

IMPLEMENTATION OF AGILE SCRUM IN THE DEVELOPMENT OF A COOKING OIL DISTRIBUTION APPLICATION

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Abstract—The development of a cooking oil distribution application using the Waterfall methodology faces challenges, particularly in responding to changes in customer needs and government regulations. This study identifies issues such as difficulties in feature adjustments, complex communication among stakeholders, delays in releasing new features, and resistance to new technologies. The method used to address these challenges is Agile Scrum, which involves creating User Stories, managing the Product Backlog, conducting Sprint Planning, and evaluating through Gray Testing and User Acceptance Testing (UAT). The objectives of this research are to develop a more efficient and responsive application, analyze development issues, and assess the effectiveness of Agile Scrum in enhancing flexibility and productivity. Results indicate that the implementation of Agile Scrum improves team efficiency in time management and responsiveness to changes, accelerates the release of new features, and meets user expectations while enhancing business value.

Index Terms—agile scrum, project management, software development.

I. INTRODUCTION

In the rapidly evolving information technology era, software development methodologies have undergone significant changes. Agile methodology, with its flexibility and adaptability to changing requirements, has become a major approach in modern software development. In contrast, the Waterfall methodology, which is more structured and linear, remains in use for projects requiring systematic and stable approaches. Both methods have distinct advantages and limitations that can affect the final outcome of software projects.

This study focuses on the development of a cooking oil distribution application, which faces significant challenges when employing the Waterfall methodology. Its rigid and sequential nature often struggles to accommodate dynamic changes in customer needs and government regulations, leading to delays in feature releases and reduced operational efficiency. Key issues include difficulties in adjusting application features, complex stakeholder communication, delays in new feature deployment, and resistance to new technologies. These challenges highlight the urgent need for a more adaptive and responsive development approach.

The objective of this study is to develop a cooking oil distribution application that is more efficient and responsive to market demands through the implementation of Agile Scrum. This methodology was chosen for its ability to enhance flexibility, efficiency, and collaboration in software development. The study explores and compares the effectiveness of Agile and Waterfall methodologies and provides practical guidance for practitioners in selecting the most suitable methodology for their project characteristics.

Previous studies have addressed various aspects of Agile and Waterfall methodologies. Pargaonkar (2023) offers a comprehensive analysis of the advantages and disadvantages of both models in software quality engineering and their applicability to different scenarios [1]. Amarta and Anugrah (2021) conducted a case study on implementing Agile Scrum using Trello as a project management tool, demonstrating effective Agile application in specific contexts [2]. Aboalghanama and Awad (2023) examined the impact of Agile strategies on retail supply chain performance, highlighting Agile's role in enhancing responsiveness and customer relations [3]. Hasugian and Rahayu (2018) analyzed information system requirements for the protection of Indonesian migrant workers, providing insights into Agile applications in social contexts [4]. Additionally, Irawan, Triayudi, and Iskandar (2023) discussed Agile implementation in Point-of-Sale systems, adding perspectives on Agile in trade systems [5].

The primary contribution of this study is to provide an in-depth understanding of how Agile and Waterfall methodologies can be applied in various software projects, particularly in the context of cooking oil distribution applications. The research offers practical guidance for developers and project managers in selecting and applying methodologies that best fit their project requirements. Limitations include the scale of research and project variability, which may affect generalizability. Continuous training and skill development, as well as challenges in applying these methodologies in large-scale projects or integrating them with other methods, are also noted.

This study differentiates itself by employing a holistic approach to compare Agile and Waterfall, with a focus on Agile Scrum application in cooking oil distribution. It links theory with practice, provides practical guidance, and reinforces Agile's position in modern software development while acknowledging the relevance of Waterfall for structured contexts. Novelty lies in the detailed, applied analysis helping practitioners select the most effective methodology for their projects. This research offers new insights on Agile Scrum's effectiveness in addressing industry-specific challenges and its potential broader application in software development.

II. RESEARCH METHODOLOGY

This research is designed to provide a systematic guide for identifying problems and applying Agile Scrum in developing a cooking oil distribution application. The research follows a qualitative approach with several main stages, visualized in the flowchart shown in Figure 1. The flowchart illustrates the research steps from problem identification to Agile Scrum-based solution implementation.

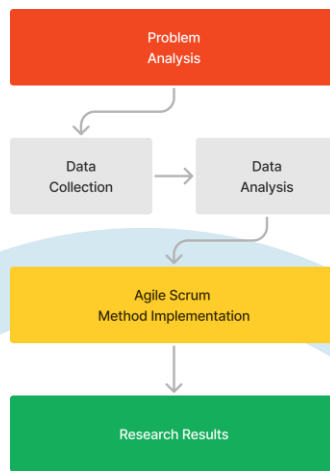


Figure 1. Research Framework Flowchart

The study begins with problem analysis to identify key issues in application development, including dynamic requirement changes, complex stakeholder communication, delays in feature releases, and resistance to new technologies. The outcomes of this analysis form the foundation for subsequent research stages.

