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CHOOSING THE MOST SUITABLE PROJECT MANAGEMENT METHODOLOGY

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Abstract: *During last decades, project management growth rapidly. It developed from a couple fields of application including civil construction, engineering, and heavy defense activity to a large area of fields. In every industry developments or improvements can be implemented using project management tools and methodologies. Nowadays, there are various approaches and methods that can be used in different types of project management. The purpose of this paper is to analyze the project management methodologies, to identify the criteria for choosing the most suitable approach and to understand how applying the best methodology can help companies add value and gain competitive advantage.*

Keywords*: agile, Kanban, lean, PMI, PMBOK, project management, project management methodologies, scrum, six sigma, waterfall*

JEL Classification*: L3, M10, M21*

1. Introduction

During time, for projects were established different definitions, each of them trying to be much specific and complete. Therefore, Project Management Institute (PMI) defined project as a temporary endeavor undertaken to create a unique product, service, or result (PMBOK, 2017), European Union states that a project is a series of activities aimed at bringing about clearly specified objectives within a defined time-period and with a defined budget (EU – PCM, 2004), and also, the project was defined as a temporary process comprising a series of activities which must fall within a well-defined period of time, an amount of allocated resources and which must achieve a clearly defined objective (Victor, 2008).

Starting with 1960s, "project management methodology" started to be defined by various organizations that have begun to identify effective tools that simplify achieving business benefits and organizing work in a structured and unique entity. The key criteria for establishing productive working relationships between teams and departments within one and the same organization were communication and collaboration.

Since then, the term has been changed and amended several times, Project Management Methodology is a strictly defined combination of logically related practices, methods and processes that determine how best to plan, develop, control and deliver a project throughout the continuous implementation process until successful completion and termination. It is a scientifically-proven, systematic and disciplined approach to project design, execution and completion (McConnell, 2010). Also, according to the Project Management Institute (PMI), a project management methodology is defined as 'a system of practices, techniques, procedures, and rules used by those who work in a discipline' (PMBOK, 2017).

2. Project management methodologies

A methodology is a method, a description of a process, a set of documented procedures, a list of steps that must be followed to run a project. The project management methodology contains procedures for project management that describe each step in detail, so that everyone knows what needs to be done to carry out the project activities.
A methodology for project management describes through procedures:

- roles in the project
- the activities and processes necessary for the development of the projects
- the forms (models) of documents that are used
- instructions for using project management tools

Using a project management methodology for all the projects reduces the time of projects, eliminates ambiguities and reduces the effort required for project management. Considering the fact that are various approaches and methods that can be used in managing different types of projects, project management methodologies can be divided into traditional and modern approaches.

3. Traditional project management methodology

One of the traditional project management methodologies, Waterfall is a linear, sequential design approach where progress flows downwards in one

direction—like a waterfall (Muslihat, 2019). Originating in the manufacturing and construction industries, its lack of flexibility in design changes in the earlier stages of the development process is due to it becoming exuberantly more expensive because of its structured physical environments. It is a process that takes place step by step to design, develop and deliver a product or service. This requires the achievement of the succession in the implementation process and provides the planning benefits based on Milestone.

The methodology was first introduced in an article written in 1970 by Royce (although the term 'Waterfall' wasn't used), and emphasizes that you're only able to move onto the next phase once the current phase has been completed. The main stages in the waterfall methodology are: feasibility, planning and design, implementation, validation (testing and debugging) and closing project (launch into production and post implementation support).

3.1. Feasibility

During this stage it is performed a study in order to identify if the project purpose solve the problem/provide the service requested into certain criteria of time and budget. Also, are identified resources and technology available to implement the project and it is analyzed the business value obtained.

3.2. Planning and design

This stage represent an important component of project management. After the scope of the project is established, it is decomposed into more granular tasks. In this phase is identified the duration to complete each piece of work identified, the resources needed to proceed this tasks and also the order in which activities have to be completed. Also, are identified the constraints, the milestones of the project and the features releases. Related to design activities, during this stage business requirements are centralized into a specific document, are validated by stakeholders and confirmed with developers from technical feasibility perspective.

3.3. Implementation

In this phase, developers implement the requirements considering the components and deliverables established into planning phase. After all the tasks identified during planning are developed, a proof of concept is presented to project team and stakeholders in order to avoid risks, clarify requirements and adapt them if necessary.

3.4. Validation

During this stage, Quality Assurance team validate developments based on business requirements and test cases. After all test cases are successfully validated, end users perform the UAT (User Acceptance Testing). In order to close this step, UAT must be successfully performed.

