Scrum Triumphs Over Waterfall: A Case Study of Agile Success in the "Let's Shop" Software Project

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***Abstract*— This essay compares a traditional software process model to an agile methodology, particularly Water and Scrum, through the insights of the "Let's Shop" project, an e-commerce web application. The analysis seeks to comprehend the practical implications of choosing between the two given software development methodologies. Ultimately, the development team and stakeholders agreed that agile approaches are more effective in projects and add value quickly than traditional waterfall techniques.**

***Index terms*—Project management, Agile, Scrum, Waterfall**

I. Introduction

"Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" [1]. The rapid development of technology and stakeholder expectations require flexible software development approaches for their projects. The decision between traditional methodologies and agile frameworks plays a pivotal role that can profoundly influence the project. outcomes. Through thoroughly examining Let's Shop's context, problem statements, and outcomes, the aim is to assess suitability for projects with similar scope and scale. The study analyses how each method interacted with the project's dynamic requirements, adaptability, stakeholder involvement, development pace, and delivery.

II. Background

There is an increasing need for a localised online platform that serves the electronics sector in Hanoi, the capital city recognized for its lively commerce and crowded markets. Let's Shop is an e-commerce website dedicated to this demand. The primary objective of this project is to develop a user-friendly interface for the online store, expanding the reach of the existing physical store in Hanoi. Specifications include Admin and Customer user roles, user experience, product placement, secure payment, order delivery, data analytics, ratings, and reviews. Managing inventory, international shipping, and the mobile version of the app are out of the scope of the Let's Shop project. The development team is a small group of six members, including the product owner, data engineer, frontend engineer, backend engineer, scrum master, and tester. Throughout the software development lifecycle of the project, each phase was documented with evidence and data that will be analysed in this essay.

III. Discussion

A. Definitions and characteristics

Scrum is an agile project management approach emphasising short, targeted sprints (usually 2-4 weeks) that facilitate rapid delivery and iterative improvement. Teams comprise developers who produce the product, a scrum master who facilitates processes, and a product owner who prioritizes features. While sprint planning and retrospectives direct development and adaptation, daily stand-up sessions guarantee openness. Because Scrum values adaptability, prompt feedback, and transparent communication, it is perfect for intricate projects with changing specifications. Its high pace and strict organization can be demanding, too, and to prevent burnout with polled workloads and fluctuating productivity, a committed team and constant adaptation are needed [2].

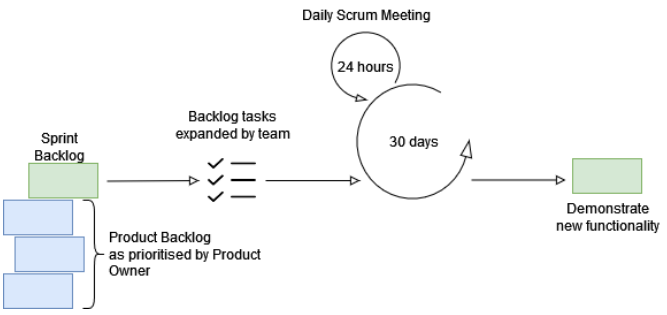

Figure 1: Scrum methodology

The Waterfall technique is a traditional approach to project management that consists of a series of steps that must be finished to proceed to the next phase, such as requirement collecting, design, development, and testing. This structure is appropriate for clearly defined projects with steady requirements since it provides unambiguous planning and control. Its rigidity, however, may not be able to adapt to changes or unforeseen problems, which could cause delays and expensive rework. In addition, incomplete phase integration and early feedback might lead to final products that are not aligned. Waterfall offers predictability, but projects that need constant modification or are dynamic may not be the best fit for their rigidity [3].

