

# AGILE MANAGEMENT IN CONSTRUCTION INDUSTRY

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**Abstract** - Project management in the information systems industry has had a bad report of turning in value and has consequently seized upon the current evolution of agile assignment management. What is meant by agile project management, from whence it originated and whether it has further applicability are not widely understood. The development industry also has a much less than ideal mission administration document and may gain from the adoption of agile mission management. An extended literature review has established that agile project management does indeed offer significant improvements and that the construction industry might also potentially benefit. In order to unravel to an agile theory, the underlying rationales for agile have been explored, leading to the identification of further promising research.

**Key Words:** Project Management, Agile Project Management, Traditional Project Management, Construction Project Management, Research on Management

## 1. INTRODUCTION

The increasing strain to deliver high-quality products in a dynamic and hastily altering international market pressured specialists to enhance APM methodologies. Although traditional project methodologies are regarded as the source of formality in project management and have been in use for a long time and their success in certain industries is highlighted by various scholars for complex projects, especially information technology (IT) and software projects, traditional methods can be relatively ineffective as requirements are intangible and volatile. The use of TPM in these sorts of initiatives has led to various troubles and failures, due to its rigid nature and the adoption of strict linear strategies for planning, executing, and controlling. APM has emerged as a highly iterative and incremental process in which project teams and stakeholders actively collaborate to understand the domain, identify what needs to be built, and prioritize functionality. Agile has been increasingly more adopted and used in initiatives characterised through uncertainty and unpredictability. More than 80% of world companies and massive public-sector initiatives apply APM.

As APM has been initiated and influenced by agile software-engineering practices and methods, no clear definition of its processes and methodology has emerged, as all definition have been influenced by specific software engineering and IT practices and terms. This paper

compares TPM and APM methodologies in terms of PMBOK project-management process groups and knowledge areas and management as defined in the disciplines related to communication, risk, change management, and leadership styles. This comparison allows practitioners to identify when it is suitable to use each method, and identify the strengths and limitations of each method. A challenge is the organisation of human beings and sources to acquire a described goal and purpose. According to the Project Management Institute (PMI), undertaking management includes applying knowledge, skills, tools, and techniques to project activities to meet or exceed a project's stakeholder wishes and expectations. An organization's shipping of business results is realized via the success of projects; hence, venture management is the method and procedure through which corporations comprehend their goals and success.

Furthermore, leading organizations have realized the importance of assignment administration and embraced mission administration as a device to control fees and enhance initiatives and employer results. Executives realized that embracing project-management strategies and strategies reduces risks, cuts cost, and improves the success price with the aid of turning in what customers desire (PMI).

Applying project management methods is crucial to ensuring project success and delivery. Avoiding project failure is no longer a handy task, and now not being in a position to determine what is a failed mission makes it even harder. What makes challenge success harder to obtain and evaluate is that the same challenge can be seen by means of special people as a whole failure, partial failure, or even a success (PMI).

## 2. METHODOLOGY

### 2.1 General

Agility is defined as the ability to act proactively in a dynamic, arbitrary, and constantly changing environment and organizational agility is an organization's ability to be adaptable to changing conditions without being forced to change. APM is a combo of TPM concepts and flexible, lightweight, collaborative, adaptable to customary change, but exceptionally disciplined practices.

APM principles and techniques have been rather influenced through the standards of agile software development methods. Agile development methods such as

Scrum, Extreme Programming, and Lean are all driven by a set of principles that are principle-based rather than rule-based. This set of concepts publications the roles, relationships, and activities of the software-development procedure among the improvement team, managers, and customers.

The APM approach is primarily based on brief delivery iterations accompanied via non-stop learning. At the beginning of the project, the project team conducts a streamlined planning, requirements definition, and solution design to initiate the project. Afterwards, the team is involved with subsequent waves of iterations that entail more detailed planning, requirements analysis, design, execution, tests, and delivery to customers and stakeholders.

