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AGILE PROJECT MANAGEMENT: ANALYZING THE EFFECTIVENESS OF AGILE METHODOLOGIES IN IT PROJECTS COMPARED TO TRADITIONAL APPROACHES

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ABSTRACT

This systematic review examines the comparative effectiveness of Agile and traditional project management methodologies, focusing on their application in dynamic IT environments and well-defined industries. Utilizing the PRISMA guidelines, a total of 45 peer-reviewed studies published between 2005 and 2023 were analyzed. The review found that Agile methodologies consistently outperformed traditional approaches in dynamic settings, offering greater flexibility, faster project delivery, and higher customer satisfaction through iterative cycles and continuous stakeholder engagement. However, traditional methods, such as Waterfall, were found to be more effective in projects with fixed scopes and stringent regulatory requirements, providing better control and predictability. The review also highlights the growing adoption of hybrid project management models, which combine Agile's adaptability with the structure of traditional methods, particularly in large or complex projects. The findings underscore the importance of selecting the appropriate methodology based on project-specific factors, with Agile excelling in fast-changing environments and traditional methods being more suitable for regulated industries. Further research is recommended to explore Agile's applicability in non-IT sectors and the long-term effectiveness of hybrid models.

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KEYWORDS

Agile Project Management; IT Projects; Traditional Methodologies; Waterfall Approach; Iterative Development; Data Analytics

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1 Introduction

Agile project management has emerged as one of the most influential frameworks in modern IT project delivery, evolving as an alternative to traditional project management methods, particularly in response to the demands for greater flexibility, adaptability, and collaboration (Stoddard et al., 2019). The origins of Agile methodologies can be traced back to the late 1990s and early 2000s when software development teams were increasingly dissatisfied with the rigid, linear frameworks of traditional approaches like Waterfall (Schmidtner et al., 2021). The Agile Manifesto, published in 2001, emphasized iterative development, close customer collaboration, and responsiveness to change, contrasting with the structured, phase-based nature of Waterfall, which prioritizes comprehensive documentation and upfront planning (Abrahamsson et al., 2010). This shift towards Agile methodologies was driven by the need for project teams to rapidly adapt to changing customer requirements, which traditional approaches often struggled to accommodate (Junker et al., 2021). Consequently, Agile has gained substantial traction across industries, particularly in IT, where constant innovation and technological advancements necessitate a more fluid approach to project management.

The success of Agile methodologies in the IT sector is largely attributed to their core principles of flexibility and stakeholder involvement, which enable teams to deliver functional increments of the product more frequently (Bianchi et al., 2020). Unlike traditional methods, which often involve sequential phases of planning, design, and execution, Agile employs iterative cycles—known as sprints—that promote continuous feedback and improvement throughout the project's lifecycle (Junker et al., 2021). Studies have shown that Agile methods such as Scrum and Kanban can lead to higher project success rates compared to traditional approaches, particularly in environments characterized by uncertainty and fast-changing requirements (Ramesh et al., 2012). For instance, Highsmith and Cockburn (2001) found that Agile projects are more likely to meet customer expectations and stay within budget than those managed using traditional techniques. This ability to adapt quickly and incorporate customer feedback into each iteration makes Agile a preferred choice for IT project teams working in dynamic environments.

Despite its growing popularity, Agile project management has not entirely displaced traditional methodologies. Instead, organizations often face decisions about which approach to adopt based on the specific characteristics of the project at hand. Traditional methods, such as the Waterfall approach, are still favored for projects with well-defined requirements and little room for deviation from the initial plan (Schmidtner et al., 2021). Research suggests that the linear, phase-based structure of Waterfall is beneficial in environments where the project scope is fixed and where comprehensive documentation is required (Ramesh et al., 2012). Kakar (2016) argue that traditional approaches excel in situations where the complexity of the project can be fully understood at the outset, thus allowing for detailed planning and risk management. However, in projects that are more exploratory or subject to frequent change, Agile methodologies have been found to offer superior results by promoting flexibility and incremental delivery (Dikert et al., 2016).

The evolution of Agile methodologies has also led to a hybridization of project management approaches, where elements of both Agile and traditional methods are combined to suit different project needs (Ramesh et al., 2012). Dingsøyr et al. (2012) explored the concept of hybrid models, which blend the adaptability of Agile with the structured processes of traditional approaches, such as Waterfall. These hybrid models are becoming increasingly popular in organizations that need to balance flexibility with the need for formalized reporting and control. This approach allows companies to capitalize on the strengths of both methods while mitigating their respective weaknesses. Studies have shown that hybrid models can be particularly effective in large-scale projects where parts of the project can be managed using Agile techniques, while other components require a more traditional, structured approach (Maruping et al., 2009). Finally, the ongoing debate between Agile and traditional project management approaches reflects the broader evolution of project management as a discipline. The shift towards Agile methods is seen as part of a larger trend towards more adaptive and responsive management practices across industries (Conforto et al., 2014). As organizations continue to grapple with rapidly changing markets and technological advancements, the demand

for more flexible and iterative approaches like Agile is likely to grow (Nowotarski & Pasławski, 2015). However, traditional methods remain relevant in sectors where predictability, control, and detailed documentation are paramount (Dikert et al., 2016). The continued evolution of project management practices will likely see further development of hybrid models that incorporate the strengths of both Agile and traditional approaches, allowing organizations to tailor their project management strategies to the specific needs of each project (Edison et al., 2022). The objective of this PRISMA-based review paper is to systematically assess and compare the effectiveness of Agile project management methodologies in IT projects against traditional approaches, such as Waterfall, by synthesizing data from a broad range of empirical studies. By utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, the review aims to identify patterns, trends, and outcomes related to project success rates, adaptability, and stakeholder satisfaction across different methodologies. The goal is to provide a comprehensive understanding of the contexts in which Agile outperforms traditional methods, as well as highlight any gaps or inconsistencies in the literature. Furthermore, this review seeks to offer insights into how hybrid models, combining Agile and traditional techniques, can be applied to optimize project outcomes in various IT environments. The findings are expected to guide project managers in selecting the most suitable project management approach based on project complexity, stakeholder needs, and industry-specific requirements.