3.5. Closing project

After the Validation stage is successfully performed, the functionalities are ready to be released to production, to make them available to the intended and users. In order to make sure that all components are released in the appropriate order, a release plan is prepared and agreed by all team members and stakeholders. Also, a roll back plan must be in place, to make sure that the previous version of the functionality can be restored easily. As soon as project is released, the development team will support users during the first four weeks in order to obtain the stabilization of the functionality in production.

Best suited for: Larger projects that require maintaining stringent stages and deadlines, or projects that have been done various times over where chances of surprises during the development process are relatively low.

4. Modern project management methodology

Comparing with the traditional approach, the modern ones do not focus on linear processes but they provide an alternative look at project management. Some of them are most suitable for IT and software development, while others can be implemented in production, product engineering, process improvement and so on. Modern approaches are using different models of the management process. Some of the modern project management methodologies are presented below.

4.1. Agile

The Agile methodology is an alternative to traditional waterfall methodology and it is mainly used for software development, where requirements and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their customers. In this approach, the development happens in increments and each increment is a mini-waterfall by itself (Huo, Verner, Zhu and Babar, 2004). Emerging from the values and principles of the Manifesto for Agile Software Development (Agile Manifesto, 2001), this approach was created as a response to the shortfalls of the Waterfall method.

Developers realized they needed something different to the linear, sequential approach of the traditional Waterfall methodology in order to keep up with the improving and innovative culture of the constantly-developing software industry. Agile is a methodology that has methodologies within itself, such as Scrum and Kanban.

Best suited for: Projects that require flexibility and have a level of complexity or uncertainty. For instance, a product or service that hasn't been built by the team.

4.2. Scrum

Scrum is the most widely used Agile framework. It is an iterative incremental approach towards product development by the development team. In this approach, unlike waterfall, planning for the entire project is not a done upfront (Murali and Venkataiah, 2017).

What distinguishes Scrum from Kanban is how it operates by using certain roles, events, and artifacts, having as reference the scrum concept – the iterative box in which goal is accomplished. Time frame does not exceed one calendar month and are consistent throughout the development process.

Scrum team roles

- **Product owner**: Product expert who represents the stakeholders, and is the voice of the customer.
- **Development team**: Group of professionals who deliver the product (developers, programmers, designers).
- **Scrum master**: Organized servant-leader who ensures the understanding and execution of Scrum is followed.

Scrum events

- **Sprint planning**: Where the entire Scrum team get together—at the beginning of every Sprint—to plan the upcoming sprint.
- **Daily Scrum**: 15 minute time boxed meeting held at the same time, every day of the Sprint, where the previous day's achievements are discussed, as well as the expectations for the following one.
- **Sprint review**: An informal meeting held at the end of every Sprint where the Scrum team present their Increment to the stakeholders, and discuss feedback.

- **Sprint retrospective**: A meeting where the Scrum team reflect on the proceedings of the previous Sprint and establish improvements for the next Sprint.
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Scrum Artifacts

- **Product backlog**: Managed by the Product Owner, it's where all the requirements needed for a viable product are listed in order of priority. Includes features, functions, requirements, enhancements, and fixes that authorize any changes to be made to the product in future releases.
- **Sprint backlog**: A list of the tasks and requirements that need to be accomplished during the next Sprint. Sometimes accompanied by a Scrum task board, which is used to visualize the progress of the tasks in the current Sprint, and any changes that are made in a 'To Do, In progress, and Done' format.

Best suited for: Projects that consists of teams of less than seven people who need a flexible approach to delivering a product or service.

4.3. Kanban

Kanban is another popular Agile framework that, similar to Scrum, focuses on early releases with collaborative and self-managing teams. It is a very visual method that aims to deliver high quality results by painting a picture of the workflow process so that bottlenecks can be identified early on in the development process.

Kanban achieves efficiency by using visual cues that signal various stages of the development process. The cues involved in the process are a Kanban board, Kanban cards, and Kanban swim lanes, as they are detailed below (Muslihat, 2018):

- **Kanban board**: What's used to visualize the development process, a Kanban board can be either physical (a whiteboard, sticky notes, and markers) or digital. The board's basic structure is three columns labelled as 'To-Do, Doing, and Done'—which is rather self-explanatory.
- **Kanban cards**: Each Kanban card depicts a work item/task in the work process. Used to communicate progress with your team, it represents information such as status, cycle time, and impending deadlines.
- **Kanban swim lanes**: Flowing horizontally, Kanban swim lanes are a visual element on the board that allows you to further distinguish tasks/

items by categorizing them. Their purpose is to offer a better overview of the workflow.

