AN IMPROVED ADAPTIVE AND DYNAMIC HYBRID AGILE METHODOLOGY TO ENHANCE SOFTWARE PROJECT SUCCESS DELIVERIES

[1] SEENIVASAGAM MOHANARAJAH, [2]DR MARZANAH A. JABAR

[1] Faculty of Computing, Engineering and Technology, Asia Pacific University of Technology and Innovation, Malaysia

[2]Assoc. Prof., Department of Information System, Faculty of Computer Science & Information Technology, University Putra Malaysia

E-mail: [1]smohan@apu.edu.my, [2]marzanah@upm.edu.my

ABSTRACT

Context: There has been a growing interest in the usage and adaptive ramifications within the broad spectrum of agile methodologies and its current trend as an alternative to traditional methodologies has not been widely accepted. Whilst a lot of hype has been seen since its introduction in 2001 with the Agile manifesto where delivery success was promised, software practitioners still appear to be weary as unfavourable usage perceptions dominate the software industry and the transition appears to be a formidable task. Project success and failure scenarios have been researched but the factors that establish these are still widely inconclusive and elusive creating more interest and emphasis for embarking on further research. This paper highlights and investigates the relationship between agile software development methodologies and the success and failure scenarios prevalent in the software industry.

Objective: To provide new success and failure causes and roots to a new adaptive and dynamic hybrid agile methodology that could further enhance software delivery success with more frequent use of agile methodologies in a reliable manner.

Method: The methodology used is the Evidence-Based Software Engineering (EBSE) research and practice. Additionally, the Systematic Literature Review (SLR) method was also incorporated as it provided a rigorous review and synthesis of research results. In analysing the reviewed data, we have used the Analytical Hierarchy Process (AHP) method as it provided a clear approach in attaching priorities to recommended solutions.

Results: Through a review of a set of research articles on project management history, its disciplines, its relative misunderstood and with the inconsistencies in the adoption and use of agile methodologies, it has been shown that barriers still exist and the strategies of removing these obstacles and transforming them into catalysts, while been investigated and developed, still appears to be a challenge. Agile methodologies work when a broader spectrum of perceptive adaptations and a new set of dynamic critical success factors, especially when a new methodology which incorporates these catalysts for a set of project activities is developed.

Contribution: The study has contributed in proposing a new set of success and failure causes and the roots to a new agile methodology from the analysis and findings. These would be useful for researchers and software practitioners who are interested to do studies on the further adoption and use of existing agile methodologies or to tailor agile methodologies as hybrids versions in the future.

Conclusion: Success and failure scenarios are the mainstream derivative constructs of project delivery studies in terms of the moving forward in achieving higher project success rate. Issues with stakeholders were the major areas of concern as success and failure contributors. Other important factors were organisational culture and methodology, which needed equal attention as gaps still prevailed and at times festered to its own disadvantage. The most interesting find was that these contributors were equally important whether we used traditionally formal methods or moved to agilitic methods. This also explains the flat success rate for software projects over the last 5 years as we probably reached a point where we have been addressing areas in terms of causes and were not specifically trying to weed out the areas independent and applicable to the software industry. We recommend that a dynamic approach both to the

causes and the methodology is the answer as the software industry does not sit still in todays' ever changing user demands and expectations. Environments with a dynamic methodology, which encompasses a dynamic set of critical success causes as its inception based on a set of dynamic success indicators, is the key answer. The dynamic success (and failure) factors, indicators and the derived methodology are recommended from our study. This we feel should be the approach for all new and future research.

Keywords: *Project Management, Traditional Methodologies, Agile Methodologies, Success, Failures, Causes, Factors Hybrid, Dynamic.*

1. INTRODUCTION

The concept of managing projects has had a long journey, with its inception as a methodology in the early 1940s, to fundamentally ensure that a successful delivery is the end result with minimum disruptions to the project schedules. Research in the history of project is a relatively unexplored subject [1] and core ideas were always an area of contention, as history as we know it, where anything that is written is always left to be believed and tends to repeat itself. The only suggestion and eventual focus was to pay particular attention and adhere to an agreed baseline as a steering and tracking mechanism, typically on objective, time and budget [2]. Despite this focus, development and use of more complex project management methodologies, the successful delivery track records have been rather dismal. With software projects being the mainstream of projects today, the dynamics in its application is constantly changing, and landing at a set of rules that is applicable appears to be distant in the long road of reaching a journey well-travelled, just as the research in project history has been.

The various elements used to describe project management methodologies in its early conceptual days were also used to define success and failures in projects. These elements had no basic hierarchical structures and have resulted in the interchange of use of words like categories, characteristics, factors, variables, attributes, indicators, etc., for example, a set of factors could be defined as belonging to a category, or a set of categories could belong to a factor. This has led to much confusion to identify clearly where the problems stem from and how we can solve the problems in terms of success and failure areas.

However, the term factors have been constantly used in about 71% (25 of the 35) of the research papers on agile methodologies to identify contributions to project success and failures.

The software industry initially had its roots with the use of traditional methodologies for ensuring successful deliveries with its elements as discussed in figure 1, and towards the latter half of the 20th century the concept of agility as being a flexible approach made its appearance although its roots date far back as the 1930s [3]. This was interesting as agility, although caught on much later, was a concept that linked closely to quality (used by IBM and NASA) while the traditional methodologies still focused and the triple constraints (Scope, time and cost – PMBOK Body of Knowledge) to ensure quality all this while. It could be that agile methods were a culture shock as it passed control to the operative team and project managers felt left out or in fact lost an important role in managing projects.

Tremendous amount of research has also been made on critical success and failure factors but not many provide the interconnection between these factors [4]. An overview of the failure factors in provided in the figure 2 below to broadly indicate the various contributing factors but these will be later shown as specific reference to agile methodologies to assist with our discussion and viewpoints.

The 22 definitions of success is also an indication that the stakeholders view on success is varied further complicating the various project management processes and clear delivery becomes undecided [4].

Our goal is to provide a set of critical success and failure causes where the applicability of these are constrained and limited within certain boundaries which can take inputs to tailor the processes to facilitate the needs of the project, building interconnected bridges and deeming it to achieve success. This we feel it is a methodology in itself.

In summary, the need for this research is motivated for a number of specific problematic reasons where we found that, most importantly, software project failure rates are still high and users are generally not happy with project deliverables.

Agile methodologies were introduced since early 2000 and the promises that resolution to these problems will be met have not been seen.

As current issues exist with both traditional and agile methodologies and further complicated with different types of agile methodologies, it is hoped that the gap could be closed by introducing hybrid versions which would incorporate and synergize the different characteristics, principles, values and development practices of these methodologies.

The flow in this paper is organised into 10 sections. Section 2 discusses the overall concepts of project management, its traditional methodologies and the value it has contributed to the software development industry. Section 3 provides issues with software development methodologies within the boundaries of traditional and agile methodologies with a flavour of its success and failure causes while Section 4 explains how the theoretical and conceptual framework was formulated. Section 5 defines the objective of this research paper and includes 6 research questions that eventually lead to the various contributions. Section 6 introduces the methodology used. Section 7 reviews the analysis and findings of the research questions and section 8 summaries the findings and discusses new research areas. The contributions made in this research paper are discussed in section 9 together with the limitations and finally section 10 concludes the objectives and findings that require pilot studies as recommended future research.

2. PROJECT MANAGEMENT: THE EVOLUTION AND ITS CONTRIBUTION TO THE SOFTWARE INDUSTRY TODAY.

2.1 A Contextual Perspective: Scarce Historical Research And Unresolved Disciplines

The interest in researching Project management and its methodologies stems in the arduous philosophy that it is not a 'crossroads discipline' [5] where its contents should be dragged upon the two extreme ends of diluting it and making it respectable by academic studies on the one hand and letting it mature on its own by sheer trial and error on the other.

At this juncture, even academic research in the history of project management is scarce [1] and current interest appears to be limited. This is compounded by the fact that there is constant debate as to how it fits into practice in industry or into the academic circles and seems to have little resolution to-date [6]. The use and experience of project management practices is weak and its link with its best practices appears disconnected where organisations are unconvinced and unaware of the value it offers [7].

Thus academic research has to be given more importance as literature on the research of project management appears to be insufficient and case studies have been few.
In the study of PM practices, it has been observed that the better the practices, the better the product results. Failures are due to not frequently using PM best practices and this could make a difference [7].

In essence, project management should exist 'in and for itself' [5] as it encompasses the whole spectrum of organisational backbones where knowledge, concepts, lines of thinking, strategic views, alliances and planning form the elements and basic tenants of the dire need to exist and function. In terms of the discipline of project management, the question as to how real it is as a methodological technique and tool appears distant [6].

Whilst all these concepts and views have had their place and still continue to be supported, competition on the study of theoretical aspects should be rived and professional disciplines should be organised as virtues for its completeness.

Thus this study started with important notion that project management has had a difficult path with its research, disciplines, acceptance and use in industry.