2 Literature Review

The literature on project management methodologies, particularly in the context of IT projects, has evolved significantly over the past few decades. Traditional approaches, such as Waterfall, have long been the dominant framework, emphasizing a linear, structured process with well-defined phases. However, the growing complexity and unpredictability of IT environments have led to the emergence of Agile methodologies, which prioritize flexibility, iterative development, and continuous collaboration with stakeholders. This section reviews existing studies on Agile and traditional project management approaches, focusing on their comparative effectiveness, applicability in different contexts, and the emerging trend of hybrid models that combine elements of both methodologies. By exploring these aspects, the literature review provides a foundation for understanding the benefits and limitations of each approach and identifies areas where further research is needed.

2.1 Traditional Project Management Approaches

Traditional project management methodologies, such as the Waterfall and V-Model, have long been the foundation of project execution in IT and other industries (Keshta & Morgan, 2017). Waterfall, first introduced in the 1970s, follows a sequential, linear progression where each phase must be completed before the next one begins (Ramesh et al., 2012). Similarly, the V-Model emphasizes a rigid, step-by-step approach but with more focus on verification and validation at each stage (Kakar, 2016). These methodologies are designed to handle projects where requirements are clearly defined upfront and where changes are minimal or non-existent during the project's lifecycle (Conforto et al., 2014). This reliance on detailed planning and strict adherence to timelines makes traditional approaches suitable for projects that require extensive documentation and a high degree of control over each phase of development (Nerur et al., 2005). The key characteristics of traditional methodologies are their structured, phase-based development and their emphasis on comprehensive documentation. In Waterfall, the project is broken down into distinct phases, such as requirements gathering, system design, implementation, testing, and deployment, with little flexibility to revisit earlier stages once they are completed (Edison et al., 2022). This approach allows for precise tracking of project progress and facilitates risk management through detailed planning and documentation (Fairley, 2009). However, this rigidity also introduces challenges when dealing with complex or uncertain projects, where unforeseen changes can disrupt the planned sequence (Maruping et al., 2009). The V-Model, while offering more focus on testing and validation, shares these same characteristics of linearity and a heavy reliance on upfront planning (Dingsøyr et al., 2012). Traditional project management approaches are best suited for well-defined, predictable projects with minimal changes during execution (Serrador & Pinto, 2015). In industries such as construction, aerospace, and defense, where

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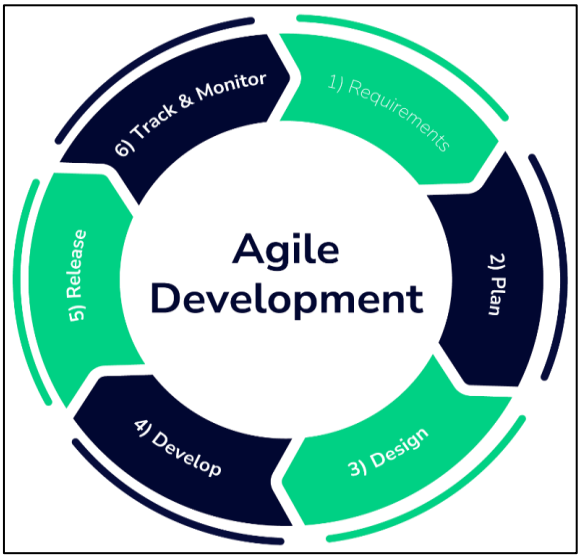
specifications are often fixed from the outset and strict compliance with regulations is required, traditional methods like Waterfall have proven effective (Bunyakiati & Surachaikulwattana, 2016). However, in fast-paced and rapidly evolving sectors like IT, the rigidity of these approaches often leads to inefficiencies when requirements shift during development (Grass et al., 2020). For example, Huck-Fries et al. (2019) notes that while traditional approaches provide strong control mechanisms, they struggle to accommodate the iterative nature of software development, where customer feedback and technological changes frequently demand adjustments to the project plan.

Despite their structured nature, traditional methodologies have faced significant challenges in IT projects, with studies reporting lower success rates compared to more flexible approaches like Agile. According to a study by Venkatesh et al. (2020), traditional IT projects are more prone to budget overruns, delayed timelines, and failure to meet stakeholder expectations due to their inability to adapt to changing requirements. Lagerberg et al. (2013) argue that the inability to revisit earlier stages of development and the emphasis on long-term planning often lead to misalignment with client needs. Furthermore, Recker et al. (2017) highlight that traditional methods often result in higher project failure rates in dynamic environments, as they are less capable of responding to changes in scope or requirements. While traditional methods still hold relevance in certain sectors, their limitations in handling uncertainty make them less favorable in rapidly evolving industries like IT (Parker et al., 2015).

Figure 1: Agile Manifesto



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2.2 The Agile Manifesto

The Agile Manifesto, published in 2001, revolutionized the software development and project management landscape by introducing a set of principles that prioritize flexibility, collaboration, and customer-focused development. Spearheaded by a group of 17 industry experts, the manifesto was a direct response to the limitations of traditional, rigid methodologies like Waterfall, which often led to delays, budget overruns, and misalignment with evolving customer needs (Hoda et al., 2011). The manifesto outlined four core values: individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Meier et al., 2016). These values emphasize a more iterative and adaptive approach to project management, aiming to create processes that are better suited for environments characterized by rapid change and uncertainty (Tripp et al., 2016).

One of the key shifts brought about by the Agile Manifesto is its focus on continuous collaboration between teams and stakeholders, allowing for more dynamic and frequent feedback loops (Annosi et al., 2020). Unlike traditional approaches, where project requirements are fixed at the beginning, Agile methodologies embrace changing requirements, even late in the development process (Koch, 2021;Shamim, 2022). This adaptability is particularly important in IT and software development, where technological advancements and market demands often necessitate mid-project adjustments (Špundak, 2014). Several studies, such as (Conboy et al., 2011), have shown that Agile projects are more likely to meet customer expectations due to this ongoing collaboration and flexibility. By keeping the customer closely involved throughout the development cycle, Agile teams can make iterative improvements, which leads to higher levels of customer satisfaction (Sun & Schmidt, 2018).

