

A Comprehensive Systematic Literature Review of Agile Methodology

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Abstract: Agile methodology, which offers collaborative, adaptable, and iterative alternatives to conventional plan-driven procedures, has become a revolutionary paradigm in project management since it was codified in the Agile Manifesto. Agile was first used in software development, but it has now spread across many different industries, demonstrating its increasing applicability in dealing with complexity, ambiguity, and quick environmental change. Given this expansion, a comprehensive synthesis of the existing body of knowledge is necessary to understand the trajectory of Agile's development, its practical applications, and its theoretical foundations. The literature demonstrates enduring issues, such as organizational resistance, misalignment with current governance structures, and the shortcomings of traditional performance measuring tools, despite widespread implementation. As a result, hybrid models that combine Agile and conventional methods have drawn more academic and real-world interest. This paper aims to present a literature review of Agile methodologies from 2001 to 2025, systematically examining their evolution, cross-sectoral diffusion, and key adaptations. It further identifies critical gaps in the literature and outlines future research directions, particularly in relation to sustainability, emerging market contexts, and the advancement of hybrid frameworks. Through this analysis, the study aims to provide a coherent and integrated understanding of Agile's role in managing complexity and enhancing value delivery in contemporary organizational environments.

Keywords: Agile Methodology; Traditional methodology; Project Management.

1. Introduction

Agile methodology, established by the Agile Manifesto in 2001, has redefined project management, particularly in software development (Krehbiel et al., 2017). Its emphasis on iterative development, customer collaboration, and responsiveness to change offers a flexible alternative to traditional approaches. This review explores advancements in Agile methodologies from 2001 to 2025, highlighting their evolution, challenges, and future directions based on recent research. Agile project management is transformative across industries, enhancing efficiency, innovation, and stakeholder satisfaction (Chukwunweike & Aro, 2024). Its principles of adaptability, collaboration, and continuous improvement enable teams to respond effectively to dynamic requirements and market shifts. Applications span product lifecycle management, public administration, construction, human resource management, and high-tech software development (Dong et al., 2024). The integration of artificial intelligence (AI) into Agile practices further optimizes workflows, automates tasks, and drives innovation. This paper also examines the hybridization of Agile with traditional methods as a strategy for managing complex projects, emphasizing the importance of continuous learning and adaptation (Reznikov, 2025).

2. Methodology

This study adopts a systematic literature review (SLR) methodology to critically examine the evolution and comparative dynamics of traditional and Agile project management from 2001 to 2025. The review draws on peer-reviewed journals, conference proceedings, books, and reports retrieved from databases such as Scopus, Web of Science, IEEE Xplore, and Google Scholar, using keywords including “Traditional Project Management,” “Agile Project Management,” “Hybrid project management,” and “AI in project management.” Studies were selected based on their relevance to project management methodologies, applications, benefits, limitations, and emerging trends, while irrelevant or non-peer-reviewed sources were excluded. Data extraction focused on definitions, application domains, success factors, barriers to adoption, and innovations such as hybrid models and AI integration. A thematic synthesis and comparative analysis approach was applied to identify patterns, contradictions, and gaps across literature. To ensure rigor and reliability, inclusion criteria were consistently applied, and coding was reviewed collaboratively, allowing the study to provide a structured and comprehensive understanding of how Agile and traditional project management practices have evolved, interacted, and adapted across sectors and contexts.

3. Literature Review

3.1 What is Agile Methodology

Agile project management constitutes a collaborative and iterative methodology focused on adaptability and the incremental delivery of value. Rooted in the Agile Manifesto, its core principles are customer satisfaction and responsiveness to change, achieved through manageable, short-cycle work phases (Celestin et al., 2024). The adoption of Agile has precipitated a paradigm shift in software development, fundamentally altering project planning, coordination, and stakeholder engagement across diverse sectors such as healthcare and telecommunications) Noteboom et al., 2021(. This approach stands in contrast to traditional, plan-

driven methodologies, which are characterized by detailed upfront planning and rigid processes (Baumgartner et al., 2021). Instead, Agile frameworks are designed to navigate uncertainty by emphasizing human factors—including competence, collaboration, and adaptability—as critical drivers of development success (Dingsoyr et al., 2010). The methodology's iterative nature, which stresses continuous user involvement, allows teams to effectively incorporate feedback and adapt to evolving requirements, thereby guaranteeing the steady production of functional software (Wulandari & Raharjo, 2023). The resultant benefits are widely documented, encompassing increased project efficiency, accelerated delivery, enhanced team communication, and greater customer satisfaction, all fostered by an environment of continuous innovation and improvement (Marnada et al., 2021).

