceeded by dozens of percentages, but the most important is the content of the delivery." (E1)

On project level, the role of the interviewee in the project organization appeared to impact to his/her answers more than the familiarity or no-familiarity with Agile methodology or methods. Developers considered a project successful when it was delivered on time and all the defined, mandatory tasks were completed without bugs, also when they themselves had learned something new during the project. They were irritated when requirements were not clear or the product backlog grew significantly from what was initially planned, effecting to the timeline set for the project. While the focus on supplier project organization was on quality and project schedule, the views on client side were more scattered. A "mandatory" scope was repeated by the team several times, but the understanding of the mandatory features and functionalities fluctuated, explained by the complexity in the scope. New requirements and changes, including dependencies to several other critical systems, were constantly discovered by business representatives during the project, often dictated by legislation that also tended to change during the project. Since all the requirements were considered equally important, it was difficult for the client (business) to decide which ones had priority over the others. Unpleasant decisions had to be made, because the schedule did not strech. For some of

the (client) team members project was considered successful only when *all* the requested features and functionalities were implemented despite the effects on schedule and cost whereas for some in the same team a succesful project was completed within set time including features must-to-have. The increasing number of requirements in the product backlog without client´s ability to prioritize the requirements, was raised up as a common problem in the project. The study results were in line with previous Agile risk research (S. V. Shrivastava & Rathod, 2017) that classified "inadequate prioritization of requirements" as a significant risk for an Agile project.

As a summary, several findings were made. First, the perceptions of project success can be classified to two categories, *project management success* and *project success*, similarly to Siddique (2016). In the theoretical framework of Agile, one or all of the traditional corners of the iron triangle of time, budget and scope can stretch, but in reality, projects are limited by fixed timeline and/or budget, and the success defined based on how well the project met the constraints. Second, the success criteria is vulnerable to the project nature. Thus, when the project has a fixed price or deadline, it´s success is defined based on the "mandatory" contractual objectives, ignoring the principles of Agile. Third, the perceived success criteria differed between stakeholders even in the same organization. This finding is, again, in line with Siddique (2016) that discovered that "every (project) stakeholder has a different perspective of success". Finally, one of the factors of success criteria, "satisfactory" scope was not unanimously and precisely defined by any of the interviewees. The Agile Manifesto (2001) implicates that the "satisfactory" scope is defined only during the project, declaring that changes are allowed even "late of the development". There is a clear conflict between Agile methodology and projects that are dictated by contractual obligations. A number of attempts to adjust the situation have been made (S. V. Shrivastava & Rathod, 2017; Walczak & Kuchta, 2013).

4.1.1 Different conceptions between groups

After the ground analysis, the study data was was examined further by classifying the data into project management success and project success, and comparing the

perceptions of project success between different stakeholders. Main observation in this study was that the differences between the organization levels inside the same organization contrasted more than the perceptions between client and supplier. For instance, in both client and supplier project groups the significance of costs was less than that of management in both organizations. Second observation was that although customer satisfaction was ranked as main contributor to a project´s success in all groups, the understanding of what actually makes client (customer) satisfied, varied. In literature, there are different approaches. For instance, Siddique (2016) believes that the three conditions should be met:

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*

In this study, however, interviewees (client) did not mention their own role in the project as prerequisities for their satisfaction. The listed three conditions were taken for granted whereas the perception of scope and its meaning from satisfaction point of view was discussed several times. Therefore, from this study perspective, it is relevant to examine the perceptions of scope more closely. Two matters, based on study data, were observed. First, the main differences were found inside the same organization group. Thus, for instance, while management judged both initial and (only) mandatory scope to be delivered, project team disagreed.

> *"A project is successful when it provides value after the delivery. The project should not forget its purpose and focus on deadline only. A scope consisting of minimum set of features is like too small shirt. It looks nice, but when you put it on, it will burst." (A4)*

"A successful project is delivered on agreed schedule and in budget including the content that was agreed in the contract. A basic set of features fulfilling 80% of the needs is enough to have." (A2)

Second, *mandatory* scope in general was not enough from project success point of view. A minimum scope is, however, in line with Agile methodology that pursues to deliver only "mandatory features and functionalities (Standish Group, 2015), avoiding large scope (S. V. Shrivastava & Rathod, 2015). The finding is important, because they reveal that traditional mindset still seems to overrule Agile. The comparisons between the groups are shown in Tables 10, 11, 12, 13 and 14.