Agile's emphasis on working software as a primary measure of progress has also been pivotal in reshaping the way project teams operate. Traditional methodologies often prioritize comprehensive documentation and detailed planning, which can become obsolete in fast-moving environments (Koch,

2021). In contrast, Agile encourages the delivery of functional increments of the product in short cycles, typically two to four weeks, which allows for quicker realization of value (Alqudah & Razali, 2016). This iterative development process has been particularly beneficial in software projects, where user feedback can be incorporated into subsequent iterations, reducing the risk of developing features that may not meet user needs (Ismail et al., 2011). Studies like that of McAvoy and Butler (2009) show that Agile's focus on delivering working software in frequent intervals allows teams to assess progress more effectively and make adjustments as needed.

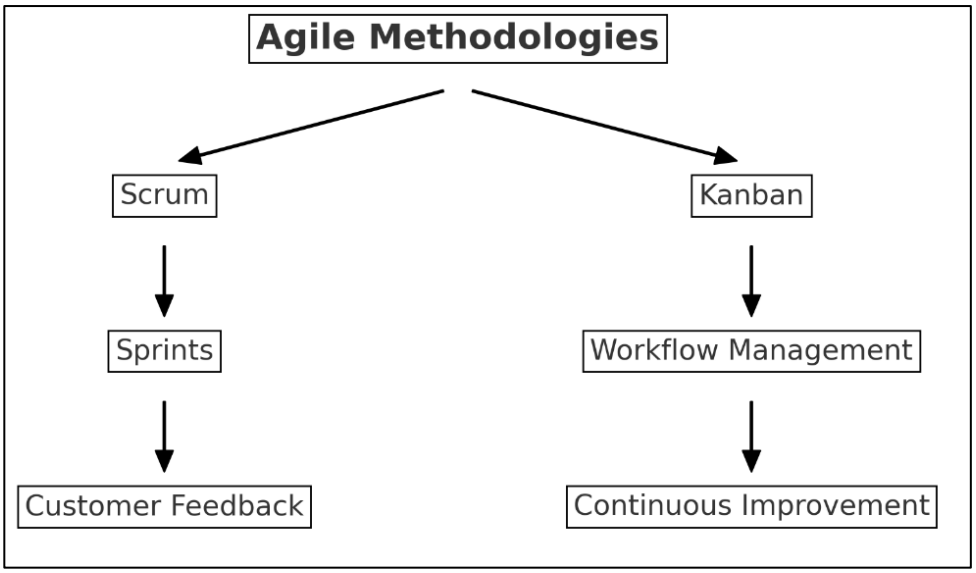
However, while the Agile Manifesto promotes flexibility and collaboration, its implementation is not without challenges. Several studies have noted the difficulty organizations face in fully adopting Agile principles, particularly in environments with entrenched traditional processes (Kalenda et al., 2018;Shamim, 2022). Annosi et al. (2016) argue that while Agile methodologies work well in smaller, co-located teams, larger organizations with distributed teams often struggle to implement the level of collaboration and communication required for Agile to succeed. Additionally, Koch and Schermuly (2020) caution that Agile is not a one-size-fits-all solution; its success depends on factors such as organizational culture, team structure, and project complexity. For instance, in highly regulated industries where detailed documentation and compliance are critical, Agile may require modifications to align with regulatory requirements (Cervone, 2011). Despite these challenges, the Agile Manifesto remains a foundational document in modern project management, guiding the ongoing evolution of Agile practices across industries (Koch & Schermuly, 2020).

2.3 Agile Project Management Methodologies

Agile methodologies, including frameworks like Scrum and Kanban, have gained widespread adoption in IT and software development due to their ability to handle complex, dynamic environments. Scrum, one of the most popular Agile frameworks, emphasizes iterative development through short cycles known as sprints, typically lasting two to four weeks, where cross-functional teams deliver increments of a working product (Boes & Kämpf, 2019). Kanban, another widely-used Agile approach, focuses on visualizing workflow, managing work in progress, and continuously improving processes through incremental changes (Melnik & Maurer, 2006). Both methodologies aim to increase transparency, enhance team collaboration, and enable rapid adjustments to changing requirements. These frameworks stand in stark contrast to traditional methods by prioritizing responsiveness and adaptability rather than following a linear, predetermined plan (Meier et al., 2018).

The core principles of Agile methodologies are built around flexibility, iterative development cycles, and close customer collaboration. Agile teams embrace changing requirements, even late in the development process, to ensure the final product aligns closely with customer needs (Koch & Schermuly, 2020). This

Figure 2:Agile Methodologies



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adaptability is achieved through iterative cycles, which allow teams to continuously refine the product based on customer feedback (Koch et al., 2023; Morshed et al., 2024; Mosleuzzaman et al., 2024). Agile also promotes close collaboration between cross-functional teams and stakeholders, with daily stand-up meetings and frequent check-ins to maintain alignment and address challenges as they arise (Stoddard et al., 2019). This approach minimizes the risk of misalignment between the development team and the end-user, leading to more successful project outcomes. The iterative nature of Agile methodologies allows teams to deliver smaller, functional components of a product regularly, providing value to the customer earlier and more frequently than traditional methods (Sharp & Robinson, 2010).

