

# Impact of Adopted Methodology on Project Execution and Milestone

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## **Abstract**

The approach used for a project's execution has a significant influence on its success. Project managers play a crucial role in the selection and implementation of suitable techniques that are customised to meet project needs and the organisational environment. Techniques for incorporating various approaches into project teams stress the value of teamwork, communication, and goal alignment. A dynamic business environment requires organisations to adapt and innovate in order to stay competitive. This is further supported by projected trends in project management approaches, such as the emergence of digital transformation and the incorporation of new technologies. The complex link between technique choice and project results is painstakingly examined in this review study, with a focus on how it affects execution effectiveness and milestone achievement. This research explores different approaches, their unique features, and the significant ways in which they influence project dynamics via a thorough synthesis of the body of current knowledge. It also provides insightful information about potential future routes for improving project performance and critically examines the effects of methodology choice on project management procedures.

**Keywords:** Project Methodology, Milestone Achievement, Execution Efficiency, Methodology selection and Project Success

## Introduction

The choice of methodology is one of the most important decisions in project management as it has a significant impact on how the project is carried out and how many milestones are reached. The framework that a project functions under is largely shaped by the methodology used; it determines not only the order in which activities are completed but also how resources are distributed and team members communicate with one another (Kerzner, 2017). Conventional approaches, like Waterfall, place an emphasis on a sequential, linear process in which each project phase is finished before going on to the next (Kerzner, 2018). Agile approaches, on the other hand, encourage iterative development, allowing teams to adjust to evolving needs and provide incremental value (Iriarte & Bayona, 2020).

The selection of these procedures over other approaches has noteworthy consequences for the dynamics of the project, including variables like flexibility, risk mitigation, and involvement of stakeholders (Stanitsas *et al.*, 2021). Moreover, the chosen approach establishes the guidelines for managing and planning milestones during the course of the project (Gemino *et al.*, 2021). The selected technique directly affects the viability and timeliness of milestone attainment by setting up the foundation for task dependencies and progress monitoring (Kerzner, 2018). As a result, the choice of methodology is crucial not only at the beginning of the project but also at every step of its execution, which ultimately determines its success or failure (Stanitsas *et al.*, 2021).

Fundamentally, the methodology selected determines the strategy, instruments, and methods used throughout the project lifecycle, influencing not just how work is done but also how obstacles are overcome and accomplishments are made. For example, in conventional approaches like as Waterfall, the focus is on a step-by-step development of project stages, where each step has to be finished before proceeding to the next (Järvinen, 2023). This inflexible framework affects risk identification and mitigation, as well as the distribution of time and resources. On the other hand, agile approaches encourage iterative development, which helps teams react fast to evolving needs and input from stakeholders (Gaborov *et al.*, 2001). This adaptability and constant development make the project more capable of overcoming setbacks and producing value little by bit (Kerzner, 2017). Furthermore, team dynamics and cooperation patterns are impacted by the technique used since various methods call for varied degrees of coordination and communication between team members (Iriarte &

Bayona, 2020). The choice of methodology has a significant impact on project results as it shapes not only the technical elements but also the interpersonal dynamics within the project team.

It is impossible to overestimate the importance of methodology selection in project management since it provides the framework within which the whole project operates. Fundamentally, the technique used determines how activities are conceptualised, carried out, and overseen during the course of the project. A sequential, linear evolution of project stages characterises traditional approaches, such as Waterfall, where each step must be finished before moving on to the next (Ng *et al.*, 2022). While project planning and execution are made clearer and more predictable by this organised approach, it may make it more difficult to adjust to changing needs or unanticipated difficulties. Agile approaches, on the other hand, place a higher value on adaptability and responsiveness. They achieve this by segmenting the project into iterative cycles and enabling ongoing input and modification (Cobb, 2023). Its iterative style encourages creativity, gives teams the opportunity to respond to changing demands from stakeholders, and improves project flexibility in changing circumstances.

Furthermore, the influence of methodology is not limited to the domain of execution; it also permeates milestone planning and accomplishment. According to Işık and Çifci (2023), milestones play a vital role in project timelines by designating important points of development and enabling monitoring of that progress. The extent of stakeholder participation throughout the process, the frequency of review points, and the granularity of tasks are all strongly influenced by the methodology that is used, which in turn affects milestone planning. For example, milestones are often more flexible with Agile approaches, with a focus on providing incremental value via numerous iterations (Ng *et al.*, 2022). In contrast, milestones in conventional approaches are usually linked to the end of significant project stages. Therefore, the choice of technique affects not only the efficacy and efficiency of reaching milestones but also the expectations and views of stakeholders on the status of the project. The goal of this review article is to provide a comprehensive knowledge of the ways in which project execution and milestone accomplishment are impacted by methodology selection. Through the synthesis of current knowledge and the provision of practical insights, it helps stakeholders and project managers navigate the challenging terrain of selecting the best approach for the best project results.

## Methodologies in Project Management

Project management methodologies include a wide range of techniques, each with unique benefits and drawbacks. Conventional approaches, such as the Waterfall model, proceed in a step-by-step, sequential fashion, with every stage contingent on the success of the preceding one (Järvinen, 2023). Projects with well-defined needs and stable settings are well-suited for this sequential method because it offers structure and clarity. But its inflexibility makes it difficult to adapt to changes and address changing stakeholder requirements. However, because to its focus on adaptability, teamwork, and iterative development, Agile approaches have been more well-known recently (Gemino *et al.*, 2021). Agile project management techniques, like Scrum and Kanban, divide work into smaller, more manageable iterations so that feedback and adaptation may happen continuously. Rapid value delivery, improved stakeholder participation, and risk mitigation from shifting needs or market dynamics are all facilitated by this iterative strategy. Agile approaches, however, are better suited for projects with dynamic or unclear objectives since they necessitate a high degree of teamwork and communication.

Furthermore, inspired by industrial concepts, Lean approaches maximise value while minimising waste (Albuquerque *et al.*, 2020). Process simplification, inefficiency elimination, and resource optimisation are the goals of lean concepts like Just-In-Time delivery and continuous improvement. Although lean approaches have the potential to be efficient and cost-effective, their use in project management may need to be modified to accommodate the particular needs of knowledge work and project contexts.

### *Examination of traditional methodologies*

- Waterfall

Traditional project management techniques, such waterfall project management, have in fact been the cornerstone of organised project execution for many years. Thesing *et al.* (2021) describe the Waterfall model as a strict sequential and linear method to project management, which was first introduced by Winston W. Royce in 1970. Fundamentally, the Waterfall technique consists of a sequence of discrete, predetermined stages, each of which builds on the deliverables of the one before it. The idea that these stages should be progressed through strictly sequentially, with each phase serving as a tangible stage gate before moving on to the next, is

the essential idea behind the Waterfall model. This technique tries to fully describe all project needs and specifications prior to starting development, placing a strong focus on meticulous planning and documenting up front.

