**AGILE PROJECT MANAGEMENT: ENHANCING FLEXIBILITY AND EFFICIENCY THROUGH ARTIFICIAL INTELLIGENCE**

**ABSTRACT**
Agile project management is an increasingly popular form of project management that places a focus on flexibility, collaboration & ongoing improvement that works effectively for software development tasks and also has various benefits, like the scope to adjust to changing requirements, utilize resources efficiently and create a continuous improvement culture. Stakeholder satisfaction, risk management and decision making may all be enhanced by combining data driven techniques and agile project management. It may also lead to a project's success overall, a faster time to market and more transparency and responsibility which also includes traditional project management techniques often suffer from being too rigid, having few stakeholder interactions, having uncertain requirements, having difficult change management, having no flexibility when it comes to risks and having insufficient resources. By solving these challenges, agile project management provides a more adjustable and effective way to project management in the fast moving, unpredictable corporate environment of today. The scrum methodology, Kanban, Scrumban, an Extreme Programming (XP), & Crystal Techniques are the instances of agile project management methodologies where every approach has benefits as well as disadvantages that are most appropriate for certain project objectives. Businesses may create a project management plan that best fits their unique needs by knowing the benefits and drawbacks of both agile and traditional project management techniques and also examines the development of project management techniques, highlighting the shortcomings of conventional waterfall techniques as well as the emergence of agile techniques. Agile project management techniques enable teams to adapt to shifting needs & priorities at any point in the project lifecycle since they are flexible and iterative and also covers a number of Agile approaches, such as Extreme Programming (XP), Kanban, Scrum, and Crystal Techniques. Since every technique has advantages and disadvantages of its own, it is critical to choose the best strategy for the job at issue, the advantages of combining data-driven approaches and business analytics with Agile project management are discussed. Better making decisions, risk management, satisfaction from stakeholders, and a quicker time to market are all possible outcomes of this combination, furthermore, Agile project management encourages greater openness, accountability, and a continuous improvement mentality. In conclusion, in the fast-paced and uncertain business setting agile project management provides a more adaptable & effective way to project management and may benefit businesses even more when integrated with data-driven approaches and business analytics.

**Keywords:** Agile project management, Artificial Intelligence, Data-driven, Flexibility, Efficiency, Continuous improvement, Risk management, Stakeholder satisfaction

**1.INTRODUCTION:**

 **1.1 Project**

Project is a short-term, well defined, performing that is started with a specified purpose and ends with the delivery of a products, service, or outcome and also have a Constrained resources like scope, time, and money are usually used to carry out projects. It has a clearly defined start and finish as well as certain aims, objectives, and limitations [(Bröchner, 2022](https://www.sciencedirect.com/science/article/pii/S0263786322000540)) in order to guarantee that resources are used efficiently and that the expected outcomes are obtained , projects are usually managed via the use of an organized methodology and [(Pinto et al.2022) usually involves segmenting the project into manageable tasks, allocating duties to teammates members, & monitoring advancement in relation to deadlines and benchmarks.](https://www.sciencedirect.com/science/article/abs/pii/S0263786322001156)

 **1.2 Challenges of Project management**

There are many challenges with project management such as scope creep, which is when a project capacity expands beyond what was originally planned, resource constraints, which are caused by a lack of time, money, or skilled labour, stakeholder management [(Malav, et al .2021),](https://www.sciencedirect.com/science/article/abs/pii/S0959652620332728) which involves managing the expectations and interests of multiple stakeholders, risk handling, which is identifying, evaluating, and reducing project risks, and [(Lavagnon ,2022)](https://www.sciencedirect.com/science/article/abs/pii/S0263786322000771) communication, which is making sure that team members as well as stakeholders are communicating effectively .

**1.3 Project's Growth percent**

A project's growth percentage, usually stated as a percentage, shows the proportionate rise in its size, scope, or value over a certain time period and the process of calculation involves comparing the project's end and beginning states to the original state, then multiplying the result by 100 [(Joghee et al ,2020).](https://research.skylineuniversity.ac.ae/id/eprint/34/)This metric helps stakeholders evaluate the project's performance and direction by providing information about how far the project has come in comparison to its beginning, by keeping an eye on the growth %, one can form well informed decisions and modifications to keep the project moving in the direction of its goals.

**1.4 Project Success rate**

The percentage of projects that reach their goals within the specified parameters of scope, time, money, value, and stakeholder satisfaction is known as the project success rate and when a project meets stakeholder expectations and produces the desired results on schedule, within budget, and at the expected standard level, it can be considered successful [(Hodiany ,et al,2022) and its .](https://bibliotekanauki.pl/articles/27315271)Success rates can differ based on a number of variables, such as intricacy of the project, the efficiency of management, as well as external influences.

**1.5 Project Management**

The discipline of successfully and efficiently arranging, planning, and execution of projects is known as project management [(Herath & Chong, 2021)](https://journal.oscm-forum.org/publication/article/key-components-and-critical-success-factors-for-project-management-success-a-literature-review) which includes managing each stage of a project from start to finish, guaranteeing that the project achieves its goals while keeping by limitations like time, money, scope, and quality [(Yao et al.2023).](https://www.sciencedirect.com/science/article/abs/pii/S0263786323000297)Throughout the duration of a project, resources, responsibilities, and stakeholders are managed using a variety of procedures, instruments, and approaches that are all included in project management.

 **1.6 Evolution of Project Management:**

From its beginnings as a simple task management approach, project management has evolved significantly to become a sophisticated field that combines psychology, technology, and strategic planning and from random approaches at first, it has developed into organized systems like waterfall, the Agile approach and Lean, each adapted to the specific demands of the company and the difficulty of the project [( Vivek et al.2021)](https://www.researchgate.net/publication/355651276_Evolution_from_operations_project_management_to_strategic_project_management_a_systematic_review/citation/download) and technological developments have been crucial in facilitating data-driven decision making, predictive analytics & real time communication. Moreover, project management has become a complex field that emphasizes stakeholder participation, communication, and leadership due to the acknowledgment of soft skills in addition to technical expertise [(Gibbin et al.2023)](https://www.sciencedirect.com/science/article/abs/pii/S095965262301911X) and also always evolving as organizations navigate a more dynamic environment, embracing innovation and adjusting to the ever-changing needs of modern projects.

**1.7 Evolution of Agile project Management:**

Agile project management has developed through continuous improvement and modification in response to the dynamic environment of the development of software and other fields in which limits of traditional waterfall systems gave rise to the emergence of Agile methodologies such as Kanban, Scrum, and Extreme Programming (XP), starting with the Agile Manifesto, which was released in 2001 ([Balaban, Suzana et al,2021)](https://www.researchgate.net/publication/351858054_Agile_Project_Management_as_an_Answer_to_Changing_Environment). These approaches revolutionized the approach projects were managed by supporting adaptability, quick feedback loops, an emphasis on incremental value delivery and also introduced continuous improvement, prioritized customer participation, and created self-organizing, cross-functional teams.