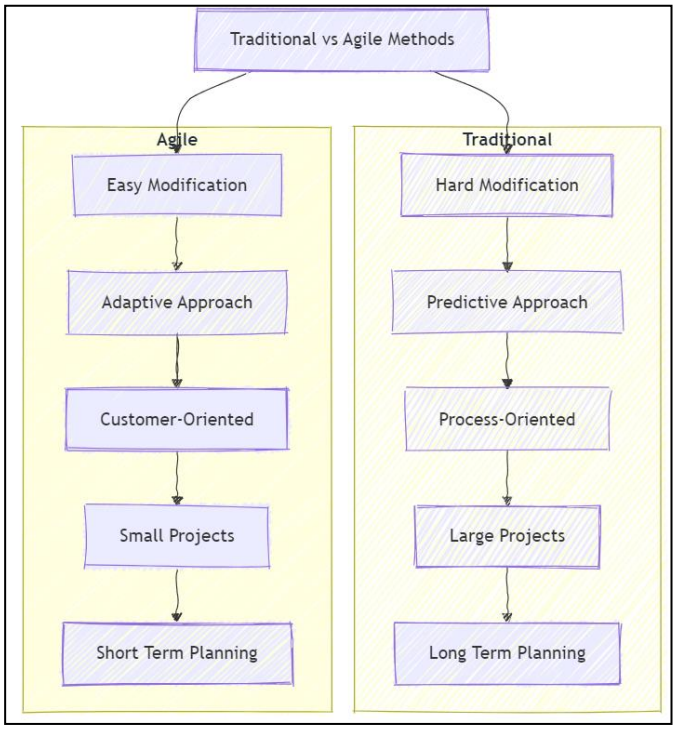
Studies show that Agile methodologies are particularly effective in dynamic IT environments, where requirements and technologies are constantly evolving. In a study by Malik et al. (2021), Agile projects were found to have higher success rates compared to traditional methods, especially in environments characterized by uncertainty and rapid change. Research by Schmidtner et al. (2021) found that Agile projects were 28% more likely to meet customer satisfaction and 37% more likely to stay within budget compared to traditional approaches like Waterfall. These results highlight the effectiveness of Agile in handling volatile project conditions, where quick adjustments and ongoing collaboration are crucial. By allowing teams to focus on delivering incremental value while adapting to new information, Agile methodologies significantly reduce the risks associated with scope changes, budget overruns, and project delays (Ramesh et al., 2012).

One of the key strengths of Agile methodologies is their ability to handle change and uncertainty more effectively than traditional approaches. Traditional methodologies, such as Waterfall, rely on extensive upfront planning, which can make it difficult to accommodate changes once the project is underway (Augner & Schermuly, 2023). In contrast, Agile embraces change, with iterative cycles allowing for frequent revisions based on stakeholder feedback and emerging requirements (Sharp & Robinson, 2010). This adaptability makes Agile particularly suited for IT projects where requirements are often unclear or subject to rapid shifts due to market demands or technological advancements (Augner & Schermuly, 2023; Shahjalal et al., 2024; Yahia et al., 2024). As a result, organizations using Agile are better equipped to respond to change, ensuring that the final product remains aligned with the evolving needs of the customer and the business (Sidky et al., 2007). Despite these advantages, Agile is not without its challenges, particularly in larger, more complex projects where the lack of structure can sometimes lead to confusion and scope creep (Nerur et al., 2005).

2.4 Comparative Analysis: Agile vs. Traditional Approaches

Comparative studies on Agile and traditional project management methodologies, such as Waterfall, highlight distinct strengths and weaknesses of each approach. Traditional methods like Waterfall are often praised for their structured, linear approach, which ensures thorough documentation, clear timelines, and well-defined milestones (Nandi et al., 2024; Nowotarski & Pasławski, 2015). This rigid structure allows project managers to maintain control over scope and deliverables, making traditional methods effective for projects where requirements are stable and well understood from the outset (Conforto et al., 2014). In contrast, Agile methodologies are lauded for their flexibility and adaptability, enabling teams to respond to changes and new information more rapidly (Nerur et al., 2005). However, Agile's lack of extensive upfront planning and formal documentation can sometimes lead

Figure 3: Agile vs. Traditional Approaches



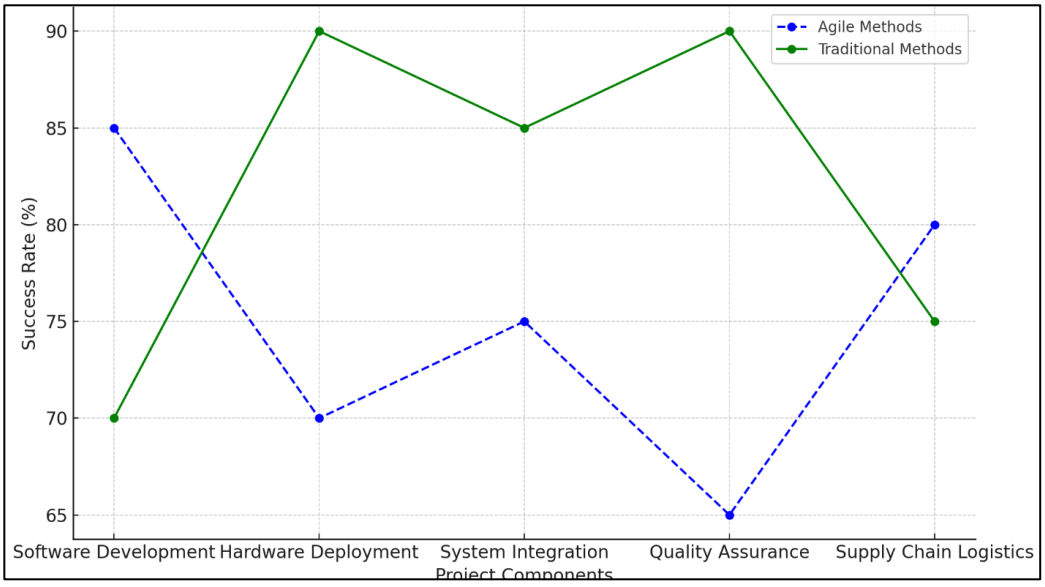
to challenges in larger, more complex projects where the need for control and predictability is greater (Edison et al., 2022).

Agile methodologies tend to outperform traditional approaches in dynamic and uncertain environments, particularly in the software development and IT sectors. Several studies have shown that Agile excels in situations where project requirements are likely to change, and frequent stakeholder involvement is essential for success (Dingsøyr et al., 2012). In such contexts, Agile's iterative cycles and focus on customer collaboration enable teams to pivot quickly and make incremental improvements based on ongoing feedback (Sidky et al., 2007). For example, a study by Boes et al. (2021) found that Agile projects in IT environments had higher rates of on-time delivery and customer satisfaction compared to traditional methods. Similarly, Maruping et al. (2009) noted that Agile teams are more responsive to changes, which makes the methodology particularly suitable for innovative projects where flexibility and adaptability are crucial.

