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Implementation Issues of Agile Methodologies in Pakistan Software Industry

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Abstract
Agile software development method is considered as an essential for software companies, bringing significant benefits. The implementation of agile software development method enables organizations to adapt the dramatically changing business environment. This paper identifies the issues associated with the agile methodologies implementation. The deductive approach, the qualitative research method and the semi-structured interview are employed to conduct the research on the issues of agile methodologies implementation of selected five case companies in Pakistan. A comparison of five software companies of Pakistan with empirical evidence and existing literature was made to find answers. The research results indicate the reasons for adopting agile software development, the adoption process, and the issues facing during the adoption in software companies in Pakistan. Researchers developed some suggestions for software companies in Pakistan in addressing the implantation issues of agile methodologies.

Keywords: Agile Methodologies, Implementation Issues, Software Companies, Software Projects, Adoption process, Pakistan Software Industry.

INTRODUCTION

According to the annual state of agile survey by VersionOne, one of the largest agile management tool providers, 88% of the respondents said that their companies were implementing agile development methods. The survey was conducted in 2013 with the participation of 3501 individuals from the software development community. Agile development methods, which enable organizations to adapt to the dramatically changing business environment, prove to be the solutions to the limitations of traditional approaches [1]. In recent years, agile software development has been increasingly adopted and continuously used in many organizations in the software industry of Pakistan.

Various practices of agile development have been introduced over the years, for instance Scrum, XP, and Lean software development. Agile approaches aim at the common goal to equip project teams with the ability to quickly address the uncertainty of software requirements, despite different implementation methods.

In Pakistan, the software industry has been growing at a rapid pace and becoming the outsourcing haven of many international companies. In order to adapt to the global trend, Pakistanis enterprises have make great efforts to advance their working systems and strengthen their competitive advantages. As an improvement, agile software development has been adopted with an attempt to achieve better project management and success.

During their collaboration with the Pakistan Agile Forum, the authors had the opportunity to discuss with many developers, whose firms are implementing or planning to employ agile approaches for their projects. Consequently, the authors have strong desire to study the current practices of agile development in different software companies in Pakistan, aiming at providing the general overview of the agile development's adoption in Pakistan. Additionally, an analysis of obstacles occurring during the adoption process will be made with an attempt to provide some suggestions for the successful emergence of agile development in software companies in Pakistan.

Agile Development

Agile Software developments believes in early involvement of the user by early deployment and establishing communication with the user by getting the feedback from the users and stakes holders, and this iterative process continue till the end of development process. According to Agile development framework people are most important than the tools and process. In this way, agile methodologies involve the user in development process very early by providing feedback to the team very early [2, 3].

The analysis of the agile software development based on the review of literature, industry practices, and observation of agile based developments and interview of the experts in the field. Some frameworks put more emphasis on management activities while some believes in support of the typical engineering and software development activities [4, 5]. The study will also provide a comprehensive analysis of the proposed framework for its best practices, implementation and for any limitation.

LITERATURE REVIEW

Different researchers work on the agile methodology in software industry. Turk et al. 2005 [6] described the limitations of agile process and problems that software developers and project managers face in agile processes. Pekka Abrahamsson et al. [7] discussed the plan driven approach contrast to agile one. The researcher paper focused on three aspects: Agile Methodologies, agile

difference from plan driven approach and thirdly similarity/differences of agile approaches.

Agile approach focuses on people, interaction, current running software, customer communication and change rather than process, tool, plans and contracts. Boehm and Turner [8] in their work discussed the traditional developers and managers relating to software development practices. In their research the authors discussed the different barriers to the agile process. Agile Software Development: It's about Feedback and Change' focused on integration of agile methods, in plan driven approach to software developments. Agile methods are at various levels in different organization, there is still need to understand various issues like adoptability, scalability in relation to agile practices [9, 10].

Harish et al. [11] in their paper ' A Sophisticated Study on Best Practices of Agile Software Testing' said that among many software development methodologies evolved in recent years, agile has developed as efficient solution to test in agile framework. Mikko Raatikainen et al. [12] In their paper named as 'Integrating Product Family Modeling With Development Management in Agile Methods ' discussed that Agile methods integration with product family produced high quality software with minor modification and effort. In author's point of view, this combination provided improved planning, monitoring and controlled development. They said that industry is facing many issues. Backlog management and agile methods could solve many of the software product family issues of industry. Spundak Mario [13] In his paper named as 'Mixed agile/traditional project management methodology reality or illusion?' discussed the two existing project management approaches: Traditional and Agile. The author proposed idea that mixing of these two approaches would produce a single project management methodology.

Over the last decades, Pakistanis software industry was said to be underdeveloped, particularly during the 1990s. However, from the 2000s, Pakistan made the very first but promising move into the global ICT [14]. The strong need and demand for IT and software products and services determined the growth of this industry. In other words, it leads to a surge blooming of software industry in Pakistan. The proportion of ICT industry increased steadily from 1% in 1993 to 7% in 2012 of the total GDP of Pakistan.