But even with its widespread use throughout history, the Waterfall technique has come under heavy fire, especially in modern project management situations. The fundamental lack of flexibility and adaptability of the Waterfall technique is one of the main critiques thrown against it. Once a phase is over, the Waterfall model's sequential design gives limited opportunity for iteration or course correction (Diem, 2021). In dynamic contexts where project needs are susceptible to change or when unanticipated obstacles develop during project execution, this lack of flexibility becomes particularly troublesome. Furthermore, since stakeholders may not be aware of the project's progress until much later, the Waterfall technique may result in long development cycles and delayed feedback, which might cause a mismatch with changing stakeholder demands. The Waterfall technique is still used in certain project settings despite its drawbacks, especially those with stable surroundings and well-defined requirements. In these situations, the predictable, structured character of the Waterfall technique may provide predictability and clarity, enabling efficient resource allocation and planning. Project managers must, however, be aware of the trade-offs that come with using the Waterfall model and carefully assess if it is appropriate given the goals of the project, its restrictions, and the dynamics of its stakeholders.

Although the Waterfall technique has long been a mainstay of organised project execution, its strict sequential structure and limited flexibility present serious difficulties in modern project management settings (Diem, 2021). In order to effectively facilitate successful project results, project managers must assess the Waterfall approach's applicability in light of project-specific considerations, acknowledging both its advantages and disadvantages. This thorough introduction clarifies the fundamental ideas of the Waterfall technique, explaining its organised and methodical approach to project management. In order to fully comprehend how each principle influences project execution, the following are evaluated for each one:

1. **Sequential Progression:** The Waterfall model's linear phase sequence guarantees a logical project lifetime progression. The project develops gradually as each phase builds on the results of the one before it (Thesing *et al.*, 2021). This step-by-step development gives project teams

a clear road map that makes it possible for them to follow a defined course from the start of the project to its conclusion.

2. Extensive Planning: The Waterfall technique is based on extensive planning and documentation from the beginning. Teams provide a strong foundation for future project activities by carefully defining and documenting project requirements and specifications up front (Zanalda, 2019). The foundation for wise decision-making and resource allocation throughout the project lifespan is laid at this thorough planning stage.

3. Phase Gates: In the Waterfall model, phase gates signify the end of one project phase and the start of the next. They are essential milestones. By ensuring that deliverables fulfil predetermined criteria before moving forward, these clearly defined milestones improve quality assurance and project governance (Mutlu, 2019; Thesing *et al.*, 2021). Phase gates facilitate informed decision-making on project direction and resource allocation by giving stakeholders insight into the project's progress.

4. Minimal Changes: After a phase is finished, the Waterfall technique discourages changing the project's requirements or specifications. By placing a strong focus on stability and predictability, Thesing *et al.* (2021) want to reduce the likelihood of mid-project changes causing delays and disruptions. Adhering to a "freeze" on modifications after each phase helps teams stay focused and move forward with the project while staying within the set parameters.

5. Document-Centric: An essential component of the Waterfall technique, documentation acts as a communication tool and a repository for project knowledge among project stakeholders. Traceability and accountability are made easier throughout the project lifecycle by comprehensive documentation, which guarantees clarity and transparency about project requirements, specifications, and deliverables (Thesing *et al.*, 2021). Additionally, document-centricity facilitates knowledge continuity and transfer, allowing team members and stakeholders to collaborate effectively.

6. Validation at End: In the Waterfall approach, testing and validation procedures are normally carried out at the conclusion of each step. Before moving on to the next phase, this end-of-phase validation makes sure that deliverables meet the required specifications and quality standards (Mutlu, 2019). Teams may lower the likelihood of errors and rework later in the

project lifecycle by identifying and addressing problems early via output validation at critical milestones.

The Waterfall methodology's fundamental ideas highlight its methodical, organised approach to project management. Although the aforementioned principles provide lucidity, anticipation, and oversight in the implementation of projects, it is essential for project managers to recognise the intrinsic constraints of the Waterfall methodology, namely its inflexibility and restricted capacity to adjust to evolving needs. Project managers may successfully negotiate the benefits and limits of the Waterfall technique to generate successful project outputs by critically analysing its applicability in light of stakeholder demands and project-specific circumstances.

- V-Model and its Core Principle

It is true that the Verification and Validation model, or V-Model, offers an organised and methodical framework for project management and software development. But even though it has many advantages, there are certain drawbacks that should be carefully considered (Ma, 2021). Importantly, there are two drawbacks to the structured approach of the V-Model. From requirements collecting to testing, it offers a methodical and well-defined approach that guarantees each stage is well-defined and follows a logical order (Balkhair, 2019). Its hierarchical form makes it simpler to monitor progress and allocate resources efficiently, improving project visibility and enabling greater control over the development process. Furthermore, by lowering the possibility of mistakes and faults, the focus on validation and verification throughout the project lifecycle contributes to the maintenance of product quality and dependability.

But the V-Model's rigidity may also be a problem, especially in contexts that are dynamic and change quickly. Due to its sequential design, there is no opportunity for flexibility or adaptability to changing needs since each step must be finished before moving on to the next (Balkhair, 2019). Delays and bottlenecks may come from this lack of adaptability, particularly if modifications or problems occur late in the development cycle. A false feeling of security may also result from the V-Model's emphasis on upfront planning and documentation, which makes the assumption that all needs can be precisely specified and understood at the outset of the project. Iterative development methodologies are necessary to adapt changes more efficiently, since needs tend to change over time (Henry, 2008).

Furthermore, even if the V-Model emphasises verification and validation a lot, it could not sufficiently cover other important facets of software development, such stakeholder engagement and user input. The V-Model may undervalue user happiness and commercial value by putting too much emphasis on technical compliance with criteria. This might result in products that don't satisfy end users' expectations or don't provide stakeholders with the advantages they were supposed (Alazzawi & Rahmatullah, 2023).

Although the V-Model provides an organised and methodical approach to project management and software development, its rigidity and limited flexibility may present difficulties in contexts that are dynamic and changing quickly. To guarantee project success, project managers should thoroughly assess the V-Model's applicability for their particular projects, taking into account both its advantages and disadvantages. They should also be ready to modify or augment it with more flexible and iterative methods as necessary. Let's examine its fundamental ideas closely and go into more detail about each one:

1. **Emphasis on Verification and Validation:** Throughout the project lifecycle, the V-Model heavily emphasises verification and validation operations. While validation verifies that the software satisfies end users' needs and expectations, verification makes sure the programme complies with predefined standards and specifications (Ren *et al.*, 2024). Through methodical testing and verification of each delivery against predetermined criteria, this focus on validation and verification helps assure the quality and dependability of the finished product.

2. **simultaneous Development and Testing:** The simultaneous development and testing of software components is one of the main tenets of the V-Model. According to Fattepur *et al.* (2023), the V-Model divides development and testing operations into parallel tracks, with each stage of development matching a corresponding stage of testing. By ensuring that testing operations are included into the development process from the beginning, this parallel method makes it possible to identify and address problems and flaws early on.

3. **Phased Approach:** The V-Model develops software in phases, with each stage of development matching a particular stage of testing. The development process is given structure and clarity by this tiered method, which enables incremental advancement and milestone accomplishments (Ren *et al.*, 2024). But the V-Model's strict sequentiality may also work against it, making it more difficult to adjust and react to shifting demands or market dynamics.



