

# Software Development Team Views of Success Factors in Agile projects

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## ABSTRACT

Software projects consume significant resources in their development. These projects use a variety of different approaches to development, including Agile methods. Not all projects succeed and a variety of project success factors have been established or proposed for many of the development approaches. However, the success factors for projects using Agile methods have not been well evidenced to date. This study reports on preliminary analysis of the views of members of Agile software development teams on factors that contribute to the success or failure of projects adopting an Agile approach. Software developers, testers, business analysts and product owners were surveyed using an online questionnaire. Fifty-nine responses were gathered and analysed. Respondents reported factors contributing to success include understanding the project, customer involvement and clear communication with and within the team. Factors contributing to project failure include factors outside the control of the team such as multiple intermediaries between the customer and development team and a lack of understanding of the Agile process by client representatives.

**Keywords:** Agile success factors, development teams, software development projects, software development teams

## 1. INTRODUCTION

A large number of software projects are underway globally at any one time. These projects consume significant resources during development. Of all projects underway some will succeed and others will not. Agile software development processes have often been adopted with the goal of reducing project failure, however not all projects that adopt an Agile approach do succeed (Coram & Bohner, 2005). Understanding the factors that contribute to project success or failure for those projects adopting Agile methods will help the software industry to deliver successful projects.

This paper presents analysis of factors that members of development teams working on Agile projects reported when asked about projects they have worked on.

## 2. BACKGROUND

Research to understand project success factors in software development projects has a long history, particularly for projects that have used a plan driven approach to development. Some of the success factors identified by researchers for plan-driven approaches include well defined objectives (Purba, Sawh, & Shah, 1995), realistic estimation (Johnson, 2001), development team skills (Krishnan, 1998), having a project manager with the ability to make good decisions (Reel, 1999) and complete and accurate requirements (Procaccino, Verner, Overmyer, & Darter, 2002). Despite the identification of these success factors or because of the difficulty achieving them Agile methods have been extensively adopted for software development and have been reported as delivering more successful projects than plan driven approaches (Misra, Kumar, & Kumar, 2009). However, not all Agile projects have been successful (Coram & Bohner, 2005; Dingsøyr, Nerur, Balijepally, & Moe, 2012).

Aspects of Agile project success have been examined by a number of researchers, for example Ceschi et al.(2005)

identified that both a good relationship with the customer, as well as a skilled development team are important factors in software development success. Their study also found that introducing Agile methods offered improvements in customer satisfaction, requirements management and in team satisfaction. Their study was based on 20 projects from 20 different software development organizations. Of the 20 organisations ten defined themselves as using Agile software development (Ceschi, Sillitti, Succi, & De Panfilis, 2005). However, results of their study may not be generalizable to the whole population given the relatively small sample size used.

Dibya and Dingsøyr (2008) systematically reviewed empirical studies on Agile software development projects. Their study identified 36 studies on Agile software development. Studies were divided into four groups: introduction and adoption; human and social factors; perception of Agile methods and comparative methods. They reported a number of benefits of those studies related to Agile practises. These benefits included Agile software development methods allowing more interaction with the customer and giving the customer opportunities to provide feedback regarding the Agile process. They also reported that the strength of evidence in the studies included in their review is very low. They note that the majority of the studies included in their review lacked sufficient information about the design and the findings of the study (Dybå & Dingsøyr, 2008). Methods used in these studies were not described adequately and the data collection and analysis methods were often not well explained. This suggest further investigation is warranted. This also suggests that it is important to establish the study setting.

Chow and Cao (2008) investigated literature relating to Agile development and identified several critical success factors. Subsequent reliability and factor analysis identified 48 success factors related to Agile development. These factors are summarized in Table 1

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This quality assured paper appeared at ITx 2016, incorporating the 7<sup>th</sup> annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2016) and the 29<sup>th</sup> Annual Conference of the National Advisory Committee on Computing Qualifications, Wellington, New Zealand, July 11-13, 2016. Michael Verhaart, Emre Erturk, Aaron Steele and Scott Morton (Eds).

