Emergence Of Agile Software Development Methodologies: A Sri Lankan Software R & D Outlook

W.K.S.D Fernando, D.G.S.M Wijayarathne, J.S.D Fernando, M.P.L Mendis, C.D Manawadu

Abstract: In software development there exists a tension between quality, cost, and time. Delivering cost competitive quality software in Sri Lanka today's time constrained market is a difficult task. Users and producers of software must contend with issues concerning features, those to include and those to exclude. Many traditional software processes are heavy with documentation and rigid control mechanisms making it difficult applying them to different software projects. New families of processes, referred to as Agile processes, are making headway into the Sri Lankan software industry nowadays. These processes focus on code rather than documentation and it consists with individuals and interactions serve an enhanced role in Agile processes. It is a belief among Agile process proponents that people can respond quicker and transfer ideas more rapidly when talking face-to-face than they can when reading or writing documentation. Therefore unlike the traditional processes, they are adaptable, not rigid. Therefore Agile software development methods have caught the attention of software engineers and researchers around Sri Lanka. The research seeks to identify and provide insight into the emergence of Agile methodologies and how software practitioners in Sri Lanka utilizes it key characteristics to succeed in software development projects while dealing with the issues introduced by rapidly changing and unpredictable markets.

Index Terms: Agile processes, emergence of Agile, Sri Lanka, software development methodologies, Sri Lankan software R & D, Software practitioners, Unpredictable markets.

1 INTRODUCTION

Agile-denoting "the quality of being agile; readiness for motion; nimbleness, activity, dexterity in motion"-software development methods are attempting to offer an answer to the eager business community asking for lighter weight along with faster and nimbler software development processes [1]. The additional process steps, roles, and artifacts helped many teams to enjoy higher success rates and more satisfied customers. Unfortunately, many projects in Sri Lanka failed attempting to use the same techniques. Some projects got lost in the documents and never implemented any code, missing the window of opportunity for the software. Others did not leave enough time at the end for implementation and test, and delivered systems inconsistent with the documents and designs on which most of the project time was spent.

- *W.K.S.D Fernando is currently pursuing a Bachelors Degree program at Sri Lanka Institute of Information Technology, Sri Lanka. E-mail: samithdf@gmail.com*
- *D.G.S.M Wijayarathne is currently pursuing a Bachelors Degree program at Sri Lanka Institute of Information Technology, Sri Lanka. E-mail: samwijayarathne@gmail.com*
- *J.S.D Fernando is currently pursuing a Bachelors Degree program at Sri Lanka Institute of Information Technology, Sri Lanka, E-mail: shaminidhanushika@gmail.com*
- *M.P.L. Mendis is currently pursuing a Bachelors Degree program at Sri Lanka Institute of Information Technology, Sri Lanka, E-mail: mplmendis@gmail.com*
- *C.D. Manawadu is currently attached to Zone24x7 (Pvt) Ltd, Sri Lanka. E-mail: dilhanm@zone24x7.com*

At the same time, numerous projects were very successful that did not follow methods with binders of documents, detailed designs, and project plans. Many experienced programmers were having great success without all of these extra steps. The determining factor of project success seemed more and more to be the people on the project, not the technology or the methods that were being used. After all, people end up writing the software at some point. To some, the developers that did not embrace the new methodologies appeared to be undisciplined and indifferent to quality, despite their successes at delivering quality software that people wanted to use [2]. Main goal of any software practitioner in a company or organization is to save time and reduce costs without sacrificing quality of the product. With the emergence of Agile software development method, which is based on iterative and incremental development, where requirements and solutions evolve through collaboration between self-organizing, cross-functional teams. In current Sri Lankan business models, customer has a much finer gain of control over the project making changes based on feedback received from the functional code. Therefore the customers' interaction with the project is high and more often the requirements of the project are changing. So the requirements in the beginning may be vary from the final requirements at the delivering stage. Sri Lankan companies use various approaches to face these strategies and some companies have understood the worth of using Agile development methodologies in their projects. Therefore this research is focused in identifying the emergence of Agile methodologies and how software practitioners in Sri Lanka succeed their software development projects using Agile methodologies. This research paper aims to discuss how is the appearance of Agile methodologies effect the software practitioners in Sri Lankan software industry. The rest of this paper is organized as follows. Section 2 discusses the related works. Section 3 describes the methodology of this paper. Result and discussion is presented in Section 4 and finally Conclusion is presented in Section 5.

