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Research Systematic Narrative Literature Review Artifact Analysis of the Application of Agile Scrum Method in the Development of Web-based Information Systems

Eko Siswo Adi Sahputra
Politeknik Siber Cerdika International, Cirebon
*e-mail: eko_siswo@polteksci.ac.id
*Correspondence: eko_siswo@polteksci.ac.id

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ABSTRACT

Using the Narrative Literature Review (NLR) method, this study aims to evaluate the suitability of the application of the Scrum framework in software development with predetermined rules. The research focuses on Scrum artifacts, namely Product Backlog, Sprint Backlog, and Product Increment. The research data was obtained from journals in Google Scholar that are relevant to the implementation of Agile Scrum in software development. The results of this research are expected to provide a better understanding of the criteria and rules that must be met in order for a framework to be considered a Scrum framework. This research will specifically examine the suitability of artifacts in implementation with applicable Scrum rules. Based on a review of 10 literature journals, the main focus is on artifacts. Most implementations of the Product Backlog do not include tasks in the backlog and are not sorted by highest priority to lowest. In the Sprint Backlog the status of the list of tasks in progress is not displayed in the backlog sprint, there is no ownership of the task, and in the Product Increment, tasks that have been completed at the end of the sprint and unfinished tasks that will be continued in the next sprint cannot be displayed. Sprint goals are also not displayed on the Sprint Backlog, so in the end it is not possible to measure the agility of Agile Scrum.

INTRODUCTION

Technology and information systems are inseparable. Information systems are a way to collect, enter, process, store, manage, and report information in an organized manner, so that companies and organizations can achieve predetermined goals (Firdaus, 2017). In building applications, especially web-based ones, the right software development methodology is needed. One of the methodologies that is widely used today is Agile. Unlike the Waterfall model, which follows a linear sequence of steps, Agile emphasizes collaboration and flexibility within the development team and the organization. Among the various frameworks under Agile, Scrum stands out as the most widely adopted, particularly in America, where its usage is reported to be 58% (Firdaus, 2017).

The Agile methodology is recognized for its effectiveness and speed in software development. While it allows for efficient modularity, it lacks explicit guidance for developing specific types of models. Agile was designed to address the limitations often encountered in traditional software development methods. Various Agile approaches, including Scrum, Extreme Programming (XP), and Kanban, promote close collaboration between customers and developers, encouraging teams to work autonomously and adaptively to meet project needs (Musfiza & Janata, 2024). Scrum, in particular, is a framework within Agile that focuses on delivering new features every 2-4 weeks. It is a crucial approach that outlines principles and values to guide teams in producing high-quality software efficiently. As a result, Scrum is recognized as a popular method among software development teams, especially in response to the demands of rapidly changing and dynamic markets (Musfiza & Janata, 2024).

The three pillars that underpin any implementation of the empirical control process are: transparency, inspection and adaptation. 1) Transparency: A significant aspect of a process that can be seen by everyone responsible for its impact. 2) Inspection: Scrum users should frequently inspect Scrum artifacts and progress towards the sprint goal in order to detect any unexpected variances in results. The inspection process is expected to be carried out not too often because it will hinder the work. 3) Adaptation: If there is a deviation in the process that causes the product to be unacceptable, then the process must be changed as soon as possible to minimize further deviations (Warkim et al., 2020).

It is called Scrum because it has 3 Roles, namely Product Owner, Scrum Master, Developer Team, 4 Events, namely Sprin Planning, Daily Sprint, Sprint Review, Sprint Retrospective and 3 Artefacts, namely Product Backlog, Sprint Backlog, Product Increment. This study uses the systematic literature review method to analyze the application of Agile methods in various fields. The study included 10 papers published from 2014 to 2024.

This research was made to check 10 scientific papers in the form of journals, from the journal will be checked the application of Agile scrum in the development of information system applications, the author only focuses on scrum artifacts, then check whether all of these journals are suitable or not in the implementation of the scrum framework, artifacts in the form of Product Backlog, Sprint Backlog and product Increment if these three things are incomplete then The implementation method does not fall into the category of Scrum methods.