**Table 1 Success Factor (Chow & Cao, 2008)**

<b>People</b>	<p>Team members with high competence and expertise</p> <p>Team members with great motivation</p> <p>Managers knowledgeable in Agile process</p> <p>Managers who have light-touch or adaptive management style</p> <p>Coherent, self-organizing teamwork</p> <p>Good customer relationship</p>
<b>Process</b>	<p>Following Agile-oriented requirement management process</p> <p>Following Agile-oriented project management process</p> <p>Following Agile-oriented configuration management process</p> <p>Strong communication focus with daily face-to-face meetings</p> <p>Honouring regular working schedule – no overtime</p> <p>Strong customer commitment and presence</p> <p>Customer having full authority</p>
<b>Organizational</b>	<p>Strong executive support</p> <p>Committed sponsor or manager</p> <p>Cooperative organizational culture instead of hierarchal</p> <p>Oral culture placing high value on face-to-face communication</p> <p>Organizations where Agile methodology is universally accepted</p> <p>Collocation of the whole team</p> <p>Facility with proper Agile-style work environment</p> <p>Reward system appropriate for Agile</p>
<b>Technical</b>	<p>Well-defined coding standards up front</p> <p>Rigorous refactoring activities</p> <p>Right amount of documentation</p> <p>Regular delivery of software</p> <p>Delivering most important features first</p> <p>Correct integration testing</p> <p>Appropriate technical training to team</p> <p>Pursuing simple design</p>
<b>Project</b>	<p>Project nature being non-life-critical</p> <p>Project type being of variable scope with emergent requirement</p> <p>Projects with dynamic, accelerated schedule</p> <p>Projects with no multiple independent teams</p> <p>Projects with up-front cost evaluation done</p> <p>Projects with small team</p>

After the identification of factors they deemed critical Chow and Cao (2008) conducted a web-based survey, gathering feedback from 109 Agile projects from 25 different countries. Findings from this survey helped them further refine their list of critical success factors, resulting in a more defined list as shown below:

- Correct delivery strategy.
- A proper practice of Agile software engineering techniques.
- A high caliber team.

Three other factors that could be critical for success were identified as:

- A good Agile project management process.
- An Agile-friendly team environment.
- Strong customer involvement.

Identifying success and failure factors in Agile projects provides information for the Agile community to refine practices (Barlow et al., 2011; Clarke & O'Connor, 2012; Cockburn & Highsmith, 2001; Hoda, Noble, & Marshall, 2011; Martakis & Daneva, 2013; Misra et al., 2009; Ramesh, Cao, & Baskerville, 2010; Rizvi, Bagheri, & Gasevic, 2013; Sheffield & Lemétayer, 2013; Tsirakidis, Köbler, & Krmar, 2009). For example Misra et al. (2009) identified following success factors for Agile software development after surveying 150 people involved in software development. The factors they identified were:

- Customer centric issue
- Decision time
- Corporate culture
- Control
- Personal characteristics
- Social culture
- Training and learning

Factors such as team distribution, team size, planning, technical competency and communication and negation were not found to have a significant relationship to success in the study done by Misra et al (2009).

Success factors in Agile software development project identified by Chow and Cao (2008) and Misra et al. (2009) are discussed above. An open question remains about the factors that make Agile projects successful. This study is designed to discover what are the success factors in Agile software development projects in New Zealand and compare these with the existing literature.

### 3. THIS STUDY

To establish success factors affecting software development project using Agile methods in New Zealand and to provide elaboration of and comparison with those already identified by Chow and Cao (2008) Misra et al. (2009) a questionnaire was developed and circulated electronically within the New Zealand software development community. The questionnaire contained a mixture of demographic and experience questions along with a range of project questions. To elicit project success factors we used an open-ended question approach and asked respondents to reply based on their accumulated experience across all projects they have been part of.

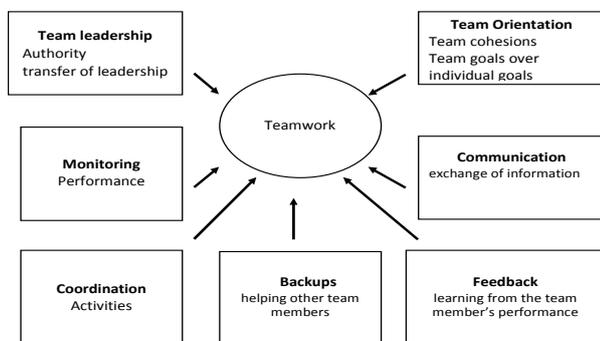
The sections below outline in more detail the method and population for the study before discussing the data collected and its analysis and comparison with previous findings.

