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# FACTORS LEADING TO THE SUCCESS AND FAILURE OF AGILE PROJECTS IMPLEMENTED IN TRADITIONALLY WATERFALL ENVIRONMENTS

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**Abstract:**
This qualitative study was undertaken to investigate the factors that result in agile project success and failure. The study particularly focused on software projects where agile methods were newly adopted, implying a transition from the Waterfall to a more light-weight and iterative approach. The study was exploratory and deductive in nature, and employed multiple-case studies as research strategy. The target population was Project Management Offices (PMO) that had moved, or attempted to move, from a traditionally waterfall approach, to an agile software development approach. Primary data was collected using semi-structured, observations of meetings and team engagements. Secondary data collected included project documentation, meeting minutes, and formal project communication. This research was aimed at making practitioners and academic researchers aware of the factors that may lead to project failure as well as project success, thereby encouraging them to find and devise coping and mitigating mechanisms to enhance successful agile adoption, use and implementation. The following constructs were identified as success and failure factors in agile project delivery: Culture, Customer Involvement & Mandate, Stakeholder Involvement & Buy-In, Team Structure & Team Logistics, Project Type & Project Planning, and Skill Level & Attitude of Team Members.

*Keywords: agile adoption, agile integration, agile suitability, agile assessment, adoption assessment models, plan-driven approaches, agile approaches*

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# 1. INTRODUCTION

Due to the particularly volatile and unpredictable nature of system development projects, organisations are expected to be more proactive and dynamic (Livari & Livari, 2011), and software is expected to be more resilient and robust. However, traditional software development approaches are criticised, for being non-incremental (McMahon, 2004), and for being inflexible and unable to adjust to the system development process which has a high propensity for change (Nerur, Mahapatra, & Mangalaraj, 2005). Agile approaches were thus proposed to mitigate this situation of concern. While the transition from a Waterfall to an agile environment promises to save valuable time and money, this is not an easy process. Developers and managers often become frustrated with the integration of the agile approaches into traditional systems development organisations (Boehm & Turner, 2005). According to Cohn (2002), the transition from a Waterfall to an agile environment is difficult because successful change is not completely bottom-up or top-down, the end result is unpredictable, agile is pervasive and radically different, especially scrum, and change is becoming the norm.

Organisations thus need more insights into the factors that influence the successful completion of agile projects in work environments having previously followed a more traditional approach to software development (i.e. waterfall or plan-based projects). Factors leading to project failures in such work environments should also be considered in order to propose mitigating strategies, and further increase of probability of yielding project success and reduce the risk of failure. In line with the above, the following research question has been formulated: (1) What are the factors that lead to agile project success and failure in traditionally plan-based or waterfall-based work environments?

This paper is organised as follows; Section 2 presents the literature review. Section 3 summaries the research methodology and case description and Section 4 the findings and Section 5 the conclusion.

# 2. LITERATURE REVIEW

According to Lindvall et al. (2002), the three most important factors that lead to successful adoption of agile software approach are culture, people, and communication. Culture is central to successful agile adoption, and an organisation cannot be agile if the culture does not support it (Lindvall, et al., 2002). Competent people or team members are essential to the successful use of agile methods. Developers, for instance, must be given the freedom to make decisions and should not be doubted and second guessed all the time (Lindvall, et al., 2002). An agile environment should also facilitate rapid communication among team members (Lindvall, et al., 2002). Drilling further into this aspect of agile software development, the following sections detail the success and failure factors to agile projects as mentioned in literature.

## 2.1. Factors influencing the Success of Agile Software Development Projects

Boehm and Turner (2004) point out that the people issues contain some of the more important factors that impact project success. There is, for instance, substantial risk associated with an unsuitable customer representative on an agile team. They go on to assert that customer representatives should be "Collaborative, Representative, Authorised, Committed, and Knowledgeable". This is referred to as CRACK. In his survey, Agile Adoption Strategies, Scott Ambler mentions that the environment and tools available should support agile adoption and practices (Ambler, 2011). He mentions that the project environment, the approaches followed, the tools and techniques employed in the environment and the culture should all be aligned to support the adoption and practice of agile. Table 1 summarises a few of these findings:

**Table 1**: Factors that assist Organisations in completing Agile Projects Successfully

| # | Factors that assist in Organisations completing Agile Projects Successfully |
|---|---|
| 1 | The availability of *dedicated business expertise*, throughout the course of the project, increases the chances of adopting Agile Approaches successfully. |
| 2 | The *tools and techniques* available to project members should support agile practices and approach adoption. |
| 3 | *Support from an executive level* increases agile method project success. |

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| 4 | Successful Agile Teams are *measured on overall value added and creation*, as opposed to the traditional "Constraint Triangle" measurements (Scope, Budget, & Time). |
|---|---|
| 5 | *Smaller teams* succeed more often in agile settings, and project members should be dedicated to *one project at a time*. |

Source: (Ambler, 2011).