2.2 Definition Of Project Success: It's Still Being Elusive.

The current perspective is that a problematic view is focused with the definition of project success in that it appears to have different perceptions and relationships [4], i.e., as to what makes it a success, and that it needs to be included as a Critical Success Factor (CSF), more importantly by the stakeholders [6]. This finding is that from the 29 articles that were analysed on project success, 22 had different definitions. Causes and attributes (though not exhaustive) that contribute to project failures are many which

probably emphasise the difficulty faced with arriving at a definition as to what failure clearly means (see Table 01) or looking at from a different perspective, what clearly constitutes project success.

Different categories are also being used to assist with the definition like doing the process right or getting the system right or getting the benefits right. With these three competing areas each identifying their importance, it is difficult to see which criteria will play a major role in arriving at a correct definition [8].

Probably the best approach is to still use the traditional concept and relate success with the predominantly used triple constraints (functionality, time and cost – i.e. quality) criteria but to associate these with other very specific factors that assist it in narrowing or closing the gap in the definition [9]. More studies must be conducted to go beyond the constraints and link these factors. This is outside the scope of our study.

2.3 Project Successes And Failures: An Overview Of Its Traditional Constituents.

The early practitioners of project management have particularly identified various constituents as leadership, perception, methodologies, KPIs, strategic policies, effective communication, knowledge management, personality and organisational learning with the most important being stakeholder management. These were and still are the pillars and the backbone of the traditional project management methods and its thus not surprising that these are still being used in achieving a high degree of success with the development and implementation of software projects in particular. However an iterative mind-set is also being seen as a crucial need and has formed the basis of agile methodologies. This is discussed in detail in the later sections. Table 1 of an overview of the summarised traditional success and failure constituents by researches is provided below. – 2011 – 2014.

A ranking of the constituents indicates that project stakeholders, and perceptive traits are major success contributors while methodology use and task management are major failure areas. We also reviewed the constituents of project success and failures with current agile methodologies as a starting point to investigate the software project environment. Whilst this approach might provide a

pathway to address the high failure rates, it is also equally important to provide some comparison between traditional and agile methods to see if the same constituents exist with both approaches and if in fact poses additional problems to an already complicated and problematic success delivery solution. This is addressed in detail as research objective two in our study.

3. SOFTWARE PROJECT MANAGEMENT

3.1 Software Project Management With Agile Methodologies: Its Success Creditability Over The Last Decade.

The interest to explore the area of IT project failures and its roots started with the poor industry statistics on project success rates provided by the Standish Group Research CHAOS Reports over the last 18 years; 1994 to 2012. Although the overall drop in challenged and failed projects was 12% (84-72%) in the initial years of the CHAOS research, it has now hovered around a 10% variance (71-61%) over the last decade even with the introduction of the agile principles in the Agile Manifesto in 2001. While project management methodologies and its use appear to gain momentum, with particular hype on agile methodologies, the drop in failure rates has been quite dismal. Figure 01 provides the research statistics by the Standish Group.

Similar statistics from Gartner survey or Gallup poll on project management, provide enough evidence of IT project failing with 43% over budget, 7% over time and delivering 56% less value than originally expected ([9].

In a study done on the user profile in the adoption of agile methodologies from 2006 to 2012 (figure 02), with a total of 1969 developers, the number of agile users initially grew from 2006 to 2007 to 51% but later tapered off and remained constant from 2008 to 2010 at about 57% [10]. Looking at these figures we can broadly concur that while agile methodologies had an increase in its usage, overall the project success rate has not shown much significant improvement.

While the link on adoption with user usage scenario might have had some doubts, we see there is a growing trend on the number of current academic articles have been published in journals by researchers on agile methodologies. The

increase in the post adoption scenario provides a trend on the interest and issues (figure 03) that have been related to problematic usage of the methodologies [11].

Just as much as we saw a scattered and wide current research view on project management over the early years of project management history, the early years of Agile development also experienced exuberance by a few practitioners and scepticism by many in its usage as it initially reduced the failure rate but later appears to have plateaued out.

Agile researches too have particularly focused on knowledge management, personality and organisational learning as popular areas which are also the pillars and the backbone of the traditional project management methods and its thus not surprising that iterative mindsets which form the basis of agile methodologies. There is a problem in achieving a high degree of success with the development and implementation of software projects in particular.

Looking at these three piecemeal findings which relate to a period over the last decade, where CHAOS reports are indicating a high failure rate, usage and adoption of agile methodologies are not increasing within the practitioners development toolkit and with the fact that there is an increasing trend in academic research articles being published, it emphasises that there is a growing concern on the serious weakness on the understanding and adoption of a agile methodologies and its success credibility.

3.2 Agile Development Methodologies: Its Related Inconsistencies With Specific Critical Success And Failure Factors

Agile methodologies were informally developed in the later part of the 1970s although in principle the ideas were being used by IBM and NASA as quality tools in the 1930s [3]. The ideas were formally introduced in the agile manifesto in 2001 with its 4 values and its 12 agile principles to assist in providing better ways to develop software especially for globally distributed enterprises. The 4 values (AV1-AV4) and the 12 principles (AP1-AP12) are as follows:-

AV1. Individuals and interactions over processes and tools

AV2. Working software over comprehensive documentation

AV3. Customer collaboration over contract negotiation

AV4. Responding to change over following a plan

AP1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

AP2. Welcome changing requirements, even late in development. Agile processes harness change for the customer' competitive advantage.

AP3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

AP4. Business people and developers must work together daily throughout the project.

AP5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

AP6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

AP7. Working software is the primary measure of progress.

AP8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

AP9. Continuous attention to technical excellence and good design enhances agility.

AP10. Simplicity–the art of maximizing the amount of work not done–is essential.

AP11. The best architectures, requirements, and designs emerge from self-organizing teams.

AP12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Current studies seem to indicate that the original approach of the Agile Manifesto and its principles has not been working from the start [12]. Cockburn, one of the 17 original authors, said after the manifesto was drafted,

"These statements should evolve as we learn people's perceptions of our words and as we come up with more accurate words ourselves. I will be surprised if this particular version isn't out of date shortly after the book is published".

But revisions have not been forthcoming and the dissatisfaction over the years since 2001 has been increasing. In a study conducted in 2010 and 2012, the 12 agile principles were analysed based on its support and understanding by developers. It was found that 3 (AP2, AP8 and AP11) of the 12 principles had issues and needed further thought [12]. The areas of confusion and lack of acceptance were related to the choice of words which led to an unclear interpretation of the principles.

This suggests that further work is still being needed to redefine and provide opportunities to accept the 12 agile principles originally introduced while compiling a set of do's and don'ts as key indicators in addressing the success and failure factors would be very useful. This would be done using the AHP method and the application domain needs to be expanded.

4. DEVELOPING THE THEORETICAL AND CONCEPTUAL FRAMEWORK

In developing the theoretical and conceptual framework for the analysis of the research material, which was essentially linear, we used the steps below as our concern was that our framework was described and motivated by existing literature (table 02).

5. MOTIVATION FOR THE RESEARCH PROBLEM, RESEARCH OBJECTIVES AND QUESTIONS

5.1 Motivation Factors And The Research Problem

This paper has introduced and discussed the issues with the many definitions of project success and its problems with agile theories and practices in industry. Our initial assessment of the current literature base on the use and adoption of agile methodologies indicates it has been slow. Another branch of research indicates that critical success and failures factors have been as introduced as toolkits to be used to increase success rates but success statistics indicate otherwise. These formed the basis of our research as it were strong *motivation factors* for a study to investigate why agile methodologies have not met its promise. The following are our motivation factors (MF1-MF9):-

MF1. The failure rates of software projects are still high (CHAOS 2012 report)

MF2. Stakeholders are generally unhappy with projects deliveries as success definitions differ [6].

MF3. Multiple definitions still exist for methodologies although they all have and use common elements, with the golden triangle (scope, time and cost) still prevalent [9].

MF4. The transition from traditional methodologies has been slow [13] and research has been sparse. Agile methods have 3 times the success rate over traditional waterfall methods and a much lower percentage of time and cost overruns [14].

MF5. Agile replacing waterfall as a standard approach [12]

MF6. Research interest is growing on the use of agile methodologies and its critical success and failure factors, but
   a. a clear working set of factors still appears distant [4]
   b. more research is needed on advance knowledge on themes beyond what we already know [11].
   c. no clear priority setting has yet to be been given to the factors [12]
   d. many of the factors have a weak link between software development practices and management methodologies [15]
   e. agile development appears relatively under-researched [11]

MF7. Agile methodologies are not working to its desired intent and revisions are not forthcoming [12]. The present models too have loads of flaws [13].

MF8. New research focuses on hybrid agile to handle complex projects [11] and the reality of mixed agile/traditional methodologies [16]. A 16% increase in productivity by using hydid methods [17].

MF9. A need for dynamic models so as to continuously tailor agile based methodologies/models at the organisational level [18].

These areas of concerns and motivation, we feel, have provided us with a complex research problem.

'Since the introduction of agile methodologies more than a decade ago to improve the successful deliveries of software projects, a clear set of success and failure factors is not evident, no hierarchies have been set and the transition from traditional methodologies has been slow, whilst

current agile methodologies lack adaptive and dynamic characteristics.'