### 4. METHOD

A questionnaire was designed for online data collection. The target participants were people involved in Agile software development in roles such as developer, tester, business

analyst, or product owner. The questionnaire was administered online with participants recruited via e-mail using a convenience sampling technique based on expert purposive sampling. Participants were recruited using purposive expert sampling to select individuals that have expertise in Agile software development (Lawrence et al., 1993). Purposive sampling is a sampling technique where participants are selected based on their knowledge and the purpose of the study (Barbour, 2001). This sampling technique was chosen to ensure representation of the different roles involved in Agile software development (Tongco, 2007).

A questionnaire was constructed using the teamwork model framework to inform the development of questions. As well as background demographic information such as the role, time they have been working in software development, size of an organization. The questionnaire also included questions to gather information regarding the Agile practices used for the software development project. In addition to those questions respondents were also asked to describe what they see as the important differences in projects that they have worked on that have been a success versus those that were not successful. The components of the teamwork model framework are presented in Figure 1 below.



**Figure 1 Teamwork model components (Moe, Dingsøy, & Dybå, 2010)**

Seventy people from 35 identified organizations responded to the online questionnaire. Of the questionnaire respondents 59 (83%) described the success and failure factors of the Agile projects they had been involved with.

Thematic analysis (Braun & Clarke, 2006) was used to analyse the responses obtained. The analysis identified the success factors relating to projects they have been involved in and also factors that had contributed to project failure. The factors were classified and grouped into themes which are explored in Section 5. Characteristics of the respondent population are discussed in Table 2 to place the analysis in context.

## 5. POPULATION

Of the 59 responses considered in this study the majority (49) reported that the Agile development method they used was Scrum. The average experience respondents had working in the software development industry was 15 years.

The largest group of respondents were developers (48%). Table 2 presents the roles of the respondents.

**Table 2 Respondent roles**

Developers	29(48%)
Product owner	9(16%)
Business Analyst	8(14%)
Other	7(12%)
Tester	6(10%)

Table 3 summarizes the Agile approaches used by study respondents. In the questionnaire respondents we able to select more than one approach they used during the project development

**Table 3 Agile method used**

Scrum only	35
Scrum + Lean software development	8
Scrum + Extreme programming (XP)	3
Scrum +Feature Driven Development (FDD)	3
Other	10

In additions to those listed in Table 3 a number of respondents listed approaches under the “other” heading. These other approaches included

- Something between Scrum and Kanban
- “Agile” with small a
- Aspects of Agile but not the formal Agile process
- Waterfall
- Clipper
- No clear methodology used
- Fail- fix
- V-model

Some respondents used Scrum as an Agile process in combination with particular technical practices, these are outlined in Table 4.

**Table 4 Combination of Agile methods used**

Scrum and Lean software development	8
Scrum and Extreme programming(XP)	3
Scrum and Feature Driven Development (FDD)	3
Scrum and waterfall	1
Scrum and Clipper	1
Scrum and V-Model	1
Scrum and Fail-Fix	1
Scrum and MVP, PSI, ATDD	1

The data analysis process involved identifying codes from the data supplied, searching for themes and naming themes. This process is discussed in the following sections.

## 6. ANALYSIS

Data was analysed using a thematic analysis method (Braun & Clarke, 2006). Thematic analysis is a way of identifying, analysing and reporting distinguishable and related patterns found in descriptive information (Braun & Clarke, 2006). For example, thematic analysis was used in a study conducted by Schroeder et al. (2010) to explore the strengths, weakness and threats of using software in higher study. Thematic analysis was chosen for this study to describe patterns found across the data obtained from respondents.

The following process was used to code each of the responses received.

- The responses were read through for familiarity.
- Initial coding was used to categorise specific information given by the participants.