2 LITERATURE REVIEW

J. Erickson et al presented that the pace of change in the software development industry remains at a high rate. People continue to push the boundaries of known techniques and practices in an effort to develop software as efficiently and effectively as possible. Extreme Programming and Agile Software Methodologies have arises as an alternative to comprehensive methods created primarily for very large projects [3]. Gylterud's thesis has elaborated on the combination of Software Product-Line Engineering and Agile Software Development. This discussion bestowed some characteristics and a framework for Agile Software Product-Line Engineering, in addition it indicates that the practices of both software engineering approaches could be combined and described a possible combination [4]. Cockburn A. argued that 'would be-agile development' centers around handling late-breaking surprise. That leads to the strategy of building the project from sub projects (incremental development), enriching informal communications between people, and highlighted the tacit rather than the external knowledge base [5]. Deias et al. experiences shows that XP is no surprise either. If the team decreases the necessary programming experience results will be at best marginally better than what one would expect from any other methodology. They found out that the most problematic attribute of the XP methodology is the requirements on the on-site customer and it is not a good idea to "customize" the core practices of XP [6]. Muller et al. presented experiences about XP with Computer Science graduate students. Pair programming is adopted easily and an enjoyable way to code within undergraduates. Their studies emphasized that XP requires coaching until it is fully adopted. And they point out whether more experienced developers are as willing as students to adopt a new process are questionable [7]. Cockburn et al. argued many significant benefits of pair programming such as many mistakes get caught, end defect content is statistically lower, the designs are improved and code length shorter, the team solves problems faster, people enjoy their work more and many other cost and benefits of pair programming [8]. Williams et. al found that Integrating the partitioned tasks of programmers requires this extra intercommunication effort. Pair programming can halve the number of separate tasks to be integrated, and thus they anticipate that large groups consisting of pair-programming teams should be fair much better [9]. Abrahamsson et al. attempted to make sense of emerged agile software development methods. Based on the result of their analysis, practitioners are in a better position to understand the various attributes of each method and make their judgment in a more informed way [10]. Conboy et al. aims to develop a comprehensive framework of software development agility, through a thorough review of agility over many disciplines. Then they presented the framework in a software development context, through a review of software related research over the last 30 years [11]. One important study that demonstrated by Strode D.E. provides a comparative study of the five agile methods: DSDM, XP, Scrum, ASD, and Crystal Methods, and addressed the question 'what is an agile method?' A comparative analytical framework suitable for this purpose is described along with the results of applying the framework to those, and provides an analysis of the properties common to those agile methods, the differences between them, the unique properties, and some understanding of appropriate method combinations [12]. Vyer et al. concludes that agile methodologies are gaining widespread acceptance but there is often a misalignment with organizational culture and values. They described that in some corporations, agile methods need to be adapted to survive. In many others, their time will only come when changes in structure, culture and values have occurred. Within the agile organization, systems created for the web will be a crucial determinant of competitive advantage. This research clearly indicates that agile methods such as XP are highly favored by practitioners involved in developing systems for the web [13]. Taking the argument in a new direction D. Turk et. al presented a list of limitations based on a study of principles and assumptions underlying a subset of the processes that claim to be "agile". Not all assumptions apply to all these processes. Companies that develop long-lasting, large complex systems may not be able to use agile processes in their current form. In general, some aspects of a software development project can benefit from an agile approach while others can benefit from a less-agile or more predictive approach [14].

3 METHODOLOGY

Since the questionnaire is the best method to gather high accuracy real time data by using several simple steps, team has decided to do a questionnaire to gather information. A quantitative approach using a questionnaire is adopted to understand the background and the perception of practitioners in Sri Lanka towards software process and agile methods. Based on the feedback for the surveys conducted, the research team decided to confine this research to find how the appearance of Agile methodologies effect the software practitioners in Sri Lankan software industry. The research team selected Software Architects, Tech Leads, Project Managers, Software Engineers, Quality Assurance Engineers (QA), Business Analysts and other IT related people as participants. In order to collect responses, the team carefully selected participants from 45 Software R & D Organizations in Sri Lanka. From each organization, an individual was contacted and the questionnaire was emailed. Out of the 45 participants whom were sent questionnaires, 33 of them responded, thus making it a response success rate of 73%. The questionnaire had different sections for agile and non-agile users as the questions differed for each group.