Table 10. Comparison between Client and Supplier Project Teams

Dimension	Attribute	Client Project Team	Supplier Project Team	All
Project Management Success	On Time	67%	100%	83%
	On Budget	33%	0%	13%
	Initially agreed scope delivered	33%	33%	33%
Project Success	Client Satisfaction	67%	100%	100%
	Mandatory features and functionalities delivered	33%	33%	33%

Table 11. Comparison between Client and Supplier Management

Dimension	Attribute	Client Management	Supplier Management	All
Project Management Success	On Time	100%	100%	100%
	On Budget	100%	100%	100%
	Initially agreed scope delivered	50%	100%	67%
Project Success	Client Satisfaction	100%	100%	100%
	Mandatory features and functionalities delivered	50%	0%	67%

Table 12. Comparison between Client Project Team and Client Management

Dimension	Attribute	Client Project Team	Client Management	All
Project Management Success	On Time	67%	100%	80%
	On Budget	33%	100%	80%
	Initially agreed scope delivered	33%	50%	50%
Project Success	Client Satisfaction	67%	100%	100%

	Mandatory features and functionalities delivered	33%	50%	50%

Table 13. Comparison between Supplier Project Team and Supplier Management

Dimension	Attribute	Supplier Project Team	Supplier Management	All
Project Management Success	On Time	100%	100%	100%
	On Budget	0%	100%	25%
	Initially agreed scope delivered	33%	100%	50%
Project Success	Client Satisfaction	100%	100%	100%
	Mandatory features and functionalities delivered	33%	0%	25%

Table 14. Comparison between 3rd Party Groups

Dimension	Attribute	3rd Party, Client	3rd Party, Supplier	All
Project Management Success	On Time	100%	100%	100%
	On Budget	67%	50%	60%
	Initially agreed scope delivered	0%	0%	0%
Project Success	Client Satisfaction	100%	100%	100%
	Mandatory features and functionalities delivered	100%	100%	100%

As a summary, the results reveal two issues: first, the perceptions of project success are different between different stakeholders, and within the organization itself, and second, the understanding of client satisfaction was not unanimous. Thus, the project success criteria should be defined during the initiation phase, as suggested by Hussein (2012).

4.2 Understanding Agile

Despite all the interviewees had been involved to Agile projects for many years, and were familiar with the methods and processes, their mindset was still, for most part, traditional. Agile was understood mainly as a different way of breaking the work down into smaller pieces, fast development and openness to changes. The observation was clearly evident in the project team, both on client and supplier side, but also in the management.

"In Agile, development is done fast. But that is nothing new, it´s always been like that." (B1)

"I heard the word "Agile" first time 20 years ago. What I understand is that in Agile the work is implemented and tested in small pieces." (A1)

Two of the interviewees, however, realized that Agile represents an ability to change direction when needed, and one of them described Agile as a new mindset.

"Agile means, in practice, applying new methods to service or project deliveries that means that we do not only split the work into small pieces but we also think about the implementation in a different way. Team work is emphasized, and also different ownership. In short, Agile means communal teamwork in which everyone pushes hard for a common goal." (C1)

4.3 Downsides

4.3.1 Critics

Critics towards Agile methodology was expressed by client project group and the 3rd party. In many projects, the model is decided before the actual project takes place. The Agile approach was challenged by three interviewees. First, it came out that the nature of the project may not allow Agile processes and/or practices. Governmental and statutory projects were mentioned as examples, in which the legislation often is restrictive and comprises of many rules and that contrast with the principles of Agile. One of the interviewees had negative experiences on Agile in such projects whereby in continuos services the experiences were positive. The results are in line with Miller (2019) that suggests to use hybrid approach or traditional methodology with Agile practices. For instance, "an option is to add agile practices to a traditional methodology to reach the desired level of agility" (Miller, 2019).

