Comparing Traditional vs Agile Methods for Software Development Projects: A Case Study

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Abstract—The Paper compares traditional vs Agile Software Development approaches to evaluating them as performance in Managing objectify Project. The goal of this paper is to explore the challenges in oral communication and confidence that arise during project management & offering solutions for overcoming them. The findings highlighted issues of interaction and confidence in managing projects & study indicates where Agile project management techniques are more effective because they foster greater teamwork and communication. Furthermore, the study's findings indicate that subsequent studies should focus on developing solutions to the difficulties of interaction and confidence in project management. The study has a narrow focus, so the findings may not be applicable to other sectors or project types. The study found that agile methodologies are difficult in IT project groups. However, interaction and confidence in project supervision are critical to ensuring the successful growth of IT projects. The research's usefulness lies in its identification of interpersonal and trustworthy difficulties in project management, as well as how to overcome these challenges. The study's recommendations for improving the efficacy of project development are aimed at entities in the information technology sector.

Keywords—Project Management, Agile Method, Software Development, Waterfall Approaches and Scrum Framework.

I. Introduction

The software development business has recently undergone significant changes, prompting corporations to reconsider their Project Management practices. In this field of Software Development venture Management, two important techniques, conventional and agile, have emerged as the leading challengers. To develop High-quality software within budget and schedule restrictions, it is critical to understand inherent advantages & disadvantages of every technique.

The paper provides a thorough case analysis that examines challenges of traditional versus Agile software development methodologies. The goal is to provide an understanding of the benefits and drawbacks associated with each strategy by examining real-world circumstances and effects. The aforementioned evaluation is intended to assist software programmers, project executives, and consumers in making educated decisions that are appropriate for the unique demands of their specific projects. This case analysis compares the characteristics of Traditional Waterfall technique versus Agile Methodology, examining their influence on project preparation, execution, adaptability, Client's satisfaction, and overall project success. The traditional Waterfall technique takes an orderly & linear approach, whereas agile promotes iterative development and continual communication.

The study aims to illustrate the influence of each approach on important project parameters like project timetables, cost-benefit analysis ratio, risk reduction & stakeholder participation by critically evaluating its benefits and downsides. The goal of completing a thorough analysis is to provide readers with practical observations derived from real-world experiences, allowing them to navigate the software development landscape with confidence. The article presents a detailed case landscape that's examines advantages & disadvantages of traditional and Agile Approaches to software development, finally forwarding to a convincing conclusion. The paper's goal is to provide stakeholders with the knowledge they need to make educated decisions by examining alternative techniques in real-world scenarios. The ability to use an appropriate project management technique may have a substantial influence on achieving successful software creation achievements in a continually changing business as shown as Fig. 1.
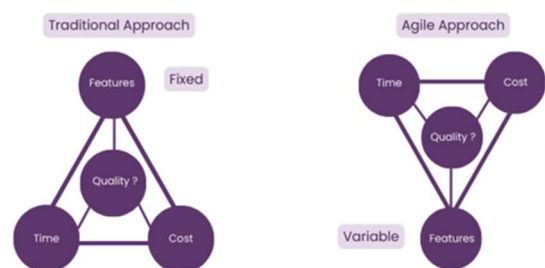

Figure 1. Framework of Comparing Traditional vs Agile Approaches

II. CHARACTERISTICS OF DISTINCTIONS AND PARALLELS AMONG WATERFALL & AGILE TECHNIQUES IN IT SECTOR

A. Traditional / Waterfall Models

The conventional model, sometimes known as the waterfall approach, is a stationary paradigm that approaches systems development in a linear, sequential manner, completing one job before commencing the next. The waterfall technique breaks down operations into the following actions: requirement evaluation, layout, programming, and testing. According to these processes are as follows: interactions (including initiative start-up and requirements collecting), budgeting (calculating, time management, and monitoring), illustrating (evaluation and layout), execution (programming and testing), and deployment [1] approach contains six phases: requirement assessment, system design, programming layout, Integration, Unit testing and Coding and End Customer of the envisioned Systems as shown as Fig. 2.
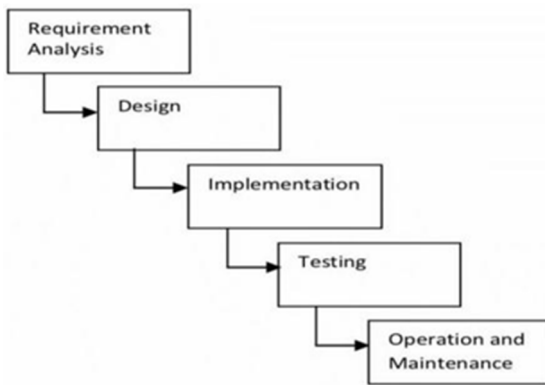