3.2 Historical Overview and Agile Principles

Agile methodology first emerged in the 1990s as a response to the limitations of traditional, rigid project management systems, with early methods emphasizing iterative development and flexibility. The introduction of the Agile Manifesto in 2001, which identified its essential values, was a significant milestone. Agile gradually gained traction in software development, eventually growing in the 2010s through scaling frameworks to support huge enterprises. Agile has evolved into a comprehensive management concept that is used across different industries, combining digital transformation and emerging technologies to improve adaptation, creativity, and continuous value delivery (Saravanos, 2025). Originating as a response to the rigidity and limitations of traditional project management approaches, Agile methodology emerged with a strong emphasis on flexibility, close customer collaboration, and iterative value delivery. Unlike predictive models that rely on extensive upfront planning and fixed scope baselines, Agile promotes adaptive planning and incremental development, allowing teams to respond effectively to evolving requirements. In its post-2019 evolution, Agile has moved beyond team-level implementation toward enterprise-wide scaling, integrating frameworks such as SAFe and Disciplined Agile to align multiple teams and strategic objectives. Furthermore, Agile practices are increasingly being combined with emerging technologies such as artificial intelligence, data analytics, and automation, enhancing decision-making and real-time responsiveness. Importantly, Agile principles are no longer confined to software development; they are now applied across diverse sectors including healthcare, construction, education, and public administration, reflecting their versatility and growing relevance (Chibuike Daraojimba et al., 2024; Neumann et al., 2024; Raharjo & Purwandari, 2020). At the portfolio level, agility is driven by the continuous alignment of projects with evolving customer and stakeholder needs. This alignment is supported by organizational flexibility, decentralized decision-making, and the ability to rapidly adapt to environmental changes. Such capabilities significantly enhance value delivery by ensuring that outputs remain relevant and responsive to stakeholder expectations. Additionally, Agile environments foster higher levels of customer satisfaction through continuous feedback loops and iterative releases, while empowering teams with greater autonomy and accountability. The emphasis on continuous learning, knowledge sharing, and capability development further strengthens organizational resilience, enabling sustained performance even in highly dynamic and uncertain contexts (Forozandeh & Ardalani, 2026).

Considering recent developments in project management standards, particularly those presented in the PMBOK® Guide – Seventh Edition and the Agile Practice Guide, there is a growing recognition of the need to clearly distinguish between predictive (traditional) and adaptive (Agile) approaches. The predictive approach is characterized by detailed upfront planning, well-defined scope, and structured control mechanisms, making it suitable for stable environments with low uncertainty. In contrast, the adaptive approach embraces change, encourages iterative planning, and relies on continuous stakeholder engagement, making it more effective in complex and uncertain settings. Consequently, modern project management practice increasingly advocates a hybrid approach that combines the strengths of both methodologies. Such an approach allows organizations to tailor their management style based on project characteristics, including complexity, risk level, and environmental volatility, thereby achieving a more balanced and context-sensitive governance framework (Al-Nabae et al., 2024; Al-Nabae & Sammani, 2019; Project Management Institute, 2017b, 2017a)

3.3 Benefits of Agile

Agile principles serve as a critical enabler for digital technology integration within Product Lifecycle Management (PLM), primarily by enhancing organizational collaboration, operational flexibility, and process efficiency. This approach allows firms to respond with agility to volatile market demands, align cross-functional teams, and streamline development cycles (Ibeh et al., 2024). The applicability of Agile methodologies extends beyond the private sector; in public administrations, they are adapted as a cultural shift, a governance framework, and a set of practical tools like Scrum to drive digital transformation, despite challenges posed by bureaucratic inertia (Neumann et al., 2024). The successful implementation of Agile yields significant benefits, including superior software quality, enhanced developer morale, and reduced costs, over the traditional waterfall approach, despite the distinct challenges inherent in its adoption (Hajjdiab & Al Shaima, 2011). The core principles of Agile Project Management (APM), including adaptability, iterative processes, and collaboration, are essential for effectively managing project uncertainty, fostering innovation, and enabling incremental value delivery (Dong et al., 2024; Noteboom et al., 2021). This philosophy is further reinforced by Agile Human Resource Management, which integrates Agile principles into HR practices to bolster organizational adaptability and talent management (Al-Hosaini & Sofian, 2015, Moh'd et al., 2024). The success of methodologies such as Scrum and Kanban hinges on key factors including clear communication, stakeholder involvement, and adaptive planning, which collectively mitigate complexity and ensure quality outcomes. (Daraojimba et al., 2024; Dong et al., 2024). This holds true across diverse domains, from high-tech software development to the construction industry, where APM fosters improved performance through continuous feedback and rapid response to change (Albuquerque et al., 2020; Amajuoyi et al., 2024). A significant evolution in this domain is the integration of Artificial Intelligence (AI) with Agile frameworks. AI augments APM by automating tasks, optimizing resource allocation, and facilitating data-driven decision-making, thereby significantly enhancing efficiency and predictive capabilities (Tadimarri et al., 2024). For organizations navigating the transition from traditional models, a hybrid approach that combines Agile's flexibility with structured planning has proven effective in maintaining control while

achieving greater responsiveness (Karim Zadeh et al., 2024). However, this AI-Agile integration presents challenges, including a shortage of skilled personnel, data privacy concerns, and the necessity to align AI tools with core Agile values for effective implementation (Tadimarri et al., 2024).