4. Traceability and Documentation: According to Ren *et al.* (2024), traceability and documentation are essential parts of the V-Model that guarantee requirements, designs, and test cases are properly recorded and traceable during the course of the project. The focus on documentation and traceability among project stakeholders promotes accountability, openness, and information sharing. But the V-Model's stringent documentation requirements may also be problematic since they can add to the cost and administrative load, especially for large-scale projects.

5. Risk Management: Zhu *et al.* (2023) state that the V-Model proactively identifies and mitigates possible risks throughout the project lifetime by incorporating risk management concepts into the software development process. Through a methodical evaluation and management of risks, the V-Model reduces the possibility of delays in project completion, overspending, and poor quality. However, since the V-Model focuses on predetermined risk mitigation measures rather than accepting uncertainty and ambiguity, its approach to risk management may be too deterministic.

All things considered, the V-Model has drawbacks even if it provides a methodical and disciplined approach to project management and software development. The V-Model's strict sequential structure may be a limitation in dynamic and quickly changing settings where adaptation and flexibility are critical. Furthermore, the V-Model's copious documentation and administrative burden might be problematic, especially for projects with limited resources or deadlines. Therefore, taking into account stakeholder demands and project-specific considerations, project managers must critically assess the V-Model's applicability, taking into account both its advantages and disadvantages in terms of enabling effective project results.

### **Emerging Methodologies and their Applicability**

New approaches such as Lean have, in fact, attracted a lot of interest from a variety of sectors, mainly because of their shown ability to maximise efficiency, reduce waste, and improve overall quality (Kolasani, 2023). Though these approaches provide useful foundations for improving organisations, they are not without drawbacks and difficulties. The possibility of improper application or an excessive focus on technique at the cost of more general organisational objectives is an important factor to take into account. Without taking into

account the particular context and culture of their organisation, some organisations may embrace methodologies like Agile, Lean, or Six Sigma, among others, as a cure-all for all inefficiencies (Zhu *et al.*, 2023). This may result in a severe and dogmatic application of technique, suppressing originality and creativity in favour of close adherence to guidelines and equipment.

Furthermore, process optimisation and data-driven decision-making are critical to the efficacy of these approaches. Organisations may have difficulties in gathering, evaluating, and interpreting pertinent data, despite the fact that data analysis is essential for pinpointing areas that need development and directing improvement initiatives (Diem, 2021). Inadequate or false data may cast doubt on the viability of attempts for development and result in erroneous conclusions, which ultimately impede rather than promote progress. Furthermore, organisational leadership and stakeholders must actively participate in and be committed to these projects for them to succeed. Improvement initiatives could not have the momentum and resources to bring about significant change if there is a lack of strong leadership support and buy-in from all organisational levels. Organisational silos, conflicting agendas, and resistance to change may all hinder development and reduce the efficacy of these programmes (Lima *et al.*, 2023). Moreover, these approaches could be less successful in stimulating creativity and bringing about revolutionary change, even while they are excellent at streamlining current procedures and producing small-scale gains. Recognising that too strict adherence to emerging methods principles may inhibit creativity and restrict potential for disruptive innovation, organisations must achieve a balance between operational excellence and innovation (Kolasani, 2023).

Because of this, these approaches provide useful instruments for raising productivity, cutting costs, and raising quality; nonetheless, enterprises need to use them carefully and critically. By taking into account the distinct context, culture, and objectives of their establishment, along with the addition of complementary methodologies like Agile and Design Thinking to Lean and Six Sigma, organisations can optimise the efficiency of their improvement endeavours and foster enduring, enduring prosperity.

### ***Agile, and its core principles***

In fact, agile methodology has gained popularity as a flexible and dynamic approach to project management, particularly in response to the difficulties presented by projects with complicated, unpredictable, and quickly changing needs (Işık *et al.*, 2023). Organisations are increasingly confronted with initiatives that challenge conventional, linear methods to project management in today's fast-paced and constantly-evolving business environment. It is challenging to forecast and prepare for future demands with confidence since these initiatives often entail changing stakeholder expectations, dynamic market situations, and changing technological environments. Agile technique presents a strong substitute in these situations by offering a framework that welcomes change and uncertainty rather than fighting against it (Ng *et al.*, 2022). Agile helps teams to swiftly adjust to changing needs and market circumstances by breaking projects down into tiny, manageable increments or iterations. Early and ongoing value delivery to stakeholders is made possible by this iterative approach, which also guarantees that project outputs stay in line with changing requirements and priorities. Throughout the project lifecycle, agile methodology places a high priority on customer and stakeholder interaction and cooperation. Agile teams learn a great deal about the requirements, preferences, and priorities of their customers by actively including stakeholders in the development process. According to Stanitsas *et al.* (2021), the adoption of a customer-centric approach facilitates a more profound comprehension of project needs and empowers teams to make well-informed choices that optimise value delivery and stakeholder satisfaction. Moreover, the Agile approach fosters in project teams a culture of openness, responsibility, and ongoing development. Agile encourages a feeling of ownership and responsibility among team members by giving self-organizing teams the freedom to decide for themselves and to manage their work independently. Teams may discover areas for improvement and gradually implement changes by reflecting on their processes, practices, and results via regular feedback loops and retrospectives.

Teams are guaranteed to stay flexible, adaptable, and robust in the face of unpredictability and complexity because to this iterative approach to improvement (Albuquerque *et al.*, 2020). All things considered, projects that are marked by ambiguity, complexity, and quickly changing needs might benefit greatly from the use of agile approach. Agile empowers teams to efficiently traverse the obstacles of contemporary project management by embracing change, promoting

collaboration, and placing a high priority on continuous improvement. Agile methodology offers a flexible and robust framework for delivering successful project deliverables and fostering sustainable company development as organisations continue to adapt to a more turbulent and uncertain business context (Thesing *et al.*, 2021). The agile methodology has gained popularity as a flexible and dynamic approach to project management. It works especially effectively for projects with complicated needs that change quickly and a high degree of uncertainty. The fundamental tenets of Agile approach and its consequences:

**Iterative and Incremental Development:** The agile approach places a strong emphasis on the breakdown of projects into smaller, more manageable iterations or increments. Every iteration produces a product increment that may be shipped, facilitating quick feedback and adjustment (Malla, 2023). By encouraging early and ongoing value delivery to stakeholders, this approach helps teams adapt swiftly to shifting demands and market conditions.

**Customer Collaboration:** Agile approach places a high priority on working together with customers and stakeholders. Agile teams learn a great deal about the requirements, preferences, and priorities of their customers by actively including them in the project lifecycle. This focus on the needs of the client guarantees that project results maximise value delivery and closely match stakeholder expectations (Kakar, 2023)

**Adaptive Planning:** The agile approach promotes adaptable, change-responsive plans that are pliable. Agile teams accept change as a normal and unavoidable aspect of the project lifecycle as opposed to sticking to strict, long-term goals. Teams may dynamically modify actions, resources, and priorities in response to changing market circumstances and needs by using adaptive planning (Magistretti & Trabucchi, 2024). Agile technique gives self-organizing teams the freedom to decide for themselves and to carry out their tasks on their own. Agile teams are more capable of responding rapidly to obstacles, working together productively, and coming up with creative solutions when they cultivate an environment of empowerment and responsibility. Project success is fueled by self-organizing teams, which encourage innovation, accountability, and continual development (Kakar, 2023).