Thus, in a nutshell, agile methodologies have not met its promise.

5.2 The Research Objectives

Thus, the main research objective of our study is

'to provide new failure causes (obstacles), set priorities and the roots to a new hybrid agile methodology that is dynamic and adaptive to further enhance software delivery success with more frequent use of agile methodologies in a reliable manner'.

The *research objectives* (RO1-RO6) are as follows:-

RO1. demarcate and set boundaries to the definitions of project success and perceptions within the context of different stakeholders to see if it applies in the agile environment

RO2. assess the categorisation of established critical success and failure causes which have claimed to have worked within the context of agile values and principles

RO3. based on the limitations discussed in the current research literature with regard to failure causes (obstacles), identify opportunities that exist to pursue the development of new success causes (catalysts) for agile adoption and implementation

RO4. set priorities for a hierarchical representation of critical success causes with the use of accepted ranking method(s), e.g. the AHP method

RO5. encompass these success and failure causes strategically into agile values and principles to further support its applicability, adaptability and validity

RO6. propose a framework to assist in the transformation and development of a new dynamic and adaptive agile hybrid methodology

5.3 The Research Questions

To approach the research objectives (RO1-RO6) in a structured manner, a set of 6 high level *research questions* (RQ1-RQ6) have been introduced. Based on current available research, we attempt to investigate the following:-

RQ1. Have the problematic definitions of software project failures affected agility as the perceptions of success have not been uniformly viewed and interpreted by different stakeholders?

RQ2. Are current identified success and failure causes grouped into typical broad areas of categorisation and standardisation and do they work within a set of ranked priorities (AHP)?

RQ3. What potential failure causes identified from previous studies still exist that need to be transformed to success causes within the spectrum of agile methodologies to make it more development and implementation centric?

RQ4. What are the most commonly identified success and causes failures within the pool of agile methodologies and are there any similarities when compared to traditional methodologies?

RQ5. What traditional and agile processes currently support the mapping of the agile manifesto with its values and principles to embrace current success and failure causes?

RQ6. How do we use the mapping to propose a framework to develop a dynamic and adaptive hybrid version of an agile methodology?

5.4 Mapping Objectives, Questions And Motivation Factors

To have a concrete set of research questions, we mapped each objective by its respective research question for the possibility of a 'closure by objectives' as we progress later with our analysis and our findings. Also, based on our motivation to do this study, we further mapped the motivation factors to the research questions. The first motivation factor on the high failure rate of project failures encompasses all the other factors and we

indirectly addressed if the objectives are met (table 03).

6. METHODOLOGY DESIGN

6.1 EBSE Research And Practice

This study has used the Evidence-Based Software Engineering (EBSE) research and practice where typically advice is based on accumulated results from 'scientific experiments'. In our case, 'scientific experiments' relate to the review and analysis of specific agile methods and factors made available in current literature from researchers. We have also incorporated the Systematic Literature Review (SLR) method which is a methodologically rigorous review and synthesis of research results [29]. The SLR method facilitates high quality research and students pursuing their PhDs are also encouraged to use this methodology, although it might take 8-9 months [20]. The author is a PhD candidate and has applied and used this methodology.

This is in contrary and the exact opposite of the expert opinion review which is based on the unreliable advice [19] approach which uses ad hoc literature selection and falls into the category of an unstructured piecemeal analysis which should be avoided in our case.

The question is how are project end results, i.e. success or failure studied? Do we just only study the extremes, since normal projects, which are concerned with most people [1] happen to be the ones we are tracking but nothing about distinguishing the extreme from the normal one. There are risks associated with such a strategy [1] as the finding is not a true representation of the norm.

6.2 Inclusion And Exclusion Criteria

As we wanted to ensure we referenced quality materials for our data collection and analysis we set up a criteria to create a basis to include and exclude reference material. Only academic scholarly journals and selective well-known industry reports on statistics were used. The articles used were not older than 2009 unless we were discussing previous trends where a longer period will provide a clearer picture. We particularly excluded news material, white papers, extracts of minutes from meetings and blogs as we rather used facts and keep away from opinions , marketing biased reports and personal views.

6.3 The Search String Approach

The search was based on the key themes for the study and these were used as search strings where other researchers also looked at what theories and concepts they have put forward that identified and closed possible gaps that might exist. This approach was to form a basis to create an overall platform for the research and limit the boundaries in the development of the current theoretical and conceptual framework.

To assist with the research questions, a search strategy was used with a set of search strings (strings of questions which at times used Boolean algebra) similar to methods incorporated in systematic literature reviews [21]. The string of questions were then use to build the theoretical and conceptual framework and the findings tested with the research questions.

6.4 Number of articles reviewed and selected

In total 82 academic papers were reviewed and about 54 were found to be useful. The table below provides an overview of the broad categories that were selected in the search to assist in developing a theoretical and conceptual framework (table 04).

6.5 Most cited researches and their number of articles

A lot of research and studies have been published in scholarly journals and while the growth has been significant, a few researchers stand out in the number of publications. A review on the 20 most active researches who have been cited between 2001 and 2012, Dyba, Dingsoyr and Nurer were the top 3, each with 254, 187 and 124 citations respectively on articles on agile software development [11]. In our study these researches have been included and cited to assist in ensuring the findings and analysis provides a significant picture of the agile methodologies and its associated issues and problems (table 05).

7. RESEARCH QUESTIONS: ANALYSIS AND FINDINGS

The findings that was expected from the study was to clear a pathway to arrive at a focus area as to how current agile methodologies are parked and used in the software development process and where it is leading to. These findings are presented in more detail in this section in the form of answers to questions. A theoretical and conceptual framework has been developed (see below) to assist with the study. An overview is provided in figure 04.

RQ1.   Have the problematic definitions of software project failures affected agility as the perceptions of success have not been uniformly viewed and interpreted by different stakeholders?

A stakeholder's perception and importance of success is dependent on a person's individuality, personality, nationality, the project type and contract type [8]. Success is also viewed within the context of the stakeholder's personal development and professional learning that has been attained [9]. Yet others indicate that success is outcome related to economic and business climates, and subjective to interpretations and negotiations. Disparity also exists as while one stakeholder considers a project to be a *complete success*, the other stakeholders deem it to be a *dramatic failure*. Perceptions run rife and agreement appears to be impossible [4]. This appears to be the common view among researchers where satisfaction is the main criteria to achieve success.

We looked at the various findings from current research literature and compiled table 06 to see the different views that have been identified as achievements that define project success by stakeholder groups.

Analysis indicates that although there are considerable variations to the definition of success amongst stakeholders, the idea of being satisfied appears to be a universal derivative of success with nearly all recent researchers. But to be satisfied could involve a multitude of perceptive inclinations and

the idea of mental models [14] with teams brings in an important perspective. Teamwork does not automatically arise and to use this as a decisive input to success could relate back to the original work done on the principles of the agile manifesto where research on the relevance of teamwork to agility was not explored [22] and thus would not feature well.

It has also been found that perfect teams are not always the answer to today's software development challenges [23]. While attempts have been made to summarise the project success factors and failure factors, a clear definition of what project success is still another challenge [6].

As we look at our first our objective, which was to demarcate and set boundaries to be able to define project success within the context of project stakeholders in a singularly manner, we find it is still eluding us and new studies are required to provide a clearer definition.

These studies have not yet identified a compelling model of the success and failure causes. Based on an extensive review of the project success literature, it is concluded that a clear definition of project success does not exist and there is a need to develop meaningful and measurable constructs of project success. They indicated that the current research theorising the causes is not sufficient in meeting this objective.

RQ2.   Are current identified success and failure causes grouped into typical broad areas of categorisation and standardisation and do they work within a set of ranked priorities (AHP)?

There are a tremendous number of articles that discuss critical success and failure causes but the categorisation and/or classification of these are very varied. The terms criteria, characteristics, categories, factors, variables, attributes and indicators are used interchangeably that it is not clear to what extent we can relate each of these terms as to the actual causes. Factors are grouped into categories as organisational, people, etc. [24] while factors and criteria are grouped as indicators by some researchers [15]. Success factors have also

been included as project mission, schedule, time monitoring, etc. [6] and yet this is typically addressed as attributes by surveys being done [25]. Others refer to all these to be variables and proceed further to use the terms project success criteria (the results) and critical project success factors (the organisation) to differentiate and provide a link to these terms [8].

This has been a major challenge as the current view on the critical success and failure factors that have been developed and introduced too has had its drawbacks as it appears to be not working. Support from executives for these factors within the organisation is not strong especially when the environmental base is not conducive [24] to use agile methodologies.

We find failure causes occurring at every action during the life of the project with developers, users, etc., and even the whole project team. Stakeholders and their perceptions always seem to be the major contributing factor based on these studies yet the focus is on methods, models and the triple constraints [6].