Flexibility became a requirement when Agile approaches gained popularity, especially in software development [( Omonije,2024).](https://www.researchgate.net/publication/377979833_Agile_Methodology_A_Comprehensive_Impact_on_Modern_Business_Operations)as a result, scaled Agile frameworks were created, such as SAFe (**Scaled Agile Framework)** methodologies, LeSS(**Large-Scale Scrum)**, and DAD **(Disciplined Agile Delivery),** that offer direction on implementing Agile concepts in more complicated projects and larger companies[(Saqqa et al.2020).](https://www.semanticscholar.org/paper/Agile-Software-Development%3A-Methodologies-and-Al-Saqqa-Sawalha/53436eeef7672a4b982ba8872491635cbf211f1a?p2df) through the implementation of new levels of cooperation, management, and alignment, these frameworks allowed businesses to efficiently use Agile approaches at scale without sacrificing responsiveness or agility.

Moreover, another important turning point in its development was the fusion of Agile & Devops approaches in order to optimize the software delivery pipeline, Devops places a strong emphasis on automation and cooperation between the operations and development teams (whiteley et al,2021). By means of continuous enhancement, delivery, and feedback, organizations may attain quicker time to market, enhanced reliability, higher customer satisfaction by integrating Agile concepts into the Devops mindset [( Habermann & Schmidt 2020).](https://www.inderscienceonline.com/doi/abs/10.1504/IJMP.2020.105674) and reduces the boundaries between operation and development and drives the advancement of Agile methodology project management into novel areas of effectiveness and innovation.

**1.8 Drawbacks in existing project management approach:**

Even while they work well in many situations, current project management approaches include a number of faults that might make a project fail[(Alsharef et al,2021)](https://www.mdpi.com/1660-4601/18/4/1559) and a significant limitation is the inflexibility of conventional approaches such Waterfall which Following a set strategy to the point can lead to delays, overspending, and eventually project failure in a dynamic environment where requirements change quickly [(Sanz-Llopis & Ostermann 2020)](https://www.emerald.com/insight/content/doi/10.1108/IJMPB-08-2019-0210/full/html) and rigidity causes particular problems in sectors where responsiveness and flexibility are critical, such as those defined by ambiguity, risk, complexity and volatility.

Furthermore, managing expectations from stakeholders and communicating effectively is a challenge for traditional project management in which Stakeholders are important to the success of a project [(Pargaonkar,2023).](https://d1wqtxts1xzle7.cloudfront.net/106763843/ijsrp_p14015-libre.pdf?1697745969=&response-content-disposition=inline%3B+filename%3DA_Comprehensive_Research_Analysis_of_Sof.pdf&Expires=1718470946&Signature=K7Y-UMt2EbjkHVOxCPHjl~rdLqjMKi0GttTMLtecJPPdX~-fCM3ng1EyiMWOykHLgdyNt9HIiH4YqrHt1byNaaR7K97Jcld1jvSsLI9k9Ge2MtK7HHQ9twhO4Y5tHVlQc~X0SxVYyqdayyh6CJdVX57ZX~JNkaLm~xkqiiN9uUBOJ1LXR0PT4j5qRxlU788P~F4Q3ICPuWMU40nLctxBsZSUgMeJLs6-G4Xdp7qjEDNGjyA54Lv3XADevOxYjwT7j1DfgIVyl9PnKP2fGNVe6Ec0GRdBhRFhorzgY6VwdEbbkKFZ7iIdmYh8ajpZlFE~0UthJaEPDmfJ477b0tKgug__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA) yet occasionally their demands and opinions are disregarded or misinterpreted. Conflicts, scope creep, and project derailment can result from this misalignment, [(Masia & Poll 2021).](https://www.inderscienceonline.com/doi/abs/10.1504/JGBA.2021.114320)in addition, poor communication among team members, stakeholders, and leaders may delay decision-making, increase risks, and decrease confidence, all of which may delay cooperation and creativity.

As the Agile Manifesto reminds, another common mistake is an ability to put procedures and instruments before of people and communication and when rigidity and inflexible procedures are the norm, team members' creativity and flexibility may be inhibited, which can result in dissatisfaction and fatigue [(Carsten Kaufmann, 2022)](https://www.sciencedirect.com/science/article/pii/S026378632200076X). Furthermore, excessive reliance on technology and tools can occasionally hide the value of human centred project management techniques like sympathy, behavioural intelligence, and efficient leadership, even while these methods are helpful for organizing workflows and managing data.

Finally, a lot of project management approaches now in use find it difficult to handle the complexity of contemporary projects, which frequently involve various teams, groups, and even organisations [(Giezen, 2020)**.**](https://www.sciencedirect.com/science/article/abs/pii/S0263786312000129) moreover, Separated methods of project management may restrict cross-functional cooperation, information exchange, [(Davila et al,2020)](https://ascelibrary.org/doi/abs/10.1061/%28ASCE%29CO.1943-7862.0001844) and cooperation as projects grow more linked and interdependent and the fragmentation raises the risk of misunderstandings, layoffs and conflicts across various project ecosystem components in addition to reducing efficiency and effectiveness .

Therefore, even though conventional project management techniques have clearly been useful for planning & executing projects [(Clauss et al,2021)](https://www.sciencedirect.com/science/article/pii/S2444569X20300317), their shortcomings highlight the necessity for continuing innovation & evolution in project management techniques to meet the changing demands of the modern business climate.

**1.9 Agile project management:**

Agile project management is an adaptable and continuous techniques of managing projects that puts an emphasis on quick feature delivery, teamwork, continuous advancement, especially in the context of software development projects [(Manurung & Kurniawan 2021).](https://www.emerald.com/insight/content/doi/10.1108/IJMPB-10-2020-0310/full/www.frost.com/full/html) and some of typical Agile Techniques includes Scrum, a well-liked Agile methodology that makes use of sprint evaluations and reviews, stand-up meetings every day, and fixed-length sprint and Kanban a visual system that uses cards to indicate tasks on boards[(Ivetic, Pavle et al.2020)](https://www.researchgate.net/publication/344752386_Reinventing_Universities_Agile_Project_Management_in_Higher_Education)and the goal of kanban is to increase productivity by decreasing work in progress (WIP).

**2. LITERATURE REVIEW:**

**2.1. Project management:**

The complex method of planning, carrying out, monitoring every facet of the project that is necessary to obtain a certain objective which comprise a variety of procedures, approaches, and instruments used to guarantee the successful and efficient completion of projects [(Rahardja & Lutfiani 2020).](https://iopscience.iop.org/article/10.1088/1742-6596/1477/3/032023/meta)where various components of a project, such as setting goals, generating plans, assigning resources, regulating risks, collaborating with stakeholders, are mostly within the control of project managers and delivering high quality outcomes that satisfy stakeholders requires juggling conflicting demands and restrictions, which is a necessary component of effective project management

**2.2 .Agile project management:**

Agile project management focuses adaptation, cooperation, and continual improvement which is a fluid and progressive method to project management & though its inception was in the field of software advancement sector, its efficiency in handling intricate projects with dynamic needs has led to its widespread use in many industries (Binci et al. 2023). Agile's fundamental principles are found in the Agile, which puts an focuses on people & their communication over procedures & technologies, functional software over comprehensive documentation, customer participation over contract negotiations,& adapting to change rather sticking to a schedule

It is based on the continuous idea that work is broken down into small feasible units called sprint or iteration, in every iteration usually lasts for a set number of time, usually from 2-4 weeks (Marder et al,2021), throughout which a cross-functional group works together to produce a product advancement which could be transported and by delivering value to stakeholders early and often, this continuous approach grant them opportunity to offer input and build the project's course across its entire duration[.](https://www.sciencedirect.com/science/article/abs/pii/S1472811721000689)

The importance on client collaboration that Agile project management places on is another essential component and the agile teams aggressively include consumers and end users as well as other stakeholders in the process of development [(Rush & Connolly 2020)](https://scholarworks.boisestate.edu/itscm_facpubs/88/), asking for their opinions and suggestions to make sure the finished product fulfil their requirements and increased satisfaction and goal alignment result from the project's team and stakeholders working closely together to build openness and confidence .