4.3.2 Company culture

Based on observations, an Agile –preventive atmosphere seems to be evident when company culture supports traditional Waterfall approach with command and follow – attitude. In such, often competitive environment, managers are still expected to lead daily work, and set priorities, in other words, control the work. Disappointment related to the management support, together with multitasking and self-directional expectations, were brought up as prime failure reasons by interviewees in the client project team.

> *"Too much to do at the same time. It is not possible to do multiple tasks at the same time."*

> *"With this amount of people it is impossible to do all the tasks."*

Such problems were not mentioned on supplier side. One of the explanatory reasons might be that supplier´s project team was used to allocate the time between several simultaneous projects whereby client´s concentration was, before the project started, focused on their daily duties, and their time management was challenged along the project since they had to balance between their challenging and time-consuming daily duties and the demanding, complex project scope. Their frustration was reflected in the project. For them, too tight resource allocation was a serious problem. In Agile, management control is low (Miller, 2019), yet the lack of management support is a serious problem in the projects (Standish Group, 2015).

4.3.3 Teamwork

In this study, the teamwork is understood as *cooperation* between *client and supplier project organizations*, and not as *teamwork within Agile (Scrum) team*. The organization of the project team differed from Scrum Agile in terms of non-existence of a nominated Product Owner. The decisions and priorities were discussed jointly by client and supplier

organization, but often often dictated by client´s Business Owner that controlled the conversations. Typically, the conversations turned to arguments, the business owner refused to prioritize the requirements and, because business owner did not accept any resilient proposals, the decision-making was escalated to superiors on client side.

This setting is typical in traditional projects, whereby in Scrum Agile, the Product Owner manages the discussion between client and supplier, sets priorities, manages product backlog and accepts the end product (Miller, 2019). The Product Owner must understand client´s business, thus the role is usually assigned to a client representative.

However, in case of fixed price projects, the role is recommended to be assigned in client organization (Walczak & Kuchta, 2013). A Product Owner should not be more than one person, because in case of many, the requirements may contrast between each other. The lack of one single Product Owner came up as a concrete problem in the ongoing project during the study.

The importance of teamwork was highlighted by several interviewees, both on client and supplier side, including also 3rd party organizations.

> *"It (teamwork) is extremly important so that people can share the tasks in the team and prioritize them." (D1)*

> *"Then, it would be good that the chemistry between project team members works so that the project proceeds flexibly." (A5)*

Lack of teamwork was frequently brought up as an obstacle for a project success, causing e.g. communication problems and lack of trust between the project team members.

> *"It is like never-ending battle, always someone trying to be on top of conversation. It is very exhausting and eats my energy." (A3)*

During the study, it was observed that the teamwork is based on individuals, their motives and social capability more than company culture. However, the company culture can heighten motivation and thus effect to negative or positive attitudes of individuals. Further, clash of cultures between client and supplier can improve or weaken an effective teamwork. From Agile point of view the lack of motivation is problematic, because the team should not include non-motivated members. In practice, the team will be formed based on available members at a time. Agile principle of motivated team members is difficult to put into concrete actions should the individuals themselves or company culture destroy the motivation.

Two of the interviewees highlighted a permissive environment in which people are allowed to do mistakes and learn from mistakes. Similarly, people need to be flexible so that if the project scope changes from initial, people would not accuse others but they move on in the project. Poor or non-existing teamwork results to a situation in which people are afraid to express their opinions or make decisions (Walczak & Kuchta, 2013), lowering also motivation. It also causes communication problems that are classified as statistically significant risks for an Agile project (S. V. Shrivastava & Rathod, 2017).

4.3.4 Team efficiency

Team efficiency is suffered when the project members are changed in middle of the project, or their capability is not on sufficient level. Also, when the mother language is not same between the team members, the work amount increases along translations, and the risk of misunderstandings grows. Unlike Shrivastava and Rathod (2015), that classified the language problem as least important risk factor, one of the interviewees perceived it as a significant risk.