Following problem analysis, data collection is conducted through literature review, interviews, and observations. The literature review explores fundamental theories and best practices in Agile methodology and Scrum framework, referencing books, scholarly articles, journals, and related publications. Interviews with business owners gather information about current development challenges, needs, and potential Agile Scrum benefits. Direct observation is carried out to understand ongoing operational workflows, including monitoring distribution activities, current application usage, and team interactions in software development projects.

Collected data are analyzed to evaluate patterns, challenges, roles, responsibilities, and needs in applying Agile Scrum. Interview and observation data inform team workflow patterns, RACI (Responsible, Accountable, Consulted, Informed) metrics, and the design of an efficient application workflow.

The analysis results guide solution design to improve operational efficiency and application adaptability. Design phases use relevant tools and techniques aligned with Agile Scrum principles. Application development then implements the designed solutions, followed by testing to ensure functionality meets expectations. Testing includes Gray Testing for system performance and stability and User Acceptance Testing (UAT) for end-user validation. Agile Scrum implementation proceeds iteratively, allowing continuous adjustment based on user feedback and evolving requirements.

III. RESULTS AND DISCUSSION

This chapter presents the results and analysis of implementing Agile Scrum in developing the cooking oil distribution application. The discussion focuses on key stages of the project, including User Stories, Product Backlog, Sprint Planning, Implementation, Daily Scrum, Sprint Review, Retrospective, and release evaluation. The aim is to understand how Agile Scrum elements contribute to project objectives, enhance user experience, and ensure efficient business operations.

User Stories were collected through interviews with end users, logistics personnel, and warehouse managers. These stories captured essential needs such as order tracking, integration with logistics systems for timely delivery, transaction management, and reporting. A key User Story was the requirement for a dashboard summarizing transactions, invoices, deliveries, and receivables, to allow users to monitor business activities effectively.

The Product Backlog was created based on the collected User Stories and stakeholder priorities, ensuring that high-value features were implemented first. Sprint Planning sessions involved selecting backlog items, estimating work using the Sprint Burndown Chart, and preparing a clear plan to achieve sprint goals. Implementation included designing mockups with Figma, developing features using ReactJS, Kotlin, and Golang, deploying the application on Google Cloud, and conducting Gray Testing and User Acceptance Testing.

Sprint Burndown Chart																							
Features	Estimate (Point)	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	
Dashboard	5																		1	1	1	1	1
Customer Features	5	1	1	1	1	1																	
Product Features	5	1	1	1	1	1																	
Order Features	13	1		1	1	1	1	1	1	1	1	1	1	1	1								
Shipping Features	13	1			1	1	3	-3	1	1	1	1	1	1	1	2	2	1					
Warehouse Features	13	1	1					1	1	1	1	1	1	2	-1	2							
Billing Feature	13	1									1	3	3	1	1	1	1	1					
Payment Feature	8	1													1	1	1	1	1	1	1	1	
Reports	5	1																	1	1	1	1	1
Remaining Effort	80	72	69	66	62	57	52	53	50	47	43	37	31	26	25	19	15	11	8	5	2	0	
Ideal Trend	80	76	72	69	65	61	57	53	50	46	42	38	34	30	27	23	19	15	11	8	4	0	

Figure 2. Sprint Burndown Chart for Daily Progress

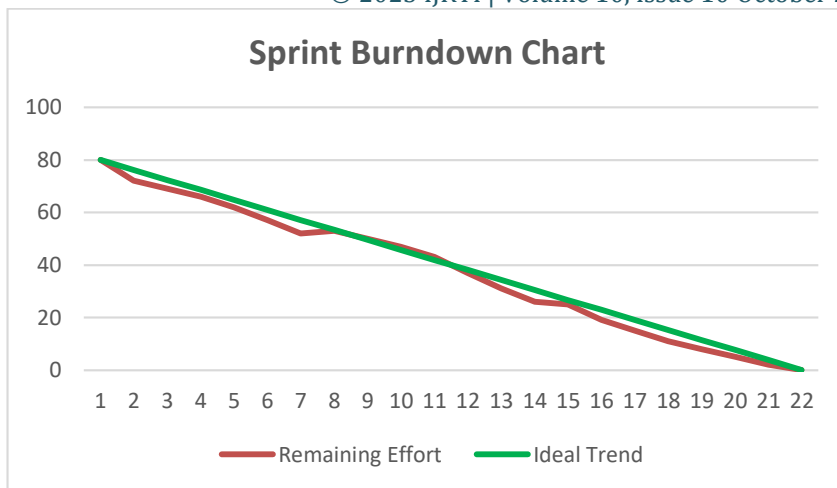


Figure 3. Burndown Graph for Task Evaluation in Sprint

Daily Scrum meetings ensured team alignment, while Sprint Review allowed stakeholders to provide feedback on completed features. Sprint Retrospective evaluated what worked well, what did not, and areas for improvement. The results of a Sprint Retrospective are summarized in the table below, which highlights improvement actions, responsible parties, and target completion times.