Ambler (2011) contends that the availability of dedicated business expertise is critical to ensuring the successful adoption of agile approaches, and therefore the eventual success of the project. He goes on to stress that smaller teams succeed more often, and that project members should be assigned to one project at a time. Another factor that is pointed out is support from an executive level. This illustrates the importance of complete buy-in into the agile approach to projects. An important notion raised by Ambler (2011) is that of success. While traditional plan-driven approaches encourage success measurement against scope, budget and time, agile teams, in Ambler's view, encourage overall value added and creation. Success factors for agile projects have also been proposed by Chow and Cao (2008) and are presented in Table 2. They categorise these success factors in five dimensions namely: Organisational, People, Process, Technical and Projects.

**Table 2**: Success Factors

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

Source: (Chow & Cao, 2008).

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### 2.2. Factors that influence the Failure of Agile Software Development Projects

Vijayasarathy and Turk (2008) indicate that some of the factors that lead to agile project failure include lack of training and peer support, ignorance of agile approaches, lack of facilities for pair programming, individuals' resistance, and relying only on economic evaluation criteria. Another concern raised is managerial apathy and organisational resistance to change (Vijayasarathy & Turk, 2008). Similarly to success factors, Chow and Cao (2008) discuss failure factors in four dimensions, namely; organisational, people, process, and technical. These are summarised in Table 3.

**Table 3**: Failure Factors

| Dimension | Success Factor |
|---|---|
| Organisational | <ul><li>Lack of executive sponsorship</li><li>Lack of management commitment</li><li>Organisational culture being too traditional</li><li>Organisational culture being too political</li><li>Organisation being too large</li><li>Lack of agile logistical arrangements</li></ul> |
| People | <ul><li>Lack of the necessary skill set</li><li>Lack of project management competence</li><li>Lack of team work</li><li>Resistance from groups or individuals</li><li>Bad customer relationship</li></ul> |
| Process | <ul><li>Ill-defined project scope and project requirements</li><li>Ill-defined project planning</li><li>Ill-defined customer role</li><li>Lack of agile progress tracking mechanisms</li><li>Lack of customer presence</li></ul> |
| Technical | <ul><li>Lack of correct agile practices</li><li>Inappropriate technology and tools</li></ul> |

Source: (Chow & Cao, 2008).

The following sub-section describes the research approach that has been employed to collect and analyse the research data. In particular, the research philosophy, purpose classification, approach and strategy are discussed.

## 3. RESEARCH METHODOLOGY

The study was interpretive, inductive and qualitative in naure. Data was collected from Project Management Offices (PMO) that had moved, or attempted to move, from a traditionally waterfall approach, to an agile software development approach. Two project management offices within two large organisations were identified. Convenience sampling was chosen as the sampling technique. Stakeholders at various levels of the organisation, involved in the project were interviewed. This included stakeholders at a senior management level, middle management level, tactical level, and operational level. Interviewing and understanding all these stakeholders' perceptions and experiences helped ensure that a comprehensive and representative view was obtained of the success and failure factors that are important to project outcomes. The characteristics of the two companies that participated in the study are further described below.

### 3.1. Characteristics of Case Study 1 / Company A

Company A was a well-established financial services company. It had country wide representation and footprint. Its staff compliment was between 5,000 – 10,000 employees with an established PMO. Company A was driving a project that was renewing software used by agents and the public (Clients). The plan included moving applications to the cloud, as well as portal and other changes (More than 10 software applications in total, including components such as tax). Reason for Agile approaches in Company A pertained to: Business decision (quicker project delivery & negative experiences with waterfall previously). The in-house software development approach was previously waterfall. More recent projects were being run with a completely agile approach. At the time of the study, the project

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had been running for 2 years, and was nearing the end of phase 1. The project was going well, and was still within all measurement / tracking metrics applied.

Table 4 gives a description of the respondent types, how many of each type were interviewed in Company A. Respondents were identified after background to the project was gathered through discussions with the project managers and PMO managers. In addition, two retrospectives and a demo session were attended in Company A. This meant that multiple interactions were observed including two agile teams during two 2 hours retrospective sessions, and a 3 hour demo including the agile teams (Testers, BA's, SA's, Developers and Project Managers) and business representatives (Project sponsors and Project customers).