3.4 Traditional and Agile Project Management Methodologies

Traditional (waterfall) and Agile project management methodologies are two of the most extensively used methodologies in project planning and execution, however they differ in philosophy, processes, and tools. While the traditional approach emphasizes upfront preparation and a defined sequence of actions to maintain stability and control, Agile relies on flexibility, iteration, and quick response to change, making it better suited to dynamic and uncertain contexts. Given these basic differences, it is critical to perform a systematic comparison of the two techniques to better understand their strengths and weaknesses, as shown in the table below.

Table 1. Comparative Analysis of Traditional and Agile Project Management Methodologies		
Dimension	Traditional (Predictive/Waterfall)	Agile (Adaptive/Iterative)
Approach	Predictive: fixed scope, adjusted cost & schedule.	Adaptive: fixed cost & time-box, flexible scope.
Governance & Roles	Centralized authority, Accountable Project Manager.	Shared decision-making and empowered, self-organizing teams, Servant-leader role, self-organizing teams.
Planning	Detailed upfront planning, linear phases.	Incremental planning, rolling-wave, iterative delivery.
Scheduling	Baseline schedule with milestones and critical path.	Short iterations (sprints), releases, on-demand scheduling.
Measurement of Work	Based on work hours, effort estimation.	Story points, velocity, cycle time, and other team/product metrics
Quality Management	Formal verification & validation after development.	Continuous integration, testing, and validation within each iteration.
Risk Management	Risks managed through periodic reviews and response plans.	Risks handled continuously through inspection, adaptation, and frequent feedback.
Change Management	Controlled via formal change requests and approvals.	Built-in adaptability, backlog refinement, dynamic reprioritization.
Communication & Collaboration	Relies on documentation and structured reporting.	High transparency, daily stand-ups, visual management (Kanban boards, radiators).
Stakeholder Engagement	Managed at specific gates/stages.	Continuous collaboration, high visibility, active participation.
Procurement & Resources	Fixed procurement contracts, specialized resources.	Flexible procurement, cross-functional teams, shared roles.
Value Delivery	Focus on delivering the final product at project closure.	Early and continuous delivery of value in increments.

Monitoring & Control	Earned Value Management, variance analysis.	Agile metrics: velocity, burn-down/burn-up charts, CFD.
Boundaries & Lifecycle	Sequential phases with defined start and completion criteria	Iterative/incremental cycles, with time-boxing common in Scrum., incremental delivery cycles.

3.5 Challenges in Agile Adoption

The implementation of Agile methodologies, while advantageous, encounters considerable impediments, especially within organizations characterized by entrenched hierarchical structures and inflexible cultures. Scholarly literature consistently identifies lack of top management support, robust leadership endorsement, comprehensive training initiatives, and strategic cultural alignment as pivotal factors for mitigating these challenges (Al-nabae & Sammani, 2021; Baxter et al., 2023, 2023; Endres et al., 2022; Khoza & Marnewick, 2021; Tripathi et al., 2021; Venugopal & Saleeshya, 2019; Zhang et al., 2019). A further critical challenge lies in the evaluation of Agile project success. Cultural clashes and organizational resistance to change rank among the most formidable barriers to adopting agile methodologies. Conventional performance metrics are often ill-suited to capturing the iterative and customer-focused essence of Agile frameworks (Aouni et al., 2025; Bakar & Dorasamy, 2023; Baumgartner et al., 2021; Kuchel et al., 2023). Consequently, hybrid models integrating Agile with traditional, plan-driven project management methodologies have emerged as a pragmatic solution. These models seek to reconcile Agile's inherent flexibility with the structural rigor required in highly regulated sectors such as finance and construction, where compliance mandates and extended project lifecycles are normative (Baxter et al., 2023, 2023; Kuchel et al., 2023, 2023).

