The Impact of Agile Methodology (DSDM) on Software Project Management

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ABSTRACT
Software project management leads to success and failure of software project. Software project management include planning, managing and controlling different knowledge areas such as scope, time, cost, quality, risk, human resource, stakeholders, and procurement management. The key issue of software project management is to manage scope, time and cost for a project. Requirement of user changes throughout life of project, and those effect time and cost of project and other knowledge areas as well.

Agile methodology is framework for software development with reduced risk. Agile is iterative software development methodology that focuses on frequent and faster delivery, and entertain customer changes. There is positive impact on development cost, time and productivity by switching from traditional waterfall model to agile model.

This paper examines that how agile methodology affect different aspect of software project management. Our literature review proposes that agile methodology helps in software project management that leads to the success of software.

Keywords
Agile methodology, Cost, DSDM, Knowledge area, Software Project management, Scope and quality, Time

1. INTRODUCTION
Software project management includes the knowledge, techniques, and tools needed to manage the software products development. [3] It encompasses 10 knowledge areas. 4 are core knowledge areas such as project scope management, project time management, project cost management and project quality management. 5 are supporting knowledge areas through which project objectives are achieved, such as human resources, communication, risk, and procurement management, stakeholder management group. Project integration management affects all of knowledge areas. There are 5 process group involved in project management. Each knowledge area has some activities in process Good project management lead to success of software.

As customer requirement are changes with the time being. Classical waterfall model doesn’t accommodate changes and freeze requirement. To cope with the requirement changes many new models are proposed, one is agile methodology which is mostly used in organization. Agile methodology is software development methodology that focus on iterative development, entertain changes and reduce risk. Dynamic software development model (DSDM) is agile framework that focuses on frequent delivery and user involvement.

The challenge of project management is to increase customer satisfaction and make software successful. In DSDM changes are never push aside, but scope, time, cost, quality is not compromised. DSDM may have positive or negative impact on project management. In this paper, we conducted a survey to find that how DSDM affect software project management. In survey, several questions are asked related to regarding impact of DSDM on each knowledge area of project management.

2. LITERATURE REVIEW
Agile development has been gaining interest of many organization in past few decades and widely used in software engineering. Due to the lightweight practices of agile, it is the focused approach in many industries. [6] Nowadays, requirements are going toward volatile behavior. Agile processes aim to handle and effectively managed those requirements iteratively. [4] All agile methodologies are working in different ways but follow the principles and values i.e. customer’s satisfaction, iterative development defined in the Agile Manifesto. [5]

2.1 Characteristics of Agile Software Development
- Modular development
- Repeatable by short period
- Incremental process
- Manage changing requirement
- Adaptive in risk situation and reduce its impact on project

2.2 Agile Methods
Many of the practices that are introduced and promoted by agile development. Agile methodologies combine various customer, management, software engineering practices and principles together in an effective way that helps software development teams and guide them in such a way that the process of rapidly planning, development, testing and deployment become efficient. Both Old and innovative ideas are encompassing by each agile methodology.

Based on the literature review after 2000, various methodologies in agile categories have been introduced. There are following agile methodologies that commonly used for software project development. [1]
- The Extreme Programming (XP) Approach
- The Scrum Approach
- Crystal
- Dynamic Systems Development Method (DSDM)
• Lean Development
• Feature-Driven Development (FDD)

These above mentioned agile methodologies have a clear relationship with software project management. Literature shows the impact of agile methodologies on different knowledge areas of SPM. Different knowledge areas of Software project management are scope, time, cost, quality, human resources, communication, risk, integration and stakeholder’s management. Review shows that there may be both positive or negative impact of agile on these knowledge areas.

The impact of agile methodologies on scope. For those projects having high levels of change, Agile methodologies tend to be a better solution. Scope creep is a serious issue. The reality is that business requirements become volatile with the passage of time and as a result scope of work changes in response. No one can do nothing to stop the changing requirements, and changing scope. [2] Due to use of agile methodologies, there is big change in project scope management and how effectively these methodologies can handle changes during software development. Same for cost and other knowledge areas of software project management.