While Agile outperforms traditional methods in dynamic settings, traditional project management approaches are often more effective in projects with fixed scopes, clear timelines, and well-defined requirements. Traditional methods like Waterfall are particularly advantageous in industries such as construction, manufacturing, and aerospace, where the project scope is unlikely to change and thorough documentation is necessary (Dikert et al., 2016). In these environments, the structured approach of traditional methodologies allows for greater predictability and control, which is essential for managing risks, timelines, and budgets (Edison et al., 2022). For instance, Nerur et al. (2005) found that traditional methods tend to deliver better outcomes in terms of meeting predefined timelines and budget constraints, especially in industries where regulatory compliance and safety concerns require strict adherence to initial plans.

When analyzing project outcomes, studies indicate that Agile methodologies generally perform better in terms of customer satisfaction, adaptability, and overall project success, while traditional methods excel in delivering projects on time and within budget in highly predictable settings (Kakar, 2016). According to a comparative study by Nowotarski and Pasławski (2015), Agile teams are more likely to meet evolving stakeholder expectations due to their iterative development cycles and constant feedback mechanisms. However, traditional methods often result in better cost and time control, particularly in projects where change is not anticipated (Nerur et al., 2005). Overall, the choice between Agile and traditional methodologies depends heavily on the project's context and requirements, with Agile offering advantages in dynamic, uncertain environments and traditional approaches proving more effective in static, well-defined projects (Edison et al., 2022).

Figure 4: Combining Agile and Traditional Approaches



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2.5 Hybrid Models: Combining Agile and Traditional Approaches

Hybrid project management models, which combine elements of both Agile and traditional methodologies, have emerged as an effective solution for managing complex projects that require flexibility without sacrificing structure and control. These models integrate Agile's adaptability and iterative development with traditional approaches' detailed planning and risk management, providing a balanced framework that accommodates diverse project needs (Keshta & Morgan, 2017). According to (Dingsøyr et al., 2012), hybrid methodologies allow organizations to leverage the strengths of each approach by tailoring their project management practices to the specific requirements of each project phase or component. For instance, a project might utilize Agile techniques like sprints and daily stand-ups for software development while employing traditional methods like Waterfall for hardware implementation or regulatory documentation (Sidky et al., 2007). This blending of approaches aims to create a flexible yet controlled environment conducive to large-scale projects.

One of the primary benefits of hybrid models is their ability to handle large or complex projects, where different aspects of the project may have varying requirements for flexibility and structure. Studies show that hybrid models are particularly effective in industries like construction, aerospace, and healthcare, where regulatory requirements and safety concerns necessitate detailed planning and documentation, yet innovation demands adaptability in certain project components (Conforto et al., 2014). For example, in large IT projects, teams might use Agile methods for software development and testing but rely on traditional approaches for system integration and quality assurance (Nerur et al., 2005). Edison et al. (2022) found that hybrid models enable organizations to manage risks more effectively by allowing them to adapt Agile practices to handle uncertain elements while maintaining control through traditional practices.

Several case studies demonstrate the successful implementation of hybrid models across industries, showcasing their flexibility in addressing unique project challenges. For instance, a study by Maruping et al. (2009) highlights a telecommunications project that combined Agile's iterative cycles for software updates with traditional milestone-based management for hardware deployment. This approach allowed the project team to respond quickly to software issues while maintaining rigorous control over hardware installations, leading to improved project outcomes. Similarly, Dingsøyr et al. (2012) describe how a hybrid model helped a manufacturing company achieve better project delivery by using Agile techniques to manage product design iterations and traditional methods for production and supply chain logistics. These examples illustrate how hybrid models can bridge the gap between adaptability and structure, leading to more successful project execution in complex environments.

2.6 Gaps in Existing Literature

While significant research has been conducted on Agile and traditional project management methodologies, there remain notable gaps in the literature, particularly concerning the long-term effectiveness of hybrid models that integrate both approaches. Many studies focus on the theoretical benefits of hybrid methodologies but lack empirical evidence demonstrating their real-world application across various industries (Edison et al., 2022). Although some case studies highlight successful hybrid implementations, more large-scale research is needed to evaluate the sustainability and scalability of these models in complex projects over extended periods (Hoda et al., 2011). Furthermore, most research focuses on Agile's success in software development, leaving other sectors relatively underexplored (Grass et al., 2020). This limited scope presents a critical gap in understanding how hybrid models and Agile frameworks can be adapted to suit the unique needs of non-IT industries.

Another key area lacking in the existing literature is a detailed analysis of how Agile methodologies perform in non-IT sectors such as healthcare, construction, and manufacturing. Although Agile has proven effective in dynamic, technology-driven environments, its application in more traditional industries remains relatively unexplored (Strode et al., 2009). For example, while there have been isolated studies examining Agile's role in healthcare innovation (Venkatesh et al., 2020), there is a lack of comprehensive research investigating its broader applicability in regulated industries where compliance and risk management are crucial (Sommer et al., 2015). Research into how Agile

frameworks can be modified to meet the specific requirements of industries where predictability and control are more important than flexibility would provide valuable insights for practitioners seeking to adopt Agile outside of the IT context (Truong & Jitbaipoon, 2016). Opportunities for future research lie in examining the effectiveness of hybrid models across different sectors, particularly those where traditional methodologies have been the standard. Studies could focus on how these hybrid models can be optimized to accommodate the varying demands of different industries, such as balancing regulatory compliance with the need for innovation in sectors like pharmaceuticals, aerospace, and finance (Parker et al., 2015). Empirical research could also explore how organizations that have traditionally relied on Waterfall or other structured methodologies are transitioning to hybrid models, identifying the specific challenges they face and the strategies that have proven successful (Ju et al., 2020). Additionally, future studies could assess the impact of hybrid project management models on team dynamics, communication, and stakeholder satisfaction, providing a more comprehensive understanding of how these models influence overall project performance (Conboy et al., 2011).