Figure 2. Framework of Waterfall Model Phases

B. Agile Methodology Approaches

Agility development has built on concepts of iterative & incremental advancement, in where each phase of development process has evaluated several times. Iterative software development involves discovering solutions based on customer input.

Agile approaches necessitate a transition from control and command management to management and cooperation. The administrative form that allows this transformation must strike the correct balance of autonomy and collaboration to reap the benefits of synergy while being flexible and responsive.

In response to the Agile Manifesto, the four fundamental agile factors include the following: Early Customer Involvement, Design Iteratively, Self-Sustained Teams and Modify the Adoption. There are several contexts in which agile approaches may be applied, such as research, teaching, and customer service. The list of agile norms is as follows: Sprint Queues, Daily Scrum, Scrum Supervisor, Sprint Assessment, and Sprint retrospectives are all incorporated in the Product Backlog.

1. Scrum is an agile methodology that supports development teams in adhering to specified goals while reducing work on less important tasks via the use of incremental and iterative procedures. Scrum aims to keep things simple in a complicated corporate environment. The expression, which has rugby roots, describes a group strategy for finding a misplaced ball during play. Scrum highlight on how everyone on a team in development should interact to create a flexible, adaptive, and productive system in a constantly changing environment rather than teaching implementation skills [2] described the process in full. Scrum is founded on two concepts: team autonomy and flexibility. Project leaders provide tasks to the team, but each iteration allows them to choose how to work, aiming to increase productivity. Scrum does not recommend specific software development methodologies due to project complexity and unpredictability. Instead, it provides ideas and tools for managing different phases as shown as Fig. 3.
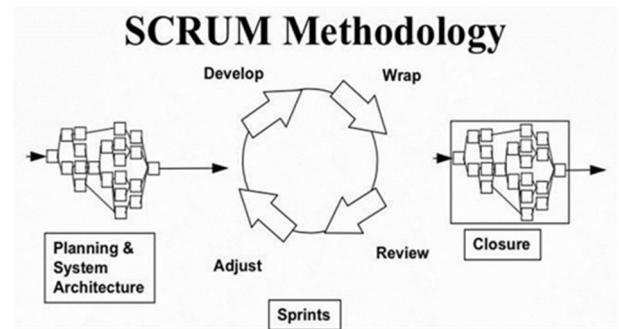

Figure 3. Framework of Scrum Methodology Approaches

2. Lean Principles Framework: K Pandey et al. [3] proposed the lean idea, which was based on several automotive industry studies done by experts at the Massachusett's Institute of Technology (MIT) Global Motor Vehicle's Programme. This idea falls under the larger category of lean production and builds upon TPDS. They noted that good management, teamwork, early involvement and liaison across segments, and simultaneous processes for development were different among global or Japanese lean manufacturers, as well as variations in production processes. Numerous businesses that produce large software-intensive systems have embraced lean manufacturing; but, if one wishes to fully draw on this competitive edge and eliminate further waste from manufacturing operations, lean must also be applied to PD activities.

The LPDS paradigm's three core subsystems are process, talent, tools, and technology, which are defined using 13 ideas as shown as Fig. 4.

Figure 4. Framework of Lean Product Development System (LPDS)

Even with the benefits of using agile methodologies, many companies are reluctant to totally give up on their customary procedures. Their hesitation has several causes, some of which are as follows:

a. Agile methodologies significantly reduce documentation and mainly depend on implicit knowledge.

b. The efficacy of agile approaches for mission- and safety-critical projects has not been sufficiently proven.

c. The idea that very stable projects are unsuitable for agile methodologies.

d. The notion that effective implementation of agile methodologies requires skilled workers who value a high degree of flexibility.

e. The notion that successful implementation of agile methodologies requires skilled personnel with several degrees.

