# The Influence of Agile Methodology (Scrum) on Software Project Management

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***Abstract*— Software project management has main role in the Software industry. It includes different processes and knowledge areas. The triple constraint of the software project like time, cost and scope is directly dependent on the requirement of the project. Agile methodology is the iterative way for developing the software project for frequent changes, fast delivery and reduce risk. Software project management also plays important role in agile based software project. Agile methodology influence software project management at 10 knowledge areas. In this study we carried out survey from different software companies and it shows that almost every software company uses agile development (Scrum) and has a positive impact on the software project management.**

***Keywords—Agile Methodology, Scrum, Project Knowledge Areas, Software Project Management.***

## I. INTRODUCTION

Now-a-days the rise and fall of the software companies is common. Those who learnt lesson from their previous fails they succeed. Due to advancement in technology new approaches and methods are under development. Software industry also adopt new approaches with the change in technology and techniques. Agile methodology is one of the methods which help in lead to success of any software.

In past many software failed before it reaches to completion stage, it is due to lack of planning and lack of project management techniques and tools. Good project management will always lead to success of software. [1] Software project management includes the knowledge areas, tools and techniques. It consists of ten knowledge areas which has four core and six are supporting. Core knowledge areas are project cost management, project cost management, project scope management and project cost management and supporting knowledge areas are project human resource management, procurement management, project comm. management, stakeholder management, risk management and project integration management which integrates all the knowledge areas it has 5 process like initiating, planning, executing, monitoring and control.[2] If software develops by follow all the specified tools and techniques of PM it will defiantly lead to success.

Agile methodology accommodates the requirement changes in future, and it has such flexibility which can handle cost, scope, quality of software according to customer needs. Scrum is the framework of agile methodology as it focusses on the day to day project management and is most widely adopt agile project management method. we use scrum framework to find out the impact of agile methodology on software project management in Pakistan software industry, as the use of scrum is widely increase day by day and many software projects develop by using scrum. In globally distributed projects there is a growing interest and literature demand that use scrum practices to understand empirical study. [3]

## II. LITERATURE REVIEW

Many organizations use the agile development approach and it increases day by day in past few decades and produce high quality software systems. [3] As the requirement changes and it moves toward volatile behavior so, agile method handle it efficient and effective way to manage those requirements in iterative way. [4] The agile methods highlight more on people, their association with each other, working software, client coalition, and alteration, rather than on methods, tools, contracts and plans. [5] According to the literature review of Anupama Kaushik, what are the main properties of a methodology and what is considered as integral part of project management methodology in a wider or narrower sense? The need for combining project management approaches is shown on the case

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of software development project. [6] . Scrum Software Maintenance Model initiates with the planning process containing version control for maintenance change stalking. After planning, special attention is made to pattern the type of maintenance request. Remedial maintenance is considered as priority and employed started on it by creating new code branch.[7]

### *A. SCRUM*

Scrum is a framework of agile methodology which provide the flexibility to control and manage the requirements as well as the development of software. It is iterative and incremental base model which build software with define mechanism like a module of software can develop in small chunks in iterative way. Scrum was designed to increase the produce-ability of development process, align individual and organizations dictums, define a culture focusing on recital, support shareholder value construction, to have good message of performance at all levels, and improve distinct development and class of life. [8] Scrum is such a flexible model which can be apply to any project of any kind of industry. It can be useful for small projects as well as for larges project.


Figure1 (Scrum Model)

Scrum processes involve scrum Master, scrum team and product owner. It also contains sprints, it is a smallest block in which a team can assign task, it will be done in 3 to 4 weeks. The task for sprint is decided by sprint backlog, it contains all the requirement for current sprint, and which could change during development. Product backlog is considered as bulk of requirement and is by assessed product owner. It is broken up into sprint and followed by sprint planning structure which includes different methods to get a sprint completed on time. The aim of each sprint is to deliver a potentially organized and error free product. [9] Scrum meeting can usually last for 15 minutes it involves a scrum master who is the chair of the team and focus on answering three questions of "what did you in previous meet up? What obstacles are you facing? And what is in your To Do list by next meeting?" [10].