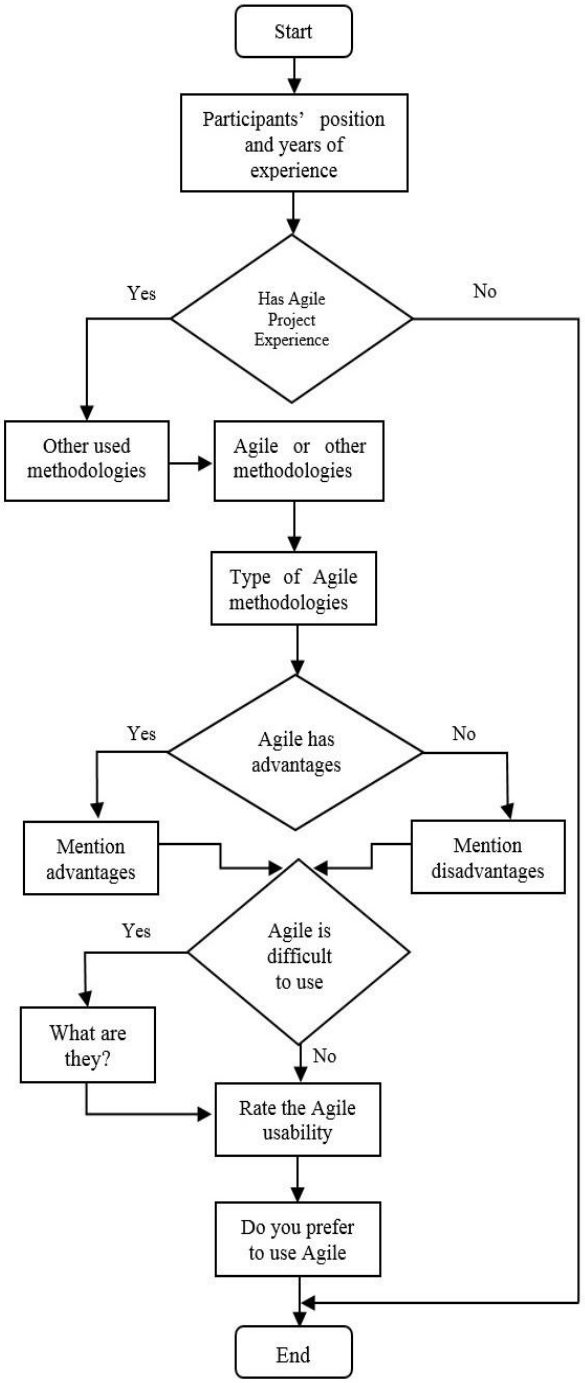

Fig. 1. Flow Chart for the Initial Study

4 Result and Discussion

A questionnaire was sampled with participants whom were dispersed in 33 Software R & D organizations in Sri Lanka. Most of them were currently working in software development projects. Therefore the audience of this questionnaire can be considered as industry experienced group of participants. Among the participants 8 were involved in Software Engineering field which made them a percentage of 24%. 6 participants were in the Quality Assurance field, it represents 18% of total participants, 6 participants were Technical Leads and percentage is 18%. Business analysts, Software Architects and Project Managers represented by 4 participants for each and percentage of the total respondent base was 12%. Apart from the categories defined in the questionnaire a Database Administrator also participated and it represented 3% of the participants.

Fig. 2. Field of Work

Most of the participants have 6-10 years of experience and the percentage is 39%. 27% had two to five years of experience, 18% had less than two years of experience and 15% had more than ten years of experience.