**Continuous Improvement:** The idea of retrospectives embodies the basic Agile methodology notion of continuous improvement. Agile teams evaluate their procedures, methods, and results on a regular basis to find areas for development and make small, gradual adjustments. A culture of learning, adaptability, and creativity is fostered by this iterative approach to improvement,

which promotes continuous project success and team development ((Magistretti & Trabucchi, 2024)..

Accept Change: The agile approach views change as a chance rather than a barrier. Agile teams embrace change as a way to improve project results and provide stakeholders with more value, as opposed to opposing it or seeing it as a disturbance. Agile teams maintain their responsiveness, adaptability, and resilience in the face of uncertainty and complexity by welcoming change (Kakar, 2023). Agile methodology's fundamental ideas place a strong emphasis on adaptability, teamwork, customer attention, and ongoing development. Agile has several advantages, such as better customer satisfaction and flexibility, but it also has drawbacks, such managing stakeholder expectations and maintaining project discipline in unpredictable circumstances. Project managers may successfully employ Agile concepts to optimise project results and negotiate the difficulties of contemporary project management by critically assessing the methodology's basic principles and their consequences.

### ***Lean Methodology***

Originating from lean manufacturing concepts, lean methodology has gained prominence due to its focus on maximising customer value and minimising waste. But its use outside of conventional production settings offers chances as well as difficulties that need for careful consideration (Nshirim & Nwagwu, 2023). Fundamentally, the Lean approach promotes the constant pursuit of process improvement and the reduction of non-value-added tasks. Lean uses waste identification and elimination across the value process to maximise productivity and improve customer satisfaction. Although this idea has application in a number of non-manufacturing sectors, including software development, healthcare, and services, its use requires rigorous context analysis and customisation to fit the particulars of each industry (Fattepur *et al.*, 2023).

Lean concepts, for example, may expedite workflows, shorten lead times, and improve customer satisfaction in software development by giving top priority to features that benefit users most. Value stream mapping is one technique that helps teams see and analyse development processes to find waste and inefficiencies. In a similar vein, kanban systems make it easier to see and control work in progress, guaranteeing efficient resource allocation and timely resolution of bottlenecks (Kolasani, 2023). Furthermore, teams may release features

progressively in response to customer demand by using the just-in-time production idea in software delivery. This approach minimises waste and maximises value. Nevertheless, there are difficulties in applying lean concepts in non-manufacturing settings. For instance, the naturally complicated and iterative structure of the software development process may make it difficult to strictly implement lean concepts. In contrast to manufacturing, software development often entails unpredictability, inventiveness, and quick change. Manufacturing processes may be standardised and optimised for efficiency. Therefore, in order to properly handle the dynamic nature of software development projects, lean techniques may need to be modified and enhanced with agile approaches (Mutlu, 2019). Additionally, non-manufacturing industries' performance with Lean efforts depends on elements including employee engagement, leadership support, and organisational culture.

Lean implementation initiatives may be hindered by resistance to change, a misalignment with strategic goals, and a lack of resources, which might compromise their potential influence on customer happiness and performance. The lean methodology, which is based on lean manufacturing concepts, is distinguished by a number of fundamental ideas that guide its approach to waste reduction and process optimisation. These guidelines provide a structure for optimising client value and reducing waste. The following are the fundamental ideas:

1. **Maximising Customer Value:** This is the first and most important Lean methodology concept. According to Amrani and Ducq (2020), this concept highlights the significance of comprehending client wants and preferences and providing goods and services that closely adhere to their demands. Lean seeks to improve customer happiness and loyalty by concentrating on value-added operations that directly contribute to addressing customer demands.

2. **Reducing Waste:** Reducing waste, which may be broadly divided into seven categories, is a cornerstone of the lean technique. These include overproduction, waiting, transportation, overprocessing, inventory, motion, and defects. In order to optimise workflows, save expenses, and boost productivity, lean principles promote the discovery and removal of waste across the value chain (Amrani & Ducq, 2020). Although cutting waste is a key component of lean, businesses must exercise caution to avoid sacrificing creativity or quality in the sake of efficiency.

3. Continuous Improvement: Kaizen, also known as continuous improvement, is a fundamental Lean methodology concept that highlights the significance of gradual, continuous improvements in services, goods, and processes. Lean organisations may maintain competitiveness in a business environment that is changing quickly by promoting a culture of continuous learning, experimentation, and adaptation (Nshirim & Nwagwu, 2023). All organisational levels must be committed to and engaged in the quest of continuous improvement, however, as well as prepared to accept change and challenge the status quo.

4. Respect for individuals: Upholding and empowering individuals inside the organisation is a key component of the lean technique. This idea acknowledges that workers are important resources with priceless insights, know-how, and experience. Lean companies may maximise worker potential and cultivate a collaborative, innovative, and ownership culture by including workers in problem-solving and decision-making processes (Amrani & Ducq, 2020). But having true respect for people is more than simply saying the right things; it means being dedicated to creating a positive work atmosphere, funding staff growth, and honouring and rewarding accomplishments.

5. Pull-Based Systems: Pull-based systems, in which work is done in reaction to consumer demand instead than being pushed through the system based on projections or production plans, are recommended by lean principles. Pull-based systems decrease lead times and overproduction by minimising surplus inventory and overproduction (Nshirim & Nwagwu, 2023). This improves resource utilisation. In order to guarantee that production or service delivery is responsive to consumer requirements while preserving efficiency and quality standards, switching to a pull-based system requires rigorous planning and coordination. Although the lean approach provides useful tools and ideas for process improvement in a variety of sectors, its use in non-manufacturing settings requires careful consideration and modification to meet the particular demands and problems of each industry. Organisations may use the advantages of Lean methodology to promote efficiency, innovation, and customer value in non-traditional contexts by adopting the key concepts of Lean and tailoring them to their particular situation.

### ***Six Sigma Methodology***

Reducing errors and variances in processes is the goal of Six Sigma, a data-driven technique that promises near-perfect quality. Its dedication to accuracy and efficiency is shown by the fact that it uses statistical tools and methods to monitor, analyse, and improve process performance. Despite having its roots in manufacturing, Six Sigma's claimed applicability to other sectors and project types needs careful examination (Patel & Patel, 2021). The organised approach of Six Sigma, which is often expressed in frameworks like DMAIC (Define, Measure, Analyse, Improve, Control) or DMADV (Define, Measure, Analyse, Design, Verify), is one of its primary strengths. By offering a methodical road map for process improvement and problem-solving, these frameworks support organised decision-making and organisational alignment (Byrne *et al.*, 2021). Rigidly following predetermined stages, however, might inhibit innovation and adaptation, reducing its usefulness in complex and dynamic contexts.

Moreover, while Six Sigma places great emphasis on making decisions based on data, the effectiveness of this approach depends on the quantity and calibre of data. Six Sigma may provide major advantages in sectors like industry or finance where data is readily available and reasonably straightforward to measure (Amrani & Ducq, 2020). The use and efficacy of Six Sigma tools and procedures, however, may be constrained in industries such as healthcare or services, where data may be more qualitative or subjective. Furthermore, if statistical analysis is the only method used, qualitative elements like staff engagement and customer experience may be overlooked, even if they are just as important for process development. Furthermore, Six Sigma may unintentionally put short-term efficiency benefits ahead of long-term strategic goals due to its emphasis on defect reduction and process optimisation (Daniyan *et al.*, 2022).

