IMPACT AGILE PROJECT MANAGEMENT:
IDENTIFICATION AND ANALYSIS OF PROBLEMS IN SCRUM IMPLEMENTATION

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ABSTRACT. Due to its novelty, flexibility and productivity the Agile Methodologies have gained much popularity and attention of the industry practitioners, designer and developers along with researchers and writers. It has become a hot topic among stakeholders over the last few years. Out of many agile methodologies Scrum has become on the top of list being a framework. While adopting Scrum frame work, one of the scrum role i: Scrum team have to overcome a number of problems and hurdles related to Scrum HRM (Human Resources), Scrum QA(Quality Assurance), Scrum Ceremonies, and Scrum artifacts aspects of the Agile project management in implementing Scrum. The research paper identified these problems using a survey and focus group discussion of experts of the field conducted in a software project company and through systematic review of related literature. The results and recommendations will be discussed in the paper. The results may be used by other software development companies of the area for streamlining their project management using agile methodologies

KeyWords: Agile Methodologies, Scrum, Scrum implementations, Scrum Team Problems.

1. Introduction. In 2001, agile was officially come into business when 17 pioneers/practitioners of the agile methodology met at the Snowbird Ski Resort in Utah and signed the Agile Manifesto. That manifesto is now considered the introductory text for agile practices and principles. The manifesto laid down the new philosophy behind agile, which focuses on readily functioning software, team collaboration, communication and flexibility and to address changing business requirements. Some agile methodologies are as follows:

- Scrum
- Extreme programming (xp)
- Lean software development (lsd)
- Crystal methods
- Adaptive software development (asd)
- Dynamic system development method (dsm)
- Feature driven development (fdd)

1.1. Scrum. The scrum as an agile development method was introduced by hirotakatakeuchi and ikujirononaka in 1986 in the Harvard Business Review. Later was developed by Jeff Sutherland in 1993[1] scrum is actually a frame work rather than a process [2], as in all project life cycle there are also different
phases exist, through which a project team must go through in order to develop a software project. The team itself decides how the whole process will be done. A series of iteration known as a sprint will decide the time limits for each phase and progress of the project. Scrum addresses those projects facing quick changes and requirements.

1.2. **SCRUM ROLES.** The roles actually are persons which involve in Scrum for developing project, for giving guidance and keeping things according to requirements of projects.

1.3. **Product Owner.** The person decides the business value and determines the order and type of work to be done at each phase and is responsible for recording all activities in the product backlog. He is responsible for providing funding when required, creating all types of requirement return on investment objectives and release planning. [3]

1.4. **Scrum Master.** The scrum master manages a self-organizing team to facilitate team’s daily scrum but not control the team and make the team productive. Ensures close cooperation among different roles and functions. He removes hurdles facing by the team or process. He is the custodian of the scrum values, practices, and rules and try to implement them in true spirit. It is a link between management and team [4]

1.5. **Scrum team.** It is the project development team having up to 10 members with a specific skill. The team is responsible for implementing all functionalities laid down in the requirements. It will be a self-organized, self-managed, and cross-functional team. All team members will be equally responsible for both failure and success of the project. [3]

1.6. **SCRUM ARTIFACTS.** These are the documents created by people before or during a sprint in the project development using Scrum.

1.7. **Product Backlog.** A list of priorities according to business values, required functionalities, and user stories as a basic unit of work. The list made by the product owner. The product owner can change priorities during or at the end of a sprint. The priority item should be written with enough detail for helping the team for effort and time estimations. The PC available to all stakeholders.

1.8. **Sprint Backlog.** It contains the highest priority item from the product backlog to be subdivided into small tasks (explain enough) at least 16 hours for each task to complete. Team members define these tasks in planning meetings. All team members can view and be changed during daily scrum meetings.

1.9. **Burn down Chart.** It shows the total remaining work hours in one sprint on a daily basis. Team become self-organized using the chart.

1.10. **SCRUM VALUES.** Commitment, Focus, Openness, Respect; Courage.