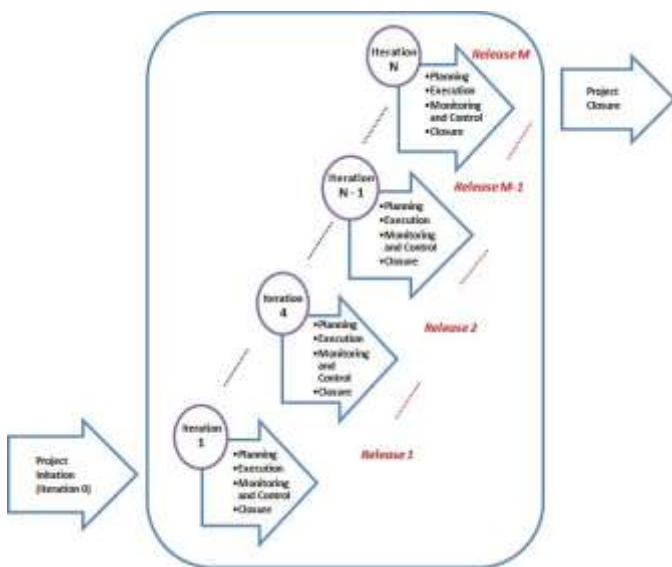


Figure 1: Agile Project Management Method (APM) Process

The APM strategy lets in for on the spot modification of the challenge as necessities are reviewed and evaluated in each iteration. Furthermore, APM follows a feature-driven management approach; hence, it concentrates on defining a project’s scope and requirements by prioritizing the list of project features and requirements based on value, such as increased revenue or market share. Thus, the involvement of the customer in the scope and analysis of the project’s requirements is crucial. Customer engagement ensures the agile project team is not investing much effort working on low value or ineffective costly features or requirements.

APM puts much emphasis on collaborative development and management to deliver results, getting feedback from customers, and continuous improvement and enhancements. APM has particularly iterative and incremental processes, the place challenge group individuals and stakeholders actively collaborate to apprehend the mission domain, pick out what desires to be built, and set up priority functionality sidled into practice about a decade ago and rapidly grew to be the principal standard for managing IT

projects. Despite its recent arrival, APM has the advantage of greater flexibility and collaboration, facilitating its spread throughout various sectors, including the public sector.

The agility notion began in the area of software development to tackle the unstable nature of software products and the uncertainty and challenge of defining necessities early in the project.

One special attribute of agile improvement and management is that each iteration is self-contained with things to do spanning from requirements analysis to design, implementation, and testing. At the end of each iteration, the customer is introduced a launch that integrates all software components; the client then presents the needed comments and refinements in the requirements and facets of the system, to be deliberate and viewed in future releases or iterations. Agile software development and management is driven by the principle of value-driven delivery to satisfy customers’ needs through early and continuous delivery of valuable and high-priority software-product features. In addition, agile management does not oppose change, as it exploits change to ensure customers’ competitive advantage.

APM has been substantially influenced by way of one of the most famous agile software-development methods: Scrum. The Scrum process is driven by managing iterations called sprints. Scrum development is carried out by a team that is self-directed and self-organizing. The team is given the authority, responsibility, and autonomy to decide how best to meet the goal of iteration. In Scrum, each iteration is called a Sprint. Before each sprint, the team plans the sprint and chooses the backlog items to be developed and tested in the sprint.

In Scrum, there are three main artefacts: the product backlog, the sprint backlog, and the sprint burn-down chart. These should be openly accessible and visible to the Scrum team. The product backlog is an evolving, prioritized list of business and technical functionality that needs to be developed into a system, including defects that should be fixed.

A sprint backlog is a list of all business and technology features, enhancements, and defects selected to be addressed in the current sprint. For each task in the sprint backlog, the description of the task, its owner, the status, and the number of hours needed to complete the task are recorded and tracked. The sprint backlog is updated on a daily basis to reflect the number of remaining hours to complete a task. The dash backlog helps the team predict the degree of effort required to entire a sprint. The team has the right to increase or decrease the number of remaining hours for a task, as team members realize that the work was under- or overestimated.

