STUDY ON AGILE MANAGEMENT IN CONSTRUCTION PROJECT USING SCRUMBAN METHODOLOGY

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Abstract – *Construction project management today is a highly and current discussed area. The construction market and the number of different actors and the way that projects are procured today has however changed. This has led to a gap between the managerial view on how construction projects should be conducted today and how they actually are executed. This is reason enough to question this conservative industry and look into what possibilities there might be in the future. The Agile project management approach evolved from the software industry where it has grown and developed through empirical progress. It is suited for large complex projects where it is difficult to specify the product in advance. It is today used in different industries but mostly in the software business where the customer detects their needs through means of repeated tests and improvements to a prototype. The major advantages found with implementing the Agile approach is an increase in the client's involvement. The Agile management through Scrumban method almost forces the client to increase their participation in the project compared to the situation today. It can also decrease uncertainty and improve risk management. By the use of time management and specific meetings it will also be beneficial for keeping track of the project's progression and status.*
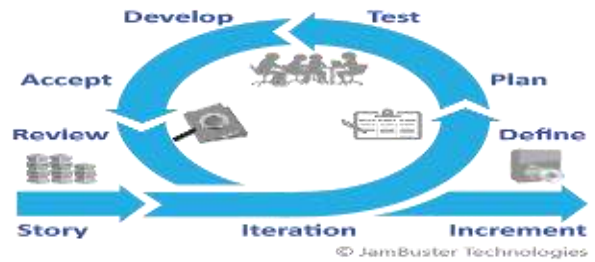
*Key Words***:** Agile project management, Scrumban.

1. INTRUCTION

Agile is a project management methodology that uses short development cycles called "sprints" to focus on continuous improvement in the development of a product or service. Whilst some continued to eschew the information systems waterfall method, it was not until 2001 that a 'Manifesto for Agile Software Development' (Beck and et al, 2001a) evolved through the efforts of leaders in the field and the term Agile became synonymous with a variety of existing information systems development methodologies, under the auspices of the Agile Alliance. The 'Manifesto' (which must be reproduced in full) states: 'We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Fig-1 Agile project development cycle

The Agile Project Leadership Network (APLN) has a wider focus than just software and focuses on: value, customer, teams, individuals, context and uncertainty. The APLN Declaration of Interdependence (Anderson and et al, 2005) for agile and adaptive management states that, based on the experience of the authors, the following interrelated strategies deliver highly successful results:

- Increase return on investment by making continuous flow of value our focus.
- Deliver reliable results by engaging customers in frequent interactions and shared ownership.
- Expect uncertainty and manage for it through iterations, anticipation, and adaptation.
- Unleash creativity and innovation by recognizing that individuals are the ultimate source of value, and creating an environment where they can make a difference.
- Boost performance through group accountability for results and shared responsibility for team effectiveness.
- Improve effectiveness and reliability through situation specific strategies, processes and practices.

1.1 Agile Management In Construction

Agile Construction is a way of doing business adapted to construction jobsites and overall project delivery, born from agile manufacturing and project management, mostly used in manufacturing production automotive and software developing teams. It is the application of the Toyota Production System to construction, with two parallel paths: measuring (ASTM E2691) and improving productivity and segregating and externalizing work through prefabrication and supply chain management.

Agile project methodology breaks down projects into small pieces that are completed in work sessions that run from the design phase to testing and quality assurance (QA). These sessions are often called *sprints*, the term for iteration used in one specific and popular Agile development method known as Scrumban.

1.2 Working Principle of Agile Management

Agile teams build rapid feedback, continuous adaptation and QA best practices into their iterations .They adopt practices such as continuous deployment (CD) and continuous integration (CI), using technology that automates steps to speed up the release and use of products. There are 12 key principles that still guide agile project management today

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
- Business people and developers must work together daily throughout the project.
- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
- Working software is the primary measure of progress.
- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
- Continuous attention to technical excellence and good design enhances agility.
- Simplicity—the art of maximizing the amount of work not done—is essential.
- The best architectures, requirements, and designs emerge from self-organizing teams.

12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.

1.3 Agile Construction Focusing Areas

- Labour productivity and measurement
- Job scheduling and planning
- Procurement management
- Prefabrication components or parts already assembled by the supplier reducing time and complexity of the task

- Reduction of labour composite rate (the cost of the worker to the company per unit of time)
- Estimation accuracy and improvement
- Project financial management

2. AGILE PROJECT DEVELOPMENT USING SCRUMBAN

Scrum-ban is the combination of Scrum and Kanban and tries to use features from both the software development models. Following are the core principles of Scrumban:

Visualize the workflow: This is one of the most important tools taken from Kanban and applied to Scrumban. Visualizing workflow literally means team visualizes different phases their Product backlog Items (PBIs) or stories go through starting from the sprint backlog and ending in the done phase, on a white board.

Pull Work: In Scrumban, the work is pulled as and when needed into a queue unlike the approach used in a traditional Scrum where all the work to be completed within a sprint is assigned in the beginning of the sprint to the sprint backlog.

Limit Work-In-Progress (WIP) Items: One of the important aspects of Scrumban is to apply limits to the work in progress items at every stage based on team capacity.

Make Team Rules Explicit: In tradition scrum, the idea is that teams are self-organized and they will work and co-ordinate themselves, however in practice there are always gaps between how a team shall organize themselves and how things are work-ing out. "Self-organised teams cannot work if they don't have shared understanding of how work is done" (Yuval, 2012).