 Agile project management encourages cross functional, self organizing teams as well and teams that use Agile have the scope to collaborate & adjust to developing conditions, as opposed to depending on top down, hierarchical decision making processes [(Koch & Schermuly 2021) together, team members from many disciplines such as growth and development, design, and testing achieve common objectives by combining their varied backgrounds and specialties to produce outputs that are of the highest caliber](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536) [[(Felix et al.2021)](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536)](https://www.sciencedirect.com/science/article/abs/pii/S1755581721000559?casa_token=Vm6xHxECnvQAAAAA:YLdqHp6YvBSeaKlSrm6jHLcgXyrBfb5ptZoeeggw-7PU5dJL2dUlOzMZGNq9xutjpx3hOJfefH-W)[. Furthermore, agile approaches such as Scrum and Kanban offer methods & frameworks to help Agile teams plan, carry out, and monitor their work efficiently and ultimately, in the present fast moving and uncertain business world, This technique provides a dynamic and flexible method to project management, permitting teams to create value rapidly and adjust to changing requirements.](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536)

[Moreover, Agile project management supports a culture of constant growth and research which provides the teams to examine their processes, highlight areas for development, and test out novel ideas to increase their efficiency through frequent evaluations or review sessions and teams are able to adjust and develop over time, continually improving their methods to provide better results, due to this continual feedback loop](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536) [[(Bogdanova et al,2020)](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536)](http://ijasos.ocerintjournals.org/en/pub/ijasos/article/786345) [and moreover, it encourages visibility and openness by tracking progress and updating stakeholders on status through the use of visual tools like activity boards, burndown visualizations, and Kanban boards](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536) [[( Ebirim et al.2024).](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536)](https://fepbl.com/index.php/estj/article/view/864) [and this transparency allows stakeholders to be updated on the project's status in real time and encourages accountability and teamwork within the group.](https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12536)

**2.3.Difference between agile project management and traditional project management:**

There are some key differences between agile project management and conventional project management in that first of all, while traditional project management techniques like Waterfall stick to a more rigorous, sequential procedure, Agile places an emphasis on flexibility and adaptation[([Gemino](https://journals.sagepub.com/doi/abs/10.1177/8756972820973082#con1) et al.2021)](https://journals.sagepub.com/doi/abs/10.1177/8756972820973082) which divides projects into brief, time-limited iteration called sprints and this structure enables teams to modify requirements and priorities at any point during the project's lifecycle according to input from customers or shifting market conditions [(Jafari et al,2024)](https://www.worldscientific.com/doi/abs/10.1142/S0219649223500600). On the other hand, traditional project management generally requires a great deal of planning up front and a straight line through the project stages, with few opportunities for modification after the plan is established.

Second, during the project, rigid cooperation between cross-functional teams, clients, and stakeholders is encouraged by agile project management and agile places a strong emphasis on teamwork and communication [(Gaborov et al.2021)](http://81.2.247.240/index.php/jatespath/article/view/279), with regular meetings and feedback systems to guarantee comprehension and alignment[(Zavyalova,Elena etal.2020).](https://www.researchgate.net/publication/339510213_Agile_vs_traditional_project_management_approaches_Comparing_human_resource_management_architectures#:~:text=The%20traditional%20management%20approach%20is,traditional)%20methods.%20...)Conventional project management may feature more hierarchical organizational structures, fewer channels for communication, and an ability for project leaders or senior leaders to make decisions without seeking much feedback from the team as a whole.

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| --- | --- | --- | --- |
| **Features** | **Agile Project Management** | **Traditional Project Management** | **Literature Review** |
| Method of Planning | Iterative and adaptable, with regular modifications made in response to input & evolving needs. | Sequentially and rigorous, with a thorough strategy made from the start and implemented all the way through. | [Ciric et al ,2021](https://apem-journal.org/Archives/2021/APEM16-1_099-111.pdf) |
| Managing Change | Recognizes change as a necessary element of the process & views it as a chance to get better. | Usually hesitant to change ,necessitating formal change management procedures and frequently leading to extra expenses and delays. | [Gaborov et al,2021](http://81.2.247.240/index.php/jatespath/article/view/279) |
| Team Arrangement | Cross-functional in nature, self-organizing groups that work closely together and adjust to changing demands. | A hierarchical allowing team members less freedom to adjust to changing circumstances and clearly defined positions and tasks up front. | [Koch et al,2023](https://bpspsychub.onlinelibrary.wiley.com/doi/full/10.1111/joop.12429) |
| Interactions and Feedback | Focuses as enormous value on regular feedback loops, stakeholder involvement, and frequent and transparent communication. | Depends on official reporting and documentation systems, and communication routes are frequently less flexible and more rigorous. | [Gemino et al,2021](https://journals.sagepub.com/doi/abs/10.1177/8756972820973082) |
| Project Delivery | To deliver value in small steps, with regular releases and chances for adjustments. | Intended to complete the project's scope in a single, fixed end delivery; this sometimes led to lengthier lead times until stakeholders could observe any real progress. | [Aleinikova et al, 2020](https://elibrary.kubg.edu.ua/id/eprint/41314/) |

**Table 2.1: Difference between agile project management & traditional project management**

**2.4.Similarities between agile & traditional project management:**

Despite using distinct methodologies, agile & traditional project management have a number of essential similarities.

**Goal-Oriented:** Within limitations like time, money, and scope, the both agile and conventional project management (Teichert et al.2024) seek to accomplish certain project goals and the main goal is to provide benefit to stakeholders or consumers, regardless of the approach used[.](https://ijol.cikd.ca/article_60735.html)

**Planning and Execution:** To guarantee project success, both approaches call for efficient planning and execution, While conventional project management typically requires considerable upfront preparation followed by the sequential execution of project stages [(Brandl et al, 2021)](https://www.sciencedirect.com/science/article/abs/pii/S1755581721000559) agile project management places an emphasis on adaptable planning and continuous execution.

**Resource Management:** To guarantee that project goals are effectively achieved, both agile and conventional project management require effective resource management, including people, time, and money [(Gomes et al,2022)](https://onlinelibrary.wiley.com/doi/abs/10.1002/csr.2287) which is crucial for all techniques, be it managing finances, giving work to team members, or monitoring progress.

**Risk management:** In both traditional and agile project management, minimizing risks is essential and both approaches share the common practice of identifying possible risks, evaluating their effect and likelihood [(Zahidul Islam et al.2020)](https://gjcst.com/index.php/gjcst/article/view/360) and putting strategies in place to reduce or mitigate them in order to maximize the project's outcome and minimize delays .

Agile and conventional project management share a number of core ideas and practices, despite their different methods and philosophies and these similarities make it possible to guarantee that projects are prepared, carried out, and managed in a approach that seeks to produce positive results, irrespective of the technique employed.