The Scrum team is committed to achieving the sprint goal and has full authority to do whatever is necessary to

achieve the goal. Usually the size of a Scrum team is seven, plus or minus two.

If the project has more than seven members, the team uses an approach known as Scrums of Scrums. The sprint burn-down chart illustrates the hours remaining to whole sprint tasks. This chart, updated every day, shows the work remaining on the sprint. The burn-down chart is used to music sprint progress and to figure out when items have to be removed from the sprint backlog and deferred to the next sprint. Very important contributors to team success and development progress during iteration are the Scrum Master and Product Owner. The Scrum Master, responsible for managing the Scrum project, knows and reinforces the sprint goals and objectives, and ensures the application of agile and Scrum values and principles. The Scrum Master is not necessarily a management role; it can be carried out by a senior member of the project team or the project manager. The Product Owner is responsible for maximizing the value of the project and the work of the project team through the management, maintenance, prioritization, and clarification of the product backlog. Under agile principles, the project backlog is considered to be a living artefact that goes through progressive refinement with items being added, removed, and updated. The Product Owner is ultimately responsible for managing and maintaining the product backlog along with the project team and stakeholders. In APM, at the end of each sprint, the project team demonstrates the features developed during the competed iteration in a sprint-review meeting with stakeholders and the customer. During this meeting, the team might add new backlog items and assess risk, as necessary. APM is driven by the concept of time-box processes, implying that the length of each sprint is predetermined and the scope for the iteration is chosen to fill its length. Iteration length usually does not go over 4 weeks. Instead of increasing the sprint length to fit the scope, the scope is reduced to fit the sprint length.

Because APM is influenced by agile principles and methods, APM inheritably consists of many rapid iterative-planning and development cycles that allow a project team too constantly and continuously evaluate the growing product and receive immediate feedback from users and stakeholders. Continuous improvement and enhancements are done by the project team not only to the project's products, but also to the team's working methods through their experience and lessons learned in executing each cycle. In APM, the responsibilities of project management are distributed among several roles: The Scrum Master, Product Owner, and team.

Although this format is considered one of the advantages of APM, it adds challenges and ambiguity regarding the role of project managers in the APM framework. The project manager should ensure that APM processes are executed effectively in a highly iterative and incremental manner and that project team members and stakeholders are actively involved in working together to

understand the domain, identifying what needs to be done, and prioritizing functionality.

## 2.2 Why use Agile Project Management?

In today's business world, constantly changing business needs, drivers, and requirements present a challenge to projects and their management of scope, cost, and time. Moreover, current business processes are more complex and interrelated than ever before, and projects address more complex organizational structures that involve complex communities consisting of alliances with strategic suppliers, outsourcing vendors, different types of customers, partnership, and competitors. These challenges stress the need to have a flexible and adaptable approach to deliver projects, products, and services faster, to satisfy market completion and customer satisfaction needs. The short comings of TPM approaches to meet such demands in all situations led to the evolution and increased adoption of APM. According to PMI, agile management methods will be used in 80% of all software-development projects, as research has shown that the use of agile has tripled.

These improvements may lead organizations to several gains through cost reduction, short time to delivery, and increased client and customer satisfaction and retention.

## 2.3 Traditional Project Management Versus Agile Project Management

The Guide to the Project Management Body of Knowledge recognized 47 processes that fall into five basic process groups and 10 knowledge areas (PMI). A knowledge location is defined as a whole set of concepts, terms, and things to do that make up a professional field, project-management field, or region of specialization. These five process groups include initiating, planning, executing, monitoring and controlling, and closing. The 10 knowledge areas include integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, project procurement management, and project stakeholders' management (PMI). This find out about compares and contrasts TPM and APM through investigating the method every project-management technique follows to tackle the PMBOK 5 method corporations and 10 understanding areas listed above. In addition, the study compares the two methods regarding key management disciplines related to leadership style, communication, change, and risk management.

