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Team Development and Improvement in Execution and Review of Project Construction through Agile Method and Analyzing its Benefit and Drawback with Other Existing Methods

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Abstract: ***History depicts many instances where Project Construction faced potential hurdles to met project schedule due to lacking in different areas.***
Objective of this research to study the probable causes and issues in project at different phases and system development to control in Project monitoring, reviewing and construction through "Agile Method".
After analyzing few ongoing projects and completed projects, several factors surfaced which led delay in projects were due to poor communication between stakeholders, improper planning and scheduling, Budget over run, Inadequate risk management, delay in cash flow, deficiency in review mechanism etc.
The main objective and goal is to implement developed framework of Agile Method to meet the needs of project and also analyzing its benefits and drawback with other existing methods.
Keywords: construction and demolition (C&D), FRC, recycled concrete aggregate (RCA), etc

I. INTRODUCTION

1) *Agile Methodology :* At a very basic level, Agile allows your company and teams to work in short bursts on very particular deliverables.
   At the end of the short burst of time—called an "iteration"—teams are expected to have those specific deliverables completed.
2) *Waterfall Methodology:* Waterfall is a top-down approach to project management.
   During the early stages of a Waterfall project, project managers outline all the steps to the project upfront, including the schedule, scope, and budget.
3) *Scrum Methodology*: Scrum, like other Agile frameworks, is organized around sprints. Under the Scrum methodology, teams create a backlog of tasks with realistic deadlines and organize their tasks around the sprint duration.
4) *Kanban Methodology:* Unlike other Agile methodologies that focus on a cyclical process, the Kanban methodology focuses on an optimized workflow.
5) *Extreme Programming:* This methodology has teams working toward regular, frequent releases of deliverables.
   The theory is that short cycles of work increase productivity and regular releases allow for continual feedback on products, so things are always being improved. XP users plan for changes and don't confine themselves to one set of unchanging requirements.
6) *Lean Methodology:* The goal of Lean Project Management is to maximize value and minimize waste at all steps by continuously improving processes related to product and task delivery.
   Initially used in manufacturing, the Lean philosophy has been adopted into many business sectors as a way to effectively manage projects and reduce costs.
7) *Hybrid Methodology:* Hybrid project management refers to methods that combine planning strategies from the traditional Project Management environment with the agile methodology flexible approach.

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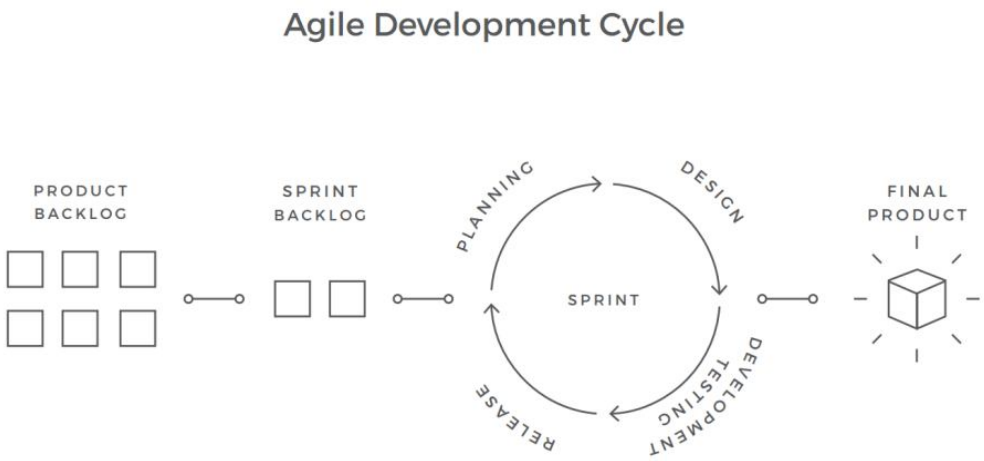

Fig 1. Agile Development Cycle

II. PROS OF AGILE METHODOLOGY

A. Flexibility

Considerably the most significant advantage of agile methodology is how adaptable it is to changing development environments, requirements and even developing teams. The emphasis for Agile methodology is on taking care of tasks that matter when they are needed. Thanks to a well-defined set of requirements, an Agile development team is usually well aware of tasks that need to be performed and in what order of priority they are in. Such a system ensures that the customers are the point of focus and that the problems they need to be fixed first are given priority. Stakeholders also gain as the development is progressive. Therefore they are less likely to incur a loss and are much more likely to remain relevant in the market space.