The number of causes is overwhelming but no single cause can be identified and it's a multitude of factors (figures 05 and 06). Major factors are leadership, perception, methodologies, KPIs, strategic policies and effective communication. The most important was identified as being stakeholder management. Even the area of stakeholders is suggested to be further classified into 3 major groups, viz., senior management (the Board, its directors, executives and executive management, the sponsor or investor, the project executive and programme director, owner, senior management), project core team (the software engineer, other organisational involvement, for e.g. business departments, project leader, project manager, project personnel, project team leader, project team, team members) and project recipients (the client, customer and end users) to address them differently to see why the same success and failure causes differ especially with perception [6].

To conceptualise a summarised overview based on the readings [16], [27], [9], we conceived an initial breakdown of the success and failure causes as shown in figures 05 and 06.

To circumvent the current unstructured approach, we have introduced a structured to the various areas or elements that involve in the study of success and failure causes as shown in figure 07. It is an overview adapted on the various elements and its perceived hierarchy from various recent research papers [6], [8], [25], [5], [2], [26], of project management methodologies.

A category is the main area to start with. It is viewed as the main root cause in addressing a problem. So all success and failure causes are traced back to the category. A factor is a subset of a category, a variable is a subset of a factor, an attribute is a subset of a variable and an indicator is a subset of an attribute.

Establishing a clear set of success initiatives using the Analytic Hierarchy Process (AHP) and the Root-Cause Analysis (RCA) methods would require a clear definition of the terms used in identifying and developing the critical factors with an established hierarchical structure of the terms. We have used categories, factors, variables, attributes and performance indictors as key distinguishing terms or elements to arrive at the success and failure to facilitate the effort. Our proposed framework will use both the RCA and the AHP methods to associate priorities to the success and failure causes.

Research question 2 was to see if these was a structure that was adapted by researches to categorise the success and failure causes into a hierarchy. We saw little or no evidence of this as factors were taken to mean categories and indicators were also taken to mean causes and the ranking of the causes was practically non-existent.

However, a major limitation with this approach is that it is difficult to categorise and reduce the causes to a manageable number [8].

RQ3. What potential failure causes identified from previous studies still exist that need to be transformed to success causes within the

spectrum of agile methodologies to make it more development and implementation centric?

This research question is based on previous work by researchers on success and failure causes. To provide a detailed picture of current failure causes, we feel, it is useful to cover a wide range of project management areas which include the various agile methodologies, successful and failed models, the perceptions, the practices, the processes and the critical success and failure factors that have been supported or not supported successful deliveries. These areas appears to be the least researched and even if researched, there is no landing in clarity.

As we viewed this, there are indications that advance knowledge on themes beyond what we already know [11] is necessary. The studies also suggest that failure causes related to customer collaboration, business core values and development principles need further exploration and more work has to be done on how to integrate these. Other studies indicate that the nature of agile teams (small teams and its self-organising nature - a feature of the first of the agile values in the manifesto) to function effectively encounter barriers as changes to corporate policies and procedures are not accepted easily [28]. Skilled client and service provided b these clients is also important [27].

The evidence also suggests that we should try to develop new critical success factors as there is a continuing need to identify the factors that positively influence project success. Success causes of agile projects should be used to provide a ranking perspective(e.g. the Analytic Hierarchy Process – AHP) in terms of importance and criticality by associating weights to these factors. This was addresses in research question 2.

But when considering traditional methods which had their own success criteria, agile needs team satisfaction to be included to the traditional 'golden triangle' as agile teams are collaborative which involves leadership and role rotation. This implies that teamwork could breakdown if they are not satisfied

with the objective of the interaction as provided in the manifesto [9].

RQ4. What are the most commonly identified success and causes failures within the pool of agile methodologies and are there any similarities when compared to traditional methodologies?

This research question reviews traditional and agile methodologies in terms of its differences and similarities within current identified success and failure causes. Similarities for success causes appear to be in the methodology approach, using highly skilled teams and having good communication with support from senior management, although the management support for agile methodologies appear to be less when compared to traditional methodologies. Similarities for failure causes in both methodologies appear to have more instances and these relate to stakeholders view of success, perceptions on adoption and usage, senior management commitment and people and team expertise and commitment. Table 01 provides a high level of the success and failure constituents with traditional methodologies while figures 05 and 06 provide the causes for agile methodologies from recent reached articles (2010-2014).

The importance and gradual acceptance by the Project Management Institute (PMBOK® by PMI – designed as a formal methodology) to use agile methodologies (SCRUM in particular) is seen with the release of the book 'The Software Extension to the PMBOK® Guide - Fifth Edition (2013) to manage software projects. This provides recognition and support to view the similarities and differences surfacing in using both methodologies, as PMI's structure which encompasses the 9 Knowledge areas and good practices can be used to manage the similarities and differences in success and failure causes

Furthermore, evidence of stakeholders satisfaction always seems to be the highest ranked in terms of failure causes in most studies and is now being viewed beyond the

'golden triangle philosophy' which only considered scope , time and cost as being very important before [9]. The importance in ranking it high supports the view taken by PMI as stakeholder management processes has been included as the 10th knowledge area in the PMBOK® Guide (5th edition).

We also see the use of agile methodologies is gradually gaining momentum as there is evidence of iteration pressure [23]. With the trend in agile replacing waterfall, the increase in adoption levels, reduction in inhibiting factors and improvement in the overall benefit levels [12] indicates the maturation of Agile Software development Processes. New progressive and maturation environments would support identifying where the similarities and differences for software developers to have confidence in the gradual shift in the current mindset. Agile methods have 3 times the success rate over traditional waterfall methods and a much lower percentage of time and cost overruns [14].

RQ5.   What traditional and agile processes currently support the mapping of the agile manifesto with its values and principles to embrace current success and failure causes?

This research question, which is a of a 'grassroots' nature for agile, provides for a link between the agile manifesto and the current success and failure causes, irrespective of whether an agile or a traditional method is used. In our search for research papers for this link, there was hardly any research done in this area, except for one, which looked at it from an ISO perspective and used standards to map it [28] as provided in the table 07. Our search for more direct links has been unsuccessful.

In our view, the little interest could stem from the weakness in the clarity of the words used to define the principles and the values in the manifesto and to the extent it can be made to refer specific terms. We base our reasoning on the differing views of agile and traditional methodologies on how goals are interpreted, degree of importance customer involvement, level of documentation and importantly the view on

changes [3]. It would be a challenge to map these areas if views are different and with no effort being made to revise and redefine the values and principles [12] there would be little change in the scenario. Software developers seem at a lost as to how to interpret these areas and in some cases are quite unsure if the final outcomes of the projects have been reached

Research in project management methodologies is also facing a dichotomisation problem as to categorising the various success and failure causes as 'hard or soft' issues. The agile manifesto implies that a 'soft' approach is good and a hard approach is not sufficient, for example, a working software is implied to be a more important (soft issue) than complete documentation (hard issue). Traditional methods, on the other hand, imply that being 'hard' is a closed system with little variation and applying systematic processes and practices produces a good product. But the very nature of the meanings of the word 'hard' which implies firmness and 'soft' which caters for emotive reasoning makes 'hard' to appear to be superior and 'soft' to be weak which implies traditional methods are superior to agile methodologies. This creates barriers to interpreting some of the project management theories which indirectly affects the mapping of roots of the success and failure causes within the manifesto [3].

Yet still other studies suggest that we should find a basis to match current practices which can be applied and are valuable to agile principles. This will provide a direct link with current established processes viz., development processes, project management processes, support processes and managerial processes [32] to study new success and failure causes and find probable mapping possibilities.

So, mappings should provide two constructs; one is to establish the link to processes, whether traditional or agile, and the other to include into the current categorisation, classification as either its 'soft' or 'hard' element as it would be a good input to research question 6.

RQ6. How do we use the mapping to propose a framework to develop a dynamic and adaptive hybrid version of an agile methodology?

This question provides for a new domain of research to be investigated as new and hybrid version of agile methods is being recommended by researchers. Additionally too, as most of the major software products and projects are managed by a methodology framework, it's fit to project size and complexities is relatively untested. This is a major drawback as most research is done with smaller projects and smaller companies [33]. Software developers are also reluctant to endorse the agile methodologies delivery promises when large and complex project are involved [34]. This provides some basis to the relevance of traditional methods and that we can't discard them altogether or replace it overnight with another method. Even gradual shifts have not been successful which applies there must be a framework that supports both.

Is should also be noted that the role played by traditional methodologies in that it works well needs caution as researchers also indicate that complex projects, which are complex systems, might need adaptive as well as a linear development strategies. Some agility which is adaptive might be required. This we feel, is encouraging, as both traditional and agile methods complement each other and hybrids, as they evolve, might provide an adequate tool [34].

Support for the development and use of hybrid methodologies is gaining momentum and is recommended as new streams of research [11]. Further support is also seen as its being suggested to use a combination of both traditional and agile methodologies in one project and take advantage of the relevant components during the course of the project and eventually customize [16].

As we see the trend for a need of hybrid platforms within the academic circles, professional project management bodies like PMI, are also joining the bandwagon and incorporating agile methodologies like

SCRUM to bridge traditional and iterative approaches (PMBOK© - 5th edition).