The key difference between the two-project management methods—TPM and APM—is that TPM is characterized by exhaustive, rigid, and detailed planning/control procedures, task breakdown and allocation, and rigid adherence to milestones. In contrast, in APM, the planning takes place several times during the life cycle of the project in an incremental manner through the planning of



each iteration or sprint. In APM, a high level of planning and a concept or approach definition is usually performed on the project level as part of Iteration 0 of the initiation process group. Iteration 0 refers to the iteration before the sequence of project iterations begins: it is the iteration through which all the project-level work takes place such as high-level scope planning, high-level release planning, definition of resources, project architecture, environment, procurement, stakeholders' definition, and product backlog definition or prioritization.

Although agile does not put much emphasis on documentation, a project charter is one of the most important documents to be defined at the project level. In APM, a project charter does not differ from the one authored thorough TPM. However, it is usually recommended, based on best practices, to have the agile process and its details spelled out in the charter to ensure clarity and familiarity of stakeholders with the project's non-traditional management approach. This is important, as agile puts full-size emphasis on advanced planning, delivery, significant communication, and guide from the customer. In APM, the customer should work with or provide a Product Owner during the iteration planning and review meetings.

For the planning process group, both TPM and APM project-level groups perform similar activities for the 10 knowledge areas, with few variations. Those variations stem from the nature of agile artefacts and processes performed in APM. During the planning processes group, APM focuses on defining the first draft of the product backlog, which defines and lists the project requirements as user stories in collaboration with the customer and Product Owner. This corresponds to the Scope Definition Document authored in the TPM as part of the planning process group. In addition, APM drives all estimates for time and cost based on the use of agile estimation related to team velocity and number of story points associated with each story in the product backlog. These two parameters determine time and cost estimates for the project. It is very vital that in APM these two parameters are refined for the duration of iterations to align with the genuine team's competencies and assignment surroundings in a matter that make certain realistic delivery timeline and cost. In execution, most time and money are usually spent on execution, during which plans are executed and implemented to create and deliver the desired product. In TPM, the project team goes through execution of the completely defined plans through the planning process group; there is usually no overlap between planning and execution unless a major flaw or chance was once identified or took vicinity all through challenge execution. In APM, mission execution is carried out incrementally and via quite a few iterations and releases. The team completes several iterations, each with its own cycle of planning, execution, monitoring/control, and closure. Each completed iteration feedback and results feed into the planning of the next and future project iterations.

## 2.5 Comparison of TPM AND APM Regarding Key Management Disciplines

In this section, the researcher looks into APM and TPM in terms of key management and leadership aspects related to the type of leadership style used, communication management, change management, and risk management.

### 2.5.1 Leadership Styles

APM emphasizes a collaborative leadership and management style rather than the traditional management style that is based on command and control, as in TPM. Both APM and TPM expect the project manager to work with the client management, the project team, and key stakeholders to ensure they know the project's status. Moreover, the project manager should remove any obstacles impacting the progress of the project. APM takes this further by emphasizing the principles of servant leadership through which the project manager is seen as a leader, not a taskmaster. Rather than putting inflexible guidelines for the crew to follow, the mission manager facilitates the team in establishing working relationships, putting floor rules, and fostering collaboration. Servant leaders should not ask anything of the team they would not be ready to do. In addition, APM is driven by collaborative development among all team members and the customer to deliver results that reflect the true need of the customer, and capturing and reflecting candid feedback. A primary electricity of APM is non-stop feedback and improvement. In addition, because APM is usually used in very dynamic projects and environments, it emphasizes adaptive control through its practices; the agile team continuously adapts and improves their methods, incorporating lessons learned from the previous cycle into the next, rather than waiting until the end of the project to discuss lessons learned. This constant collaboration among the team and the customer is the driving force to ensure project success in APM.