Comparing with Scrum approach, in Kanban there are no predefined ceremonies, the team decide when to meet and the work is captured in user stories and arranged in the order of priority for the team member to work on, whenever team members are available.

Best suited for: Like Scrum, Kanban framework is fitting smaller teams, who need a flexible approach to deliver a product or service. Kanban is also great for personal productivity purposes.

4.4. Lean

Lean methodology promotes maximizing customer value, while minimizing waste. It aims to create more value for the customer by using fewer resources. Stemmed from the Japanese manufacturing industry, its values suppose that 'as waste is eliminated, quality improves while the production time and cost are reduced.' Lean is a way of thinking about creating needed value with fewer resources and less waste. And lean is a practice consisting of continuous experimentation to achieve perfect value with zero waste. Lean thinking and practice occur together (Lean Enterprise Institute, 2021). It identifies three types of waste; muda, mura, and muri, also known as the 3Ms (Muslihat, 2018).

Muda

Muda is about getting rid of waste, and refers to an activity or process that does not add value. It can either be something that is a physical waste of your time or something that is a waste of your resources.

Mura

Mura is about eliminating variances in the workflow process at a scheduling and operation level so that everything flows evenly. For example, when publishing a magazine, if an editor spends too much time editing an article, it means that the design team will have less time to create the spread before the publishing deadline comes. Therefore, you would reduce the editing time and ensure every department's timeframe spent on the article is the same.

Muri

Muri is about removing overload so that the nothing slows down. It refers to managers and business owners imposing unnecessary stress on their employees

and processes due to things such as poor organization, unclear ways of working, and using incorrect tools.

Best suited for: This methodology is ideal for businesses or organizations that are not looking for a process as such, but are interested in transforming how they conduct doing business.

4.5. Six Sigma

Six Sigma was first introduced by engineers at Motorola in 1986. Six Sigma strategies seek to improve manufacturing quality by identifying and removing the causes of defects and minimizing variability in manufacturing and business processes. It does this by using empirical and statistical quality management methods and by hiring people who serve as Six Sigma experts. Each Six Sigma project follows a defined methodology and has specific value targets, such as reducing pollution or increasing customer satisfaction (Wikipedia, 2021).

There are two major methodologies of Six Sigma carried out by Six Sigma Green Belts and Six Sigma Black Belts, and are supervised by Six Sigma Master Black Belts (De Feo and Barnard, 2005).

DMAIC: The DMAIC method is used primarily for improving existing business processes. The letters stand for:

- **D**efine the problem and the project goals
- **M**easure in detail the various aspects of the current process
- **A**nalyze data to, among other things, find the root defects in a process
- **I**mprove the process
- **C**ontrol how the process is done in the future

DMADV: The DMADV method is typically used to create new processes and new products or services. The letters stand for:

- **D**efine the project goals
- **M**easure critical components of the process and the product capabilities
- **A**nalyze the data and develop various designs for the process, eventually picking the best one
- **D**esign and test details of the process
- **V**erify the design by running simulations and a pilot program, and then handing over the process to the client

Best suited for: Larger companies and organizations that want to improve quality and efficiency through a data-driven methodology.

4.6. PMI/PMBOK

PMI stands for the Project Management Institute which is a not-for-profit membership association, project management certification, and standards organization. Through the PMI, comes the PMBOK which is not quite a methodology but a guide detailing a set of standards that characterize project management.

PMBOK stands for the Project Management Body of Knowledge and is a set of standard terminology and guidelines for project management. It states that there are five process groups that are prevalent in almost every project. They are:

a. **Initiating**: Defining the start of a new project or new phase of an existing project.
b. **Planning**: Where the scope of the project, objectives, and how the objectives will be achieved.
c. **Executing**: Actually doing the work defined in the project management plan.
d. **Monitoring and Controlling**: When you need to track, review, and regulate the progress and performance.
e. **Closing**: Concluding all activities across all Process Groups to formally close the project or phrase.

Along with this, it includes best practices, conventions, and techniques that are considered the industry standard.

Best suited for: Because it's more of a reference guide than an actual project management methodology, you can't implement PMI/PMBOK to a project. However, it can be used for when you want to weigh in on the best practices for your project.