Software delivered in increments which includes the functionalities which customer wants in every increment customer may change the requirements in every iteration. It's very easy to handle the change requirements by using scrum model. Scrum is a used for managing of development process by applying concepts of adaptableness, proficiency and litheness from organizational process control hypothesis. Scrum concentrates on team work and product quality in versatile environment. [11][12][13]


Figure2 (Scrum Methodology)

## III. RESEARCH METHODOLOGY

We identified the problem domain by literature review of the related work as the power of Agile (scrum) on the SPM. A survey-based research methodology is carried on the bases of literature review. It contains several high-quality queries as well as open ended interrogations. This questionnaire was circulated to more than 30 Software houses in Pakistan. We have cover two important aspects in our questionnaire,

- Impact of Agile (scrum) on Software Project Management.
- Knowledge areas of Software Project Management.

Figure3 shows the steps of research methodology which we followed for finding the domain issue.

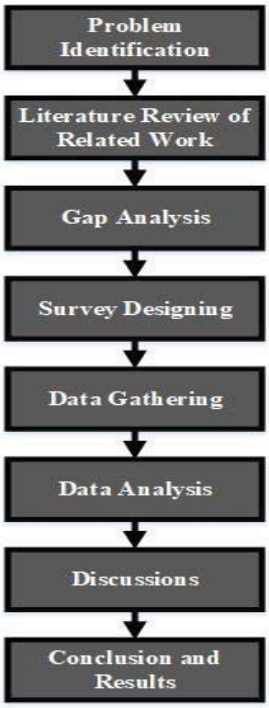


Figure3 (Research Methodology)

## IV. Survey Result & Evaluation

### A. Organizational Survey

An industrial survey was carried out between different Software companies which are at different level of CMMI, had delivered number of projects cum products timely and efficiently, and currently working on most of local and international projects. We got feedback from more than 21 companies, most of them are using scrum as software development and managing them, while other are also using Dynamic Software Development Methodologies, here a point to be noted is we conducted online survey with the help of google forms, that is paper less and an easy way to increase survey responses rather than to visit companies physically and request them to give answer of our questions. Most of the participants who filled and gave kind responses, include Software engineers from beginner to experienced level, some project managers also filled online form, besides all those persons, CEOs and Human Resource managers which are associated with software firms also helped us to give feedback. Following figure4 is the detailed results about each Project Management areas which gave us the idea to write about influence of Agile and Specially scrum while Project Management.

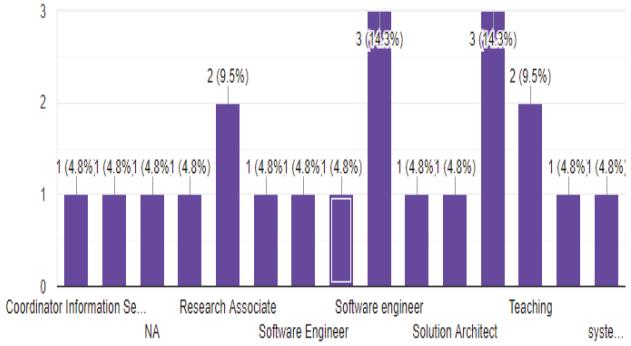


Figure4 (Influence of Scrum in project areas)

### B. Project Scope Management

Defining project scope and managing it, is a very difficult task and most important area to handle, there is always a change in requirement, and changing requirement also changes scope of project some of the time. Once project is acquired, there is a signed agreement between client and a software firm, so both have to fulfill and respect each other, changes are normal in any project from start to end, these cannot be denied or refused, surveys tell us that scrum provide easy way to handle and manage these changes, Requirement team first analyze and defines scope, solution architect then defines the importance and urgency of these requirements are then implemented by development team as instructed by team lead, this is the flow of one sprint and if any change occurs we can easily implement it by approving it from CCB (Change Control Board). From the above explained description we can say that scrum had a great influence on project Scope Management. In figure5 surveys results stating the influence of scrum in project scope management is shown.