In summary, there is a main distinction in the position of the assignment manager in APM in contrast with TPM. In TPM, the project manager is involved in directing project work in a commanded-control leadership and management style, telling the project team what to do. In contrast, the APM project manager follows a collaborative leadership style, working with the project team to realize project objectives and deliverables through the project's iterative increments.

### 2.5.2 Communication Management

Among the top communication challenges identified in the PMI Pulse research were gaps in understanding business benefits and ambiguity in understanding project requirements and expected deliverables and goals as a result of using unclear language and jargon. Moreover, the quality of people on a project, their organization and management are more important to project success than tools or the technical approach they use. In spite of the importance TPM

places on communication management through its various process groups and knowledge areas, no clearly defined criteria or outlet of practices in those process groups ensures successful communication, which is one of the main challenges identified by PMI Pulse. In contrast, APM has practices that increase communication bandwidth and frequency among all project communication channels engraved in its processes on the project and iteration level. For instance, APM puts much emphasis on co-located teams including customers and end users, as this is considered a key factor leading to a highly performing and homogeneous team. These benefits are realized as co-location facilitates coordination, alignment with project goals and requirements, as well as increased collaboration and communication among team members. In addition, face-to-face verbal exchange is at the core of communication channels in APM. APM calls for co-located undertaking crew members to facilitate what is recognized as osmotic communication. Face-to-face communication is continually the encouraged approach, as it is believed to transfer the most facts in a given time period. By nature, APM includes numerous types of formal and informal conversation channels. Informal communication includes face-to-face communication, meetings notes, and collaborative solutions. Osmotic communication is a mean of transmitting valuable information that flows among team members as part of everyday conversation and questions as they work in close proximity to each other. Formal communication tools include meetings and artefacts. These meetings include daily Scrum, sprint review, sprint, and retrospective meetings. Artefacts include products backlog, release plan, sprint backlog, and task board.

The PMI Pulse communications research found that effective communication leads to more successful projects, allowing organizations to become high performers, and hence APM supports constant, frequent, and face-to-face communication among project stakeholders by way of nature; for that reason, APM has tested successful when used as a project-management framework. Communication transparency and availability of project key information to the entire team has proven to be valuable in ensuring project success as it empowers project team members to make appropriate and well-informed decisions. Both APM and TPM acknowledge this important factor: APM took this acknowledgment further by stressing the importance of using information-radiation tools such as charts, boards, and frequent meetings, activities not well defined in TPM. Although TPM calls for popular verbal exchange and interplay among assignment individuals and stakeholders through a variety of stores to achieve and make certain assignment success; however, it does not define the specification of such as section of its methodology and technique as APM does.

### 2.5.3 Change and Scope of Management

TPM and APM range definitely in their view of alternate and how it is addressed. According to TPM, any change to project details and well-defined scope is considered a threat that should be controlled consequently alternate administration is defined as the manner and set of equipment to forestall scope creep or trade (PMI). Change management achieves this by providing an outlet for requesting, evaluating, planning, and implementing changes to a project scope. Change management has two main goals (PMI): supporting the processing of changes and enabling traceability of changes. In TPM, any approved change must be reflected to the project scope baseline and necessary corresponding adjustments to schedule and budget should be reflected to the project schedule and budget baseline.

Change management in the APM view, in contrast, is expected and facilitated. Unlike the wide and deeply defined project scope in TPM, APM focuses on defining high levels yet focused scope in the form of user stories that are scheduled to be released with the defined project release plan. During the initiation phase of a project, the Product Owner produces user stories for the entire project, but only produces detailed supporting documentation for those user stories scheduled for the first iteration. During the first iteration, the Product Owner produces detailed documentation for user stories to be worked on in the second iteration, and so on.

Hence, if the scope changes, the invested time on the scope is minimal and little rework is needed. Furthermore, APM assumes cost, time, and quality are fixed, and only scope can change. In APM, the project team commits to deliver on a fixed date for a certain cost, yet for a flexible scope. As a result, the project team in APM focuses on working on only high-priority project items and requirements that offers the most business value. When a scope change or anew feature is to be added to the project's scope, it has to be swapped with an item with the same number of story points. This approach is different from the TPM approach where new features (scope) are added at the expense of cost and delivery date.