B. Embracing Uncertainty

A derived advantage from its flexibility (yet still a significant advantage) is the fact that Agile methodology acknowledges the fact that the outcome of a specific project is, in essence, unknown until it is completed. Because of this open-minded trait, Agile methodology is always open to discovery. Sometimes other solutions to a problem which fit better into a project may be found and implemented, while on other occasions developers may discover an underlying problem to an already defined problem. The advantage here is that every problem is solved optimally, as developers ensure that every loophole is taken care of before committing to a specific solution. Developers are also at the advantage of discovering new ways of solving problems as they tackle existing ones.

C. Immediate Feedback

For some Agile methodologies, such as scrum, development is usually in cycles, each cycle providing a module in its ready release state. This ready release state is achieved through constant testing and feedback from both customers and stakeholders. After a module has been developed, these individuals are usually involved in evaluating the module, providing the developers with comments and suggestions. The developers then collect these ideas and questions and determine which changes are viable and can be made to the module. Through this cycle, the final module is usually a finished product.

D. Less Defective Products

A major advantage of Agile methodology is that the end product is usually efficient and robust as compared to other development methodologies. This robustness is brought about by the amount of work put in relating to development, implementing, testing and feedback. Debugging is also a significant part of the development cycle, and this ensures that the finished product is functioning at its best.

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E. Cons of AGILE Methodology

While Agile methodology has provided an efficient way to develop and deploy software for many companies, there are still some issues surrounding it; which usually leads to other choices appearing better.

F. Lack of Documentation

Perhaps the most significant disadvantage of Agile development methodology is the lack of documentation during the development process. This is usually because of the ever-changing scope of the project regarding requirements and problem definition. Documentation of a particular module could be rendered obsolete due to both major and minor changes made to it. Therefore, documentation is not always emphasized upon, and sometimes small changes fail to be added to the final documentation.

G. Scope Creep

Due to the flexibility of Agile methodology, some members of the development team, especially the customers, may demand more and more of the system each time it is improved. Project managers who are inexperienced or not thorough may end up mismanaging projects by failing to rationalize user requirements.

H. Time

It's evident that with Agile methodologies, a lot of time is taken on projects as a whole, as well as their modules. The entire cycle of definition, development, testing, feedback, refactoring is a cumbersome process that requires time and many other resources in abundance. The different members of the development team also need to be available almost always, which leaves little time for other commitments and this may become problematic in later stages of development.

I. Lack of Predictability

While the ambiguity of the future provides an excellent learning entity for each team group or member, it can also be stressful when it comes to the reality of providing solutions for the public. The fact that clients, stakeholders and even developers are unsure of the outcome of different decisions made during productions, some may decide to opt out of projects. This can become problematic, especially when these entities choose to leave at crucial stages of production. The backing down of entities means that time has to be taken to look for other members, or in the worst case, that the entire project is done away with.

III. WATERFALL METHODOLOGY

Waterfall project management is a sequential, linear process of project management. It consists of several discrete phases. No phase begins until the prior phase is complete, and each phase's completion is terminal—waterfall management does not allow you to return to a previous phase. The only way to revisit a phase is to start over at phase one.

If waterfall methodology sounds strict, that's because the system's history demanded it. Waterfall project management has its roots in non-software industries like manufacturing and construction, where the system arose out of necessity. In these fields, project phases must happen sequentially. You can't put up drywall if you haven't framed a house. Likewise, it's impossible to revisit a phase. There's no good way to un-pour a concrete foundation.

As you can imagine, proper planning is a must in the waterfall system. A project's requirements must be clear upfront, and everyone involved in a project must be well aware of those requirements. Each team member should also understand what their role will be in the project and what that role entails.

All of this information must be thoroughly documented and then distributed to everyone on the project. We recommend outlining this information as a flowchart, as shown below, so your team can quickly understand and reference requirements as needed. You may also want to try adding swim lanes to show which tasks go to which team member.