Organisations that focus only on defect elimination and variation reduction run the danger of neglecting more general objectives like innovation, agility, and customer-centricity. An organization's capacity to innovate and adapt to changing market conditions and customer requirements may be hampered by a narrow emphasis on process optimisation in quickly changing marketplaces where agility and creativity are critical. Six Sigma, thus, provides useful instruments and methods for process enhancement and defect reduction; nonetheless, a critical assessment of its suitability and efficacy in various sectors and situations is necessary. Businesses must carefully weigh the trade-offs between short- and long-term strategic goals when using Six Sigma techniques, and they must customise the approaches to fit their particular



requirements and obstacles (Nandakumar *et al.*, 2020). Organisations may maximise the advantages of Six Sigma while minimising its drawbacks by implementing a balanced strategy that incorporates qualitative factors together with data-driven insights. The constant pursuit of quality via the elimination of errors and variances in processes is the fundamental tenet of the Six Sigma approach. This concept underscores the vital significance of continually providing goods or services that either meet or beyond the expectations of the client. Let us explore this fundamental idea in more detail and discuss its importance in the context of the Six Sigma methodology.

1. Pay attention to quality enhancement The unwavering dedication to quality improvement is at the heart of the Six Sigma philosophy. Organisations may improve brand loyalty, increase consumer happiness, and gain a competitive advantage in the market by aiming for near-perfect quality standards. This idea emphasises the idea that excellence is a continual process of progress rather than a one accomplishment.

2. Data-Driven Decision Making: Using data to inform decisions is a key component of Six Sigma. According to Nandakumar *et al.* (2020), this entails gathering, evaluating, and interpreting data in order to determine the underlying causes of errors and variances in processes. Organisations may make well-informed decisions and focus their development efforts by using statistical tools and methodologies to provide important insights into process performance.

3. organised Problem-Solving Methodology: Six Sigma initiatives usually adhere to an organised approach to problem-solving, such DMADV (Define, Measure, Analyse, Design, Verify) or DMAIC (Define, Measure, Analyse, Improve, Control). By assisting teams in locating, evaluating, and resolving process flaws, these approaches provide a methodical approach to problem-solving (Nandakumar *et al.*, 2020). Organisations may achieve sustained success in their improvement initiatives by adhering to a systematic process that guarantees consistency and repeatability.

4. Customer-Centricity: Six Sigma's persistent attention on the needs and expectations of customers is another fundamental tenet. According to Daniyan *et al.* (2022), companies may provide goods and services that add value and achieve or beyond consumer expectations by comprehending and matching processes with customer needs. In addition to increasing client happiness, this customer-centric strategy promotes loyalty and long-term partnerships.

5. Continuous Improvement: Kaizen, or continuous improvement, is a concept that Six Sigma represents. It advocates for organisations to continuously improve process performance and get rid of waste. Organisations may adjust to changing market circumstances, grab expansion opportunities, and preserve a competitive edge by developing a culture of constant learning, innovation, and improvement (Byrne *et al.*, 2021). This concept highlights how lasting development initiatives need constant attention and participation at all organisational levels. Six Sigma, at its heart, is essentially a comprehensive quality improvement methodology based on data, organised procedures, customer-centricity, and an unwavering pursuit of continuous improvement. Over time, companies may significantly increase process efficiency, product quality, and customer happiness by adopting this approach and incorporating it into their organisational culture and practices.

### ***Agile Lean Six Sigma***

Touted as a hybrid approach that combines Six Sigma, Lean, and Agile approaches, Agile Lean Six Sigma presents a viable framework for businesses looking to strike a balance between quality, speed, and continuous improvement (Dursun & Goker, 2022). On the other hand, a critical analysis highlights both its advantages and disadvantages when applied to different project scenarios. Leveraging the complimentary characteristics of Agile, Lean, and Six Sigma techniques is one of the main advantages of Agile Lean Six Sigma. Lean offers its focus on waste reduction and process efficiency, whereas Agile adds its iterative and customer-centric approach, allowing quick feedback and adaptability to changing needs (Ali & Mohammed, 2020). These approaches are enhanced by Six Sigma, which emphasises data-driven problem-solving and quality improvement. Six Sigma offers an organised framework for process analysis and optimisation.

Projects requiring both speed and quality, such software development, product innovation, and process change, are especially well-suited for the hybrid method. Organisations may provide high-quality goods and services effectively while continually refining processes to suit changing consumer demands by combining the flexibility and responsiveness of Agile with the efficiency and rigour of Lean and Six Sigma (Sodhi *et al.*, 2020). However, Agile Lean Six Sigma has drawbacks and obstacles in addition to possible advantages. Reconciling the inherent tensions and contrasts across Six Sigma, Lean, and Agile approaches is one difficulty. Six Sigma promotes rigour and standardisation, whereas Agile stresses adaptation and

flexibility. Within the Agile Lean Six Sigma framework, balancing these conflicting goals calls for deliberate compromise and negotiation, which isn't always possible or useful. It is impossible to overstate how difficult it is to use Agile Lean Six Sigma across a variety of project scenarios and organisational cultures. Every technique has a unique set of procedures, resources, and tenets that may not always coincide. Effective integration of these approaches requires a large financial outlay for organisational alignment, change management, and training, in addition to continuous work to guarantee consistency and coherence in their use (Hariyani *et al.*, 2023). Furthermore, even though Agile Lean Six Sigma provides a thorough framework for process improvement and quality improvements, organisational commitment and leadership support are ultimately critical to the methodology's success.

Agile Lean Six Sigma programmes may find it difficult to develop momentum and produce significant results in the absence of strong leadership buy-in and a continuous improvement culture. As a hybrid methodology that incorporates the best elements of Agile, Lean, and Six Sigma approaches, Agile Lean Six Sigma has potential. However, in order to be implemented successfully, it must be carefully considered in terms of its advantages, disadvantages, and suitability for the environment and organisational culture (Sodhi *et al.*, 2020). Through a careful assessment of its suitability and customisation to address unique requirements and obstacles, companies may use Agile Lean Six Sigma's potential to promote ongoing improvement and secure a long-term competitive edge. The fundamental ideas and ideals that guide Agile Lean Six Sigma's approach are encapsulated in its core principles. Let's examine each of these ideas in more detail and talk about why they matter:

1. Combining Six Sigma, Lean, and Agile: The convergence of Agile, Lean, and Six Sigma methodology concepts forms the foundation of Agile Lean Six Sigma. This concept highlights the complementary qualities of Lean's emphasis on waste reduction and process efficiency, Six Sigma's emphasis on data-driven problem-solving and quality improvement, and Agile's iterative and customer-centric approach (Daniyan *et al.*, 2022). Organisations may take use of each methodology's advantages to enhance results and promote ongoing development by combining them.

2. client-Centricity: Agile Lean Six Sigma strongly emphasises understanding and satisfying the requirements and expectations of the client. According to Ali and Mohammed (2020), this concept emphasises how crucial it is to match projects and processes with customer needs in

order to provide goods and services that are valuable and increase customer satisfaction. Organisations may make sure that their efforts are focused on meeting the most urgent requirements and providing solutions that appeal to their target audience by making customer-centricity a priority.