**2.5. Types of agile project management:**

Agile project management cannot be applied universally and the methodology encompasses a number of approaches, each with unique advantages and subtleties. The most popular Agile methodology types are:

**2.5.1.Scrum**:

**Agile Approach:** Scrum is a widely used Agile methodology that is remarkable by its gradual & continuous method, in order to produce possibly shippable components of work, [( Munteanu et al.2021)](https://ejbmr.org/index.php/ejbmr/article/view/741)cross functional teams divide project tasks into brief iterations termed sprints, which usually run 1-4 weeks.

**Comparing Scrum with Traditional Project Management:** Traditional project management is more hierarchical and plan-driven, (Papadakis & Tsironis 2020) whereas Scrum places a major focus on self-organized teams, continuous collaboration, and adaptation to change and also it encourages adaptability and responsiveness to client input, enabling changes to be made as the project progresses

**2.5.2.Kanban:**

**Agile Approach:** Kanban is a graphical management technique focusing on efficiency maximization, work in progress (WIP) limitation, [(Alaidaros et al,2021)](http://paulorodrigues.pro.br/ojs/ijmp/index.php/ijmp/article/view/1482) and continuous flow which involves utilizing visual signals to indicate when work may be brought into the next step and displaying tasks for the project on a board called the Kanban board with rows representing various process stages.

**Comparing Kanban with conventional Project Management:** Kanban promotes more adaptable and flexible planning than conventional project management,(Zielske & Held 2021) which frequently depends on set timeframes and timetables and instead of following a predetermined plan, it promotes a continual flow of tasks and enables teams to prioritize activities depending on current requirements and limits[.](https://www.sciencedirect.com/science/article/abs/pii/S0164121221000479)

 **2.5.3.Scrumban:**
**Agile Approach:** Scrumban incorporates the ideas of the Kanban as well as Scrum approaches & the iterative methodology and roles of the Scrum Master, Product Owner,Development Team remain unchanged, [(Zayat & Senvar 2020)](https://www.worldscientific.com/doi/full/10.1142/S0219877020300025) while Kanban's continuous flow and visual management are incorporated and also it combines the flexibility and continual improvement concentrate of Kanban with the structured planning and review process of scrum(sprints)

**Comparing Scrumban to Traditional Project Management:** Scrumban combines the continuous flow and adaptability of Kanban with the formal planning of Scrum [( Shker & Saoud 2023)](https://www.researchgate.net/profile/Lama-Saoud/publication/377213650_The_Integration_between_Building_Information_Modelling_and_Scrumban_Case_Study_FD3_Commercial_Building_in_Damascus/links/65e57e6fadc608480af9b926/The-Integration-between-Building-Information-Modelling-and-Scrumban-Case-Study-FD3-Commercial-Building-in-Damascus.pdf). Scrumban is ideally suited for situations where needs are fluid or uncertain because it gives teams greater flexibility to adjust to shifting priorities and requirements than traditional project management, which frequently takes an orderly and plan-driven technique.

**2.5.4.ExtremeProgramming(XP):**
**Agile Approach:** To produce high-quality software, XP, or extreme programming, is an Agile approach which focuses on engineering techniques and ( Shrivastava et al.2021) also it places an extreme value on techniques like collaborative programming, continuous enhancement, frequent redesigning, and testing-driven development (TDD[).](https://iopscience.iop.org/article/10.1088/1742-6596/1969/1/012046/meta)

 **Comparing XP to Traditional Project Management:** XP emphasizes teamwork and technical proficiency more than traditional project management techniques, early and frequent delivery of functional software is given top priority [(Saqqa, Samar et al.2020) , with an emphasis on consumer fulfillment and adaptability to changing needs](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)

**[2.5.5.Crystal Techniques:](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)**

**[Agile Approach:](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)** [Alistair Cockburn created the Crystal family of Agile projects in which Simplicity, personal connection, and communication are prioritized and there are three varieties of Crystal Methods such as Crystals Clear, Crystal's Orange, and Crystals Yellow](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends) [[(Ikram & Dev 2020).](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)](https://d1wqtxts1xzle7.cloudfront.net/79025273/Paper191-libre.pdf?1642510358=&response-content-disposition=inline%3B+filename%3DXCRUMBAN_A_Proposed_Agile_Methodology.pdf&Expires=1718468955&Signature=PR6b3z4G8zsfAVc0Ra7xKdzCdVQuFwwfEeFo2PyQu7v1r8YEzCO1e-Epufqa8JVL4tCmm1dkJJdiLDVfS155wQcAXIuGjvP-OpskCRq7HDn3YdrUrZCwzVxFJC0SOfM5Bqq988~z1g2SBCYK6mVt-KPJfQcEDXi1WcXG9BSEfnj8PaNYIArt6jokVY9YqGP0PuOVvebb2uuxcfc2HwyGirV9~hWpYGdadb5j-nGIYRZbjNt~-sJmDLWxBkkW0QtcNMR2fNcJugJxvOWQn7JQb9vQ6xdXXIC8E5Ds-sR6FtCMEAkzfwlmFFSPmlA~BINkkgsPcoQZJY1~BiQiQlSPfA__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA) [and each is designed to address certain project features and team dynamics and the Crystal Techniques tries to achieve a balance between adaptability and structure, prioritizing people before procedures.](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)

**[Comparing Crystal to Traditional Project Management:](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)** [Crystal Techniques emphasizes teamwork, flexibility, and interpersonal interactions more than they do, in order to promote an agreement for the project goals and priorities, Crystal supports lightweight processes and regular communication, (Tetteh, 2024) in contrast to traditional approaches that may primarily depend on paperwork and formal processes and moreover, Projects with irregular needs or those where team dynamics are crucial to project success are especially well-suited for Crystal Techniques](https://www.researchgate.net/publication/342848746_Agile_Software_Development_Methodologies_and_Trends)

**2.6. Role of Technology in agile project management:**

Technology is necessary to agile project management because it facilitates better teamwork, communication, and productivity, in real-time communication is facilitated by technologies such as Microsoft Teams, Slack, and Zoom, while teamwork on project documentation is made possible by platforms like Jira and SharePoint [(Naslund & Kale 2020).](https://www.emerald.com/insight/content/doi/10.1108/IJQSS-12-2019-0142/full/html) Versions control platforms such as GitHub and GitLab, together with CI/CD technologies such as Jenkins and Circle CI, offer efficient code integration & deployment and Project scheduling software such as  Jira, Trello, and Asana improve task and backlog management [(Dühring & Zerfass 2021).](https://www.tandfonline.com/doi/abs/10.1080/1553118X.2021.1887875)Continuous improvement is facilitated by analytics capabilities that offer data on team performance, and testing and integration automation technologies that increase productivity even further and furthermore, tools for tracking time and virtual workspaces facilitate remote work, and strong security protocols guarantee data confidentiality and compliance [(Sithambaram et al,2021).](https://www.sciencedirect.com/science/article/abs/pii/S0263786321000260) and all things considered, technology enables agile teams to produce high-quality work rapidly and effectively.

**2.7. Artificial Intelligence into Agile Project Management:**

Agile project management is extremely improved by artificial intelligence (AI), which optimizes repetitive operations, generates data-driven vision, and facilitates better decision-making and by examining historical project data and observing trends, AI-powered solutions can forecast project hazards, maximize resource allocation, and simplify workflows[(Josyula et al.2023).](https://www.emerald.com/insight/content/doi/10.1108/IJOA-05-2021-2749/full/html) For example, the processing of natural languages (NLP) can perform the sorting and prioritizing of customer stories and feedback, and machine learning techniques can estimate sprint velocities and assist with dynamic workload adjustments[(Amani et al.2022).](https://journals.iau.ir/article_698174_6ba724282489287ae939ea60bd8d507c.pdf) Artificial intelligence (AI) chatbots save time on administrative duties by enabling immediate communication and support [(Lee,2020).](https://koreascience.kr/article/JAKO202009759220194.page) additionally, AI-driven analytics provide real-time vision into project health and team work, empowering agile teams to make wise decisions, adjust swiftly to changes, and continually enhance their procedures all of which eventually result in more effective and successful project results.