But, what was most important is that studies indicate there is a 16% productivity increase in using hybrid methodologies as it also incorporates the benefits of agile principles during the development stages [17].

Having established the fact by researchers that an hybrid approach is the way to go, a framework would expound and put things in a better perspective as all methodologies, during the infant stage', relied on some basic framework before it was built, accepted and used as a 'workable' tool.

But we have to consider that just constructing and viewing project success and failure frameworks on its own would not be a solution to guarantee successful implementation of projects [25]. Hybrid frameworks could be developed and linked to the values and principles and the association would be through the current success and failure elements, which we addressed in research questions 2 and 5.

Interestingly, we see that a narrow view has been used to develop frameworks for traditional methodologies (using activities, techniques and tools). Border approaches, which support our hybrid framework, should be used to incorporate additional elements like best practices, values and common technology, organisational characteristics and importantly project criticality, team size, experience and number and location of stakeholders [16]. Our research question 2 identified many of these elements that have been the derivatives of success and failure causes.

Inputs to a framework for a hybrid methodology would stem from the outputs of research question 5 which discussed mapping the various elements into the traditional and agile methodologies and its manifesto. This would form the boundaries that formulate the hybrid version. An overview and flow on the development of the proposed hybrid methodology is provided in figure 08.

8. SUMMARY OF OUTCOMES AND RESEARCH ELEMENTS FROM THE ANALYSIS AND FINDINGS

As the discussion on the research questions and the analysis covers a wide area of motivation factors and objectives a summary is provided to consolidate the various analysis, findings and the outcomes that could be used as further research.

The new areas proposed for research should be looked as new pilot studies where hypothesis are formulated and tested through empirical research.

9. CONTRIBUTION AND LIMITATIONS

Like all new contributions in any field of study, improvements will be identified and new areas for research will be the focus. Some might go further to complete the initial aims and objectives identified at the start of the study while others might additionally also branch to new concepts and theories. This current research has done both and in the six areas it has contributed. These are detailed below.

First. an overall trend analysis over the last 18 years based on Standish report on IT project success and failure rates and the usage of agile methodologies over the last decade. Definitions of project success has been varies due to different perceptions by project stakeholders.

Second, a review of the recent articles published from 2010-2014 has provided a trend and the cause of project success and failures. A compilation of an exhaustive list of the success and failures causes has been provided from the analysis These were grouped in various broad categories to facilitate a root analysis perspective.

Third, a theoretical and conceptual framework used for the study.

Forth, a hierarchical structure (AHP) of project elements presented as categories, factors, variables, attributes and indicators to support a root cause analysis (RCA) of success and failure causes to improve our understanding on the successful adoption, use and implementation of Agile in software projects.

Fifth, a new set of success and failure causes with an appreciation of the barriers and obstacles and its proposed link to the agile values and principles.

Sixth, the suggested tools (AHP and RCA) that can be used to develop a new agile methodology or a hybrid version.

Seventh, a proposed framework has been developed from the gaps that have been seen as new research areas from the analysis and findings of the 6 research questions. The new research problem areas will be formulated as a set of hypotheses to be investigated and tested. Agile characteristics has not assisted software development methodologies to reach a dynamic set of critical success causes that can be used to fit a broad range of projects (simple to complex) for successful deliveries. Thus these views lead back to the questions on the definition of success, the need for critical failure causes and the development of an adaptive and dynamic methodology which was the original basis and roots of our research.

The Hypothesises that would need to be tested would be as follows:-

H1: *A standardise definition of project success is still elusive.*

H2: *Hierarchical representation of elements used to identify project success and failure causes is a structure that works.*

H3: *Identifying and developing new project failures causes add more value than refining existing failure causes.*

H4: *Hierarchical analytic methods and root cause analyses assist in prioritising success and failure causes.*

H5: *Mapping agile values and principles to success and failure causes would strengthen the agile manifesto and meet its original intent and promise.*

H6: *Hybrid versions which combine both traditional and agile project management methodologies is the new dynamic and adaptive solution that promises the use, acceptance and successful delivery of software projects.*

As we discuss the contributions above, we have some limitations within the research analysis and findings that was done. Our findings were based on academic research materials where in most cases the data compiled and analysed were from industry sources and case studies. The samples selected could be based on a few

companies and might not be a true representation of the overall current industry trends where bias could exist. Other areas include the spectrum of projects that are used in the studies by researchers. Little categorisation was provided on the complexities of the projects being discussed, but as our concern was that most software developers were also cautious in using agile methodologies for very complex software projects we felt this might reduce the extent of the inaccurate conclusions.

Whilst other researches are aware of project complexities highlight limitations on the discrepancies in their findings from their studies with respect to large scale IT/IS projects, they also recommend that a different perspective is required in the way managerial approach viewed is and a different set of tools and techniques are needed [29].

But, on a hindsight, it is intended for these limitations to be viewed as difficult areas that will be faced in any area of study and not major setbacks that would prevent or cause blaring inaccuracies in the outcomes of the new propose research areas.

10.   CONCLUSION

The discipline, uptake and use of Agile Methodologies in the software industry have been slow and unconvincing as a robust tool. The research community also indicates that, since the use of Agile methodologies was first introduced more than 13 years ago (the Agile manifesto – 2001), issues and perceptions have been many suggesting a keen interest that a detailed investigation is needed. Studies too have revolved around the success and failure causes to assist in further reducing the overall high software projects failure rate. Stakeholder's perception, a major area that had contributed to the slow usage and failure rate, needs to be fully understood and evaluated as they hold the key to the outcome of successful deliveries.

But just identifying new causes of project failures and not working on the frameworks that we used to develop current methodologies addresses only part the problem. We need new frameworks and methodologies but they should be hybrid versions that are dynamic and adaptive (the true meaning to agility) to fit into the agile arena while incorporating the views expounded in the principles and values in the agile manifesto.

We have tried to reach our goals by providing 6 research questions that addresses the root cause of the research problem, we think, in a linear fashion, i.e., one research question is connected to the next research question and so on until we reach the last research question. Defining and describing software project success too has been a difficult and daunting task as we have 22 different definitions for it. We have found stakeholders to be the root cause of this and our ranking places them at the highest priority is terms of new failure causes.

Perceptions on the benefits of the processes, products and management of the Agile approach have been surveyed which have indicated the concepts and hence its strengths are still relatively unclear and more work needs to be done in the design of a new framework. These problems, compounded with the obstacles, perceived or not, will need to be investigated as this could very well be where all the 'roots' of the limitation of agile methodologies reside.

In the area of contributions from this study, we have provided seven and these are mostly from a systemetic review of current literature. This method provides clear and detailed outcomes of research which have also been said to be detailed. Students pursuing PhDs are encouraged to adopt this research methodology although it can be time consuming, usually about 9 months to provide good results.

The new areas of research in this study relate closely to dynamic and adaptive agile approaches and this will be the research proposal that will be used by the author to pursue his PhD.

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Table 01: Traditional Success And Failure Constituents Ranked Bv Discussions In Number Of Articles (2010-2014)

Traditional Success Constituents	No. of Articles
Methodology approach	7
Communication/Commitment at all levels (Senior to Junior management)	5
Case by case context	4
Leadership	4
Team Performance/Highly Skilled	3
Time management	3
Macro-manage policy	3
Bridging processes	2
KPIs	2
Strategic policies meets operational issues	2
Appraisal systems	2

Traditional Failure Constituents	No. of Articles
Stakeholders	7
Perceptions	7
Methodology	5
Tasks	5
Environment	4
Senior management acceptance	4
Poor Communication with senior management	4
People/Teams	3
Definition of Failure	2
Practices	2

Table 02: Steps Used In Developing The Theoretical And Conceptual Framework.

Steps	Activities	Objective	Output/Result
1.	Preliminary review was done on the recent literature base on agile methodologies.	To see a relationship between the topics, issues and basic themes for theories into the study.	Lots of research appeared to be on the use and acceptance of agile methodologies and its perceptions.
2.	Selected a topic for the study.	To investigate the relationship between Agile Methodologies and Successful Software Project deliveries.	Identified a major topic of interest: Failure of software projects has not reduced although agile methodologies were used.

3.	Reviewed relevant literature with depth which closely related to the topic.	To find 'roots' to the problem from different perspectives by various researchers on the topic and its relationship.	Main aspects/themes related to the 'roots' of topic with the literature review were identified as follows:-
			− Agile Methodologies
			  • Theories, Values and Principles, Standards and Practices, Trends, Hybrid Models, Organisation Concepts, Executive Management Style, Project Teams
			− Successful software Project Deliveries
			  • Definition of success, Stakeholders perceptions and views, Success and failure Factors
			− The relationship
			  • Organisation and Management Culture, Understanding - agreements and disagreements, Perceptions,

4.	Main aspects/themes related to the 'roots' of topic were used.	To look at the aspects/themes of enquiry into the relationship to identify motivation factors, objectives and research questions as to why the research is important to be done.	A set of motivation factors, objectives and research questions were developed and backbone of the relationship and the research was established.
5.	The set of research questions were mapped to the set objectives. The literature base was increased with more in-depth review of researchers on	To investigate further into the relationship by analysing the research questions and documenting the findings to narrow the gap and reduce software project failures.	The theoretical and conceptual framework was completed. Contributory achievements were documented with limitations to be highlighted. New research and studies to be recommended

Table 03: Mapping Research Questions With Objectives And Motivation Factors.