> *"Only Product Owner can be shared between teams. We have faced bad experiences of shared resources, for instance, if a developer works in another project, testing needs to wait." (F1)*

"*When people are not used to speak English, a lot of time is used for translations, and still there is a risk of misunderstandings." (E1)*

4.3.5 Resource allocation

Non-sufficient time allocated for a project and too small budget are tightly connected to project management success. Explanation for bringing up these problems in project team was most probably the ongoing project that was tightly connected to a strict deadline mandated by governmental legislation. Due to the complex nature and dependences of the project, the requirements were not known in detail until the project had already been ongoing for a while. Definitions took more time than planned, and were repeatedly changed. Despite the obstacles deadline did not stretch. The problem of Agile is that it does not fit well to projects that are mandated by "iron triangle" of fixed schedule, budget and well defined (initial) scope before the project starts. The issue is paid attention to in the literature (S. V. Shrivastava & Rathod, 2015; Walczak & Kuchta, 2013).

4.3.6 Agile processes

Agile processes, namely Scrum practice of daily standups was found too time-consuming. Some of the respondents complained that even short meetings, when they are regular, break their concentration. Most of the respondents preferred two status meetings per week instead of regular dailys. Another practice, timeboxing, was criticized of being stiff because it did not fit to all the work that needed to be done. Two interviewees pointed out that it does not fit to all types of work, like in case of complex definition that needs to be discussed with multiple stakeholders for longer period of time, or in case of complex implementation that needs to be tested several times by the developer during implementation. The overall view often disappears when the work needs to be break down to fit required durations, developers lose their visibility, and, as a consequence, a lot of refactoring during regression testing is required. Some of the project stakeholders were not happy with Agile´s practice of providing work estimates. In Agile, work estimates are often counted as story points or by size of a T-shirt (small, medium, large), and their

conversion to real time is not accurate. In addition, the work estimates are often optimistic, and can fail due to many unexpected reasons. Finally, in Agile projects the degree of completion is difficult to estimate because even if 90% of the requirements are implemented, the remaining 10% may still consume 50% of the initially planned time allocated for the project.

4.3.7 Empirical data analysis

The study data was analyzed resulting to six categories namely Organizational, Team, Project Management, Requirements, Agile Processes and Technology, and contrasted with Agile principles and processes following the concept from Shrivastava and Rathod (2015). One of the categories was Organizational including factors related to the Client or Supplier organization, such as management support, multi-tasking and self-direction requirements and company culture. An Agile team is built on trust and cooperation between Client and Supplier, thus the elements related to communication and communication methods fall into the category of Team. Project directing and control, in this study, comprises Project Management, and the various Agile practices like sprints and change management, comprise Agile Processes. Last category, Technology, includes elements of implementation technology and technical debt. The perceived reasons were mapped to the appropriate categories, and classified to four downside types (Problem, Weakness, Risk and Threat) reflecting their relationship to appropriate Agile principle(s). Finally, the factors were mapped to the observer groups of client and supplier, including 3rd party.

Table 15. Downside types

Downside type	Description
Problem	Problem in Agile methodology, process or practice.
Weakness	Weakness in Agile methodology, process or practice
Risk	Risk for Agile methodology, process or practice
Threat	Threat for Agile methodology or practice

Majority of the downsides are classified as risks, found in all six dimensions (Table 16).