An example of the coding process for one response to the question where respondents were asked what they see the

important differences in projects that went well with those that did not is shown in Table 5

**Table 5 Coding process for one response**

Response	Initial codes
<i>Delegated authority is absolutely crucial. I believe you need someone who can answer questions &amp; change scope when and where needed as necessary and in a timely manner. This is especially relevant in Agile projects I think.</i>	<b>Success factors:</b> <ul style="list-style-type: none"> <li>• strong governance</li> <li>• good domain knowledge</li> <li>• availability</li> </ul>
<i>Clear communication and being in a similar time zone certainly helps (and same language)</i>	<b>Success factors:</b> <ul style="list-style-type: none"> <li>• clear communication</li> <li>• similar time zone</li> </ul>
<i>The main thing I have found is that the closer you are to the ultimate product owner the better things go.</i>	<b>Success factors:</b> <ul style="list-style-type: none"> <li>• few intermediaries</li> <li>• familiarity with PO</li> <li>• high PO availability</li> </ul>
<i>The ability for the client to reduce / change scope - be open to questions &amp; clarifications is super important.</i>	<b>Success factor:</b> <ul style="list-style-type: none"> <li>• clear requirements</li> <li>• Accommodation of scope changes by client</li> </ul>
<i>This one had lot intermediaries between us and the customer.</i>	<b>Failure factors:</b> <ul style="list-style-type: none"> <li>• fixed mind-set</li> <li>• many intermediaries</li> </ul>
<i>The customer had consultants who were very fixed in their idea of what the scope was even though the actual customer wasn't.</i>	

## 6.1 Themes

Themes are the patterns across the entire set of data and relate to the research questions (Braun & Clarke, 2006). After the initial coding of the data, a complete list of codes was created and restructured to group like codes (ones that expressed the same concept). These like codes were then reviewed and combined to form comprehensive themes. This process was done with following steps

- Read responses and identified possible codes
- Create a list of identified codes
- Derive themes from codes through thematic mapping
- Themes and codes reviewed for completeness.

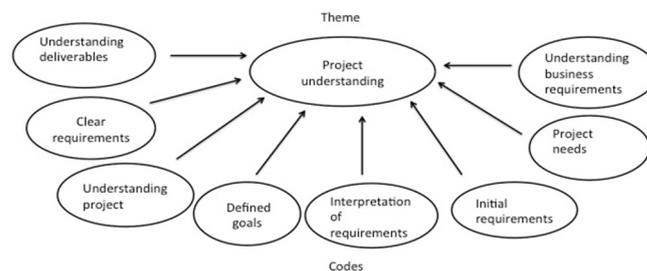
It is important to validate the coding scheme (Lombard, Snyder-Duch, & Bracken, 2002). For this study one researcher did the initial coding. To ensure the validity of the coding “peer checking” procedures were followed (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008). In this study after the initial coding was done the code were discussed with the other researchers. The initial codes were reviewed, confirmed and further codes were identified after the discussion. Neuendorf (2002) argues that having more than one coder helps in validating a coding scheme and establishing a high level of reliability.

With the codes consolidated, a list of themes was identified which is shown in Table 6. These themes are expanded and described in section 7

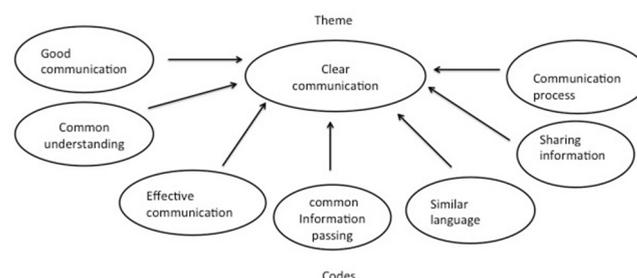
**Table 6 Themes identified**

Themes	Respondent (%)
Project understanding	66%
Understanding Agile process	45%
Clear communication	41%
Team skill	35%
Customer involvement	24%
Organization leadership	22%
Factors outside control of team	17%

Figures 2 and 3 show an example of a thematic map that was used to develop the overarching theme “project understanding” (Fig. 2) and “clear communication” (Fig. 3) derived from the initial codes identified during analysis of individual responses.