3. Kaizen, or continuous improvement: Agile Lean Six Sigma, like its component techniques, is based on this idea. In order to achieve greatness, this concept highlights the need of continual learning, adaptation, and improvement. Organisations may find areas for improvement, deal with inefficiencies, and stimulate innovation by cultivating a culture of continuous improvement in order to remain ahead of the competition (Hariyani *et al.*, 2023).

4. Data-Driven Decision Making: Using data to inform decisions is a key component of Agile Lean Six Sigma. This concept places a strong emphasis on measuring, tracking, and enhancing process performance via the use of data and statistical analysis (Hariyani *et al.*, 2023). Organisations may acquire insights into their operations, pinpoint the underlying causes of problems, and make well-informed choices to spearhead reform projects by gathering and evaluating pertinent data.

5. Flexibility and Adaptability: Agile Lean Six Sigma understands how critical it is to be flexible and adaptable in order to adjust to shifting organisational goals, consumer preferences, and market situations. According to Haiyani *et al.* (2023), this concept pushes businesses to welcome change, improve their procedures, and modify their strategies in response to customer input and changing business needs. Organisations may achieve sustainable development and efficiently handle unpredictability and complexity by maintaining flexibility and adaptability.

Agile Lean Six Sigma's fundamental ideas provide a comprehensive strategy for process optimisation and quality enhancement that is fueled by flexibility, data-driven decision-making, integration, customer centricity, and continuous improvement. Organisations may fully use Agile Lean Six Sigma to spur innovation, improve customer happiness, and achieve long-term success by adopting these ideas and incorporating them into their practices and organisational culture.

### ***Design Thinking Methodology***

The Design Thinking technique has gained considerable interest from a variety of sectors due to its focus on empathy, creativity, and iterative experimentation. It is well-known for its

human-centered approach to problem-solving and innovation (Wangsa *et al.*, 2022). On the other hand, a critical analysis highlights its application's advantages as well as disadvantages. Design Thinking's emphasis on comprehending and feeling end users' requirements, preferences, and pain areas is one of its main advantages. Organisations may design solutions that genuinely connect with their target audience by adopting a user-centric viewpoint, which can provide them with important insights into user behaviour, motives, and difficulties (Dell'Era, 2020). By empathising with people, this method improves user pleasure and raises the possibility of a successful product.

Moreover, Design Thinking fosters an interdisciplinary and collaborative approach to problem-solving by uniting people with varying backgrounds, specialties, and viewpoints. Teams may use Design Thinking to use collective intellect, creativity, and expertise to come up with creative solutions to challenging challenges by building a culture of co-creation and cooperation. In addition to producing more comprehensive and durable solutions, this multidisciplinary approach encourages team members to feel committed and invested in the work (Pande & Bharathi, 2020). Rapid prototyping and user input are used to build, test, and revise ideas in an iterative and experimental attitude that is encouraged by design thinking. Organisations may swiftly identify and handle any problems or opportunities with this iterative method, refine their concepts, and modify their solutions in response to practical input. Adopting experimentation and iteration may help organisations reduce risks, learn faster, and raise the chances of success.

But even with all of its advantages, Design Thinking has drawbacks and restrictions. Its subjective and qualitative character presents a barrier since it could not have the same level of accuracy and rigour as more quantitative approaches. Though it is excellent at producing original ideas and insights, Design Thinking may find it difficult to provide hard data or measures that may be used to gauge progress or direct choices. Consequently, it might be challenging for organisations to provide evidence of the financial benefits of Design Thinking programmes or to show concrete results (Braun & Clarke, 2022).

Initiatives using Design Thinking also depend on organisational commitment and leadership support to succeed. Initiatives using Design Thinking may find it difficult to acquire momentum and produce significant outcomes in the absence of strong leadership support and a culture that encourages experimentation, innovation, and taking risks. Additionally,

especially in bigger or more hierarchical organisations, the multidisciplinary and collaborative character of Design Thinking may present difficulties with team dynamics, communication, and alignment (Knight *et al.*, 2020). Though it provides a strong framework for creativity and problem-solving in complicated situations, Design Thinking must be carefully used, taking into account its advantages, disadvantages, and suitability for the organisational culture and environment (Lake *et al.*, 2021). Through a rigorous assessment of its suitability and customisation to address their unique requirements and obstacles, institutions may effectively use the potential of Design Thinking to stimulate creativity, innovation, and value generation. The Design Thinking technique is founded on a number of fundamental ideas that guide its approach to creativity and problem-solving. Let's examine these ideas in more detail:

1. **Human-Centered Design:** The foundation of Design Thinking is a focus on comprehending and feeling the wants, behaviours, and emotions of the end users. In order to understand user pain points, preferences, and ambitions, this concept calls for doing extensive user research, interviews, and observations. Through the use of methods like persona building, ethnographic research, and journey mapping, designers may get a thorough grasp of user demands, which forms the basis for creating solutions that successfully solve issues in the actual world (Pande & Bharathi, 2020).

2. **Iterative Process:** Design Thinking is a cyclical and iterative method to problem-solving that involves multiple cycles of user input and prototyping to create, test, and enhance solutions. Through this iterative approach, designers may swiftly come up with and test concepts, get user input, and improve their solutions in light of new information. Iterating quickly allows designers to find unnoticed problems, spot areas for development, and provide more creative and user-focused solutions (Wangsa *et al.*, 2022).

3. **Collaborative Multidisciplinary Teams:** Design Thinking encourages cooperation across heterogeneous teams made up of people with different experiences, specialisations, and viewpoints. According to Dell'Era *et al.* (2020), this concept highlights the value of multidisciplinary cooperation in producing creative solutions to challenging issues. Design Thinking stimulates creativity, cross-pollinates ideas, and advances a comprehensive knowledge of the issue domain by bringing together designers, engineers, marketers, and other stakeholders.

4. Bias Towards Action: Designers are urged to develop and test ideas often as part of Design Thinking's bias towards action. To bring their ideas to life, designers are advised to swiftly produce low-fidelity prototypes, such as drawings, wireframes, or mock-ups, rather than being stuck in analysis paralysis (Pande & Bharathi, 2020). Early prototype allows designers to confirm assumptions, get insightful user input, and spot possible problems before devoting a substantial amount of time and money to creating complete solutions.

5. Accept Ambiguity and Failure: Design Thinking views these two elements as natural byproducts of the creative process. According to Knight *et al.* (2020), this approach pushes designers to accept uncertainty, consider a variety of options, and be willing to try out novel concepts. Designers may approach problems with a growth attitude, refine their concepts, and eventually come up with more creative and practical solutions by redefining failure as a teaching opportunity.