**3.METHODOLOGY:**

A Methodical research approach will be implemented to collect, assess, and synthesize data through the identification, screening & evaluation of relevant papers and the framework for this study was created using the selected reporting items for Systematic Reviews & Meta Analyses (PRISMA) standard.

The concept behind utilizing the PRISMA technique is its organized approach to:

* Utilizing search techniques and keyword searches to find large databases of research papers.
* Assessing items in accordance with specified inclusion and exclusion standards.
* Evaluating relevant publications as part of the qualifying procedure in order to evaluate research results.

**3.1 Identification**For this review process, ScienceDirect, Scopus, and Google Scholar are the main sources and a wide choice of conference papers and peer-reviewed publications may be found in the databases and the search string contained terms like “Artificial Intelligence”, “AI”, “Agile”, “Flexibility”, “Efficiency”, “scrum” and “Agile Project Management” then search was combined using boolean operators like AND & OR to obtain the detailed list of articles in the search topic.

**3.2 Criteria for Inclusion & Exclusion**
In order to guarantee identification of relevant as well as superior research articles, the following criteria for inclusion & exclusion were created:

* **Access:** Paid papers were not included; only open-access articles included.
* **Article Types:** Included were research and review articles and Book chapters. Encyclopedias, mini-reviews, news items, and video articles were some the other publications that were not included.
* **Language:** To prevent misunderstandings caused by language, only articles available in English were taken into consideration.
* **Time Period:** To guarantee that the information is current and relevant, only articles that were published in the previous four years (2020–2024) were included because of Technological advancements, more relevance to Current practices and to avoid redundancy.

**3.3 Eligibility Criteria**Articles that met the qualifying requirements were chosen for qualitative analysis. Among the requirements for qualifying were:

* **Title:** In the beginning, the title of the articles were used to filter articles.
* **Abstract:** To filter out research that weren't relevant, abstracts of the papers were reviewed.
* **Content Analysis:** The entire texts of articles that could be relevant were examined to see if they met the parameters and requirements of the research and eliminated articles that did not clearly address AI, Agile Project Management, adaptability, or efficiency.

**3.4 Results and Discussion**

Meta-analyses and systematic review findings are reported using the PRISMA standards. PRISMA flow chart shows the steps involved in the research selection process, which includes:

* Number of articles acquired by database searches.
* Number of articles were filtered.
* Number of articles were evaluated for eligibility.
* Number of papers that were part of the final review.

There is documentation for every stage of the selection process, including the reasons behind the removal of articles at different points. The conclusions from the included research are summarized in the analysis section, which also shows how AI improves Agile Project Management's efficiency and adaptability.

This systematic methodology guarantees a thorough and objective analysis of the available literature, offering insightful information on how AI might be integrated into Agile Project Management techniques

**IDENTIFICATION**

Records identified using database (Scopus)

 n= 5255

Records excluded (n = 3857) The Exclusion reasons are Book chapters, encyclopedias , mini reviews, news articles, video articles ,Non-English language articles and the Articles published before 2019

**SCREENING**

Records screened

 (n = 1398)

**ELIGIBILITY**

Full-text articles excluded (n = 1317) The Exclusion reasons are Lack of focus on Agile Project Management, AI, flexibility, or efficiency, Insufficient data or irrelevant results

Full-text articles assessed for eligibility (n = 81)

**INCLUDED**

Studies included in qualitative synthesis (n = 22)