**SCRUM CEREMONIES.** The scrum ceremonies consist of Daily scrum meeting, The daily scrum of scrum meeting, The sprint planning meeting, Sprint review meeting, Backlog refinement meeting[4-9]

i. **Daily scrum meeting**
Scrum master and development team members conduct a daily 15 minutes meeting at the same time and place. The three questions to be discussed:
(a) What has been completed since the last meeting?
(b) What items should be done before the next meeting and (c) what problems team members have?

These meetings facilitate communications, identification and removal of abstractions in completing tasks, quick decision making abilities and improvements in visibility.

ii. **The daily scrum of scrum meeting**

The daily scrum of scrum meeting is another short duration the same arrangement as for daily scrum meeting. The focus of the meeting is to synchronize the working between different scrum teams.
iii. The sprint planning meetings
The sprint planning meeting is a monthly meeting attended by product owner, scrum master and team to discuss what will be done for the next sprint usually last for 30 days. In this meeting team members divide the project into small manageable tasks in order to complete the tasks in one sprint.

iv. The sprint planning meetings
Sprint review meeting is a monthly meeting held at the end of sprint. It is a 4 hours time bounded meeting where team members present their incremental working model completed to the product owner and everyone else. At the end the product owner review and revised the sprint planning meeting if required. The scrum master help the product owner if required. it is like inspection meeting even end user can attend and may purpose refine requirements.

v. Backlog refinement meeting
Sprint retrospective meeting is conducting after completion of each sprint. Team members generate and reflects on its own process after inspecting the behavior the take proper action for future sprint the find the answers of the questions. Is every thing ok? If any improvement required? If problem stop your task.

Backlog refinement meeting address the product backlog analysis and certain modification added into backlog which will be helpful for developing a release backlog.

2. RELATED WORK REVIEW
Agile software development methods, according to Agile Software Manifesto prepared by a team of field practitioners in 2001, emphasis on

A. Individuals and interactions over process and tools
B. Working software over comprehensive documentation
C. Customer collaboration over contract negotiation
D. Responding to change over following a plan [5])

<table>
<thead>
<tr>
<th>primary consideration</th>
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<td>Individuals and interactions</td>
<td>process and tools</td>
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<td>Working software</td>
<td>comprehensive documentation</td>
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<td>contract negotiation</td>
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<td>Customer collaboration</td>
<td>following a plan</td>
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The idea is to be ready for responses to changes requirement for the delivery of working model of the software as soon as possible within the time limits.

The author give a detailed overview of Agile methodologies, a little comparison of traditional and agile approach, research on social implications using agile methodologies research on implementation of agile, communication in agile project and empirical studies regarding agile. According to author there is a strong need for more imperial studies in the field [6]. there are many issues and problems need to be addressed yet in implementation of Agile methodologies especially using Scrum a rapidly growing and adopting by the industry agile methodologies. The papers also suggested different solutions for these issues and challenges on the basis of literature reviews and case studies conducted in different software companies using Scrum [7, 8, 9].

The authors describe current agile methodologies and practices its pros and cons and different issues for its applicability on the basis of both quantitative and qualitative methodologies. According to author the agile approach increases flexibility, agility and productivity and easily adjusted in the environment where software development projects are in progresses. Even in large organizations having large projects the approached will be to break larger projects into smaller for more flexibility, the idea is presented on the basis of researches [10].
The writer describes the Agile methodologies for software project management in a general way, addressing the role of project manager in agile projects, processes, and problems in transitioning into an agile framework and management of distributed and outsourced agile software management. The writer describes a case study for the answers to his problem using grounded theory for his quantitative analysis. The writer claims that the future will be of an agile approach [11].

The author made a comparison between different agile methodologies such as SCRUM, Extreme programming, and FDD (Feature Driven Development) to discuss their advantages and disadvantages and situations in which one is best for use. The author wrote down the problems for implementing the Scrum [12]. The author describes his paper using excerpts from KathaySchwalbe’s Information Technology Project management, 7th Edition which emphasizes the uniqueness of the agile approach in each project management process versus using more predictive traditional waterfall approach. The author compares each process of both during the whole life cycle of a software project. The paper suggests that you still use the five process group described in PMBOK Guide for the management of an agile project using Scrum framework [13].