C. Comparative Literature Review of agile and traditional methodologies

The bulk of system developers presently employ one of two SDLC approaches: conventional development or agile development. The following examines the contrast of agile and conventional methodologies:

1. **Primary Goals**: Predictability, repeatability, and optimization, that have been major objectives for more conventional systems that follow plans. While Agile is primarily concerned with responding to change and delivering outcomes quickly [4].

2. **Customer Relationships**: Agile methodologies work best when clients collaborate directly with the creation team and have sufficient tacit knowledge for the entire project. This strategy risks having implicit understanding gaps, which plan-driven strategies avoid by employing paperwork, architectural review panels, and objective expert project assessments to compensate for on-site client gaps [5].

3. **Project Oversight and Project Planning**: Formal oversight of projects is critical for the successful completion of a project related to software. Careful planning, estimate, collaboration, monitoring & control are necessary for project management features that are explicitly covered by the Waterfall technique. The planning step gets preference beyond the final paperwork by agility [6].

4. **Project Development Test**: According to the claim, conventional assurance methods consist of design and architectural principles, evaluation, vulnerability assessment, both internal and external critiques, dynamic testing, and static analysis. These methods are far more appropriate for waterfall development with an architecture focus and extensive documentation. Agile approaches, on the other hand, place more of a rather of concentrating on architecture or documentation, they should instead encourage engineers to follow coding standards and conduct internal design and code reviews [7].

5. **Incorporate agile into the context of traditional project management**: The purpose of this section aimed to provide a broad summary of the methods that have been suggested in the literature along with the steps that must be taken to incorporate APM into a traditional organizational structure.

The changeover process necessitates rigorous discipline, intense concentration, and hard labour. A summary of the results from several studies as well as a description of the tactics and steps involved in implementing APM in a conventional setting were provided in Table 1.

TABLE I. METHODS AND INITIATIVES TO IMPLEMENT APM

Techniques and Measures	Reasonable Statement
Carefully tailor the agile methodology (2024) [12]	Since each organization is unique, implementing agile may have presented a distinct set of difficulties. When choosing which agile techniques to use, each organization should take into consideration its unique surroundings.
Instead of making process modifications, build them up. (2024) [13]	determining the needs of the project and choosing the process assets that are most likely to be necessary.
Team independence and adaptability. (2024) [14]	It is important to establish early on the value of the team element as well as some fundamental concepts like having the proper personnel, being committed and dedicated, and having sufficient power.
Describe certain duties or functionalities. (2024) [15]	Specify the duties or functionality that will be handled using agile methodologies.
Adjust or reinterpret customary milestone evaluations. (2024) [16]	In order to better align with an iterative strategy, it is necessary to reinterpret standard milestone reviews.
Assessing dangers. (2024) [17]	It is crucial to weigh the dangers of going too far in favour of traditional or agile practices throughout the project's execution.

Make plans to continue going back. (2023) [18]	It is difficult to function outside of software development and to successfully handle change via iterations. It's critical to figure out how to work imperatively and modularly on projects that go beyond software development.
Embrace agile at the highest level and gain executive backing. (2023) [19]	Every organization's capacity to use APM successfully rests on its executives' support.
Remove the barriers to flexible behaviour. (2023) [20]	People may exhibit reluctance to change and adaptability. Taking down those obstacles and bringing everyone on an identical page is crucial.
Maintain a learning environment by providing coaching and training. (2023) [21]	Teams are shown to benefit greatly from training and mentorship as they apply agile approaches.
Discover the true nature of agility. (2023) [22]	Agile methodology is not project-specific, nor is it anti-methodological. It is critical to understand its operation in detail. An Agile approach should be used for projects with traits common to developing software, specifically ambiguous requirements, imaginative co-located groups, the capacity to modularize work, and close and strong client communication.

6. **Customers**: Agility needs loyal, local, informed clientele. Customers that possess the necessary knowledge and skills are required for the Waterfall model to work [23].

7. **Developers**: Agile initiatives demand informed, gregarious, cooperative, collocated, skilled, and communicative developers [24].