**Figure 2 Thematic Mapping (Project success factors related to project understanding)**



**Figure 3 Thematic Mapping (Project success factors related to clear communication)**

## 7. DISCUSSION AND RESULTS

As outlined in Section 6 and enumerated in Table 6 a number of themes were identified. Each of these themes is expanded and explained below.

### 7.1 Project understanding

“A client who has a clear understanding of requirements and priorities, and has realistic expectations.” Developer 1

In my experience, most projects struggle when the goals are either unclear or unreasonable. To me, an unclear goal is one where the customer (or product owner) has not identified the expected outcome. These goals usually involve comparative words like 'better', 'improved' or 'faster', as in 'make this feature better' without clear examples or guidelines. Developer 14

To me an unreasonable goal is where the goal has been set and a budget/timeframe set but the goal cannot be reached within budget or timeframe. At times, the root cause of the goal being unreasonable is lack of upfront research as to the scope and effort of the goal. Developer 5

“Single stakeholder with a clear vision of what they wanted to achieve with the budget and organizational clout to drive the project to achieve its purpose and objectives.” Business Analyst1

“Someone with some passion needs to have a clear vision of what the product will look like in 6 months. Make that person your product owner.” Developer 6

“Having a clear understanding of the requirements by everybody in the team including the product owner.” Developer 7

These quotes demonstrate the need of the development team to receive a clear understanding of the project from the customer. From the development team's point of view it is important to understand and deliver what the customer requires. Not having an understanding of the project deliverables and objectives was a reason for a project to be unsuccessful. For example Wieggers & Beatty (2013) stated that many problems in software development arise because of the error occurring during requirements activities. Those errors can be miscommunication, unclear requirements, or poorly specified requirements (Wieggers & Beatty, 2013). The software developers in this study found that having a clear understanding of what is required was paramount. According to the developers it is also important for a product owner to have clear understanding of what they want from the team.

### 7.2 Understanding Agile process

This project was hampered by processes within the client organization, major changes to design which weren't in scope but were accommodated, multiple interfaces to link to, some of which were incompatible with the technology choices made early on. Developer 8

I feel success of project depends on its analysis and design and should follow proper software methodology. Analysis should be done properly before it starts and the Project manager should understand the correct process, handle the project properly and should know the individual skills of employee to distribute the work task. Tester 9

In Agile projects in particular, a key factor in determining success seems to be how receptive the organization (or team) is to change at all levels, including clients. If an organization is change averse, they will react poorly to inevitable incidents, be they risks or opportunities. If they

are not, they may find changing scope in order to meet deadlines easier.” Business Analyst 2

The comments indicate that for a project to be successful it is necessary that all involved have a clear understanding of the Agile process. In this study development team members reported that customers insisted that extra features be added to a product within the original time. Adding extra features on the project is likely to increase time required to complete the project. Team members also outlined that the customer or the product owner involved in a project but was not giving a clear direction when communicating with the team. Respondents from this study also stated that the timeline and the budget were found to be harder to achieve in some of the projects where software development teams including the customer do not follow or, indeed understand, the Agile software development process completely.

### 7.3 Clear Communication

“Clear communication within the team and between the team and customer representative makes for success”. Developer 15

“Lack of communication between the team and business would cause troubles.” Solution Specialist 1

Good projects have a capable team who are working with an appropriate technology, a client who has a clear understanding of requirements and priorities, and has realistic expectations, and good communication between the client and team. However, it is very rare to have all these things on one project. If the client has difficulties in defining requirements (as is common), a very good team can often still make up for this. But many teams struggle with this, and this is often where projects unravel. Technical Lead 1

Agile development methodologies support a collaborative approach to software development (Chau, Maurer, & Melnik, 2003). Findings in this study show that some development team members identified clear communication as one of the major factors in order to make a project success. There needs to be a clear communication between the customers as well as between the team members so that the information is shared and understood by everyone. Clear communication is imperative for good collaboration in software development teams so that the development team members and the customer have common understanding. For example, Hammel et al. (2013) stated that communication in Agile software development is important for reducing misunderstandings and increasing the efficiency of work. Their study was based on a systematic literature review in the field of Agile software development (Hummel, Rosenkranz, & Holten, 2013).