Case Companies And Agile Software Development

In recent years, the number of Pakistani companies implementing agile software development has been increasing significantly. In this research, the five software companies were chosen for the authors to discover the adoption process and implementation issues of agile methodologies in Pakistan software industry.

Company A (NetSol Technologies)

NetSol Technologies Software House is best one according to ranking in the Pakistani software industry. Mr. Najeeb Ghauri is the CEO and Chairman of the Board of Directors of NetSol Technologies. In the early days in 1998 NetSol was the first IT company in Pakistan to be listed on NASDAQ.

This company in the software industry is specialized in the solution and services of finance, credit, hospital, MIS, custom development. This company has more than 100 branches in the world. The popular offices that have joint adventure are in Adelaide, Bangkok, Beijing, Dubai, Lahore, London, Riyadh, San Francisco, and San Pedro Sula.

Company B (Ovex Technologies Pakistan)

Ovex Technologies has eight Branches, located in the cities of Karachi, Lahore and Islamabad. It is a third party offshore Business Process Outsourcing Software House, based in Pakistan. This company offers a 24/7 global helpdesk with experienced professionals aiding customers in driving sustainable business growth. Their services portfolio includes comprehensive Outsourcing, Infrastructure & Software Solutions. We have been declared "Best BPO/Call Center 2008.

Ovex Tech offers specialized accounting outsourcing services to its clients throughout the globe. Accounting Outsourcing helps large and small businesses to optimize their finance/accounting function and boost profitability. The CEO did much research to seek for an optimal working model, and he found Scrum and the agile methodology.

Company C (TRG Pakistan)

The Resource Group (TRG) Pakistan is a largest company in a country providing Business Process Outsources with 4 locations in Karachi and Lahore. TRG starts operation in Pakistan in 1999 at Lahore with 50 employees now having over 1,200 employees. At TRG Pakistan, there is a state-of-the-art operational platforms for management and training process delivering 24/7/365 services for customers convenience.

Company C employed the waterfall approach for the software development process. However, both approaches had showed weak points so that the leaders would like another optimal process, and Scrum appeared to be the solution. After succeeding in several probable projects, they decided to employ Scrum for the software development process. In addition to the adoption of Scrum, Company C also started to use the Kanban method to serve as their scheduling system.

Company D (System Limited)

Systems Limited provides IT services and BPO solutions. It is a global leader of next generation solutions. The company is providing computing strategies and solutions to Government and Private Organizations. It starts its working in 1977. During its three decades of experience and evolution in IT. Almost it completed above 600 projects in different countries of world including the US, Pakistan, Middle East and Africa.

At the commencing time, company D attempted to adopt to Scrum but they experienced the failure at the adoption process due to the lack of helps and background knowledge. The Kanban method has also been employed in the company's projects. To some degree, the adoption process has been successful in Company D, which has assisted the company to gradually gain great benefits.

Company E (KalSoft Pvt. Ltd.)

KalSoft (Pvt) Ltd. provides solutions to business firms. This company meets the exact requirement of the customers. This all is done by understanding state-of-the-art technology and innovations which based on industry needs/best practices. This company has a vast experience in the financial and the foreign exchange market of the country. The standards and procedure are very reliable as these are certified by ISO 9001 and 2000. KalSoft is being working as golden partner of Microsoft. KalSoft provides solution regarding telecommunications, mobile phones and the internet.

Although the initial plan was to adopt Scrum, Company E was forced to implement the waterfall model because of the inadequate human resources. Nevertheless, the waterfall approach was temporarily used in several small and simple projects within a very short time. Until the competent personnel was sufficiently employed, the Scrum framework was officially adopted in the company.

Summary of case companies

The following table reveals the summary of the case companies with their old development processes as well as the adopted agile method.

Table 1. List of case companies and adopted methods

Company	Old development process	Adopted agile Method	Support application
Company A	Waterfall	Scrum	Redmine
Company B	Waterfall	Scrum	N/A
Company C	CMMI & Waterfall	Kanban & Scrum	N/A
Company D	Waterfall	Kanban	N/A
Company E	Waterfall (very short time)	Scrum	Jira & Redmine

Implementation Issues of Agile Methodologies In Case Companies

After analyzing thoroughly the five case companies, the authors concluded that there were different issues occurring during their implementation/adoption of agile methodologies which are as under:

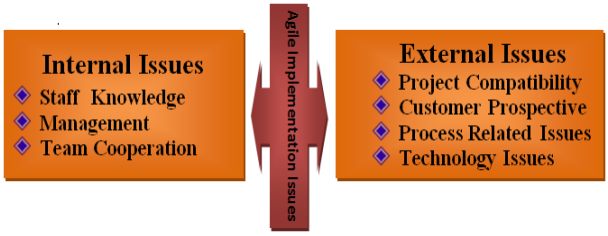

Fig 1. Agile Methodologies Implementation Issues in Pakistan Software companies

Internal Issues

An internal issue is an aspect happening inside the company, which prevents the company from successfully adopting an agile development method. In this study, such issues are the staff knowledge, management and team cooperation.