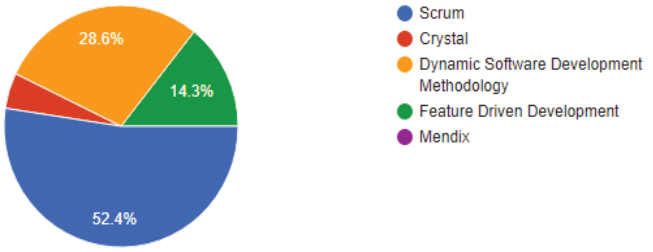


Figure5 (Influence of Scrum in Project Scope Management)

### C. Project Time & Cost Management

Managing time and cost in any project is another big task after scope, and as we know that managing cost has a poor record on most of the IT projects, it is very difficult to handle both at same time, and projects may have over scheduled or over budgeted. Scrum handles this issue very grace fully, surveys tell that by using scrum methodologies one can easily manage time and cost because work is divided into chunks and sprints are defined, developer develop their chunks in time and within budget. This makes the progress and productivity of organizations remarkably high and cost effective. In the following figure 6 effect on cost while using scrum is identified via survey result.

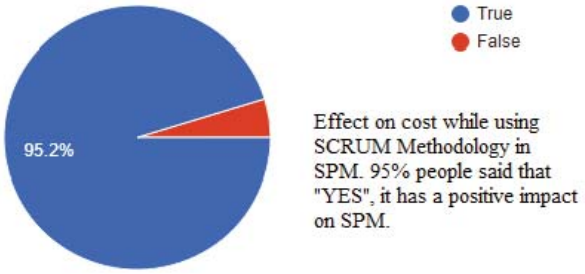


Figure6 (Cost effect while using Scrum)

Following figure7 shows strategy how time and cost is well managed if we use scrum methodology in Software Project Management.

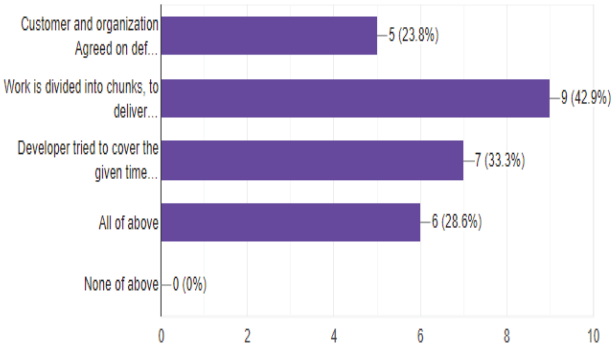


Figure7 (Use of scrum in software project activities)

Following figure8 shows stats of influence of Scrum on project cost and time management.

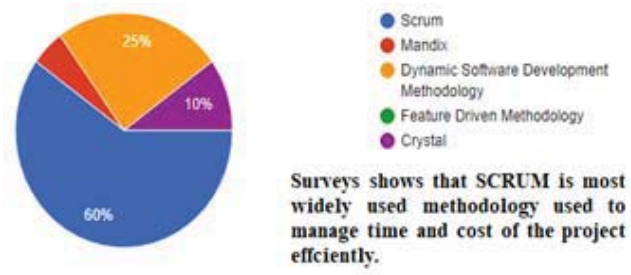


Figure8 (Influence of Scrum on Project Cost & Time Management)

*D. Project Quality Management*

Quality is defined as project must delivered in time, in cost and must cover full scope, behave as it was intended to do so, when a project or product have all the described features, we can say that it is a Quality product. Following graph shows that impact of quality on SPM has a strong impact, if we want to deliver quality product. Following figure 9 shows that impact of quality on SPM has a strong impact, if we want to deliver quality product.