RESEARCH METHOD

This study uses the Narrative Literature Review Compare technique. Literature review is one of the most popular searches carried out when making theses, dissertations, and other publications. This study utilizes the study of scientific articles, aims to criticize which parts of some of the journals are incomplete in presenting Scrum implementations that are not in accordance with the Scrum norms that occur, will be analyzed in order, which steps are appropriate or inappropriate in implementing Agile Scrum, including effective scrum software to use, the purpose of this literature review is to expand the researcher's understanding of research problems, to the method used. Researchers may choose to reproduce, repeat or criticize certain research. This research has several steps in collecting data. The first step is to search and download 20 articles. Researchers use Google Scholar to do this. The second step is to choose an article that fits the research problem.

Researchers search and read many articles, but only choose those that match the research topic. These articles are then created in the form of tables, summaries, and images that show the relationships between variables. The results of the study are in Table 1. After that, the researcher will compare and look for similarities from each article. And the last is the drawing of conclusions, in this method the researcher collects 10 scientific articles as a source of data, these scientific articles were published in the last 10 years between (2014-2024).

RESULTS AND DISCUSSION

This study analyzes 10 scientific articles as research material, which contains topics related to the implementation of Agile Scrum in the software development process

Research 1: Research Title: Implementation of Scrum in Project Management Development of Development Monitoring and Evaluation System (SMEP) application (Firdaus, 2017). Some things related to the research: 1. The product backlog that has been sorted by the highest priority is placed at the earliest number and sorted in order from high to low, 2. In the Sprint Backlog is not displayed, the goals, tasks and ownership tasks of each sprint, and do not display the number of existing sprints

Research 2: Research title of Agile Scrum Implementation in the Development Process of MBKM Monitoring Application at UNIKAMA (Santoso et al., 2022), Some things related to the research 1. The Product Backlog is displayed clearly in order of priority, 2. Scrum Events in the form of Sprint Planning are held according to the applicable scrum rules,, 4. The Sprint Backlog is displayed along with the tasks but not complete with the ownership, 5. The Daily Sprint schedule is carried out according to the applicable scrum rules, 6. Sprint Review complete with explanation and implementation, 7. Sprint retrospective is recorded in the implementation of the Scrum 8 event, the Burndown Chart is a graph of the project's work from time to time

Research 3: Research title: Implementation of Agile Scrum using Trello As project management at PT Andromeda (Amarta & Anugrah, 2021). This research was conducted by: Afrisco Ardytia Febrian Amarta, Indra Gita Anugrah, 1. Sorting the Product Backlog based on the highest Priority order, still in accordance with the Scrum rules, 2. Sprint Backlog, in each task there is no ownership of the task, 3. Sprint Review and Sprint Retrospective are held 4. Product Increment is not displayed so you can't see which tasks have been done or not.

Research 4: Research Title, Application of Agile Scrum Method on Web-based E-Posyandu System (Christine et al., 2024), This research was written by: Natalie Edrina, Bayu Priyatna, April Lia Hananto, Shofa Shofia Hilabi, 1. does not display the Product Backlog and the following list tasks with the highest task priority, 2. Sprint Backlog does not display the following List Tasks with their ownership, 3. does not enforce Sprint Planning, daily scrum, Sprint Review and Sprint Retrospective events, only focuses on the development of the system, not focused on system development methods related to Scrum methods

Research 5: Research Title, Application of Scrum in the design of Indonesian Student Housing Information System (Widyastuti et al., 2024), This research was conducted by Reni Widyastuti, Tri Hartati, Budi Supriyadi, several things related to this research, 1. Product Backlog in the list in order of highest priority, 2.Sprint backlog displays a list of tasks that are being worked on in a running sprint, but does not have ownership and each task has no ownership, 3.Sprint review, product increment and retrospective sprint steps are not held, not in accordance with the applicable rules in Scrum

Research 6: Research Title, Application of Agile scrum in the development of online guidance applications for Student Thesis (Dewi & Irham, 2021), there are several things in this study, 1. Lack of artifacts in the form of Product Backlog, Sprint backlog and Product Increment, 2. Not enforcing scrum events in the form of Sprint Planning, daily Sprints and sprint reviews and Retrospective sprints, 3, not explaining roles such as Scrum master, product owner and developer team

Research 7: Title of Research, Application of Agile Scrum Method in SiSIAM4 design several things related to the research (Nadhira et al., 2022), 1. Not explaining and describing the application of Scrum, 1. Absence of Artefacts in the form of Product backlog, Sprint Backlog, Product Increment, 2. The explanation of Roles, Scrum Master, Product Owner and Developer team is incomplete, 3. Scrum events in the form of Sprint Planning, Daily Sprint, Sprint Review and Sprint Retrospectiver are not enforced.