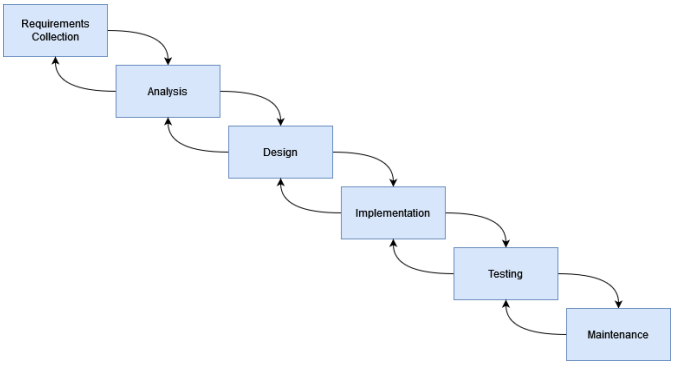

Figure 2: Waterfall model

B. Case study

At the forming stage, the "Let's Shop" project adopted the Scrum methodology as the primary software development lifecycle by our stakeholders' decision. We had 7 sprints, each taking up a 2-week interval or 10 working days. As the scale of the project is relatively small, we closely work with our stakeholders through weekly meetings for project refinement and quality approval. As the project requirements changed due to new information or expectations from the stakeholders within the reasonable scope, we needed a project management approach that allowed flexibility and adjustments. There were 6 members in the development team with minimal prior knowledge of software development lifecycles. Therefore, continuous learning, research, and open communication are instrumental to the project's successful outcome.

C. Methodology

The researcher analysed the initial project requirements of the stakeholders and collected the primary data for this essay. Data acquiring means include surveys, interviews, testing, and team documentation during the development phase and reflection. The pros of collecting these primary data are that the researcher has full authority of data analysing techniques, charts, and graphs design to give fellow readers and the development team new insights on how the choice of agile and scrum over a traditional model like waterfall was correct. Data-based research also eliminates any matter of personal biases. The cons of this method is that data acquisition can be time-consuming. Therefore, the source is not always real-time, especially when the case study is complicated, and it is impossible to acquire preliminary data.

D. Requirement analysis and survey results

1) *Requirement analysis:*

Scrum was chosen for the "Let's Shop" project after carefully analysing how well it fits the project's particular characteristics, which included a small team size, changing needs, and a critical focus on features. There were several strong arguments supporting this choice. First and foremost, Scrum became the preferred method because of its built-in flexibility and iterative process, which contrasted sharply with the Waterfall model's rigidity. Because of its adaptability, the team responded quickly to changing stakeholder expectations and incorporated innovative ideas into each sprint, creating a culture of responsiveness and continuous improvement [4].

Furthermore, the Scrum framework's frequent feedback loops enabled quick improvement and modification. In addition to the fast development pace, these iterative cycles of review and adaption ensured that the project stayed precisely aligned with changing stakeholder priorities and objectives. Moreover, implementing brief, targeted sprints was a tactical facilitator for prompt stakeholder involvement and value delivery. Scrum promoted stakeholder satisfaction by quickly delivering tangible functionalities and allowing for necessary error corrections by breaking the project into manageable pieces, handling each piece at a time. Stakeholder involvement in waterfall projects usually occurs early, during requirements collection and project planning. After these phases are finished, stakeholders frequently don't have many chances to provide valuable feedback until the final deliverables are created [5].

Finally, Scrum's focus on team empowerment and self-organization was crucial in helping the project team develop a drive, responsibility, and ownership culture. This culture of cooperation encouraged team members to take initiative and work toward common goals, increasing the efficiency and effectiveness of the project. Scrum's execution in the "Let's Shop" project is a convincing example of how well it works for similar projects with small, cross-functional teams, changing needs, a need for quick feedback, and a laser-like focus on essential features. Scrum's ability to adapt, its iterative development process, and its firm dedication to continuous learning come together in these situations to produce a climate conducive to long-term success and innovation [6].

2) *Survey results:*

The researcher has conducted surveys in which the respondents are the development team members. This section will provide the survey results and key takeaways.