The writer describes Scrum implementation in a real-life scenario by implementing Scrum Framework in real-life educational institutions. The paper suggested how Scrum will be mapped and implemented in the working of educational systems based on various Scrum roles and artifacts to those in education systems. As a result, performance monitoring will be easier. The result on the basis of research shows that the 40% better monitoring and control were evolved using Scrum Approach [14]. In the same way writer describe how Scrum software development process can be implemented in small teams. The writer being a part of such teams describe experiences (At SG Communication) that small teams are more flexible and adoptable for implementation of Scrum. The writer describes that the idea of Scrum is basically incremental time boxed. The both spiral and Scrum having same idea other than speed. The Scrum is speedy and implemented in situations where we cannot define requirement upfront and changes are expected throughout the project life cycle [15].

The author describes 7 real-life projects developed by the author using Scrum Agile software management methodology that is implemented as a model of software project management of a research and management laboratory. The paper discussed how software architecture proposals and way of documents arise. The analysis shows easier perceptions of progress more collaborative working environment, motivated team members ready to address changes, therefore an increase in growth and improvement. The paper is based on an experimental approach [16]. The author describes his experience of a case study conducted at ABB for the comparison of agile and traditional incremental approach. The paper shows that use of agile practice during the research and development phase of new product development, increases productivity in initial stages of the life cycle. It increases the flexibility for teams to address changes in requirement, do better in communication involvement of customers which increases team productive time and time made rapid progress also better in internal development process [17]. The Author describes the effect of implementing Agile methodology Scrum on the improvement of productivity in software development and what are the other performance outcomes related to productivity. It is systematic literature review which gives a relation between Scrum and Productivity [18].

3. METHODS AND PROCEDURES

A questionnaire was developed on a Likert Scale which reflected SA (Strongly Agree), A (Agree), UD (Undecided), DA (Disagree), SDA (Strongly disagree). These questions are related to Scrum HRM (Human Resources), Scrum QA (Quality Assurance), Scrum Ceremonies, and Scrum artifacts aspects of the Agile project management using Scrum. These survey questions were formulated using the opinion of Scrum experts. Each of the indicators written above was addressed using five questions, thus total 25 questions included in the survey. Focus Group discussion was conducted on the analysis of the problems faced by the Scrum team during project development using Scrum. The population of the research was the developers both experienced and fresh. Some have done their jobs as Scrum Master working in a Lahore-based Software Company. A total of 23 persons were included without offering any incentive. Out of 23 actually 14 were answered and participated in this research so a return rate of 60.86% was recorded. The answers were analyzed using SPSS. The themes and approaches of the focus group discussion were further matched and analyzed, in doing so this research study was at a time conducted through quantitative and qualitative approach.
4. Problems Identification AND RESULTS Discussion

A. Scrum Framework Related Problem

i. Interruption by scrum master /product own

About 40% developer reported that scrum master and product owner interrupt their working during a sprint, the scrum master try to pressurized developer like project manager in traditional project management by asking question about developer’s job. Similarly product owner introduce a new requirement during a sprint. Due to this interference developers feel more work pressure which result in coding errors or extra work hours to be spent. This is pure scrum framework related issue. The frame work emphasis to satisfy the product owner always. However, 60% developer satisfied by scrum master.

ii. Distributed Team

When a project is distributed among different scrum team, the scrum framework does not provide practice /rules in this regard scrum master face a lot of problems for co-ordination and communication in this scenario. The framework accumulated communications between team and among team member however communication with customer is a taught task. Customer may involve in other routine jobs or sometime become lazy in communicating with the team. Most of the team members not agree however 20% strongly agree.

iii. Working environment

The scrum considers open space better as compared to private personal separate offices for developers. Open space provide better communication and access to other developers. About 28% developers consider it as distraction. They do not like some body talking to them or taking personal calls on phone. Noise make them in uncomfortable and less productive however about 70% person were satisfied in an open space with certain precautions.

iv. Product Release

It is a comprehensive process require an independent and dedication team. Having all stakeholders present and the hardworking job’s result presentation is a tough task for the team. Since it is a must requirement in the scrum framework. However only 20% are in the favor of it.