### 7.4 Team skill

“People is the key: get the right people.” Team lead 2

“Success of the project depends on the developers working on it. If the project is assigned to developer who doesn't have right skill set then there is chance of delay or failure of the project.” Developer 7

A development team that consists of members with the relevant skill and experience in working in Agile projects will likely develop successful projects (Turk, France, & Rumpe, 2014). Software development teams that consist of developers, testers, business analysts and a Scrum master who all understand the situation and the process and practices used to develop software are more likely to be successful with an Agile approach than with a plan driven approach. In an Agile software approach the team members should be cross functional, meaning they need to have skills in different areas such as software development and testing. This cross-functionality will help each team member to have a better

understanding of the whole process rather than only his or her part in it. Findings from this study also suggest that having team members who are experienced and possess such attributes as problem solving ability or domain knowledge make for a good team.

### 7.5 Customer involvement:

“I find that if the product owner / customer rep is not 100% committed then they don’t get what they are after. This leads to rework very late in the piece.” Technical lead 4

“The main issue with this project is that stakeholder involvement in phase 1 and 2 was next to non-existent. This unfortunately meant that the solution was not designed for real world operating conditions.” Tester 4

“Customer rep is not 100% committed then they don’t get what they are after. This leads to rework very late in the piece.” Technical lead 3

“Delegated authority is absolutely crucial. I believe you need someone who can answer questions & change scope when and where needed as necessary and in a timely manner. This is especially relevant in Agile projects I think.” Developer 12

Customer involvement in a project plays an important role in the success of a project and means that the development team can get quick responses from the customer when required. Participation of a customer representative enables the development team to carry out tasks to the satisfaction of the stakeholders (Vijayasathy & Turk, 2008). According to the development team members, having a customer representative who has the authority to make decision on behalf of stakeholders plays an important role in project success.

### 7.6 Organizational Leadership

“Delegated authority is absolutely crucial. I believe you need someone who can answer questions & change scope when and where needed as necessary and in a timely manner. This is especially relevant in Agile projects I think.” Developer 12

“Agile reveals plenty of problems - but it takes committed and enabled leadership to resolve these problems // that sort of leadership is rare. Especially when you have multiple vendors involved.” Tester 3

Respondents in this study said that having a good leadership culture in an organization was crucial in the success of a project. A study done by Nerur et al. (2005) stated that leadership is an important aspect of Agile software development projects. Respondent from this study also said that it is important also to have leadership within the team who can coordinate with the outside parties involved in the projects (Nerur, Mahapatra, & Mangalaraj, 2005).

### 7.7 External factors

This one had lot intermediaries between us and the customer. The customer had consultants who were very fixed in their idea of what the scope was even though the actual customer wasn't. There was a fair amount of pushing around the contracted scope. Developer 20

Many. Generally speaking, projects don't fail for technical reasons; it's usually other factors such as poor planning, poor project management, lack of appropriate executive sponsorship, inadequate requirements, poor team structure (maybe wrong skills, insufficient senior team members, etc.), bad estimates (time, cost). Developer 17

A principle of the Agile process is customer collaboration over contract negotiation (Highsmith & Cockburn, 2001). In practice, from the team experiences, there are some factors that cannot be controlled by the team. Such factors include the involvement of customers working in Agile projects but

retaining a contract mindset regarding the project. This type of customer representative, perhaps does not fully understand an Agile approach. These customers are often not open to discussion regarding project requirements.

Other factors outside the control of the team include the outsourcing of parts of projects. This can interfere with agreed timeframes when outside vendors cannot produce products when required.

Likewise, some Agile projects have a customer consultant who works between the customer and the development team. These consultants may not understand the Agile process completely, or indeed software development, and this lack of understanding may cause project delays.

## 8. DISCUSSION

A mapping exercise was undertaken in an attempt to measure findings in a New Zealand context against those identified by Chow and Cao (2008) and Misra et al.(2009) A number of the critical factors found by Chow and Cao (2008) and Misra et al (2009) were also present in this study, however some of the factors Misra et al (2009) found not to be significantly related with success were identified as a success factors in the current study.

Before considering and discussing the shared findings between these three studies it is first necessary to consider each separately. Table 7 highlights the success factors identified in the study by Chow and Cao (2008) and provides a short description for each factor.