To summarise, the fundamental ideas of Design Thinking are an approach to problem-solving and innovation that is experimental, action-oriented, collaborative, iterative, and human-centered. Designers may create solutions that are not only technically possible but also appealing, practical, and significant to end users by following these guidelines. Every project management style has unique advantages and disadvantages concerning versatility, adjustability, and appropriateness for certain project categories. Agile is more appropriate for projects with changing needs than Waterfall, which could be appropriate for those with stable requirements. While Lean focuses on efficiency and waste reduction, the V-Model provides a compromise between Waterfall and Agile. Lean-Six Sigma is a combination of Lean and Six Sigma, whereas Six Sigma focuses on quality improvement. Design Thinking is best suited for initiatives that prioritise innovation and user-centric design. Companies should carefully assess the requirements of their projects and choose the approach that best fits their aims and objectives. The comparative study of the approaches is shown in Table 1.

**Table 1 Comparative Analysis**

Methodology	Flexibility	Adaptability	Suitability for Different Project Types
Waterfall	Waterfall methodology follows a sequential, plan-driven approach, where each phase must be completed before moving on to the next.	Waterfall methodology is less adaptable to changes during the project lifecycle. Once a phase is completed, it's challenging to make	Waterfall is best suited for projects with well-defined requirements and stable objectives. Its structured approach makes it less adaptable to changes during the project lifecycle, particularly in dynamic or uncertain environments. It is suitable for projects where requirements are well-understood upfront, and there is little expectation of significant changes in scope.
Agile	Agile methodologies prioritize flexibility and responsiveness to change. They promote adaptive planning, incremental development, and iterative	Agile methodologies are highly adaptable to changes during the project lifecycle. They allow for continuous refinement of	Agile methodologies are ideal for projects with evolving requirements and a need for rapid delivery of value. They enable frequent iterations, continuous feedback, and collaboration, making them suitable for dynamic and uncertain environments where requirements may evolve unpredictably. Agile is particularly effective for software development, product innovation, and projects where customer feedback and market responsiveness



	delivery of requirements are critical. value. and adaptation to changing		
V-Model	The V-Model provides a structured approach to project management, with predefined stages and activities.	The V-Model offers a moderate level of adaptability. While it follows a sequential approach, it allows for adjustments during	The V-Model is suitable for projects where requirements are relatively stable, but some flexibility is needed for testing and validation. It emphasizes the importance of testing and validation at each stage of the project lifecycle, ensuring quality deliverables and early detection of defects. It is commonly used in software development and engineering projects.
Lean	Lean methodologies prioritize efficiency, waste reduction, and continuous improvement. They promote a culture of continuous improvement and value delivery.	Lean methodologies are highly adaptable to changes and responsive to customer needs. They focus on eliminating waste and optimizing processes to enhance	Lean methodologies are best suited for projects focused on efficiency, waste reduction, and continuous improvement. They emphasize value stream mapping, kanban, and just-in-time production, making them applicable to a wide range of project contexts beyond manufacturing, including software development, healthcare, and service industries. They enable organizations to deliver value to customers more efficiently and effectively by streamlining workflows and minimizing non-value-added activities.

			efficiency and customer	
Six Sigma	Six Sigma methodologies focus on quality improvement and defect reduction through data-driven analysis and process optimization. They follow a structured DMAIC or DMADV framework for problem-solving and process	Six Sigma methodologies have a low level of adaptability due to their structured approach to problem-solving. They emphasize a systematic, data-driven approach to problem-solving and process optimization.	Six Sigma is suitable for projects where quality improvement and defect reduction are paramount. It relies on data-driven analysis, process optimization, and statistical tools to identify and eliminate defects, leading to higher-quality deliverables and improved process performance.	Six Sigma is commonly used in manufacturing, healthcare, and financial sectors, where quality and process improvement are critical for achieving organizational goals.
Agile-Lean-Six Sigma	Agile-Lean-Six Sigma integrates elements of Agile, Lean, and Six Sigma to provide a balanced	Agile-Lean-Six Sigma offers a moderate level of adaptability, allowing for flexibility in	Agile-Lean-Six Sigma provides a balanced approach to project management, combining the flexibility of Agile, the efficiency of Lean, and the quality improvement focus of Six Sigma. It is suitable for projects that require a balance between flexibility, efficiency, and quality improvement.	

	approach to project project execution management. It emphasizes flexibility, efficiency, and quality improvement	to project execution while also ensuring adherence to quality standards. It combines	It enables organizations to deliver value to customers more efficiently while continuously improving processes to achieve higher-quality outcomes.
Design Thinking	Design Thinking emphasizes empathy, creativity, and iterative experimentation to solve complex problems and deliver innovative solutions.	Design Thinking methodologies are highly adaptable and responsive to user needs and preferences. They encourage iterative	Design Thinking is ideal for projects focused on innovation, user-centric design, and problem-solving. It promotes empathy, creativity, and iterative experimentation to address complex problems and deliver solutions that meet user needs and preferences. It is commonly used in product design, service design, and process improvement initiatives where customer experience is a key differentiator.

### **Influence on Execution Efficiency**

The effect that methodology has on the effectiveness of project execution is an important factor that organisations looking to streamline their operations and produce positive results must take into account. Businesses may improve their capacity to complete projects on schedule, within budget, and to the satisfaction of stakeholders by choosing the most suitable approach. This section includes insights from case studies or empirical data and critically explores how different techniques affect project execution speed, resource utilisation, team cooperation, communication channels, and decision-making processes (Iriarte & Bayona, 2020). First off, approaches such as Agile and Lean are often commended for their capacity to quicken

the pace at which projects are completed. Compared to conventional Waterfall approaches, Agile's iterative methodology enables frequent delivery and flexibility to changing requirements, resulting in a quicker time-to-market. According to Kerzner (2018), lean approaches emphasise waste reduction and process optimisation, which leads to streamlined processes and minimised delays, ultimately resulting in faster project completion times. Methodology selection also affects how resources are used. By removing non-value-added tasks, lean approaches optimise resource allocation and guarantee effective resource utilisation. Agile approaches encourage cross-functional cooperation and provide teams the freedom to self-organize, which maximises resource allocation according to team capacity and project goals.

Methodologies that emphasise communication and cooperation are conducive to effective team collaboration. Agile techniques cultivate a transparent and aligned culture by prioritising daily stand-up meetings, frequent feedback sessions, and tight team cooperation (Ng *et al.*, 2022). This increases the efficiency of projects overall by enabling teams to function more cohesively towards shared objectives. Methodology has an impact on the frequency and formality of communication channels. Conventional approaches, like as Waterfall, often depend on formalised documentation and communication channels, which may inhibit decision-making and make it more difficult to adapt to changes. Agile approaches, on the other hand, encourage frequent and informal communication, which speeds up decision-making and allows for more flexibility.

Case studies and empirical data provide important insights into the relationship between the choice of technique and the effectiveness of its implementation. Research has shown that companies using Agile methodology see increased project success rates, accelerated time-to-market, and enhanced customer satisfaction in contrast to those utilising conventional ways. Similar to this, lean approaches have been linked in a number of sectors to shorter project cycle times and better resource utilisation (Iriarte & Bayona, 2020). To sum up, the efficiency of project execution is greatly impacted by the methodology used, since it affects several aspects such as decision-making processes, teamwork, communication channels, speed, and resource utilisation. To choose which approach will best help them achieve their objectives, organisations must carefully evaluate the needs of their projects, team dynamics, and

organisational culture. Methodologies and empirical data that are critically evaluated may help guide decision-making and promote ongoing enhancements to project execution procedures.