Research Objectives.	Research Questions addressed by Research Objectives and Motivation Factors	Motivation Factors
RO1. demarcate and set boundaries to the definitions of project success and perceptions within the context of different stakeholders to see if it applies in the agile environment	RQ1. Have the problematic definitions of software project failures affected agility as the perceptions of success have not been uniformly viewed and interpreted by different stakeholders?	MF1,MF2,MF3
RO2. assess the categorisation of established critical success and failure causes which have claimed to have worked within the context of agile values and principles	RQ2. Are current identified success and failure causes grouped into typical broad areas of categorisation and standardisation and do they work within a set of ranked priorities (AHP)?	MF1,MF6(a,b,c), MF7,MF8,MF9
RO3. based on the limitations discussed in the current research literature with regard to failure factors (obstacles), identify opportunities that exist to pursue the development of new success factors (catalysts) for agile adoption and implementation	RQ3. What potential failure causes identified from previous studies still exist that need to be transformed to success causes within the spectrum of agile methodologies to make it more development and implementation centric?	MF1, MF6(b,c)
RO4. set priorities for a hierarchical representation of critical success factors with the use of accepted ranking method(s), e.g. the AHP method	RQ4. What are the commonly identified success and causes failures within the pool of agile methodologies and are there any similarities when compared to traditional methodologies?	MF1,MF5, MF6(b)
RO5. encompass these success and failure factors strategically into agile values and principles to further support its applicability, adaptability and validity	RQ5. What traditional and agile processes currently support the mapping of the agile manifesto with its values and principles to embrace current success and failure causes?	MF1,MF6(c),MF7
RO6. propose a framework to assist in the transformation and development of a dynamic and adaptive agile hybrid methodology.	RQ6. How do we use the mapping to propose a framework to develop a dynamic and adaptive hybrid version of an agile methodology?	MF1, MF8, MF9

Table 04: Articles Reviewed, Unsuitable And Used

Year	Systematic Literature Review	General Project Management - Overview	Software Project Management – both non- Agile and Agile	Software Project Management – Agile only	Total
2014	4	4	6	4	18
2013	5	5	2	24	36
2012	-	1	1	12	14
2011	1	-	-	6	7
2010	-	4	-	3	7
Total Reviewed	10	14	9	49	82
Total Unsuitable	6	8	1	28	43
Total Used	4	6	8	21	39

Table 05: Most Cited Researchers And Their Number Of Articles

Author	Total Number of Citations	Total Number of Articles	Most recent article
Tory Dyba, 2011	254	7	Special Section on Best Papers from XP2010
Torgeir Dingsoyr, 2012	187	4	A decade of agile methodologies: Towards explaining agile software development - 2012
Sridhar Nurer, 2012	124	6	A decade of agile methodologies: Towards explaining agile software development – 2012

Table 06: Stakeholders Definition Of Success

	Stakeholder Groups – Definition Of Success				
Authors	Project Manager	Client/User/end-user/core user	Project Team	Sponsor/owner/executive	Provider
Kate Davis, 2014	Budget and Quality met.	Satisfaction (i.e. quality – meeting needs), close cooperation, involvement and communication	Good level of communication and collaboration.	'Maximised efficiency and commitment.	-
Gariella Cserhati et al.,2013	Very satisfied with 'iron triangle'-scope, time cost.	Complete satisfaction attained	Job satisfaction attained	Communication and co-operation was good, Satisfaction attained	-
Magne Jorgensen, 2014	All skills were available and well used.	Collaboration, Geographical distance well managed-collocated.	All skills well applied	-	Good skills, Collaboration and geographical distance made closer - collocated
Meghann L. Drury-Grogan, 2014	'Golden triangle' met – scope, time and cost, Benefits met	Satisfaction met	Personal development and professional training met. Team satisfaction met	Benefits met	-

Analysis	**Definition of success varies as different causes have been used by the same stakeholder group.**

Table 07: Mapping The Agile Manifesto To Traditional And Agile Processes

Traditional methodology processes related to Agile manifesto principles	Agile methodology processes related to Agile manifesto principles.	Agile manifesto principles
Integration, scope, time, cost and communication	Interactive and changing characteristics of projects	AP1, AP2 and AP3
Stakeholders, resources and procurement.	Team members availability, motivation, trust, collocation and self-organising teams	AP4, AP5, AP6 and AP11
Cost, quality and communication.	Measures of progress	AP7
Resource and Cost	Pace of work	AP8
Quality	Excellence and design.	AP9
Scope	Scope simplification	AP10
Quality	Constant assessment and improvement.	AP12

Table 08: Mapping Research Questions With Objectives And Motivation Factors.

| Research Questions	Results of Analysis of the Literature	Outcomes and new proposed research areas
RQ1. Have the problematic definitions of software project failures affected agility as the perceptions of success have not been uniformly viewed and interpreted by different stakeholders?	The definition of success amongst stakeholders is that being satisfied appears to be a universal derivative of success and to be satisfied could involve a multitude of perceptive inclinations. The idea of mental models [14] with teams brings in an important perspective. Teamwork does not automatically arise and to use this as a decisive input to success could relate back to the original work done on the principles of the agile manifesto where research on the relevance of teamwork to agility was not explored [22].	A study of mental models with a link to the agile manifesto as an important new perspective to be used to streamline the decisive input to formulate a uniform definition of success.
RQ2. Are current identified success and failure causes grouped into typical broad areas of categorisation and standardisation and do they work a set of ranked priorities (AHP)?	Major success factors are leadership, perception, methodologies, KPIs, strategic policies, effective communication and leadership with the most important being stakeholder management. The evidence also suggests that we should try to develop new critical success factors or try to model the success of agile projects with different methods, (e.g. the Analytical Hierarchy Process – AHP) and provide a ranking perspective in terms of importance and criticality by associating weights to these factors. Establishing a clear set of critical success causes using the AHP method would require a standard use of the terms in identifying and developing the critical factors with an established hierarchical structure.	To use categories, factors, variables, attributes and performance indictors in a hierarchical structure as key distinguishing terms or elements to arrive at the success and failure causes to facilitate the effort. This should be used for traditional and agile methods. AHP and RCA should be used to determine the ranking.
RQ3. What potential failure causes identified from previous studies still exist that need to be transformed to success causes within the spectrum of agile methodologies to make it more development and implementation centric?	Studies suggest that failure causes related to customer collaboration, business core values and development principles need further exploration and research while integrating the advance knowledge on themes beyond what we already know [11]. Other studies indicate that the nature of agile teams (small teams and its self-organising nature - a feature of the first of the agile values in the manifesto) to function effectively encounter barriers as changes to corporate policies and procedures are not accepted easily [28].	Focus should be in identifying new failure causes and not in improving causes already researched. Barriers with corporate cultures on the acceptance and use of agile would be another crucial area.
RQ4. What are the most commonly identified success and failure causes failures within the pool of agile methodologies and are there any similarities when compared to traditional methodologies?	The importance of agile methodologies is being recognised as the Project Management Institute (PMI) has included the bridging of traditional and iterative approaches. Evidence of stakeholder's satisfaction always seems to be the highest ranked in terms of success and/or failure causes in most studies which is beyond the golden triangle [9]. Iteration pressure [23] is gaining momentum and with agile replacing waterfall, increased adoption levels, reduced inhibiting factors and improved benefit levels the maturation of Agile Software development Processes is seen [12].	New research using the traditional 'golden triangle' concepts to be included with the stakeholder's management process in the hierarchical philosophy for agility. This further supports and reinforces outcomes from research objectives 1, 2 and 3.
RQ5. What traditional and agile processes currently support the mapping of the agile manifesto with its values and principles to embrace current success and failure causes?	The use and direct link of the critical success and failure factors to the 12 principles appears to be relatively non-existent (only 1 research paper in 2014) in recent publications of research articles although they focused on agile methodologies.	New studies and research to be done not just to map the agile values and principles to agile and traditional methodologies, but also to include specific success and failure causes.
RQ6. How do we use the mapping to propose a framework to develop a dynamic and adaptive hybrid version of an agile methodology?	Support for the development and use of hybrid methodologies as new area of research [11]. Further support is also seen to combine both traditional and agile methodologies in one project and take advantage of the relevant components and tailor it [16].	Research on bridging techniques incorporates the traditional and agile methodologies should be done and investigated to develop the agile hybrid framework/methodology.
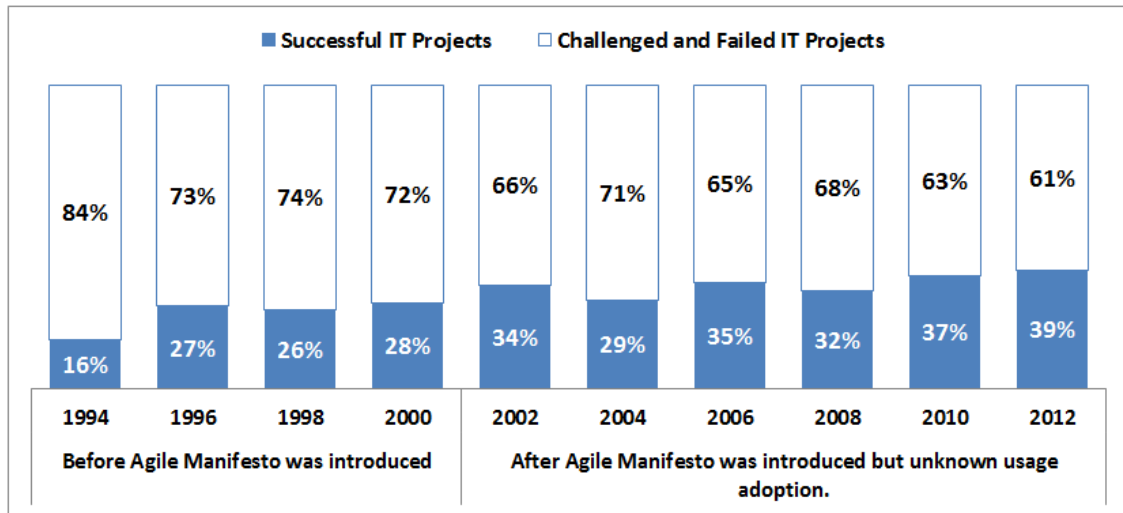
Figure 01: IT Projects Resolution From CHAOS Research: 1994-2012: Source: CHAOS Manifesto 2013.
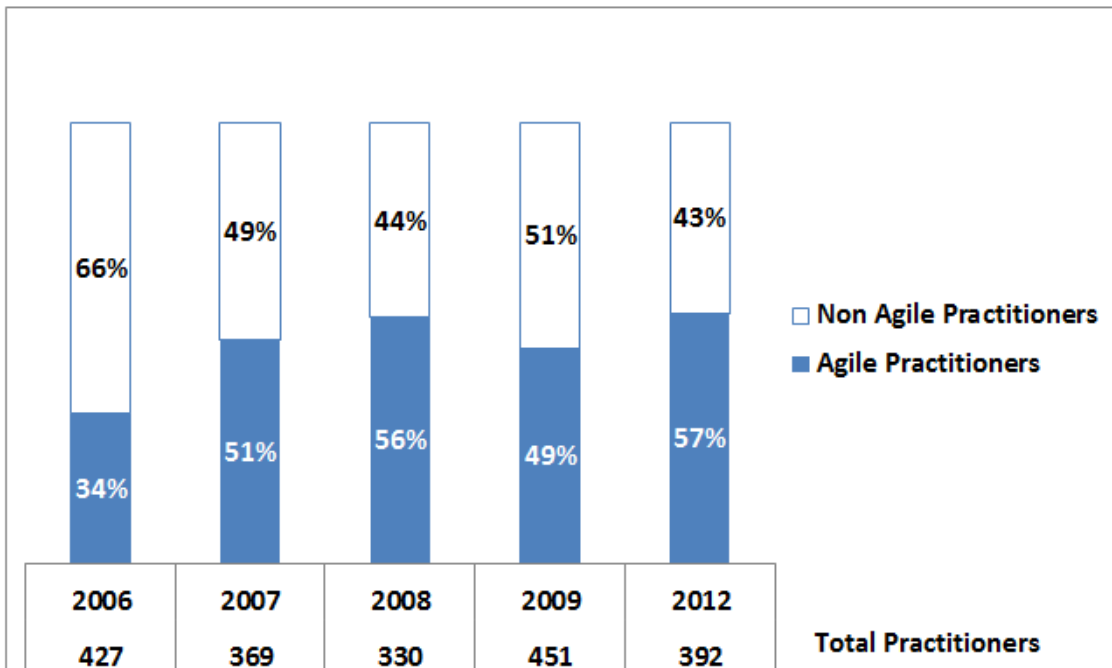