4.1. Human Resource Management related

i. Experienced scrum team

About 25% developers consider un-experience as a problem. During project task non-experience programmer interrupt the other experience member frequently. However scrum says that scrum team must be self organized and co-operative. But there will be a time limitation for an experienced person beyond which he cannot help others in real team environment.

ii. Scrum training

Most developers are not much trained and they do not know about

- knowledge of scrum framework
- use of scrum tools
- failing in “to do things”

The management did not provide training facilities to the developers only scrum master / experienced developers guide the junior when needed. But it is not scrum framework related issues. It is human resource related problem management take care about it.

4.2. Artifacts related problems

i. Documentation

Scrum emphasizes in reduction of documentation. For new programmer and even for experience person it is a problem. 34% respondent agrees at it. Particularly the developers who perform a task on a part of a project or a new entry between a sprint think it a difficult problem and they do not know hat to do in such situations. 10%
Developers declare it a week part of Scrum. Only scrum master know every thing about project. If he become absent every thing will become stand alone. Developers and scrum master use E-mails which are not properly messaged by the sender and read by the receivers.

ii. Product Backlog
Scrum provide different tools for time estimations, preparing a product backlog, for recording of done tasks by the team members. These tools are some time expensive enough or complex or too simple. it will not give help for preparation of product catalog. Product owner some time does not set the priorities of requirement according to business values. The all details not recorded in the product backlog. 23% developers pointed out this problems however only 2% product owner agree with it.

iii. Burn Down Chart
Developers are lazy to enter data about their done tasks using scrum tools which is a base for determination of burn down chart. Scrum master pointed out this problems 32% Scrum master agree with this problems.

4.3. Scrum Ceremonies
i. Estimation of Sprint Duration
Scrum framework provide guidance to estimate Sprint Time. This estimation become more effective if the team use his best estimation skills having in consideration of the module, the men employed and the bossiness value of the module. The wise estimation certainly increase the performance and hence productivity of the team. The survey shows that short duration sprint time estimation is more problematic. A six week estimation, 4 week estimation, 3 week estimation and one week estimation make 5%, 8%, 12% and 48% problematic.

ii. Sprint meetings
It includes daily scrum meeting, sprint planning meeting, sprint review meeting and daily scrum of scrum meeting. Most of the developer appreciate these meetings and reported that these meetings are very affective in terms of communication, coordination which makes the scrum teams self organized. However 12% of the respondents not agree with the statement. They reported that daily meetings are waste of time. According to them only one person having problem keep on talking while others without anything to say set idle and waste their time instead they can use this time for development. 8% criticized its conduct timing as described in the framework. 10% reported that sprint planning and sprint review meetings are also waste of time so these developers not shows much interest in these meetings.

4.4. Quality assurance
Scrum framework demands a readily working model against a particularly requirement or module after a sprint in a specified limited estimated time period. This agility pressurized scrum development team and there will be a compromise in software quality. Since the product must be released frequently the testing may not be performed properly. So the quality assurance issues may be created in the project development. The software coding and its testing become a problem as reported by 32% of the respondent.

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<th>Indicators</th>
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<th>Suggestion</th>
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<tr>
<td>Scrum Framework</td>
<td>- interruption</td>
<td>- The scrum master must be a facilitator rather then a boss</td>
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<td></td>
<td>- Distributed team</td>
<td>- The scrum team must be always ready and willing to accommodate changes because the client is always preferable</td>
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<td></td>
<td>- working environment</td>
<td>- Working environment must be to facilitate for better communication and coordination</td>
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<td></td>
<td>- product release</td>
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<td>B. HRM</td>
<td>- Experience</td>
<td>- Scrum team must be given training about the knowledge of scrum framework, use of scrum tools, research training and attendance of conferences and seminars</td>
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<td></td>
<td>- Scrum Training</td>
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<tr>
<td>C. Artifacts</td>
<td>- Documentation</td>
<td>- Changes must be recorded in product backlog</td>
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<td></td>
<td>- product backlog</td>
<td>- Developers must used scrum tools properly e.g. version 1</td>
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## Conclusion

From this research we can conclude that the implementation of Scrum framework in its true sense, active participation of management proper training of the scrum team, effective communication and coordination between team members will minimize different problems discussed earlier. However distributed team, geographically related team culture, team integration and overlapping issues may results in problem. There is a need of comprehensive study to address such situations both qualitatively and quantitatively.

## REFERENCES