### ***Impact on Milestone Attainment***

A crucial component of project management is the effect of techniques on milestone achievement, which has a direct bearing on the project's ability to fulfil important goals within allotted time frames. This section examines the ways in which different approaches impact milestone planning, monitoring, and attainment; it also examines how well they adjust to changing project needs and how well they reduce risks associated with milestone adherence (Magistretti, S., & Trabucchi, 2024). Furthermore, case studies will be given to demonstrate effective milestone management using various approaches.

Planning, tracking, and accomplishment of milestones are closely related to the project's approach. Conventional approaches, such as Waterfall, usually include thorough planning up front, with project milestones explicitly specified. But Waterfall's strict sequential structure may make it difficult to adjust to changing project needs, which might put reaching milestones in jeopardy if deviations happen (Malla, 2023). Agile approaches, on the other hand, provide more flexibility in milestone planning and tracking. Usually, agile projects are broken up into sprints or iterations, with milestones determined at the conclusion of each. With this incremental method, milestones may be adjusted in response to changing project needs, enabling ongoing progress tracking. Agile teams may reduce risks and stay in line with project objectives by routinely evaluating and modifying milestones (Magistretti & Trabucchi, 2024).

Lean approaches put an emphasis on cutting waste and simplifying procedures, which may help achieve milestones more quickly. Lean initiatives are better positioned to accomplish milestones within the allotted timeframes because they streamline procedures and reduce delays. Furthermore, teams may identify and prioritise important project milestones with the help of Lean concepts like value stream mapping, which guarantees that efforts are focused on accomplishing the main goals of the project (Nshirim & Nwagwu, 2023). The effectiveness of various milestone management approaches is supported by empirical data. For instance, a software development company's case study revealed that, in contrast to conventional Waterfall techniques, using Agile methodology enhanced project predictability and produced more accurate milestone projections (Kakar, 2023). Similarly, studies have shown that by

concentrating on process optimisation and continuous improvement, Lean Six Sigma programmes routinely accomplish milestones more successfully ((Nshirim & Nwagwu, 2023).

In conclusion, the approach used has a big impact on milestone planning, tracking, and accomplishment. Agile and Lean approaches provide more flexibility and efficiency in milestone management, whereas classic systems like Waterfall give rigid milestone planning with limited adaptability. Under many approaches, successful milestone management requires proactive risk avoidance, ongoing progress monitoring, and alignment with project objectives. Through the process of choosing the best methodology and using its advantages, organisations may improve their capacity to meet project objectives and promote project success.

### ***Implications for Project Management Practices***

Project management practices are affected by the choice of methodology in a number of ways, including project planning, budgeting, resource allocation, the function of project managers, and methods for combining different approaches within project teams. Analysing these consequences critically offers insightful information about how organisations may improve project results and streamline their project management procedures.

1. **The Impact of Methodologies on Resource Allocation, Budgeting, and Project Planning:** The choice of methodology has a big influence on resource allocation, budgeting, and project planning. Conventional approaches, like as Waterfall, often include thorough planning in advance, with set spending limits and resource distributions determined by the project's original scope (Patel & Patel, 2021). Agile approaches, on the other hand, enable more adaptable resource allocation and planning, with resources and budgets being modified repeatedly in response to changing project needs. Resource allocation and budget utilisation are improved by lean approaches, which place a higher priority on waste reduction and resource optimisation. Aligning project planning, budgeting, and resource allocation with project goals and objectives requires a thorough understanding of the consequences of technique choices (Byrne *et al.*, 2021).

2. **Project Managers' Role in Methodology Selection and Implementation:** Project managers are essential in choosing and putting into practice suitable techniques in accordance with team dynamics, organisational culture, and project needs. They are in charge of weighing the advantages and disadvantages of various approaches while taking the complexity of the project,

stakeholder expectations, and risk tolerance into account. Project managers can assist in the implementation of chosen techniques by offering project teams assistance, direction, and training. Additionally, they guarantee that, during the course of the project, procedures are successfully used and modified to meet the project's changing demands (Iriarte & Bayona, 2020).

3. Techniques for Including Various Methodologies in Project Teams: Teams working on projects that include several approaches must carefully prepare, collaborate, and communicate. Using a hybrid technique that incorporates aspects of many approaches in order to leverage their respective strengths is one tactic. For instance, a project may combine Lean techniques for waste reduction and process optimisation with Agile concepts for iterative development. Establishing distinct roles, duties, and procedures is another tactic to guarantee the smooth integration of various approaches inside the project team. Frequent feedback sessions, information exchanges, and cross-functional cooperation may help integrate and align various approaches even further (Cobb, 2023). To maximise project results, methodology selection has significant consequences for project management procedures. Organisations can improve their project management procedures and raise the likelihood of project success by critically analysing the ways that methodology affects project planning, budgeting, resource allocation, the role of project managers, and strategies for integrating diverse methodologies within project teams (Cobb, 2023). In order to satisfy changing project demands and stakeholder expectations, proactive decision-making, flexibility, and a willingness to accept change are necessary for effective technique selection and implementation.

### **Future Directions and Conclusions**

1. Expected Trends in Project Management Methodologies: A number of trends are anticipated to influence the field as project management carries on developing. Agile and Lean are two approaches that are projected to become more popular as digital transformation and project complexity grow. These approaches are more adaptable and flexible. Furthermore, it is anticipated that project management methods will be impacted by the incorporation of cutting-edge technologies like blockchain and artificial intelligence, which will result in the creation of new techniques designed to fully utilise their potential. Additionally, the increasing focus

on social responsibility and sustainability may lead to the development of project execution approaches that take the environment and ethics into account.

2. Possible Effect on Project Implementation and Milestones: Project implementation and milestone achievement are probably going to be significantly impacted by these predicted developments in project management approaches. Organisations will be better equipped to adjust to shifting market circumstances, stakeholder expectations, and technology breakthroughs with more adaptable and flexible approaches, which will lead to better project results and milestone adherence. In a corporate climate that is changing quickly, organisations may improve their capacity for innovation, teamwork, and providing value to stakeholders by adopting new approaches and technology.

3. Key Findings and Implications Summarised: Project management approaches have been critically analysed, and the results have numerous important implications for scholars and practitioners. First off, project execution, milestone planning, and resource use are all greatly impacted by the approach selected. Project managers are essential in the selection and use of suitable techniques that are contingent upon project needs and organisational environment. Thirdly, it is possible to improve cooperation and goal alignment within project teams by using varied techniques. Finally, obtaining project success and providing value to stakeholders depend on the strategic selection of approaches.

In conclusion, it is impossible to exaggerate the significance of choosing a strategic technique for project success. The capacity to innovate and adapt is critical as businesses navigate a dynamic and more complicated business environment. Organisations may improve their project execution skills, match project management methods with strategic goals, and eventually accomplish their intended results by carefully weighing the advantages and disadvantages of various approaches. The choice of strategic technique sets the stage for future development and competitiveness in a market that is always evolving, in addition to being essential for the success of the present project. Project management techniques' future depends on their capacity to take use of new technology, adjust to changing difficulties, and follow developing trends. Organisations may position themselves for success in a more competitive and dynamic business environment by keeping up with current developments and adopting strategic technique selection.



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