2.3 Comparison between traditional development and agile development:
[7]

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<tr>
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<th>Traditional Development</th>
<th>Agile development</th>
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<tr>
<td>Fundamental assumption</td>
<td>Systems are fully specifiable, predictable and development on prescribed planning.</td>
<td>High-quality adaptive software is developed by small teams using the principles of continuous design improvement based on volatile user requirements.</td>
</tr>
<tr>
<td>Management style</td>
<td>Common and Restricted</td>
<td>Leadership and collaboration</td>
</tr>
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<td>Knowledge management</td>
<td>Explicit</td>
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3. DYNAMIC SOFTWARE DEVELOPMENT METHOD

It is an agile software development methodology. It is iterative and incremental approach that focuses on rapid delivery and involve user throughout project. By using DSDM we can develop system dynamically. For both object, oriented approach and functional design approach it can be used. It is best suited for system where requirement or not fixed in advance. We can go back to previous phase of software development life cycle in DSDM. [9] As the work is not iteratively and incrementally so it may possible that some people work on requirement analysis, while some working on development of another at the same time.

Primarily focus on:
• Agile user involvement
• Empowered team for decision process
• Focus on recurrent project delivery
• Iterative development
• Entertain changes

Moreover, there is cooperation of user and developer while project development. Any changes done during development of project are correctable. Testing is conducted throughout project development.

It consists of 7 phases: [8]
• Pre-Project
• Feasibility Study
• Business Study
• Functional Model Iteration
• Design & Build Iteration
• Implementation
• Post-Project

Following Fig. 1 shows the Dynamic Software Development Model (DSDM) development process. [10]
4. RESEARCH METHODOLOGY
We carried out a literature review of work done about impact of agile methodology DSDM on software project management. A brainstorming session was held for research team to discuss the possible reasons that can affect project management. In brainstorming session participants discussed issues could be found in context of Pakistan’s software houses. A questionnaire was developed based on knowledge of literature review and brainstorming session.

We investigated issues of impact of agile on software project management based on following dimensions:

- Agile methodology (DSDM)
- Software Project management

Questionnaire was developed based on above points with multiple choice and open-ended questions. Questionnaire was created on google form and was circulated in various software companies of Pakistan. Fig. 2 shows the steps we used in research methodology.
5. IMPACT OF DSDM ON DIFFERENT KNOWLEDGE AREAS

5.1 Industry Survey:
We explored the impact of Agile methodologies on Software project management from different software industry through an online survey in order to increase response rates. We distributed an online questionnaire to people working in software industry. We got response from 20 software companies. Most of them are using Dynamic Software Development Methodology (DSDM), and other participant organization are using Scrum and Extreme programming approach. Mostly People that participated in survey are software engineers involved in software projects. We also got response from managers of different organization. They all gave us the reason to answer the main research questions.

5.1.1 Project Scope Management
Project scope management is the most important and most difficult area of software project management. Business requirements are volatile and changes during development phase of project. Organization cannot say no to customers for changes. It results scope creep. We cannot handle scope creep easily. Through survey, we found the scope managing criteria of many organization. DSDM equally suitable for small as well as large software projects that have complex scope statement. Many industries that are using DSDM gave us the impact of this agile approach in positive way that said that if any change request come during any DSDM phase, first of all scope management team check the importance of requested change and then discuss it with development team. Development team analyze the importance and urgency of change. If that particular change is not urgent and enough important then current scope of the project will not disturb but if the change has some importance, then it will be accepted by team and also accepted by change control board (CCB) in order to deliver business value to customer.

5.1.2 Project Cost and Time Management
Project cost has a poor track record in IT projects. It is difficult to handle the project that faces over-budget problem. Based on survey, DSDM handle over-budget issues effectively. In DSDM, first of all customers and organization agreed upon time and cost of project then adjust the scope according the agreed budget. DSDM approach makes the agile cost effective. Project deliver on time and within budget make the organization management process smooth.