**Table 7 Success factor identified by Chow and Cao (2008)**

Factors	Description
Delivery strategy	A successful project would have a clearly defined iterative delivery strategy that would enable a project to be divided into stages which would be delivered within given time periods and within the project cost
Agile software engineering techniques	Having a clear understanding of and following Agile software techniques enables projects to be successful by enabling a clear approach and enhancing quality of projects in an iterative manner.
Team capability	Teams involved in successful Agile projects have a clear understanding of the Agile approach and have a range of capabilities, including leadership that enables teams to follow and understand the process well.
Project management process	Successful Agile projects are managed in such a way that meets and adheres to the Agile software development process. This means that projects are divided into small pieces and delivered at regular intervals. Any changes to project scope are managed by removing or adjusting other incremental parts to ensure that project deadlines are met
Team environment	An Agile team consists of cross-functional team members who can support other team members to respond quickly to changes within a project.
Customer involvement	Continuous customer involvement in successful Agile projects means that projects can develop in an iterative and flexible manner.

Table 8 shows seven critical factors identified by Misra et al. (2009) with description.

**Table 8 Success factors identified by Misra et al. (2009)**

Factors identified by Misra et al (2009)	Description
Customer centric issue	For an Agile project to be successful it is important to have customer commitment and collaboration with the development team. Customer satisfaction is also important for successful Agile projects.
Decision time	Fast communication, informal communication and effective communication are important to make a decision on time which helps an Agile project to be successful
Corporate culture	Having a trust with people working in the projects and obtaining feedback from the customer and enabling an organization to be dynamic contribute in making Agile project successful.
Control	Qualitative measures control such having morning roll call, showing the completed story points per iteration has a significant impact on the project success.
Personal characteristics	A successful Agile project will have honest, collaborative people who are willing to learn from others. There will be a sense of responsibility in the people who are working in the projects.
Social culture	For Agile projects to succeed the culture in which they exists needs to be dynamic, communicative and with people who have progressive attitude who are not afraid of change.
Training and learning	Informal learning from the team members in an Agile software development is related to the success of Agile projects. Informal learning helps in knowledge sharing.

Table 9 shows seven critical factors from this study with descriptions

After the completion of the comparison mapping process between the work previously completed by Chow and Cao (2008) and Misra et al.(2009) and this current study common factors found in each of these were identified this is shown in Figure 4 and described below.

Only one success factor which is customer involvement identified by Misra et al. (2009) was found common to this study and the study by Chow and Cao. Customer involvement in all three studies refers to the participation of the customer in defining the scope and giving feedback. It all three studies it was found that having customers who understood the Agile process and provided continuous involvement was vital for project success.

**Table 9 Findings from this study**

Our findings	Description
Project understanding	Successful Agile teams will be those where all members, including the customer representative have a full understanding of the requirements of the project and have been part of breaking these requirements into achievable deliverables.
Understanding Agile process	For an Agile project to be successful it is important that both the team and the customer understand and follow the Agile process. This means that if changes are made to requirements during the iterative process, then accommodation must be made for those changes by removing parts or part of the original requirement.
Team skill	Successful Agile teams are cross-functional in skill and experience and have an understanding of the Agile process. They work together to solve problems within the scope of the project but also are flexible enough to change direction when required.
Clear communication	Successful Agile teams are ones that communicate well within the team and also to stakeholders. This clear communication occurs best when all team members understand the project and agree with the direction it should take.
Customer involvement	Successful Agile projects require the continuous support of customers who understand the iterative nature of an Agile process. It is important that teams work closely with those who have the necessary authority to suggest or make changes to the process.
Organizational Leadership	Successful Agile development teams require leadership from both within the team and within the organization that understands and supports the iterative nature of the Agile process.
External Factors	Often projects are constrained by factors outside the control of the team. These can include the customer not having experience in an Agile process or the reliance on a number of outside stakeholders and contractors for integral parts of the

Three factors identified by Chow and Cao (2009) were found in common with this study. These three factors include customer involvement, understanding the Agile process and team skill. A development team with members who have well-developed problem solving capacity are more likely to complete projects on time than teams with members who don't.