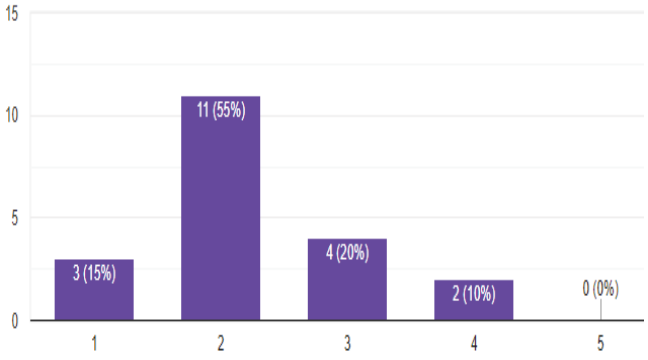


Figure9 (Research Methodology)

As agile methodologies are very much concerned about producing quality products, they provide best ways that can be followed, and a quality product is achieved. All agile methods are good at quality concerns but according to survey SCURM provides best methods for saving time and providing quality, its focus is on "Easy to use" and "conformances to requirements". Quality standards are defined by the scrum masters in any software fields and it is the responsibility of the scrum master to make sure that under developed project or product is easy to use, delivered in time and fulfill the scope of the project.

*E. Project Risk Management*

Risk has many forms, there can be people risk, process risk or product risk, and once project is acquired, we should keep all those risk in our mind, companies that fully follows agile methodologies cannot face as much amount of risk, which are not using any methodologies.

By carefully applying and identifying and analyzing risk, we can develop risk free product. But if we have look on result of surveys, they say that whatever we do and focus on all knowledge areas to cover risk, there must be some chance of risk in the project at any stage from start to end, but by using scrum this risk coming from any side of the project is managed properly.

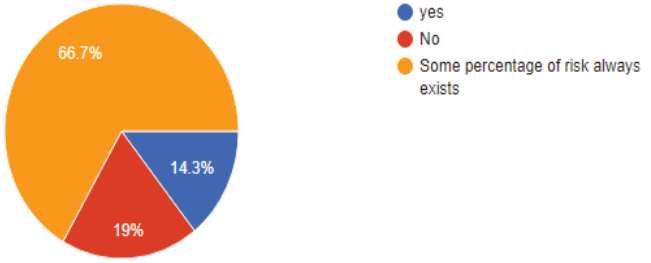


Figure10 (Influence of Scrum in Project Risk Management)

*F. Project Human Resource Management*

People are the assists of any organization, project mostly depends upon the expertise and domain knowledge of the people/employees. This is the reason, why agile methodologies emphasis on team management and team building, having a big team does not mean that product or result is client satisfactory or not. The result of surveys tells two different theories, some organization's does not had focus on a good team but most of them says that by SRUM, we hire only those people which are goal oriented, self-motivated and willing to work in team. SRUM also focus on mutual collaboration between team and the way they work together. As tasks is being divided in the team, so SRUM methodologies says that team members must help each other after completion of individual task, therefore HR management had a great influence in project management when organization use SRUM as their project management technique.

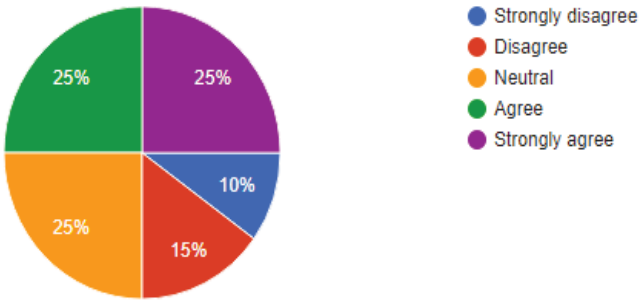


Figure11 (Influence of scrum in Project HR Management)

## V. Conclusion

It is concluded that scrum has the positive impact on the knowledge areas of software project management. Scrum has positive influence on the time, cost, scope, Quality, Risk and scope of the project. Some organization focus on the goal-oriented hiring of employees and some are not, so it has a great impact of scrum on H.R management as well. Survey shows that scrum reduces risk, control the cost, and developed quality product helps in timely completion of the project.

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