Team members will refer to the documentation you provide throughout the process. When followed properly, this document makes clear precisely what is expected, thus guiding the creation of the product. It will also provide project milestones that will make it simple to determine progress.

Consequently, thorough documentation is a priority in the waterfall project management methodology. Documentation should take place throughout every phase of the process, ensuring that everyone involved is on the same page despite the sequential progression of the project.

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A. Phases Of Waterfall Project Management

The specific phases of the system vary somewhat from source to source, but they generally include:

1) *Requirement Gathering And Documentation:* In this stage, you should gather comprehensive information about what this project requires. You can gather this information in a variety of ways, from interviews to questionnaires to interactive brainstorming. By the end of this phase, the project requirements should be clear, and you should have a requirements document that has been distributed to your team.
2) *System design*: Using the established requirements, your team designs the system. No coding takes place during this phase, but the team establishes specs such as programming language or hardware requirements.
3) *Implementation:* Coding takes place in this phase. Programmers take information from the previous stage and create a functional product. They typically implement code in small pieces, which are integrated at the end of this phase or the beginning of the next.
4) *Testing*: Once all coding is done, testing of the product can begin. Testers methodically find and report any problems. If serious issues arise, your project may need to return to phase one for reevaluation.
5) *Delivery/deployment:* In this phase, the product is complete, and your team submits the deliverables to be deployed or released.
6) *Maintenance:* The product has been delivered to the client and is being used. As issues arise, your team may need to create patches and updates may to address them. Again, big issues may necessitate a return to phase one.

B. Pros Waterfall Methodology

1) *Everyone Gets Up To Speed Quickly:* Since technical documentation is a necessary part of the initial requirements phase, this means that everyone understands the objectives. New developers can get up to speed quickly – even during the maintenance phase.
2) *Timescales Are Kept:* The phased development cycle enforces discipline. Each step has a clearly defined starting point and conclusion, which makes progress easy to monitor. This helps reduce any project "slippage" from agreed timescales.
3) *No Financial Surprises:* Costs can be estimated with a fairly high degree of accuracy once the requirements have been defined.
4) *Testing Is Made Easy:* Test scenarios are already detailed in the functional specification of the requirements phase, which makes the testing process easier and more transparent.
5) *The Outcome Is Crystal Clear:* Even before the software development starts, the design is hammered out in detail which makes the needs and the outcome clear to everyone.

IV. CONS OF WATERFALL METHODOLOGY

A. Needs Can Be Difficult To Define

Clients may find it challenging to conceptualise their needs in terms of a functional specification during the requirements phase.

This means that they may change their minds once they see the end product, which is difficult to address if the application needs to be re-engineered to any large extent.

B. Potential Lack Of Flexibility

There may be issues with the flexibility of the model to cater for new developments or changes of requirements which may occur after the initial consultation.

Changes due to business plans or market influences may not have been taken into account when planning is all done up front.

C. Longer Delivery Time

Projects may take longer to deliver, compared to using an iterative methodology such as Agile.

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D. Scrum Methodology

Scrum is one of the most popular agile frameworks in use today and rightly so- it is used to develop complex products and systems. The name scrum is originally a rugby term. In rugby, a scrum is a cluster of players trying to get the ball. In the field of project management, "scrum" refers to the brief meetings.

where team members come together to talk about their successes relating to a project, how far they've come, what the next steps are and any future challenges they anticipate. The meetings are brief and concentrated, they result in an expedited product delivery that boasts of higher quality.

To fully appreciate its importance, you first need to understand how the Agile development process works. Agile is not a specific way of developing software, nor is it a framework, instead it is a set of principles that give support to the continuous evolution of software development methods. Agile development houses a number of methodologies for software development built on iterative development.

In other words, it's all about following various methods and using certain tools to develop software. Scrum is one of these methods. Scrum's main application is the development of complex products and systems. It is grounded in the "do, check and adapt" principle which is more of an empirical process. This process ensures optimum productivity and results in greater control over any risks that may arise and this is only possible when using two approaches – iteration and incrimination.