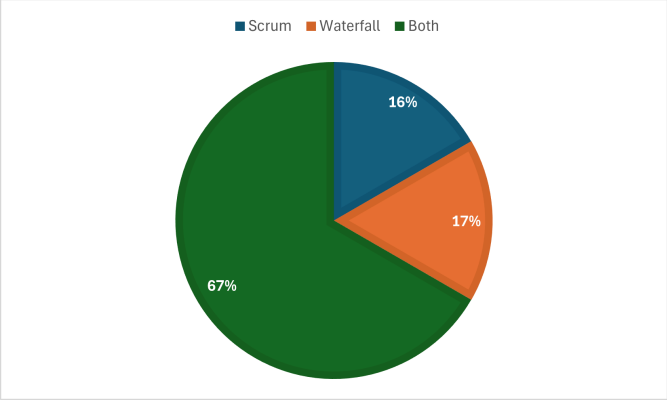

Figure 3: Knowledge of methodologies

In Figure 3, we can see that upon investigating the team's capabilities, we found that despite limited prior experience, they had taken the time to learn about project management techniques. Interestingly, a sizable percentage of the team (67%) showed knowledge of both Waterfall and Scrum processes. This result suggests that the group is flexible enough to be able to work through a variety of project requirements. Having Scrum knowledge, in particular, demonstrates their ability to adapt quickly to changes by taking advantage of the methodology's built-in flexibility.

Furthermore, the team's extent of knowledge in both approaches offers excellent chances for cooperation and knowledge sharing. This diversity promotes a dynamic learning environment where participants may effectively confront obstacles by building on each other's strengths. It also allows for the cooperation of ideas and best practices. Overall, the team's expertise in project management approaches highlights their potential for ongoing innovation and improvement through collaborative learning and their capacity to manage various project types.

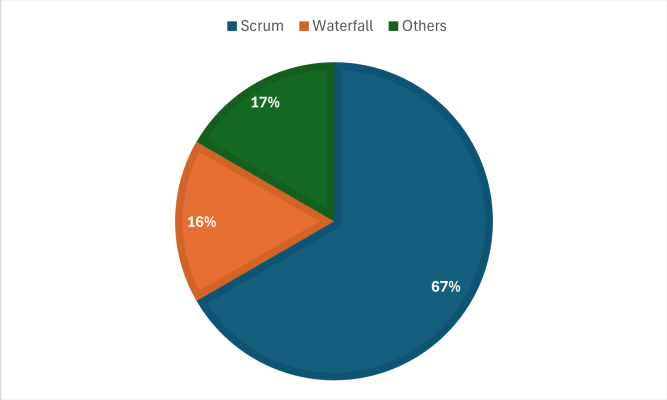

Figure 4: Implementation strategies

In Figure 4, the provided data reveals a clear preference within our team for Scrum as the project management methodology, with 2/3 of the team advocating for it, compared to 16% for Waterfall and 17% for others. The overwhelming support for Scrum suggests a belief in its suitability for the project. This might be due to several factors. Scrum's iterative nature aligns well with projects of unknown or evolving scope, allowing flexibility and adaptation. Additionally, its focus on collaboration and self-organization could appeal to a team of diverse skill sets and preferences.

The significantly smaller 16% supporting Waterfall indicates a less favourable view of its rigid, linear approach. This could be because the project demands a more dynamic and responsive methodology, something Scrum readily offers. The 17% advocating for "others" highlights that not everyone is entirely convinced by either Scrum or Waterfall. Exploring the methodologies and reasons behind their preference could reveal valuable insights into potential concerns or areas Waterfall addresses.

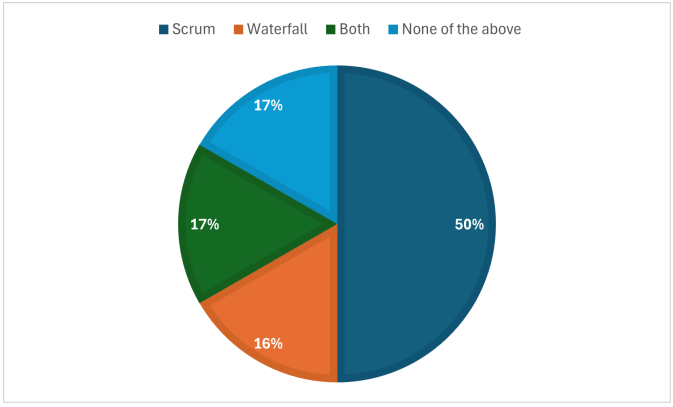

Figure 5: Meeting business requirements and customer satisfaction

In Figure 5, we can draw insights that when asked to vote for the project management framework that is most likely to meet the business requirements of the Let's Shop project and fulfil customer satisfaction, 50% of respondents advocated for Scrum and 17% advocated for both Scrum and Waterfall. Waterfall demonstrated that the team believed it could meet customer and business needs. Because Scrum is an iterative process, it facilitates constant feedback and adaptation, allowing the product to change in response to customer and market demands. This aligns with meeting business requirements and ensuring customer satisfaction through data-driven decisions and sprint-by-sprint course changes.