4. Results and Discussion

The systematic literature review shows that Agile project management has evolved significantly between 2001 and 2025, expanding from its original software-development context into sectors such as healthcare, telecommunications, construction, education, and public administration. Recent studies also indicate broader enterprise-level adoption and increasing integration with digital transformation and emerging technologies (Noteboom et al., 2021; Neumann et al., 2024; Daraojimba et al., 2024). This development suggests that Agile is increasingly viewed not only as a software-development methodology but also as a broader management approach for dealing with uncertainty, rapid change, and continuous value delivery. The review also identified clear differences between traditional and Agile project management. Traditional approaches emphasize detailed upfront planning, defined scope, centralized governance, formal change control, and baseline-based monitoring. Agile, in contrast, relies on iterative planning, flexible requirements, continuous stakeholder engagement, adaptive change, and incremental delivery. These differences indicate that the effectiveness of each approach depends largely on project conditions. Predictive methods remain appropriate where requirements are stable and formal control is important, whereas Agile is more suitable in environments characterized by uncertainty, frequent change, and continuous stakeholder feedback.

The reviewed studies frequently associate Agile with improved adaptability, communication, stakeholder involvement, continuous feedback, innovation, quality improvement, and faster value delivery (Dong et al., 2024; Noteboom et al., 2021; Albuquerque et al., 2020). These findings support the view that Agile can enhance organizational responsiveness by allowing teams to adjust priorities and requirements throughout the project lifecycle rather than relying entirely on initial assumptions. However, the review also identified important challenges to Agile adoption. Common barriers include organizational resistance, hierarchical culture, insufficient management support, limited training, and difficulties in applying conventional project performance measures in Agile environments (Al-Nabae & Sammani, 2021; Baxter et al., 2023; Bakar & Dorasamy, 2023; Kuchel et al., 2023). This indicates that successful Agile implementation requires more than adopting practices such as Scrum, Kanban, or iterative planning. Leadership commitment, organizational culture, team capability, and appropriate governance structures are also critical. Another significant finding is the increasing adoption of hybrid project management approaches. The literature shows that organizations are combining traditional planning and governance controls with Agile flexibility and iterative delivery, particularly in complex or regulated environments (Baxter et al., 2023; Kuchel et al., 2023; Karim Zadeh et al., 2024). This suggests that contemporary project management is moving away from the idea that organizations must choose exclusively between traditional and Agile methodologies. Instead, hybrid approaches provide greater flexibility by allowing practices to be tailored to project complexity, uncertainty, governance requirements, and stakeholder needs. Finally, artificial intelligence is emerging as an additional influence on project management. The reviewed literature identifies applications of AI in task automation, resource optimization, forecasting, and data-driven decision-making (Tadimarri et al., 2024). The integration of AI with Agile practices may further strengthen project responsiveness and decision-making; however, challenges related to skills, data privacy, organizational readiness, and alignment with Agile values remain important considerations. Overall, the findings demonstrate that project management is evolving toward a more adaptive, hybrid, value-oriented, and technology-supported model. Rather than replacing traditional project management, Agile increasingly complements predictive practices, with organizations selecting and combining methods according to the specific characteristics and requirements of each project.

5. Conclusion

This analysis synthesizes the trajectory of Agile methodology from its genesis in software development to its current proliferation as a transformative project management paradigm across diverse sectors. The examination confirms that Agile's core principles—iterative progression, stakeholder collaboration, and adaptive responsiveness—consistently yield enhanced operational efficiency, innovation capacity, and value delivery in dynamic environments. The implementation landscape reveals significant organizational challenges, particularly regarding cultural transformation and performance measurement. Consequently, the field has evolved through two critical adaptations: hybrid frameworks that integrate Agile flexibility with traditional governance structures, and technological augmentation through artificial intelligence to optimize workflow automation and decision-making processes.

Future research trajectories should prioritize three domains: quantifying Agile's impact on sustainable development goals, contextualizing implementation frameworks for emerging economies, and advancing theoretical understanding of hybrid model efficacy. The paradigm's enduring significance lies in its fundamental emphasis on human-centric collaboration and organizational learning as mechanisms for sustaining competitive advantage in an increasingly volatile global landscape.

6. Funding

The results demonstrate that Agile has spread beyond software development into other industries and is being utilized more frequently in contexts that are complex and dynamic. Agile prioritizes flexibility, iterative delivery, teamwork, and ongoing stakeholder interaction above traditional project management. Benefits like more flexibility, communication, quality, and quicker value delivery are also noted in the literature, along with drawbacks including resistance to change, a hierarchical culture, a lack of training, and inadequate managerial support. Furthermore, hybrid and AI-supported approaches—which combine traditional control with Agile flexibility and technology-enabled decision-making—are growing in popularity (Noteboom et al., 2021; Dong et al., 2024; Baxter et al., 2023; Karim Zadeh et al., 2024; Tadimarri et al., 2024).

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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