Planning Meetings: Unlike Scrum, Scrumban has shorter planning meetings in order to update the backlog queue as and when required.

Review, Retrospectives and Daily Stand-up meetings: These are the very important ceremonies Scrumban retains from Scrum. Review provides the team with the direct feedback from product owners and the team's key stakeholders such as product man-agers and customers.

Metrics and optional estimations in scrum-ban: In Scrum, PBI's are estimated using metrics like story points and number of tasks taken into the sprint is done based on average team velocity of last few sprints.

In nutshell, scrum-ban is a methodology which makes scrum leaner and flow oriented. It empowers team, help them to collaborate and organize by utilizing Kanban tools like visual workflow board, WIP limits at every stage of development, team rules, focusing on improving cycle times rather than estimations, etc. Further, it makes scrum flexible towards change by my having shorter planning sessions, avoiding planning for whole iteration, avoiding unnecessary estimations, late binding of tasks, pulling work than pushing, and all this is synchronized within important scrum

ceremonies like sprint planning, sprint review, sprint retrospectives and daily stand-up meetings.

2.1 SCRUMBAN FRAME WORK DEVELOPMENT

Scrumban is becoming very popular these days in service industries, where we have both development and maintenance projects. When to consider Scrumban:

- Maintenance projects
- Event-driven work
- Help desk/support
- Hardening/packaging phases
- Projects with frequent and unexpected user stories or programming errors
- Sprint teams focused on new product development
- Work preceding sprint development (backlog, R&D)
- Work following sprint development (system testing, packaging, and deployment)
- If Scrum is challenged by workflow issues, resources and processes
- To manage improvement communities during/after Scrum roll-out

2.2 PROJECT DEVELOPMENT USING SCRUMBAN

Fig-2 Project development using scrumban

Goals: This is where the team defines broadly its goals. A goal may be a broad objective which the team hopes to accomplish by doing multiple smaller tasks.

Story Queue: This is where goals are broken down into multiple Stories. A long list of Stories is created at this stage.

Analysis: This is where Scrumban differs from other approaches. The Stories created in the previous stage are now analyzed, and a select few are accepted for further work.

Development: Work is started on the selected Stories.
Testing: Once work has been done on stories, the results are tested by QA teams.

Deployment: The results are then put into practice.

Done: All completed stories are now marked as done.

Fig.2.2 Scrumban framework

2.3 SCRUMBAN METHOD PREDICTABILITY

- Companies measure the value of a project in terms of cost and returns. If the returns from a project outweigh the cost, then a company may decide to go forward with that project. But if the cost of a project is unknown, as it is with many projects these days, predicting the outcome of that project in terms of success becomes almost impossible.
- Scrumban methodology is that when companies take the time on the front end to plan a project using Agile techniques, they can estimate the cost of a project to determine whether they should continue.
- There is no single characteristic of Agile that makes it work so well to manage projects. Instead, it is the holistic practice of Agile that makes development teams successful. When project teams choose to practice Agile, they are practicing a concept that is still evolving, making this one of the best ways to work in a culture of continuous improvement.

2.4 ADVANTAGES OF SRUMBAN FRAMEWORK

- **Stakeholder Engagement** : Agile provides multiple opportunities for stakeholder and team engagement – before, during, and after each Sprint
- **Transparency :** An Agile approach provides a unique opportunity for clients to be involved throughout the project, from prioritizing features to iteration planning and review sessions to frequent software builds containing new features.
- **Early and Predictable Delivery :** By using time-boxed, fixed schedule Sprints of 1-4 weeks, new features are delivered quickly and frequently, with a high level of predictability.
- **Predictable Costs and Schedule :** Because each Sprint is a fixed duration, the cost is predictable and limited to the amount of work that can be performed by the team in the fixed-schedule time box.
- **Allows for Change :** While the team needs to stay focused on delivering an agreed-to subset of the product's features during each iteration, there is an opportunity to constantly refine and reprioritize the overall product backlog.

- **Focuses on Business Value:** By allowing the client to determine the priority of features, the team understands what's most important to the client's business, and can deliver the features that provide the most business value.
- **Focuses on Users:** Agile commonly uses user stories with business-focused acceptance criteria to define product features.
- **Improves Quality:** By breaking down the project into manageable units, the project team can focus on high-quality development, testing, and collaboration. Also, by producing frequent builds and conducting testing and reviews during each iteration, quality is improved by finding and fixing defects quickly and identifying expectation mismatches early.

3. CONCLUSION

Agile values are beneficial to the project development process and promote communication both horizontally and vertically throughout the entire project life cycle. Agile enhances innovation through high-performance multidisciplinary teams and ensures business value by direct client involvement throughout the entire delivery process. Enhanced communication, teamwork, collaboration, and organizational change improve the adoption of higher value products during the preliminary stages and throughout the project lifecycle. Kanban is compatible with Scrum, the project management method. Adding WIP and visualization to Scrum, i.e. Scrumban, helps improve Sprint Commitment effectiveness. However, it is also introduces the WIP limit as a mechanism to cyclic incremental changes. The WIP limit obviates the need for commitment to drive change, reduces any defective reliance on heroic effort, and improves overall systems thinking when considering potential improvements. Method helps to many of the most common project pitfalls (such as cost, schedule predictability and scope creep) in a more controlled manner.

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