**Figure 3.1 PRISMA Framework**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S.No | Author &Year | Title Of The Paper | Country/Region | Type Of Research | Main Findings | Data collection |
| 1 | Beata Mrugalska and Junaid Ahmed, 2021 | Organizational Agility in Industry 4.0: A Systematic Literature Review | Poland | Qualitative | Employing Industry 4.0 technologies both contributes to and results in organizational agility as it is essential for adjusting to and reaping the rewards of these innovative technologies. | Research database |
| 2 | Luna Leoni, Marco Ardolino, Jamal El Baz, Ginetta Gueli and Andrea Bacchetti,2022 | The mediating role of knowledge management processes in the effective use of artificial intelligence in manufacturing firms | Germany, France, the USA, and China​ | Qualitative | The benefits of AI implementation on supply chain resilience & manufacturing company performance are controlled by knowledge management systems. | Web surveys targeting senior executives |
| 3 | Andre Barcaui and Andre Monat,2023 | Who is better in project planning? Generative artificial intelligence or project managers?  | Brazil | Qualitative | While human generated project plans give more information and full supervision for careful execution and control, AI generated project plans are simpler and faster for initial planning. | Development and analysis of project plans |
| 4 | Jennifer Whyte, Nader Naderpajouh, Stewart Clegg, Petr Matous, Julien Pollack, Lynn Crawford ,2022 | Project leadership: A research agenda for a changing world | Australia | Both qualitative & quantitative | In order to handle the organizational, ecological, and technical issues that modern project management faces, project leadership research puts a strong emphasis on adaptable, collaborative, and morally motivated leadership. | Theoretical perspectives and research agendas. |
| 5 | Joao Varajao , Gabriela Fernandes , Antonio Amaral,2023 | Linking information systems team resilience to project management success | Brazil & Portugal | Qualitative | Establishing a shared language across participants from various institutional cultures improves cooperation, resulting in stronger partnerships and significant effects.​ | 28 semi structured interviews with academics, PhD candidates. |
| 6 | Costanza Mariani , Yuliya Navrotska, Mauro Mancini,2023 | Unsupervised machine learning for project stakeholder classification: Benefits and limitations | Italy |  Single exploratory case study | Stakeholders may be grouped more precisely and thoroughly when unsupervised artificial intelligence clustering is used. This reduces subjectivity and allows for more specialized and tailored stakeholder management techniques. | Primary and secondary sources of information, Stakeholder data |
| 7 | Jose da Assunçao Moutinho, Gabriela Fernandes, Roque Rabechini Jr,2023 | Knowledge co-creation in project studies: The research context | Portugal | Qualitative, empirical and exploratory | When stakeholders from various institutional cultures use the same language, it facilitates collaboration and results in stronger collaborations and significant effects. | **Semi-structured interviews,** Convenience sampling, **Interviews with** Academics, PhD candidates, and practitioners |
| 8 | Muhammad Irfan Hashfi, Teguh Raharjo,2023 | Exploring the Challenges and Impacts of Artificial Intelligence Implementation in Project Management: A Systematic Literature Review | Indonesia | Qualitative | The integration of AI into project management improves decision-making, efficiency, & cost-cutting across several PMBOK process groups | Reviewing literature from reputable sources |
| 9 | Hao Dong ,Nicholas Dacre, David Baxter, and Serkan Ceylan,2022 | What is Agile Project Management? Developing a New Definition Following a Systematic Literature Review | UK | Qualitative | Put an focus on adaptability, teamwork, iterative development, but project management needs a more thorough and widely recognized concept that goes beyond software development. | Semi structured interviews and a systematic literature review, convenience sampling |
| 10 | Andy Behrens, Martinson Ofori, Cherie Noteboom, Dave Bishop,2021 | A systematic literature review: how agile is agile project management? | N/A | Qualitative | Though being extensively used, agile project management still has issues with company culture and change resistance. | Review methodology and convenience sampling |
| 11 | Adebayo Agbejule and Lassi Lehtineva,2022 | The relationship between traditional project management, agile project management and team work quality on project success | Finland | Quantitative | When associated with excellent cooperation quality, conventional project management  inclined hybrid approach rated highest for project success. | Cluster analysis |
| 12 | Antonio Carlos Pacagnella Junior, Vinicius Romeiro Da Silva,2023 | 20 Years of the Agile Manifesto : A Literature Review on Agile Project Management | Brazil | Quantitative | significant axes in the literature that offer guidance for future study initiatives are management factors, software development methods, and problems. | Systematic literature review and bibliometric analysis |
| 13 | Michael Pace,2019 | A Correlational Study on Project Management Methodology and Project Success | North America | Quantitative | There is a weak relationship, with industry acting as an intermediary between project management approach & reported project success. | Online survey using Survey Monkey with a simple random sampling technique |
| 14 | Lisiane Sassi Ferreira, Farley Simon Nobre,2022 | Agile project management under the perspective of dynamic capabilities | Brazil | Qualitative | Agile project management has dynamic capabilities at the detecting, capturing, and reconfiguring levels that emphasize advantages like better motivation and communication. | Case study |
| 15 | Jefferson de Souza Pinto , Reginaldo da Silva Leme,2024 | Analysis of project management principles with the Scrum framework in systems development | Brazil | Qualitative | In a public enterprise, the Scrum approach greatly enhances systems project management. | Bibliographical research, case study, structured questionnaires and direct observation |
| 16 | Vanessa Mesquita Blas Garcia and Cristina Dai Pra Martens,2020 | Contributions of entrepreneurial orientation in the use of agile methods in project management | Brazil | Quantitative | The effective application of agile techniques in project management is significantly supported by an entrepreneurial spirit | Surveys and questionnaires with 206 valid responses |
| 17 | Henrik J. Nyman, Anssi Öörni,2023 | Successful projects or success in project management - are projects dependent on a methodology? | Finland | Both Qualitative and Quantitative methods​ | A productive work environment does not result from the uniform use of project management approaches; rather, the strategy used should be dependent on the particular project context and demands. | Semi structured interviews with 32 project professionals and their managers  |
| 18 | Fernando Andre Zemuner Garcia and Rosária de Fatima Segger Macri Russo,2019 | Leadership and Performance of the Software Development Team: Influence of the Type of Project Management | Brazil | Quantitative | In software development teams, the link between team performance and leadership approaches (transactional, transformational, and empowering) is independent of the project management approach used (agile vs. conventional). | Electronic questionnaire via Google Forms & surveymonkey.com to project practitioners in software development teams. |
| 19 | Renata Bittencourt Mendonça dos Santos, Paulo Soares Figueiredo, Felipe Tumenas Marques,2023 | Challenges to agile software project management practices in the context of the COVID-19 pandemic | Brazil | Qualitative | Motivation was impacted by a lack of agreement on project objectives, thus leadership had to make an investment in aligning objectives and foster a productive work environment. | Semi-structured interviews with employees from Agile teams |
| 20 | Afshin Jalali Sohi, Marian Bosch-Rekveldt and Marcel Hertogh, 2020 | Four stages of making project management flexible: insight, importance, implementation and improvement | Netherland | Both Qualitative and Quantitative methods​ | A four-stage flexibility framework is proposed, which consists of assessing the existing state of affairs, considering practitioners' views on adaptable project management, selecting facilitators for becoming flexible, and implementing chosen enablers to boost project performance. | Semi-structured interviews with practitioners from 24 cases. |
| 21 | Ianire Taboada, Abouzar Daneshpajouh , Nerea Toledo and Tharaka de Vass,2023 | Artificial Intelligence Enabled Project Management: A Systematic Literature Review | China & USA | Qualitative | The designated works' most focused application areas are construction project management and IT projects, with minimal use of AI in other industries like health. | Academic publications in Web of Science and Scopus |
| 22 | Emmanuel Chibuike Daraojimba, Chinedu Nnamdi Nwasike, Abimbola Oluwatoyin Adegbite, Chinedu Alex Ezeigweneme, & Joachim Osheyor Gidiagba,2024 | Comprehensive Review Of Agile Methodologies In Project Management | South Africa & Nigeria | Qualitative | Boost project performance while overcoming obstacles including change resistance and scalability issues to promote increased cooperation, continuous development, and client satisfaction. | Literature review, utilizing academic databases, digital libraries, and grey literature sources. |

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**4.OBJECTIVES:**

**1.** To identify the application of Artificial Intelligence in Agile Project Management

**2.** To assess the benefits of the agile project management: enhancing flexibility and efficiency through business analytics and data-driven approaches

**3.** To identify the Challenges in the traditional project management through business analytics and data-driven approaches

**5. ANALYSIS:**

**5.1.** **Application of Artificial Intelligence in Agile Project Management:**

Artificial Intelligence is being used into Agile project management in more and more ways to improve decision-making and efficiency where the AI programs have the ability to create and evaluate user stories according to past data and input from users[(Khatib & Falasi 2021)](https://www.scirp.org/journal/paperinformation?paperid=107733). Sentiment analysis may be used to prioritize the highest-value features by identifying the most important user demands from user comments and those helps to coordinate development efforts with customer needs and market demands while also expediting the story creation process.

AI has the potential to greatly enhance and speed up sprint planning and backlog management processes and teams may concentrate on the most significant tasks first with the guidance of automated backlog prioritization, which employs predictive analytics to evaluate the possible effect and urgency of backlog items. By evaluating team members' prior performance, present workloads, and skill sets, AI may help with job distribution during sprint planning, balancing workloads and increasing efficiency [(Suwarno & Jaya 2022).](https://ojs.uma.ac.id/index.php/jite/article/view/6412) which helps avoid bottlenecks and overloading and guarantees that sprint are well-planned, with work assigned to the appropriate team members.