Staff Knowledge

Organizational culture is the most influencing factor inside a company and is hard to change because it is the values and norms of the company [15]. The agile methodology represents a modern and beneficial method for software development, which has been employed in considerably more companies worldwide. However, in Pakistan, agile software development is still new concept to the developer community. As a negative effect, software companies in Pakistan have faced the obstacles to equip their staff with the idea and the knowledge of agile development.

Management

The key factor in succeeding in the adoption process of an agile method is a good strategy management from the company's managers. In which, the managers are responsible for making the decision and also encouraging the staff to adapt to the new development process. However regardless Company E, the other case companies encountered different problems in the management of their adoption's strategies.

Team Cooperation and Communication Issues

Due to the typical Pakistani personality, the team cooperation seems to be an obstacle to the adoption process of a company. The situation results from the fact that Pakistani employees are keen on working independently rather than in a team. Consequently, the agile adoption process of software companies in Pakistan is facing the problems of team cooperation as well as team communication.

The case companies put great efforts to motivate and encourage their employees to overcome this problem. Also, the company concentrated on providing the staff with the intensive training events and the information sessions. Such events concerned with the enhancement of soft skills, and sharing the knowledge and experience.

External Issues

The external issues detected by the authors in this research concerns with the compatibility of a project with the agile development method and the perspective of customers on the agile methodology.

Project Compatibility

There are various methodologies of software development which can be applied to a software project. The consideration of the compatibility of a project and a development approach is important. From the authors' analysis, it can be concluded that the evaluation of the project compatibility with the agile methodology is an obstacle to be addressed. Therefore, an agile development method with much iteration seems not to be the optimal alternative.

Customer's Perspective

In this study, the agile adoption of the case companies also encountered the difficulties caused by the customers. The case companies' customers were too familiar with the traditional approach so that they hesitated to change. In other words, the customers did not have experience on the new development method so that they were afraid of the project delay. To some degree, the inactive attitude of some customers also contributed partially to the prevention of the movement. In consequence, remaining the old working process would make the customers feel safer. Customers have a vital role in a software project implemented with an agile development method. The customers are required to show a high level of commitment and activeness in order to gain the project success [16].

Process Related Issues

Shifting from the traditional methodology to the agile methodology require critical changes to the process. Because of the differences in the focus, while agile is people-centric, traditional is process-centric; replacing a process that people in the company have been using for so

long is horribly hard. It affects people mindset and their perception on the norm of the process [17]. With traditional methodologies, the aim when solving a problem is to follow standardized processes, activities and measurement. On the opposite, the agile methodology stresses on assessing over measuring, bearing in mind that everything is uncertain, and adaptive changes are highly valued. Change in process model may be one of the biggest challenges in the migration because it alters the work procedure, problem solving strategies, and people roles.

Technology Issues

Tool is an important part of software development. When adopting agile, organizations have to find a tool that support iterative development with version management. An organization which relies heavily on their current technology may find it especially hard to replace it [18, 19, 20]. Also, it is not only the tool but also the people. They have to train their employees to use the new tool effectively.

RESULTS AND DISCUSSION

From the study, the authors develop some suggestions for software companies in Pakistan in addressing the adoption of agile software development and methodologies. These suggestions were concluded from the authors' analysis of the issues to the adoption processes of the case companies. As a result, these suggestions can be valuable to not only the managers but also the staff of the companies. The companies should be aware of the current situation in order to be prepared for the adoption by eliminating the existing barriers. Meanwhile, the Scrum framework is not always the most optimal approach for every project. In this case, the company should analyze the project and software requirements to decide whether Scrum is appropriate. Possibly, the waterfall model sometimes is a good approach in such projects, which contain a clear and certain list of requirements.

CONCLUSION

This paper aims at providing the readers the study of the adoption of the agile software development in the software companies in Pakistan. The study concerns the reasons for the adoption of the agile software development, the adoption process of the software companies in Pakistan, and the implementation issues.

Based on the analysis of the five case companies, the issues to the adoption process of the agile development in Pakistan were adequately identified. Breaking into components, such issues include the internal and external ones. Specifically, the internal issues surround the organizational issues, namely the staff knowledge, the management, and the team cooperation and communication. Meanwhile, the external issues defined in this study are the project compatibility and the customer's perspectives.

Future Work

The research was involved with only five software companies in Pakistan. Thus, the outcomes might not be generalized as the overview of all software companies in the Pakistan software industry. Secondly, the case companies only adopted Scrum and Kanban so that the study was only concerned with the adoption of these methods. The reasons for the adoption of agile development, the adoption process and the implementation issues occurring during the process prove to be relatively similar to and adequately confirm the existing research mentioned in the literature review of this study.

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