Table 16. Agile downside factors

Dimension	Factor	Downside type	Related Agile principle	Client	Supplier
Organizational	Agile methodology questioned	Threat	Team Motivation Training and Support	✓	
Organizational	Agile methodology is decided apart from project	Threat	Team Motivation Training and Support	✓	
Organizational	Agile model has been selected despite the project nature	Threat	Team Motivation Training and Support	✓	
Organizational	Lack of management support	Risk	Team Motivation Training and Support	✓	
Organizational	Multitasking	Risk	Team Motivation Training and Support	✓	
Organizational	Self-direction (managing the work in between daily duties and project work)	Risk	Team Motivation Training and Support	✓	
Organizational	Company culture	Threat	Customer Involvement	✓	
Organizational	Lack of project sponsor	Risk	Team Motivation Training and Support	✓	
Organizational	Lack of time allocated for the project	Risk	Frequent Software delivery	✓	✓
Organizational	Too small budget for the project	Risk	n/a	✓	
Organizational	Too tight schedule	Risk	Sustainable Pace	✓	✓
Team	Lack of resources	Risk	Small Team	✓	
Team	Lack of documentation	Problem	Face-to-Face communication Working Software	✓	✓
Team	Communication problems between Client and Developers	Risk	Customer Satisfaction	✓	✓
Team	Lack of teamwork	Risk	Customer Satisfaction Motivated Individuals	✓	✓
Team	E-mail communication not as efficient as face-to-face	Risk	Face-to-face communication	✓	
Team	Lack of competence in project team	Risk	Self-organized Teams		✓
Team	Project members are working in many projects at the same time	Risk	Self-organized Teams	✓	✓
Team	Lack of motivation	Risk	Motivated Individuals Customer Satisfaction		✓
Team	Lack of social capability	Risk	Motivated Individuals	✓	✓

Team	Team members are changed middle of a project	Risk	Face-to-Face Communication Self-organized Teams Team Motivation Training and Support	✓	✓
Team	Lack of common language	Problem	Face-to-Face Interactions Customer Involvement	✓	✓
Project management	No buffer in the schedule or budget for surprises	Risk	Sustainable Pace	✓	
Project management	Project manager is not resolute enough	Risk	n/a		✓
Agile processes	Agile project progress is difficult to follow	Weakness	Team Motivation Training and Support	✓	
Agile processes	Too short sprint intervals	Weakness	Sustainable Pace	✓	✓
Agile processes	Implementation starts too early (before requirements)	Weakness	Customer Satisfaction	✓	
Agile processes	Implementation starts too early (before architecture is ready)	Weakness	Customer Satisfaction	✓	
Agile processes	Bureaucratic change management	Threat	Face-to-Face communication		✓
Requirements	Client has not clarified the requirements themselves before project starts	Threat	Customer Satisfaction	✓	
Requirements	Inability to prioritize requirements	Threat	Customer satisfaction Customer involvement Face-to-face communication Embrace change		✓
Requirements	Objectives and limitations are not known	Risk	Customer satisfaction Customer involvement Face-to-face communication Inspect and Adapt		✓
Requirements	Unclear requirements	Risk	Embrace change		✓
Requirements	There is no understanding of the benefits that are pursued for	Risk	Customer satisfaction Customer involvement	✓	✓
Technology	Technology new and not known	Risk	Technical Excellence		✓
Technology	Business does not allow time to fix technical debt	Problem	Working software Simplicity Sustainable Pace		✓
Technology	Lack of proper facilities and tools	Risk	n/a	✓	✓

Based on the results, the Organizational downsides were highlighted by client whereby Requirements and Technology were of concern at supplier side. Both client and supplier brought team based risks up to discussions.

4.3.7.1 Problems

The discovered problems were related to the lack or non-sufficient documentation, lack of common language and the non-allowance of time for fixing technical shortages. The interviewees on client side claimed that they could not understand the written specifications because the documentation was too technical. Further, occasionally the documentation existed only in the code itself. Although the requirements and appropriate specifications were discussed also face-to-face, via communication channels and email, the understanding was not reached. In Agile, the problem of documentation is understood as “too much” of written documentation, and the problem should be eliminated by face-to-face communication (Ghobadi & Mathiassen, 2017; S. V. Shrivastava & Rathod, 2015). Based on this study results, the resolution is not correct. Instead of less documentation, the documentation should be on understandable level, i.e. it should be understood by both business people and developers. The fact in real world is, though, that the project schedule does not allow such extensive documentation to be written during the project. Therefore, one idea would be that the functional documentation is replaced, in development phase, by demonstrations, and the actual documentation is written by client after the user acceptance testing, whereas the technical documentation is written from the start by supplier. While the functional (business) people introduce themselves to the functionalities of the system, the technical representative on client side reviews and approves the technical documentation.