8. **Development Plan**: Because it promotes working software above comprehensive documentation, agility increases the volume of work which is not completed. On the other hand, because software architecture is an essential phase in the development process, the Waterfall model heavily depends on it [25].

III. BRIEF DESCRIPTION OF THE SELECTED COMPANY'S ACTIVITY

Hello, verify, an Asian-based technology firm that emphasizes in verifying identities and background checks, offers a range of services such as identity confirmation, validation of addresses, verification of paperwork, facial identification, and criminal history checks. These offerings are intended to help businesses and individuals' onboard customers, validate their identities, and mitigate risks.

The following are the features of the company's primary activities:

A. Know About Your Clients (KYC) Approaches

It helps firms comply with KYC rules by validating their customers' identities. They help to prevent fraud, identity theft, and unauthorized access to services.

B. Online Acquaintance

It provides solutions that provide companies with safe and seamless digital onboard procedures. They facilitate the expediency of the client enrolment & account opening processes by automating identification verification.

C. Preventing Fraud

The services offered by the organization are intended to identify and stop fraudulent activity. Businesses may detect suspicious activity and reduce the risk of fraud by using Hello Verify Verify's multi-source data analysis and risk assessment tools.

D. Identity Confirmation

Its expertise is offering individuals as well as companies identity verification services. To confirm the legitimacy of identification papers and validate people's identities, they employ innovative methods including artificial intelligence (AI), machine learning, & computer vision.

E. Verification of Documents

Passports, driver's authorizations, and national ID cards are just a few examples of the identifying papers that it uses to perform OCR scans and documentation validation for.

F. Risk Evaluation Assessment

It evaluates data from several sources, such as credit bureaus and government databases, to produce risk evaluations. This aids in the assessment of transaction or individual risk by entities so they may make wise decisions.

G. Industry Application Permits

Applications for its services may be found in a number of sectors, including online marketplaces, e-commerce, ride-hailing, banking, and finance. Their products assist companies in increasing security, enhancing compliance, and fostering consumer trust.

Hello, verify wants to improve security and facilitate directionless user experiences across a range of sectors, including e-commerce, financial services, sharing platforms, and recruiting. It does this by using cutting-edge technology like machine learning, artificial intelligence, and data analytic. The company employs 102 people in its technology, sales, promotion, architecture, and legal divisions. The company's guiding values are transparency, openness, client attention, and straightforward communication.

IV. STUDY ANALYSIS OF PROJECT MANAGEMENT TECHNIQUES USED AN EXAMINED ORGANIZATION

A. Gathering information procedure and origin

The goal of the current study was to compare the agile (scrum) and conventional (waterfall) approaches to software development. Finding out how these tactics are used and how successful they are in software development was the aim. The scope of their research categories, the length of their prior initiatives, and additional study-related subjects were among the questions posed to the

respondents. Twenty participants were given the questionnaire to check how familiar they appeared to be with the processes that were being shown. To evaluate how the candidates used the traditional approach [Waterfall] and the agile methodology [Scrum] in various circumstances, a set of questions was selected.

Professionals in software development were the study's primary emphasis. Of those surveyed, 90% had worked for a company for at least a year, and 45% had worked for longer than four years. Seventy percent of individuals questioned said they employed Scrum extremely successfully, making it the most frequently implemented technique. Software engineers make up 40% of the participants, quality management engineers make up 15%, and the remaining participants are business analysts, directors of projects, product developers, or scrum experts.

B. Problems with communication in project management

Communication was one of the topics addressed in a survey that isn't typically included in other polls. It was believed that smaller project groups could communicate easily. However, the survey's findings indicate that, in terms of ratios, there is nearly no distinction among project firms with 1–10 employees and those with 11–100 employees. Furthermore, the findings demonstrate that communication is challenging across many types of firms. It is slightly greater in businesses that work with government agencies than in other categories. The communication in half of these groups' efforts was problematic. In M Gaborov et al. [8] small application projects, it was marginally lower compared to the other categories.

It was found in another poll that communication—especially with customers—has not received enough attention. Merely 14% of the selected papers discussed the communication difficulty R Kumar et al. [9]. Customers must be constantly informed about project specifics and must participate in the agile development process MS Mirza et al. [10].