Although 17% of participants preferred a blend of Scrum and Waterfall, demonstrating an appreciation of the advantages of both approaches, Waterfall received less support (16%), which may indicate limitations in meeting

the competing goals of meeting business requirements and satisfying customers. The rigorous, sequential process of Waterfall may make it more difficult for the team to adapt quickly to changes in the market and client preferences. Its lack of adaptability may make adjusting to changing conditions difficult, which could jeopardize the project's success.

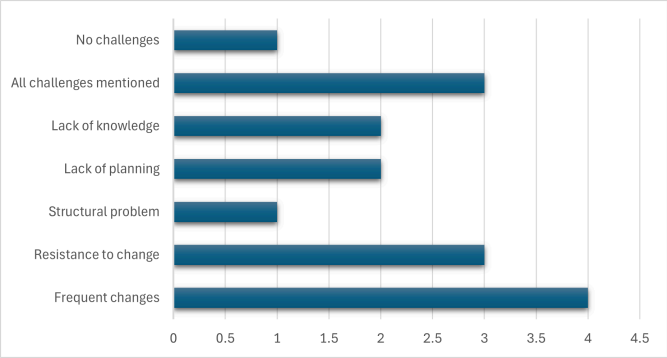

Figure 6: Challenges faced

In Figure 6, the respondents were asked to identify their challenges when approaching software project management with Scrum as their first framework. While applying Scrum, the most significant challenge was the frequent changes. The second biggest challenge was resistance to change, which also falls under the same category as the first. This fundamental knowledge shows that the team's adaptation to changes is the most important for the initial exposure of an SDLC model or migration from a traditional approach like Waterfall to Agile and Scrum.

Furthermore, since the research's primary objective required comparing the two project techniques, 67% of respondents believed the Scrum methodology was more effective at completing projects than the waterfall methodology. 84% of the respondents said the Scrum method contributed to real project improvements. 84% of them stated that they plan to keep adopting the Scrum approach for project management after considering its advantages. Additionally, of the pool of participants in this study, over 67% said they would advocate for mid-size and big businesses to adopt Scrum and Agile.

According to the "Let's Shop" project analysis, Scrum was the ideal choice because it fits its core values and has a lot of team support. Its adaptability, iterative process, and emphasis on stakeholder involvement helped it to produce value, adapt to changes, and promote a collaborative environment. Although there were difficulties, such as adjusting to frequent changes, the team's expertise and commitment indicate they can overcome them. Additional investigation into the preferences of "others" and ongoing education can refine the strategy for even higher success.

IV. Conclusion

The "Let's Shop" project analysis provides compelling evidence for selecting Scrum as the project management approach. This choice is in line with the particular requirements of the project, which include its small, flexible team, changing requirements, and emphasis on essential features. Such projects benefit from Scrum's natural flexibility, iterative development, and focus on continual learning.

The survey results further support this decision. Despite their lack of prior expertise, the team's solid understanding of both Scrum and Waterfall highlights their adaptability and potential for collaboration. Furthermore, the team's resounding endorsement of Scrum indicates confidence in its applicability.

Nonetheless, the difficulties encountered throughout implementation, especially adjusting to frequent changes, highlight the significance of ongoing education and team support. Examining the "others" group and the justification for their choice may yield insightful information for future development.

The "Let's Shop" project is an excellent example of how Scrum works well for projects with comparable needs. The team's ability to learn and adapt continuously and having the appropriate support network will be essential to their success in the future. The information acquired gives them important insights for maximizing their strategy and guaranteeing the project's long-term success as they traverse the opportunities and difficulties that lie ahead.

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