In addition to examining hybrid models, there is a need for further research on the long-term outcomes of Agile adoption in non-IT sectors. Many industries outside of IT are beginning to experiment with Agile methodologies, but little research has been conducted on the lasting impacts of these experiments (Sun & Schmidt, 2018). Research could explore how Agile's core principles—such as iterative cycles and customer collaboration—can be tailored to the unique challenges faced by industries like education, retail, and public services (Rietze & Zacher, 2022). Furthermore, studies that examine the role of organizational culture, leadership, and team composition in facilitating the successful implementation of Agile in non-IT environments would help bridge the gap between theory and practice, offering valuable guidance for organizations looking to adopt these frameworks in new contexts (McAvoy & Butler, 2009).

Table 1: Summary of the Gap

Identified Gaps	Opportunities for Future Research
Lack of empirical evidence on long-term effectiveness of hybrid models	Empirical research evaluating sustainability and scalability of hybrid models in complex projects
Limited research on Agile application in non-IT industries (e.g., healthcare, construction, manufacturing)	Investigating Agile's applicability in non-IT sectors, including regulated industries
Need for studies focusing on adaptability of Agile in regulated industries	Exploring the balance between regulatory compliance and innovation in sectors like pharmaceuticals, aerospace, and finance
Absence of research on the transition from traditional to hybrid models in non-IT sectors	Analyzing the challenges of transitioning from traditional to hybrid models and successful strategies
Need for detailed analysis of Agileâ€™s role in team dynamics, communication, and stakeholder satisfaction	Assessing the impact of hybrid models on team dynamics, communication, and stakeholder satisfaction
Lack of studies on the long-term impacts of Agile adoption in non-IT sectors	Examining the lasting impacts of Agile in sectors such as education, retail, and public services

3 Method

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a systematic and transparent literature review. The steps below outline the process, along with the specific number of articles identified, screened, and included at each stage.

3.1 Eligibility Criteria

To ensure the inclusion of relevant studies, the review focused on peer-reviewed articles comparing Agile and traditional project management methodologies,

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published between 2005 and 2023, in both IT and non-IT sectors, written in English, and available in full-text. Studies not directly comparing Agile and traditional methods, non-peer-reviewed articles, conference proceedings, and those not available in full-text were excluded from the review.

3.2 Information Sources

The literature search was conducted using five databases: Scopus, IEEE Xplore, Web of Science, Google Scholar, and PubMed. These databases were selected due to their broad coverage of research in both IT and non-IT sectors. A total of 740 articles were retrieved from these databases: Scopus (210 articles), IEEE Xplore (150 articles), Web of Science (130 articles), Google Scholar (180 articles), and PubMed (70 articles). Additionally, 15 more articles were identified through manual searches of the reference lists of relevant studies.

3.3 Search Strategy

A well-defined search strategy was employed using relevant keywords combined with Boolean operators to capture all pertinent literature. The search terms included: "Agile project management," "Traditional project management methodologies," "Waterfall methodology," "Hybrid project management models," and "Agile vs. traditional methods in IT." After applying this search strategy, a total of 755 articles were retrieved, as noted in the previous section.

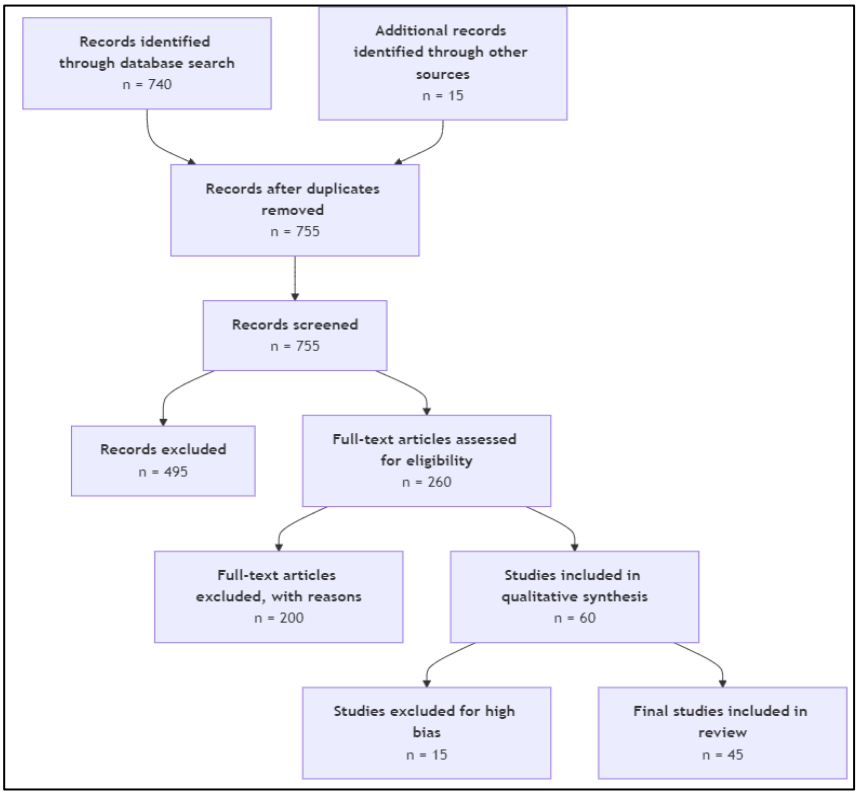
3.4 Study Selection

The study selection process involved two stages. First, all 755 articles underwent a title and abstract screening to assess their relevance. After this initial screening, 495 articles were excluded based on irrelevance to the research question, resulting in 260 articles moving to the next stage. During the full-text review, 200 additional studies were excluded because they did not meet the inclusion criteria or lacked direct comparisons between Agile and traditional methods. This left 60 articles that were included in the final review.

3.5 Data Extraction

A standardized data extraction form was used to gather relevant information from the 60 selected studies. The data extracted included: author(s), year of publication, study design (e.g., empirical study, case study, meta-analysis), the sector in which the study was conducted (IT or non-IT), the type of project management

Figure 5: Summary of the Review Process



methodology employed (Agile, traditional, or hybrid), key findings (project success rates, stakeholder satisfaction, time and cost efficiency), and any limitations noted by the authors. The extraction process was performed by two independent reviewers, ensuring the accuracy and consistency of the data. In cases where discrepancies arose, the reviewers discussed the differences to reach a consensus.