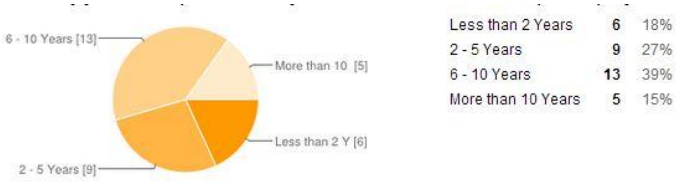

Fig. 3. Years of Experience

From the participants 73% of them have completed at least one project using Agile Methodologies and 27% of them have never used Agile Methodologies.

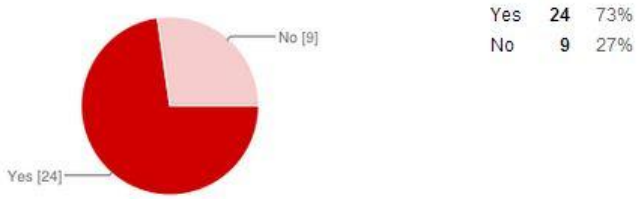

Fig. 4. People Who Used Agile

Following figure represented the other development methodologies which have been used by participants in their software development projects. 9 participants represented Waterfall and Prototyping methodologies which percentages is 31% for each. Both Spiral and Incremental have 4 participants for each and percentages is 14%. Rapid Application Development has used by 3 participants and it represented by 10%.

Fig. 5. Other Software Development Methods Used

Among the participants 58% have used Agile methodologies in their past software development projects and 42% percentage have used other methodologies.

Fig. 6. Most Used Type of Methodology for Last Few Years

Among the Agile methodologies 50% have used Extreme Programming (XP) in their organizations' software projects. Scrum has used by 25% percentage of participants, 21% have used Adaptive Software Development and the rest of the 4% used Crystal.

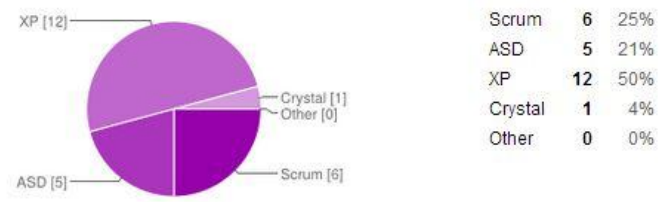

Fig. 7. Industry Used Agile Methodologies

From the participants 79% have identified an advantage of using Agile methodologies in software development projects rather than using other methodologies. And the rest of the other 21% have not identified any advantage of using Agile methodologies.

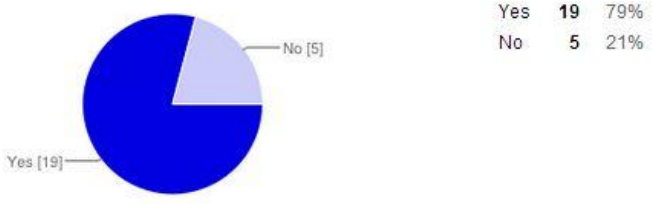

Fig. 8. People Who Sees Advantages of Agile Methodologies

According to the questionnaire participants' responses, Agile methodologies have advantages as follows: releases and defects are tested iteratively, therefore defect density is less than usual. Even late changes in requirements are welcomed by the project team and working software is delivered frequently (During weekly, rather than months). Customers, developers and testers constantly interact with each other and face to face conversion is the best form of communication and team enjoys it. Agile methods allow tracking progress levels easily, therefore project failure risk becomes less and it is increasing the productivity and quality of the project. Therefore by using Agile methodologies projects can achieve high customer satisfaction and it leads to increase the level of quality projects in Sri Lankan Software R & D industry in the future. According to the questionnaire responses from software practitioners in Sri Lanka they have seen lack of emphasizing on necessary designing and documentation, changing requirements frequently, have to find defects frequently until the project ends are as disadvantages of using Agile methodologies. From the participants 58% are facing difficulties while they are using Agile methodologies in software development projects. And the rest of the other 42% have not found any difficulties of using Agile methodologies.