In the project team, the common language was Finnish, and no problems were faced. 3rd party brought up that when the working language is not a mother language, there are issues with cultures and time is consumed a lot of more, for instance, in form of translations.

Due to business pressure, there is hardly time to fix the technical issues or develop sustainable code during the project. Therefore, the time-related decisions during the project may be biased, i.e. the definitions on high level with optimistic work estimations, providing no other alternative than to develop fast to please business stakeholders.

4.3.7.2 Weaknesses

Agile processes were criticized by both client and supplier organizations. In Agile, the objective is to get deliverables fast. Therefore, the development is often started even before architectural planning is done or the requirements known on sufficient level. Further, the processes of Scrum Agile, like daily standups, were perceived too time-consuming on both client and supplier side. Finally, the interviewees found Agile processes difficult to follow. Many of the interviewees were not familiar of the Scrum roles, methods and/or tools. For majority of the people, one-to-one email communication seemed to be the most natural way of communication, although it was not visible to others.

4.3.7.3 Risks

Majority of the identified risks were related to the team communication, motivation, social capability, team competency and allocation. In literature, the same risks are often mitigated by Agile principles: face-to-face communication, self-organized teams, training and support and customer involvement. The problem of the mitigation methods is that they are focused to one single risk at a time. For instance, when the resource allocation is not sufficient, there is no time for face-to-face discussions as much as it would be required. Teams are often, due to commercial reasons, small and the members difficult to replace, therefore self-organizing is not always possible.

Organizational risks were related to the lack of management support, multitasking and expectations of self-directional capabilities. The interviewees on client side felt like they were trapped with the unrealistic expectations of, for instance, multitasking and self-direction. For them, the management expectations reflected to the project in terms of

frustration. Equipped with company culture that was traditional, they did not see that their situation would change any better.

Requirement-related risks were engaged to the non-understanding of the requirements and objectives, and the technology-related risks mainly to the new and unknown technology taken into use in the project.

Two issues related to project management were also detected: no buffer in the schedule or budget for surprises and the non-resolute project manager. These, however, are general project risks, and not related to Agile projects per se.

4.3.7.4 Threats

On client side, both in project group and by 3rd party, the selection of Agile as project management methodology, despite the project nature, was questioned.

> *"I just ask why Agile was selected as a project management model for this project? It seems to be all the same for the supplier what kind of a project is in question, project model is always Agile. Yet it is totally different whether the project is to create web pages than this (complex) project." (A4)*

The same was observed by 3rd party (client). Based on the representative´s experiences, the benefits of Agile methodology are not reached in governmental or legislation related projects that are bound to strict deadlines. The representative provided an example in which an attempt to improve the status of a statutory project by switching to Agile methods, ended up to a disaster. However, in continuous service projects, not limited by budget or deadlines similarly than actual projects, Agile methods work well.

By complexity, the first interviewee referred to the difficulty of defining requirements that depended on, to a large extent, legislative bodies, and the requirements´ impressiveness regarding other critical systems used by the company. The processes of Agile

were criticized of not taking into account time that was required for identifying the requirements with different 3rd party stakeholders: end customers, company management and authorities. A big problem in the project were the non-harmonized instructions between the legislative bodies. The root problem in this context, on the client side, was the impossibility to adapt Agile, due to external reasons, i.e. to define requirements and priorities in pace agreed in the beginning of the project. As such, it formed a threat for the project.

The nature of a project can also be considered as a threat. The procurement process and/or contractual terms often force the project in a shape of Waterfall and/or mixed project model diminishing the benefits of Agile. Two of the interviewees mentioned this threat during the interviews.

Company culture, when against Agile, was mentioned by few of the interviewees. The culture can cause Agile-resistance and therefore seen as a threat for Agile. Similarly, when the project model is Agile, but in practice it is run as if it would be traditional, the benefits of Agile are not reached. Especially, when change management is not flexible, the project does not move on as expected.

4.4 Validity and reliability of the study

There are several limitations in the study. The limitations, as well as the possible mitigations, are described in this chapter.