5.1.3 Project Quality Management
Project quality is the “things like applying proper project management practices to cost, time, resources, communication etc. It covers managing changes within the project”.[3]

Agile methodologies are much concerned about project quality. Organizations, using agile DSDM or any other approach, have a major concern on “Fitness for use” rather than “conformance to requirements”. Organization set the level of quality at initial stage and then work according to that quality standards in order to achieve quality product.

Survey shows that agile has set its priority high on customer satisfaction and focus on business needs and deliver the project on agreed schedule and budget that accounts for the success of company.

5.1.4 Project Human Resource Management
The main focus of DSDM and other approaches of agile is to work with team collaboration. It focuses on individual that each and every team member is willing to work and has a strong experiences of team work. In many organization using agile basically aim that each and every member of the team is expected to work collaboratively using his or her knowledge and experience to develop a project output that best meets customer’s business values. Effective communication is a key to success for any agile firm.

5.1.5 Project Risk Management
Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives. [3] By focusing on all above-mentioned knowledge areas, there is less chances of risk that any agile project faces. Time, cost, quality and scope are major concerned areas and under greater risk. Effectively managed these areas by controlling scope based on the agreed time and budget give a quality product that reduces risk in any phase of agile project.

6. CONCLUSION
This survey found the impact of agile DSDM approach on different knowledge areas that are scope, time, cost, quality, Human resource and risk and we found the overall positive impact of DSDM on Software projects if approach followed by organization effectively. DSDM is different from traditional approaches in order to achieve business goals. we found that DSDM is more project-oriented. This agile methodology encourages iterative development that is the main focus of agile approach. DSDM needs an early foundation of project at an early stage so it helps organization and customers to be focused on their business needs.

7. FUTURE WORK
Our results did not produce any surprising points, but with time and a greater response rate from different organizations that are using agile methods, more substantial results may be found. In the future, we will work on the left knowledge areas that are procurement, communication, integration and stakeholder’s management and much more data for already covered areas may be collected to generate more extensive analyze.

8. REFERENCES
[1] Agile 101 - VersionOne
https://www.versionone.com/agile-101/


9. APPENDIX

9.1 Results

Impact of Agile Methodology (DSDM) on Software Project Management

1- Usage of agile methodology (Dynamic Software Development Methodology-DSDM) for software development.

![](Usage of DSDM.png)

2- Follow proper software project management for projects.

![](Management of Scope.png)

3- Management of project scope through DSDM
4- Effect of DSDM on project cost. (12 Responses)
   - By using DSDM, cost of the project reduces. So, its impact is positive (4)
   - In our case it takes long time if we follow proper agile methodology. So, we use whenever needed. Its affect based on described reason. (2)
   - By using DSDM, cost of the project reduces. So, its impact is positive (4)
   - In our case it takes long time if we follow proper agile methodology DSDM. Somehow positive. (2)

5- Management of project if it goes towards over budget. (12 Responses)

6- Effect of DSDM on project schedule. (12 Responses)
   - First of all, we set the schedule and then start work according to planned schedule and create positive effect on project. (5)
   - Sometime positive and sometime negative effect of DSDM on project schedule. (3)
   - It is the beauty of DSDM to first set the schedule and then start work according to planned schedule and create positive effect on project. (4)

7- Effect of DSDM on project quality. (12 Responses)

8- Management of human resource using DSDM. (12 Responses)
   - Agile companies practice leadership-collaboration rather than command-control management. (6)
   - Through effective meeting and communication. Collaborative team work is the key to manage all HR. (6)

9- Management of risk in projects using DSDM. (12 Responses)
   - Through proper management of other knowledge areas, risk becomes low. (7)
   - We develop contingency plan for risk management. (4)

10- Effect on project success using agile methodology. (12 Responses)
   - Always got Success (4)
   - Increase chances of success (4)
   - Project deliver on time, achieve best quality and business values achieved (4)