5. Choosing the project management methodology

Most of the times the selection and implementation of a project management methodology is a task that falls under the responsibility of an employee or a group of people within the Project Management Office (office, department or service for project management).

Step 1. The selection of a methodology for project management begins with the definition of objectives and requirements. It must be clarified why we want

to implement a project management methodology, what content it must have and how we intend to use it.

The requirements that a project methodology must meet can be:

- Its methodology contains the complete description of the phases of a project (Project Life Cycle);
- Each stage must be described in detail;
- Each activity that generates a deliverable must have a document template and examples to help the project manager and the team to carry out each project activity quickly and easily;
- The methodology must be based on an internationally recognized project management standard;
- The project methodology must be suitable (usable) for all types and dimensions of the project;
- Easy to modify and adapt for each organization;
- Easily accessible in document format (word, pdf etc) but also web (html);

Step 2. Identify and make the list of existing project management processes and procedures, already used in your organization. It is not necessary to reinvent things if we already have procedures that are used successfully in carrying out projects in our company. This effort involves comparing the existing procedures in the organization with the procedures available in the best known project methodologies, to estimate how well this methodology fits, what we can take and adapt from this methodology in order to be able to easily use in our organization. If from this analysis we estimate that the available project methodology fits in a large proportion, then we obtain this methodology and modify the procedures that cannot be used directly.

6. The advantages of using a methodology for project management

By selecting, implementing and using a project management methodology, project teams can complete project activities more easily, predictably and consistently. Implementing projects using project management methodologies can streamline project execution and enhance overall organizational performance. According to Project Management Methodologies 101: The What, Why, How, & Types Explained article (Proprofs, 2021), with the right project management methodology, organization can:

- Adapt to new project challenges easily and quickly;
- Enhance the skills of managers;

- Build a project management culture;
- Reduce project risks considerably;
- Increase team productivity;
- Understand how to invest all your resources efficiently;
- Meet project deadlines effortlessly in the time and budget.

7. Advantages and disadvantages of traditional and modern methodologies

The most frequently used methodologies are waterfall and agile methodologies. Therefore, choosing one of them must to be based on information presented below.

7.1. Advantages of waterfall methodology

- The requirements are clearly and accurately stated, they remain unchanged throughout the entire project development;
- Detailed documentation of each development stage provides resistance to changes in human resources – a new developer can quickly get all the necessary information;
- Careful planning of the project development structure reduces the number of problematic issues;
- The start and end points for each phase are set, which makes it easy to measure progress;
- The tasks remain as stable as possible throughout the development process;
- It provides easy control and transparency for the customer due to a strict reporting system;
- Release date for the finished product, as well as its final cost can be calculated prior to development (Lvivity, 2018)

7.2. Disadvantages of waterfall methodology

- All requirements must be known prior to development, which greatly delays the project kickoff;
- Low flexibility level makes it difficult to make changes while developing, or even makes it completely impossible;
- There is a need for strict management and regular monitoring, so that the project will meet the deadline;
- The client does not have the opportunity to get acquainted with the system in advance, so he does not see the product until the moment of its completion;

- In case it becomes clear in the process of development that the product does not meet market requirements, there will be no room for changes.

7.3. Advantages of agile methodology

- Changes in scope by the end users can be incorporated even though it is not captured as part of the initial requirements;
- New features can be added if the team can accommodate changes;
- Customer involvement in the project is comparatively high and would provide continuous feedback through sprint reviews;
- Bugs are identified early and can be fixed early on the project;
- Project functionality can be released at the end of each sprint;
- Creates Transparency.

7.4. Disadvantages of agile methodology

- If the product owner is not committed, the project would not be successful;
- A project plan for the whole project is not defined up front, the exactly time of delivery is unknown;
- 20%-30% of the time of the project team is committed to ceremonies
- It is not appropriate for large and complex projects
- Requires transformation at organization level

8. Conclusion

Choosing the project management methodology can be a difficult task, but considering the characteristics of each methodology, it can be easily identified the most appropriate approach for a project. Depending on the dynamics, the imposed deadline, the characteristics of the project, the size of the teams, the dispersion of the team members and other criteria, can be choose between the traditional project management methodology or the modern ones, with a focus on the agile ones. There are many methodologies to choose from, each with their own set of rules, principles, processes, and practices. The point of selecting a project management methodology is to maximize the use of resources and time. Implementing a project with the most suitable methodology increase the project success, the involvement of team members, the quality of deliverables, customer satisfaction, reduce risks, and also the competitive advantage.

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