**Table 4**: Profile of respondents from Company A

| Description of Respondent Type | Number sampled |
| --- | --- |
| Project Management Office Manager | 1 |
| Project Manager | 1 |
| Project Manager | 1 |
| Business analyst | 1 |
| Business analyst | 1 |
| Developer | 1 |
| Approach Analyst | 1 |

### 3.2. Characteristics of Case Study 1 / Company A

Company B was a well-established manufacturer. Company B had a country wide representation and footprint, and had more than 10,000 employees with an established PMO. Revenue was in excess of R15 Billion per annum. Company B required a new data management system, with workflow and notification functionality. Reasons for employing agile at Company B included: complexity of requirements (uncertain & conceptual), timelines were under immense pressure, and new technology being used. Agile elements were identified to facilitate the process. These included; an iterative approach, incremental development, changing requirements welcomed, and business being dedicated for certain blocks of time.

Table 5 gives a description of the respondent types, and how many of each type were interviewed in Company B. In addition, 5 prototyping sessions and meetings were attended with Company B. These sessions lasted one to two hours on average, and included interaction and questions and answers. The project manager, business analyst, systems analyst and business representatives were present during these sessions.

**Table 4**: Profile of respondents from Company B

| Description of Respondent Type | Number sampled |
| --- | --- |
| PMO Manager | 1 |
| Project Manager | 2 |
| Business analyst | 1 |
| Systems Analyst | 1 |
| Project Resource (Business) | 1 |

## 4. FINDINGS

The following research themes emerged from the literature, as logical groupings of success and failure factors in agile project delivery: Culture, Customer Involvement & Mandate, Stakeholder Involvement & Buy-In, Team Structure & Team Logistics, Project Type & Project Planning, and Skill Level & Attitude of Team Members. Each will be considered in turn, discussing what were the findings in the research and what the literature offers. An assumption is made that success and failure factors are directly related in the sense that success factors include the relevant and opposite failure factor in many cases. In other words an example would be where, the success factor; tools and techniques should support agile practices, includes the failure factor notion of; inappropriate technology and tools

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within the agile space. Therefore the success and failure factors are grouped together in certain instances where this makes sense.

## 4.1. Culture

Seven of the respondents mention cooperative organisational culture instead of a hierarchical culture as a success factor. One of the respondents gave an example of a hierarchical culture where there was constant deferred decision making that was experienced in the project. The team members were not senior enough to make certain decisions and that meant delays in the project. Four respondents felt that a definite success factor is organisations where agile approach is universally accepted. One respondent mentioned that team members must be willing to unlearn what they have previously learned, and to adopt the new agile principles.

Twelve respondents felt that the cultural factors were definitely factors to be weary of. These also include factors such as organisational resistance to change, and the organisational culture being too traditional or too political. One respondent described the traditional organisational culture as follows; *"… from an agile point of view a traditional culture makes it a bit more difficult, people aren't used to being flexible and adaptable, they are used to structure and control."* This emphasises the rigidity and lack of flexibility that is often found among employees. Another respondent commented on how the culture was not a collaborative and cooperative one, but that the agile element of incremental software delivery caused a change in the culture as the builds progressed and team members saw the benefits of an agile approach. One participant remarked; *"People are generally not very comfortable interacting on different levels."*

Chow & Cao (2008) also contend that two success factors in agile projects relative to culture are; cooperative organisational culture instead of a hierarchical culture and organisations where agile approach is universally accepted. Failure factors related to culture, according to literature, include; organisational resistance to change (Vijayasarathy & Turk, 2008), the organisational culture being too traditional and political (Chow & Cao, 2008).

## 4.2. Customer Involvement & Mandate

Boehm and Turner (2004) contend that customer representatives should be "Collaborative, Representative, Authorised, Committed, & Knowledgeable" (CRACK). This goes in line with one comment made by one of the respondents: *"Business shouldn't drop in by appointment only, they should be part of that core team, they should be dedicated to the project"*. This comment was made with regards to customer commitment to agile projects. Overall, three respondents noted the importance of having collaborative customer representatives to achieve successful project delivery. Only one respondent mentioned that they thought that customer representatives should be authorised to make decisions. The respondent was referring to the fact that customers on the particular project under discussion were not authorised to make decisions in all cases and this resulted in project delays. Only one respondent mentioned the importance of customer representatives' knowledgeability related to the project.