Figure 02: Data Collected Over A 6 Year Period From 1,969 Agile And Non-Agile Practitioners [10].
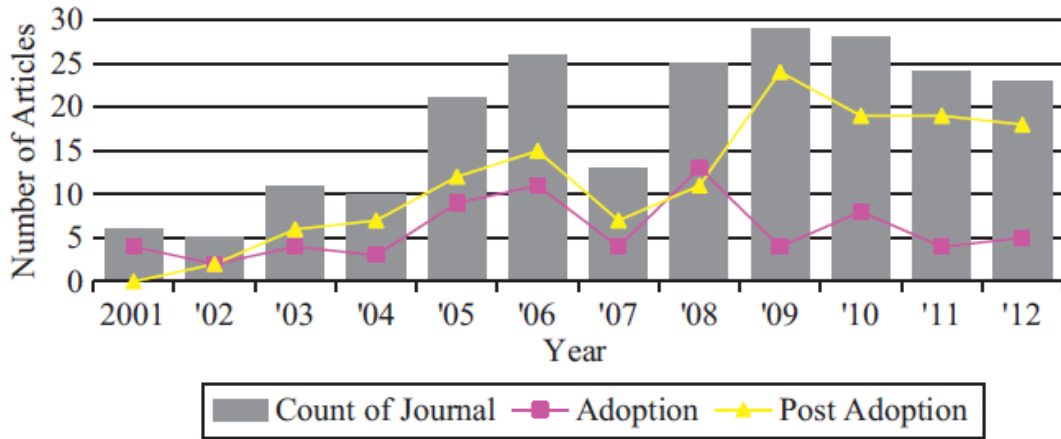
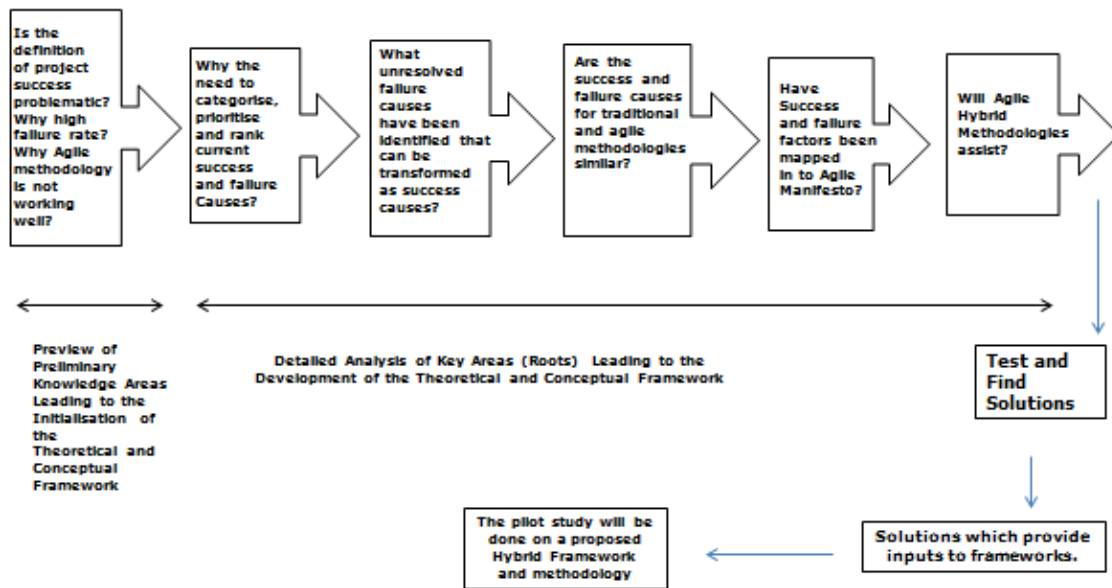*Figure 03: Number Of Articles Before And After The Adoption Agile Principles [11].*