Table 1. Sprint Retrospective Evaluation Results

Aspect	Description	Improvement Actions	Responsible Party	Target Completion
What Went Well	<ul style="list-style-type: none"> Effective team communication Features completed on schedule 	<ul style="list-style-type: none"> Continue daily communication practices Maintain strict timeline 	Development Team	1 week
What Did Not Go Well	<ul style="list-style-type: none"> QA process not detailed enough Incomplete feature documentation 	<ul style="list-style-type: none"> Improve QA process with a more detailed checklist 	QA Team & Scrum Master	2 weeks
What Can Be Improved	<ul style="list-style-type: none"> Difficulty in API integration 	<ul style="list-style-type: none"> Plan API training sessions 	Scrum Master	1 week

Finally, the workflow of the application was designed to support end-to-end operations from purchase order creation to delivery confirmation and reporting. Iterative releases ensured timely updates and responsiveness to user needs. These stages collectively demonstrated the effectiveness of Agile Scrum in delivering a functional, user-centered, and reliable distribution application.

IV. CONCLUSION

This study evaluated the implementation of the Agile Scrum methodology in the development of a cooking oil distribution application and demonstrated that this approach significantly improves the efficiency and responsiveness of the development team compared to the previously used Waterfall methodology. Agile Scrum, known for its iterative and incremental approach, enables the team to quickly adapt to changing market demands and dynamic regulations. Through regular sprint cycles, the team can continuously assess and adjust their priorities and deliverables. This approach facilitates better communication and collaboration among team members, accelerates the release of new features, and contributes to increased business value and resource productivity.

In the Agile Scrum process, each sprint begins with planning that involves defining the product backlog and task priorities, followed by development and review of the completed work. These sprints allow the team to provide rapid feedback and make necessary adjustments to address new changes or challenges. This leads to improved risk management and proactive issue resolution. Intensive communication within Agile Scrum also helps clarify expectations and reduce potential miscommunication, thereby enhancing team efficiency.

However, this study also identified several limitations. Key limitations include the need for continuous training for team members and challenges in implementing Agile Scrum in large-scale projects or in contexts requiring integration with other methodologies. Continuous training and skill development are crucial to ensure that the team can fully leverage the potential of Agile Scrum. These limitations highlight the need for mitigation strategies to maximize the benefits of this methodology.

Overall, this study confirms that Agile Scrum is a highly effective methodology for enhancing flexibility and responsiveness in the development of a cooking oil distribution application. The method provides an adaptive and collaborative approach that allows teams to address challenges and changes more efficiently.

By offering a solid foundation for broader application in various software development contexts, Agile Scrum enables teams to continually innovate and respond swiftly to market needs.

REFERENCES

- [1] S. Pargaonkar, "A comprehensive research analysis of software development life cycle (SDLC) Agile & Waterfall model advantages, disadvantages, and application suitability in software quality engineering," *Int. J. Sci. Res. Publ.*, vol. 13, no. 8, Aug. 2023. ISSN 2250-3153.

- [2] A. F. Amarta and I. G. Anugrah, "Implementation of Agile Scrum using Trello as project management at PT Andromedia," *Jurnal Nasional Komputasi dan Teknologi Informasi*, vol. 4, no. 6, Dec. 2021. P-ISSN 2620-8342, E-ISSN 2621-3052.
- [3] K. M. Aboalghanama and H. A. Awad, "The impact of agile strategy on supply chain performance: The mediating role of supply chain practices and customer relationships in the retail sector in Jordan," *Uncertain Supply Chain Manag.*, vol. 11, pp. 1627–1634, 2023. <https://doi.org/10.5267/j.uscm.2023.7.006>
- [4] L. P. Hasugian and T. M. Rahayu, "Requirement analysis of monitoring information system for Indonesian migrant workers protection," in *Proc. Int. Conf. Informatics, Eng., Sci. and Technol. (INCITEST)*, Bandung, 2018. [Online]. Available: <https://iopscience.iop.org/article/10.1088/1757-899X/407/1/012150>
- [5] A. L. Irawan, A. Triayudi, and A. Iskandar, "Implementation of point-of-sales system using Agile development method," *Klik: Jurnal Ilmiah Sistem Informasi*, vol. 3, no. 6, pp. 1326–1333, Jun. 2023. <https://djournals.com/klik> , DOI: 10.30865/klik.v3i6.940