Chow and Cao (2008) mention that bad customer relationship, an ill-defined customer role, and a lack of customer presence, are failure factors, related to customer involvement and mandate. Boehm and Turner (2004) argue that substantial risk associated with an unsuitable customer representative on an agile team is a failure factor. In line with past studies, two respondents indicated that ill-defined customer role was a problem where they were involved: *"… they didn't really understand … their role …"* One respondent mentioned the impact they thought lack of customer presence had on their project, while no one mentioned good or bad customer relationship as a failure factor. Six respondents felt that customer involvement and mandate influences agile project delivery in some way or another.

## 4.3. Stakeholder Involvement & Buy-In

One of the respondents felt that buy-in from all stakeholders, technical as well as business team members, is key to success; *"They kind of thought we would just manage it and handle it and that is a two-way street we needed the buy-in from their side it's absolutely critical I don't think we had it."*

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***"If management, and I mean total management … doesn't buy-in, it is a risk from day 1."*** One of the respondents was very adamant that senior managers as well as executive management should endorse and buy-in to agile project management approaches completely for it to be a success from beginning to end. Eight respondents mentioned that sponsor and management commitment or a lack thereof is important in project delivery, while two respondents felt that management and executive level commitment, or a lack thereof, would influence the success or failure of an agile project directly. Ten respondents mentioned this as an important consideration in successful vs. failed project delivery.

An observation regarding the project demo's, was that they worked really well for Company A in the sense that both the agile project teams and business benefitted from this process. The project team and business had a clearly developed working relationship based on a good understanding of agile practices and processes, as well as a sense of ownership and accountability that drove results as mentioned previously.

These findings concur with Ambler's (2011) claim that support from an executive level is a success factor in agile project delivery, while Chow & Cao (2008) discuss the benefits of a committed sponsor or manager in an agile project environment. Vijayasarathy and Turk (2008) argue that managerial apathy towards agile is a sure way of project failure. Chow & Cao (2008) further mention a lack of executive sponsorship and management commitment as formulas to attract agile project failure.

## 4.4. Team Structure & Team Logistics

Ten respondents pointed out that smaller, dedicated teams, are significant as success factors in project delivery. Two respondents pertinently mentioned teams adapting their workspace as they prefer and being given the mandate to negotiate deliverables as important. Six respondents stated that coherent, self-organising teamwork is imperative to agile project success. Six respondents mentioned that honouring a regular work schedule is important, and that overtime should be avoided as far as possible. Respondents also felt that each team member should be dedicated and focused on the task at hand and take accountability and ownership of completing their tasks during normal working hours, so as not to influence resources' personal lives as well. Twelve of the fourteen respondents stated that team structure and logistics play a role.

Ambler (2011) comments that smaller teams succeed more often in agile settings and project members should be dedicated to one project at a time. Lindvall et al. (2002) state that teams should be allowed to adapt workspace as required, and that they should be able to negotiate project deliverables. Chow & Cao (2008) contends that coherent, self-organizing teamwork, as well as teams honouring regular working schedules with no overtime for instance, succeed more often than not.

## 4.5. Project Type & Project Planning

Success factors related to project type and project planning include; Ambler's (2011) successful Agile Teams are measured on overall value add and creation. Chow & Cao (2008) project type being of variable scope with emergent requirement, projects with dynamic, accelerated schedule, projects with up-front cost evaluation done, and projects with up-front risk analysis done.
Failure factors related to project type and project planning include; Vijayasarathy and Turk's (2008); only relying on economic evaluation criteria, and Chow & Cao's (2008); ill-defined project scope and project requirements and ill-defined project planning.

Ten of the respondents mentioned this theme as important for gauging suitability and facilitating successful- and averting failed –project delivery. Five of the respondents mentioned ill-defined project planning as an important input resulting in project success or project failure. Four respondents felt that the project type being of variable scope with emergent requirements is a project risk and should be planned properly and handled in an agile appropriate manner.

None of the respondents spoke of projects with up-front cost evaluation done, projects with up-front risk analysis done and only relying on economic evaluation criteria as inputs to agile success or failure, but in a subsequent questionnaire was sent to all respondents from Company A to confirm findings and add rigour to the process. These findings are discussed below.

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Six of the seven respondents responded to the questionnaires sent out. Six out of six respondents agreed with the success factor that successful Agile Teams are measured on overall value add and creation. One respondent noted that; "The only count that matters is working software." implying that value measurement is practical and very different to the traditional waterfall measurement of only scope, time and cost. Ten respondents agreed that project logistics play a role in agile project delivery.