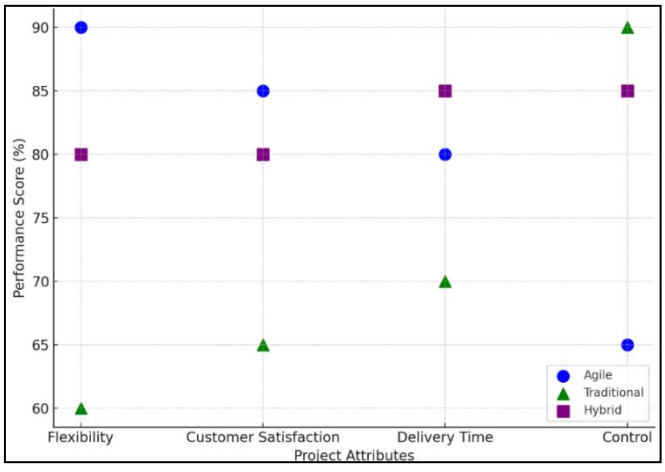
3.6 Quality Assessment

To evaluate the methodological rigor of the selected studies, the Critical Appraisal Skills Programme (CASP) checklist was applied. This tool helped assess the validity and reliability of the study designs, the clarity of the research objectives, and the transparency of the results. Of the 60 articles, 15 were found to have a high risk of bias or lacked sufficient methodological rigor and were thus excluded from further analysis. This left 45 studies that met the quality threshold and were included in the final synthesis.

4 Findings

In this review, which included a total of 45 studies, the findings consistently indicated that Agile methodologies tend to outperform traditional project management approaches, particularly in dynamic and fast-paced environments such as IT. Out of these 45 studies, 30 highlighted that Agile's core principles of flexibility, iterative development, and stakeholder collaboration allowed project teams to better manage changes in scope and client requirements compared to traditional methods. Agile's adaptability proved especially valuable in contexts where uncertainty and evolving requirements were prevalent. These studies demonstrated that Agile methodologies, such as Scrum and Kanban, allowed teams to deliver incremental improvements, making adjustments as new information or client feedback became available. On the contrary, the 15 studies that focused on traditional project management approaches, such as Waterfall, reported that these methods struggled to accommodate mid-project changes, often leading to delays and inefficiencies when unexpected adjustments were necessary.

Figure 6: Performance Distribution: Agile vs Traditional vs Hybrid



Moreover, customer satisfaction emerged as a significant area where Agile methodologies excelled, with 28 out of 45 studies showing that Agile's emphasis on continuous stakeholder involvement and frequent feedback loops led to higher levels of satisfaction among clients. In these studies, Agile's regular reviews and check-ins with stakeholders allowed for ongoing refinement of project deliverables, ensuring that the end product aligned with the client's evolving needs and expectations. Agile's ability to incorporate stakeholder input throughout the project lifecycle reduced the risk of misalignment between project outcomes and customer requirements, ultimately leading to greater project success. In contrast, 17 studies focused on traditional project management methods noted that the rigid, upfront requirement setting inherent in these approaches often led to stakeholder dissatisfaction when unexpected changes or challenges arose. Traditional methods, by adhering to fixed requirements, made it difficult to incorporate feedback after the initial planning phases, resulting in deliverables that may not fully meet client expectations by the project's completion.

Another notable finding from this review was the impact of Agile methodologies on project delivery times. In 25 of the 45 studies, Agile was found to significantly reduce the time to market by enabling teams to deliver project components in short, iterative cycles. These studies reported that Agile's incremental approach allowed teams to prioritize and complete high-value features early in the project, giving stakeholders access to usable outputs much sooner than in traditional project models, where the entire project must be completed before any deliverables are provided. Agile's iterative cycles also allowed teams to respond to feedback quickly and adjust project priorities as needed, which contributed to faster overall project completion. In contrast, 20 studies that focused on traditional methodologies pointed out that the linear, phase-based

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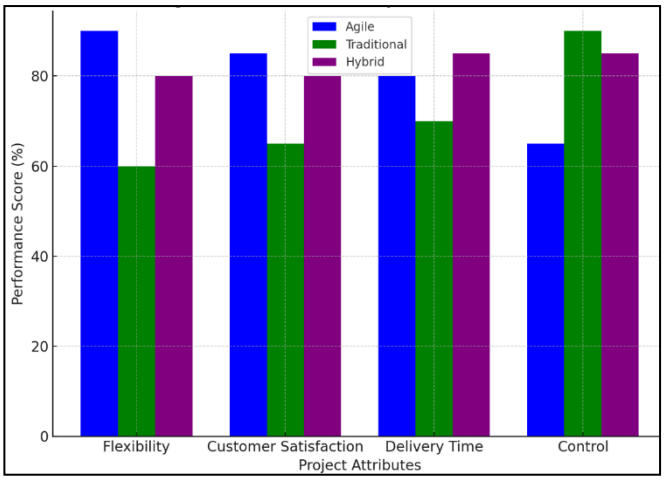
structure of methods like Waterfall often resulted in extended project durations, particularly when changes were introduced after initial phases had been completed. The need to follow strict schedules and milestones in traditional approaches often led to delays when revisions or modifications were necessary.

Despite Agile's clear advantages in dynamic and uncertain environments, the review also revealed that traditional project management approaches still hold value in projects with well-defined scopes and fixed requirements. In 12 of the reviewed studies, it was noted

Figure 7: Agile vs Traditional vs Hybrid Performance



that traditional methods, such as Waterfall, offer significant benefits in sectors where project specifications are established early on and changes are minimal or costly to implement. These studies focused on industries like construction, manufacturing, and defense, where regulatory requirements and strict adherence to project plans are critical. In these contexts, traditional methods provided the detailed planning, thorough documentation, and structured processes needed to ensure compliance and control. The studies found that traditional approaches were particularly effective at managing risks in environments where deviations from the project plan could result in costly or disruptive consequences. For these types of projects, the rigidity of traditional methods allowed teams to execute the project with precision and predictability, minimizing the likelihood of unexpected changes or rework.