Success factors such as decision strategy identified by Chow and Cao (2008) include some similar description with the project understanding factor from this study but did not overlap sufficiently to determine a mapping.

As mentioned, team skill was a factor identified both in this current study and in that by Chow and Cao (2008). It is interesting that this factor was not specifically identified by Misra et al. (2009). However, they do list personal characteristics as a significant factor. In their discussion, they noted that personal characteristics are an important factor in creating a good team structure for Agile projects. Likewise,

the factor identified by Misra et al. (2009), as corporate culture, does share some overlap with this study's factor of organisational leadership. In both cases, it is necessary, for Agile projects to be successful, that the Agile process is led and supported within an organisation and at all levels of that organisation.

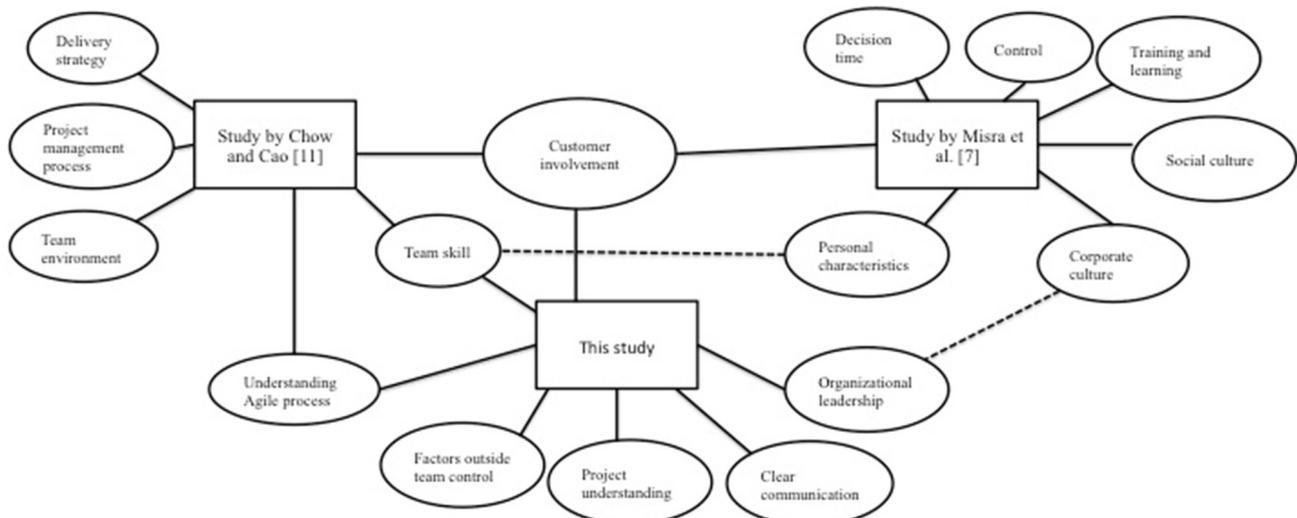


Figure 4 mapping findings (This study, Chow and Cao (2008) and Misra et al. (2009))

## 9. CONCLUSION

This study reports on the preliminary analysis of the software development team views on factors that contribute to the success or failure of projects adopting an Agile approach. This study will help the software development companies in New Zealand to be aware of the success and failure factors in the completed project and help them to look on those factors in their current or the new projects.

Findings identify the main factors that contribute to the success of software projects using an Agile approach. The main factors identified from this study are Project understanding, Understanding Agile process, Team skill, Clear communication, Customer involvement, Organizational leadership and External factor. The identification of the success factors will help companies using an Agile software development approach to consider these factors when developing the new project. Some of those factors are associated with how the customer and the development team relate to each other.

The study reported on in this paper is part of a larger study and as such the information reported here will help to inform the larger project and aid in the understanding of what can be the main factor that can contribute to a complex relationship between the customer and an Agile software development team. This work will also help the software development community to understand the viewpoint of the development team including business analyst, product owners and project managers from their experience and develop successful projects.

## 10. FUTURE WORK

Future work will identify the success factors from people involved in management of Agile software development projects. This study could also be replicated in other countries to triangulate the findings.

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