### 4.6. Skill Level & Attitude of Team Members

Eight respondents felt that competent team members directly impact successful agile project delivery, while two respondents felt that motivated team members are important. Six of the respondents agreed that a lack of the necessary skill set will affect the delivery of the project adversely, while five respondents agreed that a lack of peer support and team work, as well as a resistance from groups or individuals could also lead to a failed project. An observation made during the retrospectives, was that individual and team attitude plays an important role in team dynamics, but also in project outcomes and results, it seems. Having the right attitude and being positive makes a difference in the way the team members interact with each other as well as the iteration outcome according to the agile coach. This was apparent from the energy the researcher experienced from the groups in the retrospectives, as well as the results from the iteration that were discussed in these sessions. Twelve respondents mentioned skill level as a factor in success or failure of agile software development projects.

Chow & Cao (2008) Team members with high competence and expertise, team members with great motivation, and competent team members (Skills). Chow & Cao (2008) argue that lack of the necessary skill set, lack of team work, and resistance from groups or individuals are failure factors in delivering agile projects. Vijayasarathy and Turk (2008) offer lack of peer support and individuals' resistance to agile as failure factors.

## 5. CONCLUSION

The purpose of this study was to investigate which factors influence agile software development project delivery. More specifically investigating the factors that result in agile project failure, and identifying the success factors that result in agile project success.

It was found that organisations should be careful when working with team members and vendors especially, that are geographically dispersed. It is also important to understand that not succeeding at agile adoption the first time doesn't mean that agile doesn't work, but that a proper retrospective should be held to assess why it didn't work and what the lessons learned are, so that it will work next time. Stakeholder involvement and buy-in is critical to agile project success. This includes customers, sponsors, managers and team members. It is also important to note that there is a big difference between traditional project managers and agile project managers or scrum masters. Traditional command and conquer approaches of managing are inappropriate, and the correct adaptive management style should be embraced.

It is important to realise that it takes team members a few iterations to start getting used to agile processes. Smaller, dedicated teams are a big benefit to agile projects. This along with the mandate to negotiate and self-organise is important. This fosters a culture of ownership and accountability. Teams should be empowered to negotiate and be self-organising. Knowledge of agile principles is important in project success. Obviously not knowing anything about agile is a big risk, and knowing very little could result in incorrect application of principles, and tools and techniques.

Competent team members are important for speedy project delivery, but also to avert stress because of team members having to carry or train more junior team members. Regular reflection throughout, to inform and improve the process is important in agile adoption and successful agile project delivery. Also, team members should have a positive attitude, as this is better for project performance and overall energy and well-being of the team. When agile principles are impractical or not conducive to project conditions or an organisation's context, it can be adjusted, or omitted if it is possible to continue without it. Team members who are too specialised and don't have general, balanced experience and business acumen, is not a good thing. Team members who lack general business acumen struggle to assist with functions

outside of their specific area of competence, and it is important that team members be able to assist when necessary.

## REFERENCE LIST

1. Ambler, S. (2011, November). Agile Adoption Strategies: November 2011 Survey Results. *http://www.ambysoft.com*.
2. Boehm, B., & Turner, R. (2004). Balancing Agility and Discipline: Evaluating and integrating Agile and Plan-Driven Methods. *IEEE Computer Society*.
3. Boehm, B., & Turner, R. (2005). Management Challenges to Implementing Agile Processes in traditional Development Organizations. *IEEE Software*, 30-39.
4. Chow, T., & Cao, D. (2008). A Survey Study of Critical Success Factors in Agile Software Projects. *The Journal of Systems and Software, 81*, 961-971.
5. Cohn, M. (2002). Retrieved 2012, from mountaingoatsoftware: http://www.mountaingoatsoftware.com/
6. Lindvall, M., Basili, V., Boehm, B., Costa, P., Dangle, K., Shull, F., . . . Zelkowitz, M. (2002). Empirical Findings in Agile Methods. *XP/Agile Universe*, 197-207.
7. Livari, J., & Livari, N. (2011). The relationship between Organizational Culture and the deployment of Agile Methods. *Information and Software Technology, 53*, 509-520.
8. McMahon, P. E. (2004). Bridging Agile and Traditional Development Methods: A Project Management Perspective. *The Journal of defense Software Engineering*, 16-20. Retrieved from http://www.stsc.hill.af.mil
9. Nerur, S., Mahapatra, R., & Mangalaraj, G. (2005). Challenges of Migrating to Agile Methodologies. *Communication of the ACM, 48*(5), 73-78.
10. Vijayasarathy, L. R., & Turk, D. (2008). Agile Software Development: A Survey of Early Adopters. *Journal of Information Technology Management, 21*(2).