The whole idea behind Agile Project Management with Scrum is to give the end users exactly what they want. This can be achieved through "Sprints" or continuous feedback and iterations. Sprints are meant to be short, but regular, cycles of no more than four weeks for which a significant product increment is expected to be presented.

Figure 4 : Scrum Project

To work on a Scrum project, we first need to understand that there are three roles. These roles are:

1) *The Product Owner:* The product owner is the one in charge of the business side of the project. He is the person to be held accountable when processes do not follow the right order. Being a primary stakeholder in the project, it is the Product Owner's responsibility to have a vision for what he or she hopes to see. The ability to communicate that vision to the entire team also falls squarely on his shoulders.
2) *The Scrum Master:* The Scrum Master is responsible for ensuring each member of the team understands Scrum and their roles in it. He or she acts as a teacher and coach, verifying certain team members adhere to the theory and practices of Scrum. He/She leads by example, wearing the cloak of patience while paying attention to every aspect of the project. Working with the Product Owner, the Scrum Master helps with management of the Product Backlog and developing techniques to streamline it.

E. Extreme Programming

Extreme Programming (XP) is an agile project management framework used in software development. It prescribes everything, from how to organize projects and develop software, to how to increase developers' productivity and what's the best way to collaborate on code.

XP starts with an idea that software development is hard. That's why, according to XP, the 4 most important things in software development are:

CODING - At the end of the day, if the program doesn't run and make money for the client, you haven't done anything.

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F. Testing

You have to know when you're done. The tests tell you this. If you're smart, you'll write them first so you'll know the instant you're done.

Otherwise, you're stuck thinking you maybe might be done, but knowing you're probably not, but you're not sure how close you are.

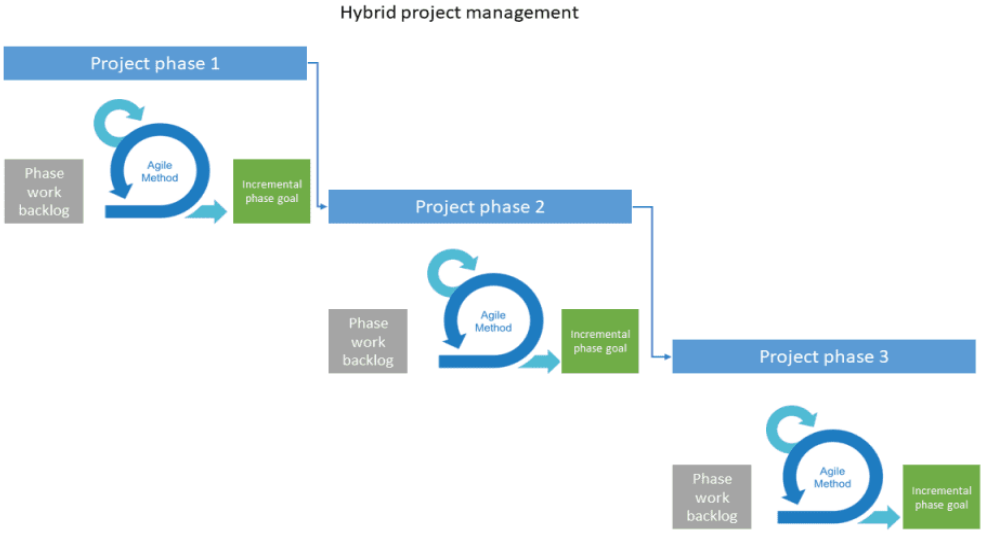

Figure 7: Hybrid Project Management

V. PROS OF HYBRID PROJECT MANAGEMENT METHODOLOGY

Developers and consumers agree on the deliverables at an early stage in the development lifecycle. Progress can be marked easily as the entire scope of work is already known in advance Business analysts are more likely to scrutinize and document all primary requirements of the project. Testers can eventually prepare test scripts from the “requirement” documentation while coding takes place simultaneously

VI. CONS OF HYBRID PROJECT MANAGEMENT METHODOLOGY

Inability to track deliverables or whether the set deadlines will be met Continuous administrative intervention to resolve team conflicts results in a waste of time and effort

VII. CONCLUSION

Agile methodology have proven to increase profits 37 percent faster and generate 30 percent more revenue than non-Agile companies. Higher speed, flexibility, and productivity achieved through such approaches are the key drivers which motivate more and more organizations to switch to Agile.