Figure 04: Interest Areas - Selection And Focus Used In Constructing The Theoretical And Conceptual.
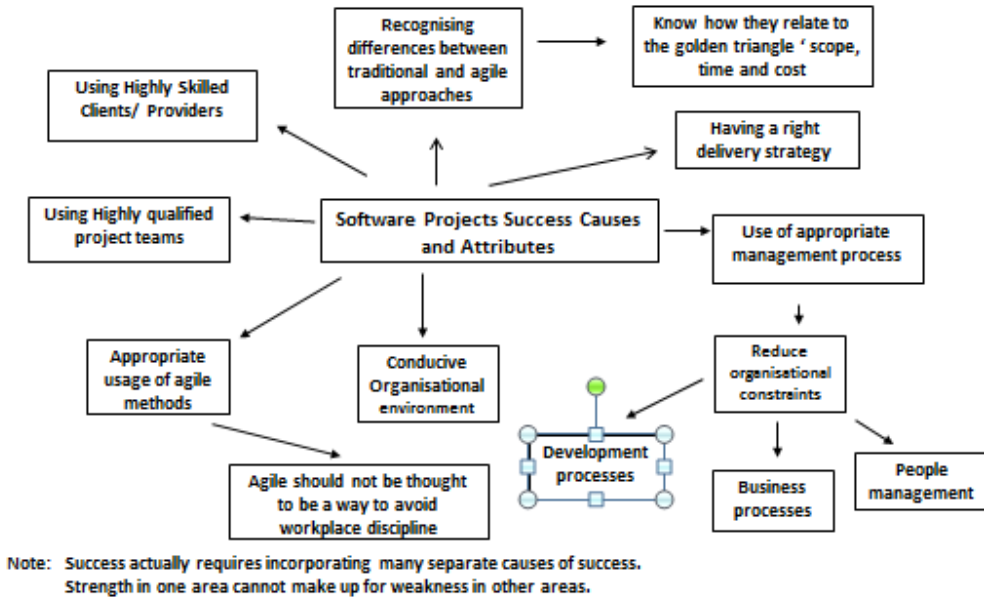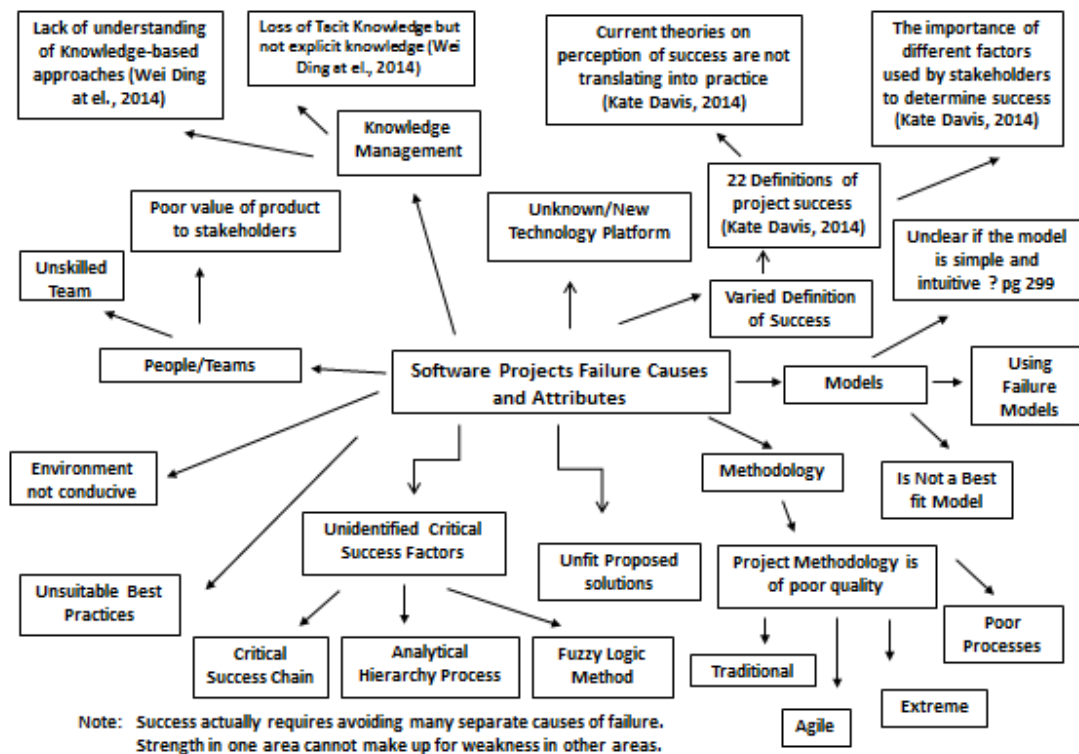
Figure 05: Software Project Success Causes And Attributes

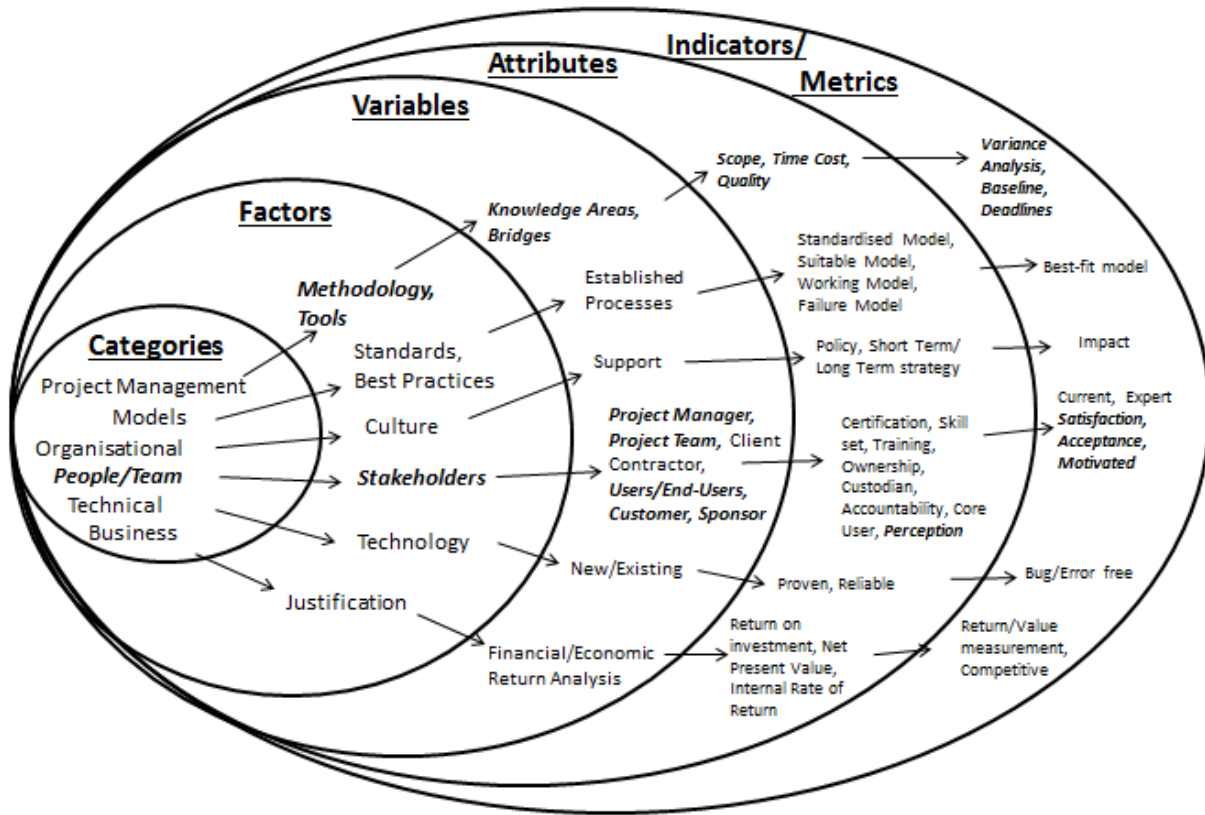*Figure 06: Software Project Failures Causes And Attributes*
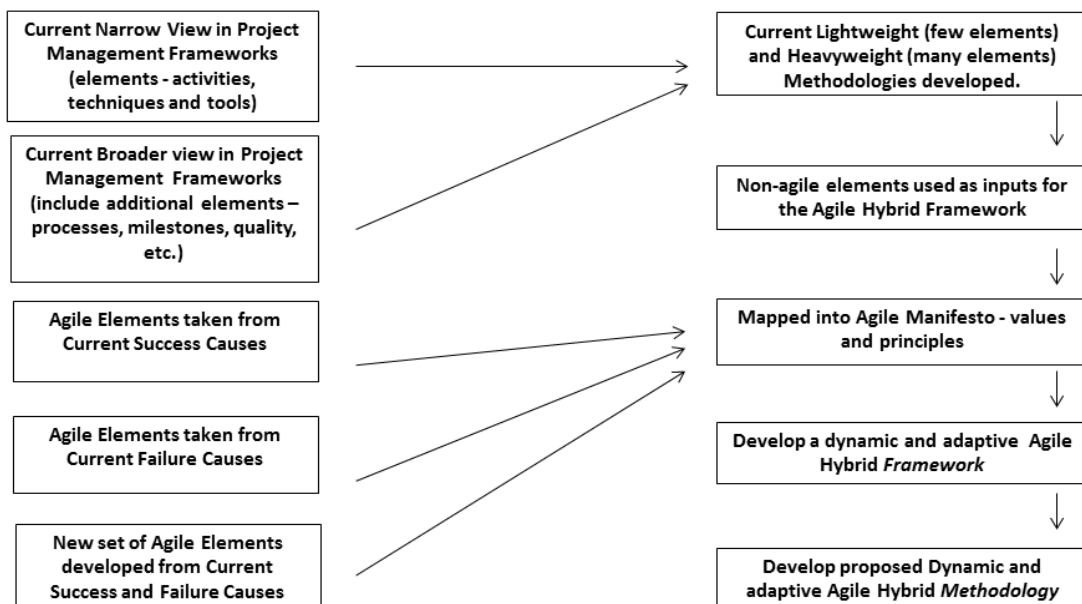
Figure 07: Proposed AHP Of Success And Failure Areas

Figure 08: Proposed Pilot And Full-Blown Study