Four main components comprised the final questionnaire: the technical experience of the responders; creation of new products using the waterfall model; new product development using the scrum approach; and their own thoughts. Five-point Likert scales were used to create the questions. The Likert scale went from "never" to "always" to analyse the employment of software development approaches, and it went from "much worse" to "significantly better" for performance. Just 20% of respondents in the present survey cited client fulfilment as an agile approach (scrum) benefit. It's possible that the other teams' and their clients' inadequate communication contributed to this comparatively low proportion.

C. Trust Issues in Project Administration

Agile approaches improve trust by being more transparent, responsible, communicative, open to criticism, and knowledge-sharing, according to an analysis by MR

Rahman et al. [11]. Their initiatives were clearer and more transparent as a result of using agile principles, both inside the team and across the entire company. At the iteration/sprint scheduling meeting, for example, everyone on the team may see which responsibilities each person is responsible for and exactly how lengthy these will take. "Everyone gets the latest developments at the exact same moment but from somebody else".

This is consistent with the survey's findings. Working using the scrum technique fosters cooperation, according to 30% of respondents. The reason for this comparatively high number is because agile techniques, such as scrum, have proven effective in addressing the issues around project management trust.

V. RESULT AND DISCUSSIONS

When questioned about the benefits of the waterfall approach, 25% of respondents replied that it was simpler to use, which is likely the only benefit they were aware of. Actually, twenty-five percent more respondents said they had never used the waterfall approach. Only one software developer, out of the eight that responded to the survey, thought that Waterfall was simple to use. It was shown that the waterfall approach is inferior to agile development of software life cycle procedures. Nonetheless, it is imperative that the development team choose the SDLC that will be most useful for the project.

The questionnaire and interview findings underscore the obstacles to communication and confidence in project management. The study comes to the conclusion that agile approaches, which offer greater chances for team member communication and cooperation, are more successful in project management.

A. Suggestions tailored to the IT organization under analysis

Agile life cycle for software development methods have been found to be better than conventional SDLC methods. The agile software creation life cycle does, however, have several disadvantages. Therefore, it is crucial that development team choose SDLC that would enable project to run as efficiently as possible. The quantity of development group, its location, scope and difficulty of application, type of initiative, business tactics, team's engineering skills, and any additional pertinent variables could all be used by group to decide which SDLC to use. Other considerations may be considered if necessary. Before deciding on an SDLC, the team must analyse the differences, as well as the benefits and drawbacks of each. Prior to comparing the proposed SDLC to the chosen one, the team must undertake extra study on company setting, industry requirements, and business strategy.

Agile methodologies provide more opportunities for communication, collaboration, and suggestions, all of which contribute to a project's success. The study suggests that agile methodologies can enhance software

development teams' project management practices and lead to improved project effectiveness.

VI. CONCLUSION AND FUTURE WORK

1. Examining the poll results, it is clear that Scrum—a form of agile methodology—is becoming more and more common in software development. Individuals in organizations with professional backgrounds favour Scrum for many reasons. It was discovered that 95% of those that participated in the survey used agile approaches, with Scrum accounting for around 74 percent.

2. Working using the scrum technique, according to 30% of respondents, made teamwork simpler. This unusually high proportion can be attributed to the ability of agile methodologies such as scrum to address issues of trustworthy for managing projects.

3. Since testing is done at every stage of the product's lifecycle, Scrum has a high success rate. This feature enables continuous monitoring of the product during its production. To ensure that workers are not constrained by their job descriptions, Agile also holds that every single member of the developing teams should take on a greater role and be more engaged. A large portion of the team has predetermined what they will do in the upcoming sprint, and they are also given decision-making power. The ability to modify requirements as needed is offered by agile.

4. Merely 25% of participants expressed agreement that waterfall enhances customer relations. In the meantime, 40% of respondents said that scrum is significantly better and 75% said it is better.

5. Agile methods improved transparency, accountability, communication, responsiveness to feedback, and knowledge-sharing, all of which contribute to increased trust. Their projects were more transparent and clearer as a result of using agile approaches, both within and outside the company.

6. The study revealed communication and trust difficulties in project management, as well as strategies for addressing these challenges. The study, which included a questionnaire questionnaire and telephone interviews with developing software bands, discovered that agile project management techniques are more effective because they facilitate greater team collaboration and communication.

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