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Agile Element** | **AI Applications** | **Literature Support** |
| 1 | User Stories | AI-driven user story generation and prioritization, sentiment analysis on user feedback | [Oyekunle et al,2024](file:///C%3A%5CUsers%5CSHAKTHI%5CDownloads%5CAI-Driven_Environments_A_Qualitative_Assessment%5Clinks%5C66360ca17091b94e93ef0ed0%5CProject-Management-Competencies-in-AI-Driven-Environments-A-Qualitative-Assessment.pdf)[Mehta & Pandya 2020](https://www.researchgate.net/profile/Pooja-Mehta-26/publication/344487215_A_Review_On_Sentiment_Analysis_Methodologies_Practices_And_Applications/links/5f7bfb2992851c14bcb16528/A-Review-On-Sentiment-Analysis-Methodologies-Practices-And-Applications.pdf) |
| 2 | Backlog Management | Automated backlog prioritization, predictive analysis for backlog refinement | [Ozdenizci Kose,2021](https://onlinelibrary.wiley.com/doi/abs/10.1002/smr.2331)[Bahi et al,2024](https://openurl.ebsco.com/EPDB%3Agcd%3A15%3A29402159/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A176379003&crl=c) |
| 3 | Sprint Planning | AI-assisted sprint planning and task allocation, workload balancing | [Brüggen&Holland,2022](https://www.ceeol.com/search/article-detail?id=1055961)[Bhavsar et al,2019](https://d1wqtxts1xzle7.cloudfront.net/64695480/Bussiness_process_reeingnering_journal_KrunalBhavsar.pdf?1602852142=&response-content-disposition=inline%3B+filename%3DBussiness_process_reeingnering_journal_K.pdf&Expires=1718466526&Signature=CEFQGsmYGbOX6l3Gzagd3GAzPp2YLOHVYu3sJ03H4x7Sqxtrv6htoFhsa8vXqY7BldPjtkxWir9YZVha5fjC1ppgiaHGqjGJ4UfrIyWzGO8naKHa~y~DBgdXrEw0q7VQmE6h1L7wteO0yQ1S7BmcpFg0bmQiHmI79lfNGrLEX4K7AMVVB0bzQwN6o2dPEKRGt1qj-f8DD4iZlZQurm3B0jeQnfGk8PyZWL7x8X2I5rGls17j2TLJnSURFTEZgDQw7xomTzOg2CrEtIkjTG2PioCPrTsxa7ffB2xfdmmP9xwBDZXWZa2gE6vFWAZKA0J-I7iPTTrWsNnm9ukEUryQ9Q__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA) |
| 4 | Daily Stand-ups | Automated summarization of daily stand-up reports, sentiment analysis on team morale | [Xander & Andres,2024](https://jest.com.pk/index.php/jest/article/view/130)[Shamim, 2024](https://globalmainstreamjournal.com/index.php/IJMISDS/article/view/107#google_vignette) |
| 5 | Continuous Integration (CI) | Automated code integration and testing, AI for error detection and resolution suggestions | [Gupta, 2020](https://www.ingentaconnect.com/contentone/asp/jctn/2020/00000017/f0020009/art00144)[Özpolat et al.2023](https://dergipark.org.tr/en/pub/ejt/article/1330631) |
| 6 | Continuous Delivery (CD) | Predictive deployment analysis, automated rollback planning | [Steidl et al.2023](https://www.sciencedirect.com/science/article/pii/S0164121223000109)[Cunningham,2021](https://www.ceeol.com/search/article-detail?id=939806) |
| 7 | Retrospectives | Text mining and sentiment analysis of retrospective meeting notes, automated action item tracking |  [Migid et al.2022](https://www.sciencedirect.com/science/article/abs/pii/S016412122100279X)[Joshi, 2021](https://www.researchgate.net/profile/P-L-Joshi/publication/350579236_A_Review_of_Agile_Internal_Auditing_Retrospective_and_Prospective_International_Journal_of_Smart_Business_and_Technology_IJSBT_Australia_Volume_9_No_2_2021/links/61cc1298d450060816750567/A-Review-of-Agile-Internal-Auditing-Retrospective-and-Prospective-International-Journal-of-Smart-Business-and-Technology-IJSBT-Australia-Volume-9-No-2-2021.pdf) |
| 8 | Test-Driven Development (TDD) | AI-driven test case generation, automated test execution and result analysis | [Vial et al,2023](https://onlinelibrary.wiley.com/doi/full/10.1111/isj.12420) |
| 9 | Pair Programming | AI-assisted coding suggestions and error prevention, automated code review and feedback |  [Liu & Li 2024](https://journals.sagepub.com/doi/abs/10.1177/07356331241240460)[Sudarmaningtyas & Mohamed 2021](https://repository.dinamika.ac.id/id/eprint/6854/) |
| 10 | Release Planning | Predictive analytics for release scheduling, AI-driven risk assessment for release management | [Odejide&Edunjobi,(2024)](https://www.fepbl.com/index.php/estj/article/view/959)[Bento et al, 2022](https://www.inderscienceonline.com/doi/abs/10.1504/IJTIP.2022.126841) |

AI improves daily stand-ups & continuous integration during the execution stage and can undertake sentiment analysis to measure team morale and summarize reports for daily stand-ups, spotting any problems early. AI reduces human labour and improves code quality in continuous integration (CI) by automating code integrating and testing, identifying issues and recommending fixes [(Kaushik et al.2020).](https://link.springer.com/article/10.1007/s13369-019-04250-6)Like this, AI is used in continuous delivery to provide dependable and seamless software releases by doing automatic rollback planning and predictive deployment analysis [(Myllynen et al,2021).](https://asmedigitalcollection.asme.org/nuclearengineering/article-abstract/7/4/041201/1096362/Developing-and-Implementing-Artificial)Using text mining & sentiment analysis, AI-driven insights throughout retrospectives help teams comprehend the subtleties of their performance, and automated action item monitoring makes sure that retrospective decisions are efficiently implemented. Agile teams may increase productivity, provide higher-quality results, and better meet user expectations by incorporating AI into these areas.

**5.2.Benefits:**

Advantages of using Agile project management, divided out into points with an emphasis on improving flexibility and efficiency using business analysis and data driven strategies:

 **5.2.1.** **Flexibility in Response to Changing Needs:**

Agile approaches, which puts a strong focus on frequent feedback processes & rapid development, naturally promote flexibility and when paired with data-driven methodologies and business analytics, teams can rapidly examine changing demands, client input, and industry patterns [(Jafa et al,2021)](https://real.mtak.hu/197151/) and makes it possible for them to decide with knowledge and modify project objectives and deliverables appropriately, leading to a more adaptable and client-focused method to development.

**5.2.2. Effective Resource Use:** Performance indicators, project dependence, and resource usage trends are all revealed by business analytics and Teams may detect and reduce bottlenecks, enhance resource allocation, and simplify procedures by incorporating these findings into Agile  project management[(Carl Marnewick et al.2022)](https://www.sciencedirect.com/science/article/pii/S0263786322000606?casa_token=fzFjtAHb27AAAAAA:h3hHIU1rtc5HMPMSJhRTYtC8Ev8oT6fmIys-a_GzDuqo2iDE1XU5YArK-zoqOTItTKMyOcf9QvA) which results in decreased waste, increased resource usage efficiency, and enhanced project outcomes overall.

**5.2.3.Culture of Continuous Improvement:** Through continual enhancement cycles and evaluations, agile approaches promote an approach of continuous enhancement and Teams may use analytics together with data-driven initiatives to analyse success over time, identify areas for advancement, and test out new tactics,  [(Ali.et al,2021)](https://ojs.unito.it/index.php/ejsice/article/view/5158) as a result, teams are empowered to constantly improve their procedures and provide stakeholders with greater value, fostering a culture of growth and creativity.

**5.2.4. Improved Decision-Making:** Agile teams may make decisions based on actual facts rather than random judgments or assumptions when they use data-driven decision-making and teams may make better judgments on product priority, [( Dursun et al,2020)](https://content.iospress.com/articles/journal-of-intelligent-and-fuzzy-systems/ifs189125) managing risks, and project direction by examining relevant information, including consumer behaviour, market developments, and project parameters from which Better results, less uncertainty, and more trust in decision-making follow from this.