Project engineering, being an extremely fast-paced industry, calls for flexibility and responsiveness in every aspect of project development. Agile methodologies allow for delivering cutting-edge products and cultivating innovative experiences while keeping the product in sync with the market trends and user requirements.

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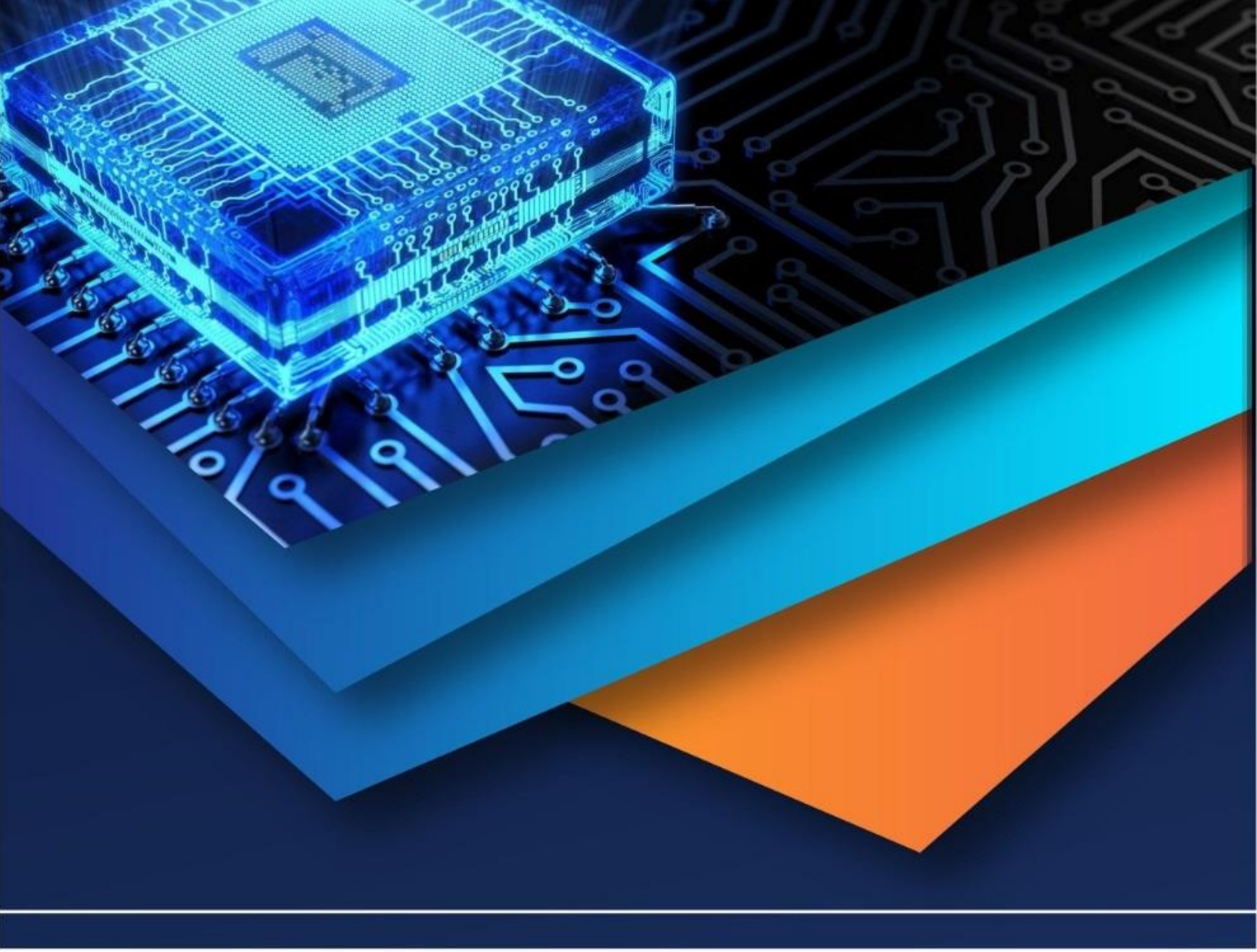

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