Research 8: Title of this research, Application of Agile Scrum method in the creation of a website for the sale of basic necessities in Erwin stores (Nurlies et al., 2024), several things related to this research, 1. On the Scrum Product Backlog, Sprint Backlog, Product Increment artefacts are not displayed, 2. Scrum Sprint Planning, daily Sprint, Sprint Review, Sprint Retrospective events are not held 3. Roles scrum Master, Product owner and developer team name is not mentioned

Research 9: Research title, Application of Agile Scrum method in the design of MBKM-REPORT mobile application at Universitas Putra Indonesia YPTK Padang (Warkim et al., 2020), several things related to the research, 1.Artefact in the form of Product Backlog, explained in order of priority, complete Sprint Backlog task list without ownership, Product Increment not displayed, 2. Event Scrum, Sprint Planning, daily sprint, Sprint review, Sprint retrospective are not shown evidence of implementation, 3. Scrum Product Owner, Scrum Master, Team Developer roles are not displayed

Research 10: Research Title, Application of the Scrum Method in the development of Regional Service Information Systems (Santoso et al., 2022), several things related to the research, 1. The Artefact Product Backlog cannot explain in detail the high- and low-priority Tasks, the Sprint backlog does not display Tasks and ownership, the Product Increment at the end of the sprint is also not displayed, between completed tasks and unfinished tasks, 2. Scrum events are not held, 3. Roles in Scrum are not displayed

Based on an analysis of 10 research articles on the implementation of Agile Scrum in software development based on artefact analysis, it was found that:

1. **Product Backlog:** As a mechanism for dividing work into small tasks and measuring the duration of project completion, Product Backlog is not applied consistently in most of the journals studied.
2. **Sprint Backlog:** The Sprint Backlog, which monitors tasks worked on during a sprint, is also not displayed. This results in difficulties in determining the priorities and objectives of the sprint.
3. **Product Increment:** Information about successful and uncompleted tasks during the sprint, which should have been listed in the Product Increment, was also not found. As a result, the success rate of task completion in a sprint cannot be evaluated.

Disadvantages: The incompleteness of these three Scrum artifacts indicates that the applied method cannot be fully considered as a true Scrum method, causing the unreliability of the applicable framework. This is due to the lack of fulfillment of the rules underlying the Scrum framework.

The advantage most implementation research journals prioritize the Waterfall framework in

terms of system development, because the system built does not require a large cost because it does not require Scrum master roles, Product Owner, and developer team only need to be developed by 1 or 2 people

Based on a search of 10 related journals, for a system that is small and does not require a lot of resources, it is enough to use the Waterfall method or the Agile Kanban method. Therefore, the title of this study should not be the implementation of Agile in application development but rather the implementation of hybrid methods, namely Agile and waterfall, a systematic method of waterfall while Agile works with a small task task with short Sprints.

CONCLUSION

After conducting an in-depth study of almost 10 related studies not complementing the scrum artefacts according to the rules of the scrum framework, the scrum framework has three main components: the artifact (the product produced), the event (the meeting or activity), and the role (individual responsibility in the team). These three components must exist and function properly for a project to be said to use the Scrum framework well. Scrum is perfect for large, complex projects that involve many people. However, for small projects that are not too complicated, the Waterfall method may be better because it is simpler and does not require a large team whereas for the process, whereas. The author concluded that most of the search results of 10 journals, for implementations applied using hybrid methods, namely Agile and Waterfall, a combination of Agile that is done in a short time with small tasks while waterfall is known to be systematic.

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