**5.2.5.Enhanced Risk Management:** By examining past data, detecting trends, and forecasting possible problems, business analytics may assist in detecting and evaluating project risks and teams may take steps to prevent risks by keeping an eye on important data, seeing warning signals early, and putting mitigation plans into place when they are linked with Agile project management  [(carl & Annlizé  2022)..](https://www.sciencedirect.com/science/article/abs/pii/S0263786322000606) and by taking proactive measures, the risk of project delays or breakdowns is decreased, increasing the project's overall durability.

**5.2.6. Enhanced Stakeholder Satisfaction:** Agile approaches place a high value on stakeholder interaction and customer cooperation all the way through the development process and teams may measure customer satisfaction indicators, assess stakeholders needs and preferences, and customize deliverables by utilizing business intelligence and data-driven techniques,[( Marnewick et al.2022)](https://www.sciencedirect.com/science/article/pii/S0263786322000606?casa_token=0WMb_z6iqOAAAAAA:Ij1PAV5_u3aUacMw23Fm302p-TI-6F0qUwTpTAnvfNfjM0fxxk1M4WelypQhT7QmtgfjIj7qv1s) as a result, there is a rise in satisfaction from stakeholders, greater consistency with business objectives and belief in the project team.

**5.2.7. Faster Time to Market:** Teams may provide value to clients more quickly and effectively when they mix agile project management with business analysis and teams can reduce time to marketplace for new products or upgrades by segmenting projects into more manageable segments and prioritising features based on insights derived from data [(Cooper, 2021)..](https://onlinelibrary.wiley.com/doi/abs/10.1111/jpim.12565) and as a result, businesses may better grasp new possibilities and maintain their competitiveness in quick-paced marketplaces.

##### 5.2.8.Increased Accountability and Transparency: Business analytics gives insight into the status of projects, performance indicators, and results and accountability between stakeholders and team members is promoted when transparency is incorporated into Agile project management and teams can make themselves responsible for keeping their word, taking immediate action when problems arise, and providing value to clients by keeping track of and exchanging pertinent data [(Ozorhon et al.2022)](https://ascelibrary.org/doi/abs/10.1061/%28ASCE%29ME.1943-5479.0001052) and encourages a culture of cooperation and trust.

Organizations may increase flexibility, efficiency, stimulate continual enhancement, better manage risks, and cultivate stakeholder cooperation by incorporating business analysis and data-driven techniques into Agile project management. Agile teams can adapt to changing business demands more quickly, generate value more successfully, and complete projects with higher success because to these advantages.

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**Figure 5.1 Benefits of the agile project management**

Organizations can benefit from a host of advantages by combining agile project management with data-driven methodologies and business analytics and these advantages include enhanced flexibility, productivity, satisfaction from stakeholders, and creativity, all of which can add values to better project result & overall organizational success.

**5.3.Challenges:**

There are a number of challenges that traditional methods of project management, like waterfall, must overcome in order to be flexible and effective.

**5.3.1. Rigid Structure:**

The traditional methods of project management frequently attach to an ordered framework in which projects are divided into phases that must be finished in order to advance to the next and it may be challenging to allow modifications or adjust to changing requirements mid-project due to its inflexible structure [(Picciotto, 2020)](https://www.sciencedirect.com/science/article/abs/pii/S0263786318311141). and as an example, it may be costly as well as time-consuming to make substantial modifications to the project's scope or objectives after it enters the execution phase of the project from the planning phase.

**5.3.2.Limited Stakeholder participation:**

### Throughout the project lifetime, stakeholder participation may not be given priority by traditional project management approaches[(Orieno et al.2024)](https://wjarr.com/content/sustainability-project-management-comprehensive-review)andmisunderstandings, unfulfilled expectations, and disappointment with the final deliverables can result from this lack of continuous involvement as well as interaction with stakeholders.

**5.3.3.Uncertain Requirements:**

 Conventional project management techniques frequently require for the advance definition of entire project requirements and nevertheless, needs may not always be clear or may evolve throughout the course of a project[(Bertello et al.2021),](https://link.springer.com/article/10.1007/s11365-020-00727-1) particularly one that is complicated or novel and due to this ambiguity, it may be difficult to precisely plan and carry out the project, which might result in delays and additional effort.

**5.3.4.Inflexible Change Management:**

 It might be difficult to handle changes in traditional methods for project management and sometimes, change control procedures are rigorous and established, requiring significant records and approval for small modifications and may cause [(Ciric Lalic et al.2022) the project to lag and make it more difficult to respond to new problems or possibilities.](https://www.emerald.com/insight/content/doi/10.1108/IJMPB-04-2021-0108/full/html)

 **5.3.5.Limited Flexibility to Risk:**

Throughout the course of a project, risk management may not be sufficiently addressed by traditional project management approaches in which Identifying, evaluating, and mitigating risks are frequently handled as independent, distinct tasks rather than being incorporated into the overall project management process [(Robert Picciotto,2020)](https://www.sciencedirect.com/science/article/abs/pii/S0263786318311141?casa_token=Zdkn0kv_czUAAAAA:0BqfDdiYNVMPxNY8VwRAwVMBjTMWMD7OKrg3qO8luB_0P0dqgy0atMOm0vs_IMzhAWOJM4J62Tw) and unexpected risks might therefore materialize and cause delays, overspending, or even project collapse.

**5.3.6.Resource Restrictions:**

In traditional project management, resource restrictions such as tight budgets or a lack of personnel can provide serious difficulties and insufficient resources [(Garritty **et al.2021)**](https://www.sciencedirect.com/science/article/pii/S089543562031146X) can cause initiatives to run behind schedule, lose quality, or fall short of their goals

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**Figure 5.2 Challenges in the traditional project management**

With regard to meet these difficulties, these techniques must change to become more adaptable and agile and as an example, agile methods focus a strong focus on iterative development, successful stakeholder involvement & change-responsiveness. Organizations may improve adaptability, productivity, and eventually project success by adopting Agile concepts and implementing information-driven decisions into project management procedures.

**6. CONCLUSION:**

Although they have been around for a long, traditional techniques could result from being rigid & unresponsive to change and moreover, in these paper comes the power of Agile where it equips teams to provide value more quickly & efficiently by placing a high priority on flexibility, collaboration, and ongoing improvement. Flexibility and efficiency are the two main components that make this successful and teams can adjust to shifting demands, client feedback, and industry trends thanks to agile's iterative methodology where flexibility is further enhanced by data-driven initiatives and business analytics. Teams may adopt a more client-centric approach by making well-informed decisions on project goals and deliverables through the analysis of pertinent data, such as consumer behaviour and project metrics. Increased efficiency is another characteristic of Agile which can be locating bottlenecks, allocating resources optimally, and streamlining procedures, business analytics can cut down on effort wastage. Furthermore, Agile promotes a continuous improvement culture by conducting regular reviews and retrospectives and based on data insights, teams may examine historical performance, pinpoint areas for development, and try new tactics. Over time, this data-driven strategy results in greater efficiency and also the efficiency and adaptability have several advantages by Fact-based decision-making by agile teams can result in better risk management and, eventually, higher project success. Agile's focus on teamwork and data-driven insight into consumer demands also increases stakeholder satisfaction where additional benefits include shorter time-to-market, more openness and responsibility, and a continuous learning culture. Agile project management is clearly advantageous in today's uncertain and fast-paced corporate climate where Agile helps teams to create value fast, adjust to change efficiently, and produce better project results by doing away with the constraints of traditional approaches and agile's emphasis on adaptability, speed, and data-driven choice-making will surely pursue to be a key part of success as project management changes.

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