In summary, the difference between APM and TPM regarding scope change management stems from TPM's emphasis on fixing the scope, as it is the core necessity to fix a project's resources, cost, and timeline. In contrast, APM considers functionality of the project that affects the scope to be variable while project resources (time and people) are fixed. Unlike TPM, the aim of agile is to have a small scope, rapid delivery at high rate, with a greater emphasis on communication rather than a process or plan.

Moreover, APM brings so much emphasis into progressive definition of scope and requirement, especially in cases when the customer is having difficulty articulating requirements. This is ensured as agile processes harness

change for customer's competitive advantage and emphasizes continuous attention to technical excellence and process improvement. Agile teams address this challenge through continuous and progressive iterations between planning, execution, control, and delivery.

#### 2.5.4 Risk Management

Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality (PMI). Project risk management includes the processes of conducting risk-management planning, identification, analysis, response planning, and control (PMI). Risk management calls for managing risk proactively. Only known risks that have been identified and analyzed are possible to be proactively managed. In TPM, it is crucial for the project manager and project team to be committed to address risk management proactively and consistently throughout the project. Moving forward on a project without proactive attention to risk management may lead to unmanaged threats and issues. The TPM process of risk management includes planning risk management, identifying risks, performing qualitative risk analysis, performing quantitative risk analysis, planning risk response, and risk control (PMI). In addition, TPM uses a risk register to log, manage, monitor, and document a project's risks.

In APM, there is no unanimous agreement on the need for formal risk management due to its iterative, limited scope, and controlled nature. Explicit risk administration becomes pointless when a challenge uses an agile approach. The short iterations, focused scope, emphasis on user acceptance criteria, and frequent customer deliveries help project teams avoid the biggest risk most projects face of eventually delivering nothing or delivering the wrong thing. APM focuses on two artefacts related to risk: the risks register and risk burn-down chart. The risk register should be made available for the entire team, and managed and maintained collaboratively with the project team. At every iteration planning and review meeting, the risk register is reviewed and updated with any new information obtained over the completed iteration. This way risk management becomes an integral part of the APM process and artefacts. The risk burn-down chart is an APM artefact to track a project's risk exposure rate among iterations. Risk exposure is a measure in days calculated by multiplying the probability of a risk with the number of lost days in case the risk took place. The risk burns down chart plots the sum of the risk exposure rate for each iteration; as the number of completed iterations increases, the risk-exposure rate should go down, reflected in a linear drop on the chart. The risk burn-down chart provides a quick and easy way of visualizing changes in risk over the life span of a project.

### 3. CONCLUSIONS

Global competition is at an all-time high. Technology is advancing at an unprecedented pace. Organizations must deliver more with fewer resources. Although there is no perfect solution to project management and success, executives and managers are turning to agile project management as a key solution to assist in this challenge. The increasing strain to deliver quality products in a dynamic and swiftly changing world market forced gurus to strengthen APM methodologies. Traditional project methodologies are regarded as the source of formality in project management and have been in use for a long time; their success in certain industries is highlighted by various scholars. APM has emerged with its highly iterative and incremental process, where project team and stakeholders actively work together to understand the domain, identify what needs to be built, and prioritize functionality. Unlike TPM, the aim of agile is to have a small scope and rapid delivery at a high rate. APM emphasizes communication rather than processes or plans. APM yields impressive benefits; its benefits come from many factors, primary of which is increased productivity and quality.

Projects that have used APM have been 5 instances extra high quality than those using TPM in cost and quality; furthermore, APM initiatives had 11 instances larger return on investment. In addition, APM has proven itself a practical way to manage high-risk, time-sensitive research-and-development projects due to its slight weight processes that lead to efficient decision making and productivity.

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