Data validation

The size of the research data is small and focused to a specific line of business. The interviews were conducted in a sparse number of companies that operate within the same heavily regulated industry branch, insurance, in a limited area in Finland. Since the insurance business is statutory of its nature, this may have reflected in the data that can be one-sided and narrow. Further, the study was conducted during a short period of time (May-June 2020) in exceptional circumstances due to the pandemia situation that

started in March 2020. All interviews were conducted via mobile phone without face-to-face communication. Uncertainty and fear of future might have effected to the emotions of participants reflecting in their answers.

The creditability of the study was, however, validated, when the data was compared with the previous empirical data results, as no deviations or exceptions were found. Thus this study reinforces previous research (Fink & Pinchovski, 2020; Ghobadi & Mathiassen, 2017; Holvitie et al., 2018; Miller, 2019; S. V. Shrivastava & Rathod, 2017; Walczak & Kuchta, 2013), and its results can be considered to be valid and reliable.

Previous research

The research data used in this study, is collected mainly from reliable scientific sources (ScienceDirect, ResearchGate) and publication channels (Elsevier, IEEE), with few exceptions like 6POINT6 (an independent IT consultancy, London), Digital.ai (announcing State of Agile, VersionOne) and Standish Group International (announcing Chaos Report). There were two reasons for adding the non-scientific publications to the study. First, the data in their publications is already been used in several other researches, also referenced multiple times. Second, they include data that does not exist in the scientific literature, such as expectations towards Agile projects, project success rates etc. Despite the justifications, it is is worth to mention that criticizm has also been presented. It is worth to mention that for instance, the Chaos Report, published by Standish Group International, has been criticized for providing inaccurate data, misleading definitions and non-reliable project success rates (Eveleens, J. & Verhoef, C., 2010). Despite the critics, the source is important as Standish Group has followed project success starting from 1996, and thus provides data from a long period of time.

5 Conclusions

The findings reveal that the expected project success is perceived differently, depending on the respondent, his/her role in the project and familiarity of Agile methodology. While majority of the respondents expect the project to be completed on an initially set schedule and budget, business satisfaction is appreciated even more. In the Agile methodology, a delivery with “satisfactory” scope, including mandatory requirements, is enough for judging a project successful (Standish Group, 2015 and 2018).

Achille´s heel in Agile methodology seems to be, however, the definition of *satisfactory* scope. When the project has fixed price and/or schedule, the question becomes vital. In an Agile project the scope is allowed to change constantly, sometimes even completely, thus it is difficult to manage. Without an ability to continuosly prioritize the requirements, the product backlog and budget will increase and the schedule will exceed. Clashes between Agile principle of continuos change and the contractual terms on fixed price and schedule without ability to strech, are apparent. Attempts to reconcile Agile methodology and a fixed price project are proposed by e.g. Shrivastava and Rathdod (2017) and Walczak and Kuchta (2013) that suggest a mixed approach in which the scope is managed by traditional techniques, but the changes in the scope are managed by Agile methodology. It can be argued that the problem in fixed price projects is not the change management per se, but the Agile methodology that welcomes changes continuosly, and even during last phase of development. Vast majority of all projects are, after all, fixed price projects, and even if they are time and material based, the budget is paid great attention to, thus it is worth to think whether the problem is due to Agile methodology or due to contractual terms that do not fit into Agile.

In addition, Agile methodology does not work well in statutory projects that are often dictated by legislation and in which the procurement process cannot be overtaken. This problem came up in the empirical part of the survey, and is also noted by Standish Group (2015) that discovered that satisfaction was small in governmental projects compared to other line of businesses.