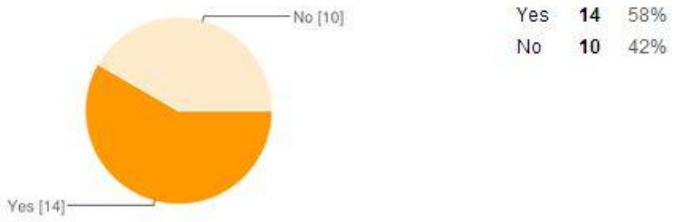

Fig. 9. People Who Sees Difficulties of Agile

Identified difficulties are as follows; in Scrum methodology, difficult to cooperate for daily scrum meetings. Agile methodologies have extended the work load for individual person. For Quality Assurances' testing periodically and preparing test plans are difficult to handle. For the past few years Sri Lankan practitioners needed more time to adjust to Agile projects and needed more training for them. But currently users of Agile methodologies become high. Therefore it is good for the progress of IT industry in future. Among the Agile methodologies 29% have defined usability of Agile methodologies as 'Excellent', 38% have defined it as 'Good', 25% defined as 'Average' and only 8% have mention it as 'Poor'.

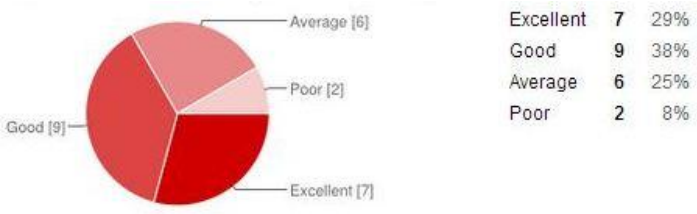

Fig. 10. Evaluation of Agile Methodologies

From software practitioners in Sri Lanka 79% of them have preferred to use Agile methodologies for their future software development projects. And 21% of them have not preferred to use Agile methodologies in the future.

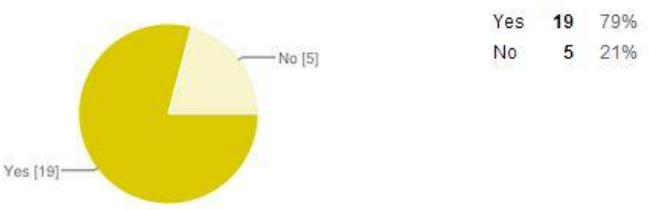

Fig. 11. People Who Prefer to Use Agile

The work has investigated the usage of agile methods in Sri Lanka. Agile can be taken as a widely used methodology in Sri Lanka since 73% of participants are aware of agile methodologies. People who have used Agile methodologies have used other methodologies also with their projects, such as waterfall, Spiral, Incremental, Prototyping, Rapid Application Development. Since they are aware of other software development methodologies they could response to questionnaire with a comparative view with other methodologies and the Agile. The questionnaire results shows that most of the current projects in the Sri Lanka uses Agile methodologies since 58% of responded persons have mostly used Agile with their resent projects. Extreme Programming (XP) can be taken as the most used agile methodology in Sri Lanka and the next most used Agile methodology is Scrum and Adaptive Software Development and Crystal also used in Sri Lanka. It showed that most of these users uses agile with a reasonable understanding of agile methodologies. Sri Lankan Agile users sees advantages of using agile methodologies and most of them not sees any difficulty of using agile methodologies with their projects. Figure 8 and figure 9 shows it clearly. Finally 79% of Software practitioners are recommending Agile to use with their next projects and it shows Sri Lanka is adopting Agile and more towards to go with agile in the feature.

5 Conclusion

The works described in this paper aim to provide understanding about the perception and the current awareness of agile methods in Sri Lanka. The results gain from the survey showed that most of the software practitioners in Sri Lankan IT organizations are moving to Agile methodologies rather than using other software development methodologies. This research was carried out with software practitioners from 33 different IT organizations in Sri Lanka. Therefore the research team found that as a limitation for this research it also affects the accurate results and for a good research project. As a result of this research it shows that Sri Lanka has adopted Agile methodologies in certain areas though some were not still interested in agile methodologies. It shows a good trend of using Agile methodologies and still need to be developed. For the future works the research team will also use interviews to strengthen the results the team has found from the questionnaires. For future works, team will answer part of our research questions. As stated before, the main question: What are the factors that can bring about the adoption or rejection of agile methods in Sri Lanka?

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