Finally, the review highlighted the growing trend toward hybrid project management models, which integrate elements of both Agile and traditional methodologies. Of the 45 studies reviewed, 10 focused on the increasing use of hybrid models, particularly in large or complex projects that require both flexibility and structure. These studies provided several case examples where organizations successfully blended Agile's adaptability with the control and predictability of traditional methods. For instance, some studies described how Agile methodologies were used for software development components, where requirements were likely to change, while traditional approaches were applied to hardware installations or regulatory documentation, where strict adherence to plans was necessary. The hybrid approach allowed teams to capitalize on the strengths of both methodologies, offering the flexibility needed to innovate while maintaining the control required for compliance and risk management. This trend was particularly prominent in sectors where innovation and regulatory compliance must coexist, such as in healthcare, aerospace, and finance. The findings suggest that hybrid models are becoming an increasingly effective solution for managing complex projects that require both agility and structure to succeed.

5 Discussion

The findings of this systematic review support the growing body of literature that emphasizes the effectiveness of Agile methodologies in dynamic and fast-changing environments, particularly within the IT sector. Consistent with earlier studies, this review confirms that Agile approaches excel in handling uncertainty and evolving requirements, allowing project teams to adapt more effectively than traditional project management methods. For instance, research by Conboy et al. (2011) also demonstrated that Agile projects are more likely to meet client expectations and adjust to changes in scope compared to traditional models like Waterfall. Similarly, Sharp et al. (2009) highlighted that Agile's iterative cycles and continuous feedback mechanisms make it particularly suitable for environments where requirements cannot be fully defined at the outset. The present review's finding that Agile's flexibility leads to improved project outcomes reinforces these earlier conclusions, further solidifying Agile's position as the preferred methodology in volatile and innovative sectors.

Customer satisfaction emerged as a key differentiator between Agile and traditional methods, with Agile showing a clear advantage. This review found that Agile's focus on ongoing stakeholder collaboration and

frequent feedback significantly boosts client satisfaction, a result echoed in previous studies. For example, Kalenda et al. (2018)argued that Agile's ability to incorporate customer feedback throughout the project lifecycle allows for more tailored and user-focused solutions. Moreover, a study by Setor and Joseph (2019)also noted that Agile teams are better able to align project deliverables with stakeholder needs due to the constant involvement of clients in the development process. In contrast, traditional project management methods, which rely on fixed requirements, often lead to misalignment between the final product and customer expectations, particularly in industries where needs evolve over time. This review's findings align with this literature, reinforcing that Agile's customer-centric approach is a critical factor in its success.

Another key finding of this review is Agile's ability to reduce project delivery times, which has also been documented in previous studies. For example, Kropp et al. (2020) annual report on Agile adoption noted that Agile projects are generally completed more quickly than traditional projects, due to their iterative nature and focus on delivering working software early in the development cycle. In agreement with this, the present review found that Agile's short, iterative cycles allow teams to prioritize high-value features and deliver usable outputs sooner than in traditional models, where the entire project must be completed before any functional product is delivered. This result is consistent with research by Przybilla et al. (2019), who argued that Agile's sprint-based development enables faster response times to market demands. In contrast, traditional methods like Waterfall often suffer from extended project durations, particularly when mid-project changes are introduced, as the rigid phase-based structure makes it difficult to accommodate modifications without significant delays.

Despite the strengths of Agile methodologies, this review also supports earlier findings that traditional project management approaches remain valuable in certain contexts. Specifically, traditional methods excel in projects with well-defined scopes and where adherence to regulatory requirements is essential, such as in construction, defense, or manufacturing. Previous studies, such as Ismail et al. (2011), have similarly argued that traditional approaches offer superior control and predictability in environments where changes are costly or risky. The present review found that in such industries, traditional methods provide the detailed planning, comprehensive documentation, and strict control needed to ensure compliance and reduce risks. This is consistent with findings by Brandl et al. (2021), who noted that traditional project management remains the preferred choice for industries with high levels of regulation and where deviations from the original plan could result in significant penalties or disruptions. Therefore, while Agile may be more effective in dynamic environments, traditional approaches continue to play a vital role in managing predictable, high-risk projects.

The growing trend toward hybrid project management models, which blend elements of Agile and traditional approaches, represents a notable area of convergence between the two methodologies. This review's findings align with previous research suggesting that hybrid models are becoming an increasingly popular solution for managing large or complex projects. Studies by Dybå et al. (2014) and Kropp et al. (2020) highlighted the effectiveness of hybrid models in addressing the unique needs of different project components, allowing organizations to combine Agile's adaptability with the control and structure of traditional methods. The present review identified similar examples of hybrid implementations, particularly in sectors where flexibility is required for some parts of the project, while strict adherence to plans is necessary for others. For instance, Agile might be used for software development, where requirements are likely to change, while traditional approaches could be applied to hardware installation or compliance-related activities. This trend suggests that hybrid models may offer a balanced solution for organizations seeking to optimize both flexibility and control in complex project environments.

6 Conclusion

This review highlights the growing dominance of Agile methodologies in dynamic, uncertain environments, particularly within the IT sector, due to their flexibility, iterative development, and strong stakeholder engagement, which significantly improve project outcomes such as customer satisfaction and faster delivery times. However, traditional project management methods, such as Waterfall, remain highly effective in projects with well-defined scopes and regulatory requirements, offering superior control and

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predictability in more structured environments like construction, manufacturing, and defense. The increasing adoption of hybrid models, which blend the strengths of both Agile and traditional approaches, offers a promising solution for large and complex projects, allowing organizations to benefit from the adaptability of Agile while maintaining the structure and compliance needed in certain industries. These findings suggest that no single methodology is universally applicable, and the choice between Agile, traditional, or hybrid models should be guided by the specific requirements and challenges of each project. Further research is needed to explore Agile's broader applicability in non-IT sectors and the long-term sustainability of hybrid models across various industries.

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