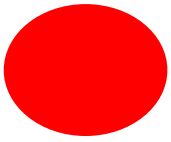
Reasons for project failure seem to support the prevailing assumption that project stakeholders must understand and follow Agile in order to success. The theory has several gaps. As evidenced by the empirical survey, the team spirit may suffer due to unrealistic self-organizing and self-mananging expectations that are the essence of Agile. Multitasking together with decision-making ability are not always present, yet Agile methodology calls for these. Walczak and Kuchta (2013) refer to this problem by saying "It is worth noticing that the probability and impact of conflict between team members are greater when the project team adopts the Agile methodology, since in traditional project management there is always a single person responsible for decisions and the progress of the project does not get blocked if the project team is not able to reach a consensus in their discussions.". It is entitled to ask whether the project team must adapt Agile methodology or should the project methodoloy be decided based on the team´s capability and alternatives? Downside of Agile is that it simply calls for certain personal characteristics which may be in contradiction with company culture or against a person´s personality. In such case Agile training, as often offered as a solution, does not solve the problems. Another gap is related to Agile processes. As detected in the empirical part, timeboxing is a stiff mechanism that definitely helps to evaluate project progress, but does not fit into large, complex definition or implementation that may last for weeks or even months. When such work is splitted into small and even minor tasks to be completed within set period of time, the big picture will disappear. In worst case the malfunctioning code is detected only during regression testing or, even worse, at production use. Risk of failure is bigger in projects where the team members work in different countries. Definitions that seem to be self-evident in home country, are not such in another country. Misunderstandings are not just causing mistakes but also consume time, because of different cultures. It is no coincidence that Agile methodology works best in small projects where the teams are local and the team members know each other.

6 Managerial recommendations

In this study, the perceptions of Agile project success as well as the project success and failure factors, in the context of commercial software delivery projects, were examined in the light of existing research.

Some managerial recommendations can be provided based on the study. First, the project methodology should be selected based on project nature. The choice to be made is not typically black and white, i.e. between Agile and Waterfall, but something in between, for instance, a hybrid model including best practices from both Waterfall and Agile. The decision depends not only on project nature, but on many other issues, like project size, complexity and so on. A simplified model for decision-making is presented in the Table 16 below.

Table 17. Different project starting point environments in the context of Agile project model selection

Factor	Agile methodology suits well	Risks involved when using Agile methodology	Agile methodology does not suit
			
Contract	Time & material	Time & Material Project	Statutory Project
Budget	Budget can stretch	Budget can stretch (within set limits)	Budget cannot stretch
Schedule	Schedule can stretch	Schedule can stretch (within set limits)	Schedule cannot strectch
Project size	Small project	Project with only a few dependencies	Complex project with lots of dependencies
Team size	One, small and local team (max 7 members)	Max few teams, all from same culture and language	Multiple teams from various cultures, different mother language
Language	Same language	Different mother language, good language skills of common language	Different company cultures between client and supplier
Agile/traditional mindset	Agile mindset	Agile mindset	Traditional mindset
Company culture	Similar company cultures between client and supplier	Partly different company cultures between client and supplier	Different company cultures between client and supplier

Company culture	Company culture supports Agile	Company is Agile-friendly, but not used to Agile mind-set	Company culture does not support Agile (competitive and commanding attitude)
Product Owner	Product Owner capable of prioritization of (and dropping out if/when needed) Product Backlog items	Product Owner hesitates decision-making on prioritization of (and dropping out if/when needed) Product Backlog items	No Product Owner PO not able to prioritize items in Product Backlog
Project team (including client)	Project members 100% allocated for the named project	Time allocated for the project for project members	Project members from matrix organization
Project team (including client)	Project members can support each other	Project members can at least partially support each other	Project members are not able to support each other
Project team (including client)	Project members are motivated	Project members are, in general, motivated	Project members are not motivated

Further, as Agile methodology calls for specific characteristics, such as self-directive, autonomous *team*, the members of the team should be selected accordingly. For instance, decision-making capability is necessary, especially in the role of Product Owner that is responsible of the Product Backlog item prioritization. In addition, it is often forgotten that an Agile project requires plenty of time from the participants *throughout* the project (definition, testing). Therefore, it is worth to discuss with the representatives prior the project starts, about the resourcing and other capabilities. Especially in matrix organization the nominated (client) project members might have daily routines they must perform along the project, thus the project resourcing must be planned accordingly. Typically, supplier organization is already harnessed for the project, therefore the issue needs to be highlighted especially in client organization.

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